Volume 3 – Technical Appendices

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

ERM

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1 TEAM PROFILE

This EIA Report has been compiled by Environmental Resources Management Ltd (ERM), on behalf of the Applicant (Ladyfield Renewable Energy Park Ltd.), supported by sub-consultants on certain specialist assessment chapters. For each topic, the detailed assessment of likely significant effects has been undertaken by organisations with relevant specialist skills, drawing on their qualifications, experience of working on other development projects, good practice in EIA and on relevant published information. Profiles of the project team are provided in Table 1.1.

Table 1.1: EIA Project Team Profiles

EIA Chapter Number	Title	Organisation Responsible	Author Profile
1	Introduction	ERM	Kenneth Reid has a BSc Environmental Science from the University of Plymouth, a PGC Project Management from the University of Strathclyde, and 14 years' experience in the renewable energy and electricity industries. He has a proven track record in the development and delivery of statutory consents and environmental management on windfarm, solar, battery storage and electricity transmission projects in Scotland. He has extensive experience in leading project teams through options assessment, environmental impact assessment, section 36 and section 37 consents, town & country planning permission, other statutory environmental consents, and consents/environmental supervision during construction.
2	Development Description	ERM	Kenneth Reid – See above
3	Site Selection and Design	ERM	Kenneth Reid – See above
4	Planning Policy	ERM	Rachael Lyall has a BSc in Construction Management from Robert Gordon University and a MSc in Environmental Management from Glasgow Caledonian University. With over 4 years' experience in Planning, Economic Development and Regeneration, Rachael can effectively assist with the understanding of the planning process for various renewable energy projects such as onshore wind, solar and battery storage. Rachael's experience can aid all stages of the planning process including pre-application consultation and preparation; submission of applications; pre-determination consultation management and post-consent conditions. Rachel Taylor has 20 years' experience in managing major planning applications and leading on environmental impact assessments (EIA), applications for marine licences, environmental permits and consents. Rachel has extensive knowledge in all aspects of regulatory and consenting regimes across the UK including Town and Country Planning as well as Development

EIA Chapter Number	Title	Organisation Responsible	Author Profile
			Consent Orders. Rachel has a proven industry track record of taking major schemes from feasibility through to full consent and construction for a variety of applications including; marine, highways, regeneration, residential and coastal defence projects. She has established excellent working relationships with high profile key stakeholders including the Marine Management Organisation, Environment Agency, Ministry of Defence, Natural England, Natural Resources Wales, Nature Scot, and Local Authorities across the UK. Rachel has a comprehensive, first-hand understanding of their statutory roles and responsibilities. This insight enables her to secure the best outcomes for clients, local communities and the environment.
5	EIA Methodology	ERM	Kenneth Reid – See above
6	Landscape and Visual Impact Assessment (LVIA)	OPEN	Jo Phillips is a Chartered Member of the Landscape Institute and an Associate Director of Optimised Environments Limited (OPEN part of SLR). Jo is an experienced landscape architect and urban designer, the past twenty-seven years having been spent covering a wide range of environmental projects, including Landscape and Visual Assessments, Townscape Assessments, Urban Regeneration and Masterplanning. Jo has acted as project manager for over 20 onshore wind farm projects, across Scotland and other parts of the UK. Jo's involvement has included undertaking scoping reports, carrying out field work and photography, liaising with statutory consultees, organising materials for and attending public exhibitions, writing Landscape and Visual Impact Assessments (LVIAs) and managing the delivery of all inputs into the EIA process.
7	Ornithology	MacArthur Green	Rafe Dewar has 18 years of ornithology and ecology experience in the consultancy sector and has been the lead author of various high profile EIA Reports, Habitats Regulations Appraisals, technical reports and Habitat Management Plans for large onshore and offshore infrastructure projects. He has managed projects through all phases from scoping to public hearings, and operational monitoring. His technical skills include ornithology and ecology surveys, collision risk modelling, population modelling, habitat management techniques and habitat loss calculations. Rafe graduated from the University of Glasgow with a BSc. (Hons.) in Zoology, and went on to gain a MSc. (Distinction) in Environmental Sustainability from the University of Edinburgh.
8	Ecology	MacArthur Green	Rafe Dewar – See Above
9	Archaeology and Cultural Heritage	ERM / Wessex Archaeology	Chris Swales (ERM) – Lead Author (Desk Based Assessment) Chris has worked in commercial archaeology for twenty years with a background in the delivery of fieldwork projects across the UK. For the past 8 years Chris has worked as a Project Manager, tendering for fieldwork projects across the renewables,

EIA Chapter Number	Title	Organisation Responsible	Author Profile
			transport, utilities and housing sectors, with works ranging from small scale watching briefs through to multi hectare excavations, managing delivery of fieldwork and through to the delivery of grey literature reports and publications. Specialisms include project management; preparation of Cultural heritage inputs of EIA scoping reports and environmental assessments, as well as the management of large-scale schemes of archaeological fieldwork, including strategy documentation, procurement and monitoring. With a background in the delivery of fieldwork projects Chris can help clients anticipate costs and source reliable suppliers of heritage services that comply with all H&S legislation as well as national standards and guidance heritage work. Andrew Reid BSc MA (Wessex) – Lead Author (Settings and Chapter) Andrew is a Principal Heritage Consultant working for Wessex Archaeology with 13 years' experience in the Cultural heritage sector. Andrew began his career as a field archaeologist before moving into consultancy in 2013. Andrew has considerable experience in undertaking a wide range of project which including the research and production of desk-based assessments, heritage statements and carrying out Environmental Impact Assessments. Andrew has particular experience in EIA for renewables and large-scale infrastructure. Mark Turner (Wessex) - Technical Review Mark has a degree in Archaeology and Prehistory from the University of Sheffield (1990) and is a full Member of the Chartered Institute of Archaeology (MCIfA). Mark has a field archaeology background, having worked for commercial archaeological contracting units for over 10 years, and 20 years' experience in commercial heritage consultancy. He has extensive experience having worked as Cultural Heritage assessor on a range of project scales from small scale residential development to major infrastructure projects. Mark's particular expertise is in the assessment of potential effects on settings and the significance of heritage assets, and in undertaking and leading EIA work. He has considerable experience in large scale development, such as renewable energy schemes, having contributed to over 70 submitted onshore and offshore wind projects (the majority consisting of onshore renewable projects in Scotland).
10	Hydrology and Hydrogeology	ERM	Isaac Csanyi holds an MSc in Environmental Monitoring, Modelling and Reconstruction from Northumbria University, obtained in 2022. In his 4 months working for ERM, Isaac has gained key foundational experience in undertaking flood risk assessments and environmental impact assessments, forming drainage strategies, as well as preparing construction environmental management plans. He has worked on a range of wind and solar farm construction projects across England and Scotland. Nick Walker has a PhD in Hydrology with 17 years' research and consulting experience on a wide range of energy, water resource and climate resilience projects. He has worked on several EIA projects for wind energy in Scotland, which involved assessing impacts on flood risk, groundwater dependent terrestrial ecosystems, and public and private water supplies. During his post-doctoral research at the South African National Biodiversity Institute in Cape town he researched hydrological niches in fynbos, which involved hydrological monitoring and modelling water flow in the unsaturated zone of research sites. He co-

EIA Chapter Number	Title	Organisation Responsible	Author Profile
			authored the research paper "Modelling the water energy nexus: should variability in water supply impact on decision making for future energy supply options?" published in the Proceedings of the international Association of Hydrological Sciences.
11	Geology and Peat	ERM	Gregor Hirst has a BSc (Hons) in Environmental Management from Glasgow Caledonian University and 7 years of experience in the assessment of ground conditions. He routinely leads on geology, soils and peat aspects of EIA including chapter production along with associated technical appendices, such as peat management plans, peat slide risk assessments, borrow pit assessments and construction and environmental management plans. He has extensive experience in wind farm, solar farm, battery storage and electricity transmission projects in Scotland, including section 36 and section 37 consents, town & country planning permission, other statutory environmental consents and discharge of conditions. Mine Van Der Berg has a BEng (Civil Engineering) from the University of Pretoria and an MSc in Soils and Sustainability from the University of Edinburgh. She has 1.5 years' experience in working with peat management plans, peat slide risk assessments, and EIA Chapters as well as completing other soils, geology & peat assessments, and construction environmental management plans. She also has 1.5 years of experience working as a Transport Engineer. Tomos Ap Tomos joined in 2013 to establish and develop the Onshore Renewables Engineering Team. Tomos has a strong background in infrastructure design, planning and construction supervision based on previous experience in design consultancy, maintenance operations and site management. Tomos has been heavily involved in both pre and post consent phases of renewable energy projects ensuring buildability and construction risk management are a consideration from inception stage. Tomos has extensive experience in preparing contract documentation for a variety of contract forms, including FIDIC, bespoke Design and Build and NEC and has acted as both Owners Engineer and Technical Advisor under these forms of contract for several wind farm projects.
12	Noise	ERM	Michael Fraser has worked globally on Environmental Assessment projects around the world including several projects in Africa where IFC standards were required. He has experience of various projects including Oil and Gas developments, seismic exploration, pipe laying, dredging, offshore windfarms, ports and power projects. Michael is experienced in modelling using empirical and detailed noise models of underwater noise propagation, and the assessment of the effects of noise on marine fauna. He works extensively with ERM's in-house marine specialists, and internationally recognised external specialists in the field of underwater noise monitoring, prediction and assessment. Bilal Ahmed has a Diploma in Acoustics from the Institute of Acoustics (IOA) and has over eight years of experience in Acoustic Consultancy, undertaking a wide range of services including; Windfarm EIA assessment, grid and reserve power infrastructure noise assessment, noise at work assessment, demolition/ construction noise & vibration monitoring, HAVs / WBV assessment, and IPPC / BAT assessment. As an associate member of the Institute of Acoustics (AIOA), Bilal undertakes noise

EIA Chapter Number	**Title**	**Organisation Responsible**	**Author Profile**
			surveys and assessments across the UK. Bilal has experience in assessments of; industrial noise audits, Battery Storage, Gas Peaking sites etc. as well as noise impact assessments of mid to large-scale residential developments. Emily Tilbury has an MSc in Audio Acoustics from the University of Salford and has over seven years' experience in acoustic consultancy with projects ranging from environmental noise impact to building and architectural acoustics. In particular, she has worked on projects involving the assessment of impact from large scale power production such as solar farms, wind farms, and hydrogen production facilities. Her experience covers all aspects of environmental noise assessment, from scoping and consultation, through background noise surveys and modelling, to reporting, and condition discharge. Emily is a full corporate member of the Institute of Acoustics (MIOA).
13	Traffic and Transport	ERM / Pell Frishmann	Frank Ocran (ERM) – Lead Author (Chapter, TA13.2 and TA 13.3) Frank Ocran is a Principal Transport Planner with over 10 years' experience working on transport planning projects in the UK and has gained a breath of experience on a wide range of topics including development planning and management, transport appraisal, travel planning and traffic engineering. He has gained experience in the different stages of the development planning process from policy reviews, stakeholder engagement, access strategies through to detailed transport assessments and using modelling techniques to develop future ready solutions to mitigate the impact of developments for a wide range of projects including residential, retail, education, office and mixed-use developments, as well as government & local authority projects. Frank joined Arcus (now ERM) in 2020 as a Senior Transport Planner before working his way to the position of Principal Transport Planner. He has a key role in the development and management of Transport inputs on EIAR projects typically in the form of Access Appraisals, Transport Statements and Construction Traffic Management Plans and has also been project manager on engineering led projects for Solar Farms as well Battery and Energy Storage Projects. Frank has been involved in the auditing of Transport Assessments / Environmental Statements in a development control capacity where advice is given on behalf of the Scottish Government. Frank was a key project engineer managing / co-ordinating Stirling Council's Development Management function for minor developments. This includes liaising with Roads Officers/Planning officers engaging with statutory and non-statutory consultees and stakeholders in the review of a range of schemes within the Council area and also acting as the technical lead for junior members assisting in providing official responses. Callum Rodgers joined Arcus (now ERM) in November 2021 following the completion of his Bachelor's Degree in Civil Engineering (BEng). He has worked within the engineering team, gaining experience in transportation engineering whilst working on a variety of projects including wind farms and solar sites.

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			Callum's experience in traffic and transportation includes the completion of transport statements for a variety of solar and battery energy storage system sites and the production of abnormal load route assessments for onshore wind farm projects. Gordon Buchan (Pell Frishmann) – Lead Author (TA 13.1) The Abnormal Indivisible Load (AIL) Route Survey was undertaken by Gordon Buchan of Pell Frischmann. Gordon has worked on over 450 wind farm sites, over 30 solar farms, peak power plants, battery storage sites, biomass plants and grid enhancement projects across the UK, Republic of Ireland, Scandinavia and the Baltic countries. He has supported several significant renewables projects in the UK and have acted as Expert Witness on a number of Public Inquiries and NSIP hearings. Gordon has given presentations at the ICE Infrastructure Show at the NEC and at the All Energy Conference in Aberdeen on two occasions. Gordon was a finalist in the 2018 NCE 100 Alternative Energy Award category.
14	Forestry	DGA Forestry LLP	James Anderson is a partner with DGA and originally qualified as an architect. He worked in London for many years delivering complex major social housing, high end residential, master planning and urban renewal projects. The project management and designs skills utilised in such projects are transferable to the forestry and windfarm projects carried out by DGA Forestry. James is experienced in ArcGIS, MapMaker GIS, AutoCAD and a wide range of other design programmes. He has now been involved in over 30 windfarm and overhead line projects within forestry plantations, including GIS mapping; forest design planning; and contributions to numerous Environmental Statements. Having worked with DGA as a self-employed consultant over a number of years James joined DGA full time in 2012 to assist with the expanding project workload. James is the lead on DGA Forestry's GIS mapping and data analysis and is also responsible for the operation of DGA Forestry's UAV platform.
15	Land Use, Socio-Economics, Tourism & Recreation	ERM	Kirsty MacInnes has a BSC in Geography from the University of Glasgow and a MSc in Environmental Sustainability from the University of Edinburgh. She has 2 years' experience in the renewable industry delivering Environmental Impact Assessments (EIA) and Environmental and Social Impact Assessments (ESIA) across a range of renewable sectors including onshore/offshore wind, solar, CCUS and hydrogen. She has represented clients and cohesive delivery teams on the ground, engaging with a range of stakeholders including statutory and non-statutory consultees, local government, and communities. Claire Lawless is Director of Social Sustainability in the Capital Project Delivery team of ERM. Claire is an economist by background. She provides social and economic advice and stakeholder engagement across diverse projects in the energy, property, water, environment and transport sectors. Claire has provided socio-economic impact assessments in line with EIA regulations over 20 years, including for both TCPA and DCO processes. Claire also advises on social value, social and economic impact for ESG, social license to operate and to inform other decision-making purposes, such as public funding.

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			Claire has been developing the socio-economic impact assessment methodology for major projects for over 20 years and is an experienced HMT Green Book practitioner. She was part of the Environment Overview Committee determining the methodology for social, economic and community effects of HS2 as part of the Hybrid Bill. Claire is currently a member of IEMA and supported their response to the emerging EOR process, focussing on the socio-economic aspects of it. She is also working with IEMA to develop socio-economic impact guidance.
16	Climate Change and Carbon Balance	ERM	Eleanor is an Environmental Consultant based in York, UK. Having graduated with a first-class Environmental Science degree, she joined the Onshore Renewables Team at ERM in February 2021, and has since gained experience in project management, report writing and review, and GIS. Her main roles have been to project manage solar and BESS schemes, provide GIS support for various technical teams, assist Project Managers with onshore wind projects, draft and review technical reports, including Climate Change Impact Assessments, and liaise between technical teams, clients, and landowners to provide key deliverables to projects. Kulsum is a Managing Consultant based in Glasgow ERM's Climate Change team. Kulsum has a strong track record in both technical delivery and project management and specialises in GHG accounting. She has a particular focus on delivering comprehensive GHG inventories and providing support with benchmarking and decarbonisation and sustainability initiatives. Kulsum has considerable experience in numerous sectors including manufacturing and pharmaceuticals as well as across the energy sector, ranging from oil and gas to hydrogen, renewables and CCS. Kulsum has a MEng in Chemical Engineering and is currently working towards an MSc in Carbon Management. Belinda Ng holds a BA in Geography and MSc in Environmental Technology, and joined the ERM team in February 2023. She has experience working with clients to set decarbonisation targets, understand their Scope 1-3 carbon emissions, and report in alignment with TCFD. She has also conducted industry-specific benchmarks on key ESG trends. Additionally, she has experience working on EIA in Hong Kong.
17	Other Issues: Shadow Flicker, Aviation, Telecommunications, Television Reception & Utilities	ERM	James Lumsdon has an MSc Environmental Protection and Management and BSc (Hons) in Sustainable Environmental Management from the University of Edinburgh and Scottish Rural Universities College respectively. He has eight years of experience in EIA and statutory permitting for schemes including highways, flood defences, structures and renewables. This experience includes both EIA coordination as well as leading on discipline- specific assessments such as land use, outdoor access, and cumulative effects. Additionally James has experience of working on a range of ecological and structural surveys as well as desk- based assessments.

EIA Chapter Number	Title	Organisation Responsible	Author Profile
18	Cumulative Effects	ERM	Kenneth Reid – See above

Environmental Impact Assessment – Technical Appendix 3.1: Scoping Opinion

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The business of sustainability

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The Scottish Government
Energy Consents Unit

Scoping opinion on behalf of the Scottish Ministers under The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017

Ladyfield Wind Farm

Ridge Clean Energy Limited

02 March 2022

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1. Introduction

1.1 This scoping opinion is issued by the Scottish Government's Energy Consents Unit ("the ECU") on behalf of the Scottish Ministers to Ridge Clean Energy Ltd (hereafter referred to as the "Company"), a company incorporated under the Companies Acts with company number 08830217 and having its registered office at Noah's Ark Market Street, Charlbury, Chipping Norton, Oxfordshire, OX7 3PL. This is in response to a request dated 08 June 2021 for a scoping opinion under the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 in relation to the proposed Ladyfield Wind Farm ("the proposed Development"). The scoping opinion request was accompanied by a scoping report which was prepared by Arcus Consultancy Services Ltd acting as the Company's agent .

1.2 The proposed Development would be located approximately 4.7 kilometres north of Inveraray, in Argyll and Bute. It would consist of up to 22 wind turbines each with a blade tip height of up to 200m and each generating between 4-6 MW providing a maximum generating capacity in excess of 50 MW.

1.3 In addition to wind turbines there will be ancillary infrastructure including:

- A substation;
- External turbine transformers;
- Access tracks and site entrance;
- Temporary construction compound;
- Crane hardstandings;
- Borrow pit(s);
- An option for a permanent meteorological mast;
- An option for an energy storage facility.

1.4 The Company indicates the proposed Development would be decommissioned after 40 years and the site restored in accordance with the decommissioning and restoration plan.

1.5 The proposed Development is solely within the planning authority of Argyll & Bute Council.

2. Consultation

2.1 Following the scoping opinion request a list of consultees was agreed between Arcus Consultancy Services Ltd and the Energy Consents Unit. A consultation on the scoping report was undertaken by the Scottish Ministers and this commenced on the 14th of July 2021. The consultation deadline was initially 06 August 2021 but extensions were requested and granted to Nature Scotland, Historic Environment Scotland, Defence Infrastructure Organisation (MOD) and Argyll & Bute Council.

2.2 The Scottish Ministers also requested responses from their internal advisors Transport Scotland and Scottish Forestry. Standing advice from Marine Scotland Science (MSS) has been provided with requirements for Applicants to complete a checklist prior to the submission of the application for consent under section 36 of the Electricity Act 1989. All consultation responses received and the Standing Advice from MSS are attached in ANNEX A Consultation responses.

2.3 The purpose of the consultation was to obtain scoping advice from each consultee on environmental matters within their remit. Responses from consultees and advisors, including the standing advice from MSS, should be read in full for detailed requirements and for comprehensive guidance, advice and, where appropriate, templates for preparation of the Environmental Impact Assessment (EIA) report.

2.4 Unless stated to the contrary in this scoping opinion, the Scottish Ministers expect the EIA report to include **all** matters raised in responses from the consultees and advisors.

2.5 The following consultees did not submit a response:

Avich and Kilchrenan Community Council;
British Horse Society Scotland;
Cairndow Community Council;
Civil Aviation Authority – Airspace;
Furnace Community Council;
Glenorchy and Innishall Community Council;
Inveraray Community Council;
John Muir Trust;
Loch Lomond & the Trossachs National Park;
Lochgoil Community Council;
Mountaineering Scotland;
Scottish and Southern Energy Networks;
Scottish Rights of Way and Access Society (ScotWays);
Scottish Wild Land Group (SWLG);
Scottish Wildlife Trust;
Taynuilt Community Council;
Visit Scotland;
West of Scotland Archaeology Service.

2.6 With regard to those consultees who did not respond, it is assumed that they have no comment to make on the scoping report, however each may be consulted again in the event that an application for section 36 consent is submitted subsequent to this EIA scoping opinion. That will be decided following discussion between the Company and/or their Agent and the ECU.

2.7 The Scottish Ministers are satisfied that the requirements for consultation set out in Regulation 12(4) of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 have been met.

3. The Scoping Opinion

3.1 This scoping opinion has been adopted following consultation within Argyll & Bute Council, within whose area the proposed Development would be situated, NatureScot (previously "SNH"), Scottish Environment Protection Agency (SEPA) and Historic Environment Scotland (HES), all as statutory consultation bodies, and with other bodies which the Scottish Ministers consider likely to have an interest in the proposed Development by reason of their specific environmental responsibilities or local and regional competencies.

3.2 The Scottish Ministers adopt this scoping opinion having taken into account the information provided by the Company in its request dated 08 Jun 2021 in respect of the specific characteristics of the proposed Development and responses received to the consultation undertaken. In providing this scoping opinion, the Scottish Ministers have had regard to current knowledge and methods of assessment; have taken into account the specific characteristics of the proposed Development, the specific characteristics of that type of development and the environmental features likely to be affected.

3.3 A copy of this scoping opinion has been sent to Argyll & Bute Council for publication on their website. It has also been published on the Scottish Government energy consents website at www.energyconsents.scot.

3.4 The Scottish Ministers expect the EIA report which will accompany the application for the proposed Development to consider in full all consultation responses attached in Annex A.

3.5 The Scottish Ministers are satisfied with the scope of the EIA set out at Section 5 of the scoping report.

3.6 In addition to the consultation responses, the Scottish Ministers wish to provide comments with regards to the scope of the EIA report. The Company should note and address each matter:

The proposed Development

For **each** generating component of the proposed Development for which consent will be applied for, the following will be required to be assessed and fully detailed in the EIA report:

- components required for each generating station;
- the scale of the development (dimensions of the wind turbines, solar panels, battery storage etc);
- minimum and maximum export capacity of megawatts and megawatt hours of electricity for battery storage and/or solar.

Aviation – Lighting

It is recommended by the Scottish Ministers that with regards to impacts of night time aviation lighting the Company should discuss and agree with Argyll & Bute Council and NatureScot the range (in kilometres from the proposed Development) for night time assessments of the impacts of night-time aviation lighting and receptors therein to be assessed. As well as the scope, methodology, findings and recommendations of such assessments, full details of all mitigation of aviation lighting impacts subsequently identified should be provided in the EIA report.

Bird surveys

It is recommended by the Scottish Ministers that decisions on bird surveys – species, methodology, vantage points, viewsheds & duration - site specific & cumulative – should be made following discussion between the Company, NatureScot and RSPB Scotland.

Borrow Pits

Where borrow pits are proposed as a source of on-site aggregate they should be considered as part of the EIA process and included in the EIA report detailing information regarding their location, size and nature. Ultimately, it would be necessary to provide details of the proposed depth of the excavation compared to the actual topography and water table, proposed drainage and settlement traps, turf and overburden removal and storage for reinstatement, and details of the proposed restoration profile. The impact of such facilities (including dust, blasting and impact on water) should be appraised as part of the overall impact of the working. Information should cover the requirements set out in '***PAN 50: Controlling the Environmental Effects of Surface Mineral Workings'***.

Private Water Supplies

The Scottish Ministers request that the Company investigates the presence of any private water supplies which may be impacted by the proposed Development. The EIA report should include details of any supplies identified by this investigation, and if any supplies are identified, the Company should provide an assessment of the potential impacts, risks, and any mitigation which would be provided.

MSS standing advice

Please ensure that the checkilist contained in the MSS standing is adhered to with regards to the appropriate chapters of the EIA report.

Fish

MSS provide generic scoping guidelines for both onshore wind farm and overhead line development https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren) which outline how fish populations can be impacted during the construction, operation and decommissioning of a wind farm development and informs developers as to what should be considered, in relation to freshwater and diadromous fish and fisheries, during the EIA process.

In addition to identifying the main watercourses and waterbodies within and downstream of the proposed Development area, the Company should identify and consider, at this early stage, any areas of Special Areas of Conservation where fish are a qualifying feature and proposed felling operations particularly in acid sensitive areas.

Baseline Fish Surveys

The Scottish Ministers recommend that the Company discuss and agree Baseline Fish Surveys with the local District Salmon Fishery Board and Fisheries Trust.

Study area – landscape and visual

The study area in kilometres from the outer most turbines of the proposed Development should be agreed following discussion between the Company, Argyll & Bute Council, NatureScot and Loch Lomond and the Trossachs National Park.

Cumulative Landscape impact assessment

To ensure that assessments are as up-to-date as possible, Developments to be included in cumulative landscape impact assessments should be discussed and agreed by the Company and Argyll & Bute Council. Photography and visualisations submitted in the EIA report should reflect the most up-to-date cumulative position and the most up-to-date ecological and vegetation position.

Designated areas

Although the site of the proposed Development lies outwith any sites designated for their nature conservation importance, the Scottish Ministers recommend that the Company contact Loch Lomond and the Trossachs National Park, RSPB Scotland and NatureScot to discuss and agree designated sites to be included in the EIAR and the survey work and further in-depth modelling and research to be undertaken.

Wild Land Areas

The Scottish Ministers recommend that the Company discusses and agrees the assessments to be carried out in respect of the Ben Lui Wild Land Area and the Loch Etive Mountains Wild Land Area.

Viewpoints & Visualisations

It is recommended by the Scottish Ministers that the final list of viewpoints and visualisations, including those for night time assessment, should be agreed following discussion between the Company, Argyll & Bute Council and NatureScot,

Peat landslide hazard and risk assessment

The Scottish Ministers consider that where there is a demonstrable requirement for peat landslide hazard and risk assessment, the assessment should be undertaken as part of the EIA process to provide the Scottish Ministers with a clear understanding of whether the risks are acceptable and capable of being controlled by mitigation measures. ***The Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (Second Edition***), published at http://www.gov.scot/Publications/2017/04/8868, should be followed in the preparation of the EIA report, which should contain such an assessment and details of mitigation measures.

It should be noted by the Company that the Scottish Ministers engage the services of appropriate specialists to assess Peat Landslide Hazard and Risk Assessments submitted with an EIA report.

Noise Assessment

It is recommended by the Scottish Ministers that the final list of receptors in respect of noise assessment should be agreed following discussion between the Company and Argyll & Bute Council.

The noise assessment report should be formatted as per Table 6.1 of ***the IOA "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise***.

3.7 The Scottish Ministers are aware that further engagement is required between parties regarding the refinement of the design of the proposed Development regarding, among other things, surveys, management plans, peat, radio links, finalisation of viewpoints, cultural heritage, cumulative assessments and request that they are kept informed of relevant discussions.

4. Mitigation Measures

The Scottish Ministers are required to make a reasoned conclusion on the significant effects of the proposed Development on the environment as identified in the environmental impact assessment. The mitigation measures suggested for any significant environmental impacts identified should be presented as a conclusion to each chapter. Applicants are also asked to provide a consolidated schedule of all mitigation measures proposed in the environmental assessment, provided in tabular form, where that mitigation is relied upon in relation to reported conclusions of likelihood or significance of impacts.

5 Conclusion

5.1 This scoping opinion is based on information contained in the Company's written request for a scoping opinion and information available at the date of this scoping opinion. The adoption of this scoping opinion by the Scottish Ministers does not preclude the Scottish Ministers from requiring of the Company information in connection with an EIA report submitted in connection with any application for section 36 consent for the proposed Development.

5.2 This scoping opinion will not prevent the Scottish Ministers from seeking additional information at application stage, for example to include cumulative impacts of additional developments which enter the planning process after the date of this opinion.

5.3 Without prejudice to that generality, it is recommended that advice regarding the requirement for an additional scoping opinion be sought from the Scottish Ministers in the event that no application has been submitted within 12 months of the date of this opinion.

5.4 It is acknowledged that the environmental impact assessment process is iterative and should inform the final layout and design of proposed developments. The Scottish Ministers note that further engagement between relevant parties in relation to the refinement of the design of this proposed Development will be required, and would request that they are kept informed of on-going discussions in relation to this.

5.5 Applicants are encouraged to engage with officials at the Scottish Government's Energy Consents Unit at the pre-application stage and before proposals reach design freeze.

5.6 Applicants are reminded that there will be limited opportunity to materially vary the form and content of the proposed Development once an application is submitted. When finalising the EIA report, applicants are asked to provide a summary in tabular form of where within the EIA report each of the specific matters raised in this scoping opinion has been addressed.

5.7 It should be noted that to facilitate uploading to the Energy Consents portal, the EIA report and its associated documentation should be divided into appropriately named separate files of sizes no more than 10 megabytes (MB). In addition, a separate disc containing the EIA report and its associated documentation in electronic format will be required.

Lee Crosbie
Energy Consents Unit
02 March 2022

ANNEX A Consultation responses

A1

Argyll and Bute Council
Comhairle Earra Ghàidheal agus Bhóid

Development and Economic Growth

Council Offices 1A Manse Brae, Lochgilphead, Argyll, PA31 8RD

Lee Crosbie
Energy Consents Unit
The Scottish Government
4th Floor
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

15th February 2022

Dear Sir

THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

SCOPING OPINION CONSULTATION RESPONSE FOR PROPOSED SECTION 36 APPLICATION – ERECTION OF 22 WIND TURBINES WITH TIP HEIGHTS OF UP TO 200M TO BLADE TIP AND ANCILLARY INFRASTRUCTURE, LADYFIELD WIND FARM ON LAND APPROXIMATELY 4.7 KILOMETRES (KM) NORTH OF INVERARAY, IN ARGYLL AND BUTE. (TO BE SUBJECT OF S36 APPLICATION).

LPA REFERENCE: 21/01557/SCOPE

ECU REFERENCE: ECU00003254

I write in reference to your consultation regarding the above and would thank you for agreeing to extend the response period. Please note that, at time of writing the consultee response remains outstanding from Argyll & Bute Council's: Access Manager. All other responses are attached at Appendix A for your information. Please see the Council's consultation response to the scoping consultation below.

I should point out that the issuing of this scoping consultation advice should not be taken to indicate support for the proposal on the part of Argyll & Bute Council. The Council's conclusions on any future application would rely upon the consideration of the content of any accompanying environmental information, the responses of consultees, the views of third parties and any other material planning considerations.

Please note that in terms of the Council's *'Argyll and Bute Local Development Plan'* (adopted 2015) and associated Supplementary Guidance, Argyll & Bute Council will support renewable energy developments where these are consistent with the principles of sustainable development and it can be adequately demonstrated that there would be no unacceptable significant adverse effects, whether individual or cumulative, including on local communities, natural and historic environments, landscape character and visual amenity, and that the proposals would be compatible with adjacent land uses. Proposals will be assessed against the following criteria:

- Net economic impact, including local and community socio-economic benefits such as employment, associated business and supply chain opportunities.
- The scale of contribution to renewable energy generation targets.
- Effect on greenhouse gas emissions.
- Cumulative impacts arising from all of the considerations below.
- Impacts on communities and individual dwellings, including visual impact, residential amenity, noise and shadow flicker.
- Landscape and visual impacts, including effects on wild land.
- Effects on the natural heritage, including birds.
- Impacts on carbon rich soils, using the carbon calculator.
- Public access, including impact on long distance walking and cycling routes and those scenic routes identified in the NPF.
- Impacts on the historic environment, including scheduled monuments, listed buildings and their settings.
- Impacts on tourism and recreation.
- Impacts on aviation and defence interests and seismological recording.
- Impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised.
- Impacts on road traffic.
- Impacts on adjacent trunk roads.
- Effects on hydrology, the water environment and flood risk.
- The need for conditions relating to the decommissioning of developments, including ancillary infrastructure, and site restoration.
- Opportunities for energy storage.
- The need for a robust planning obligation to ensure that operators achieve site restoration.

The *'Argyll & Bute Landscape Wind Energy Capacity Study'* (2017) is also a material consideration in the Council's consideration of wind farm applications.

Should you require anything further please do not hesitate to contact me.

Yours sincerely

Arlene Knox
Senior Planning Officer
Major Applications Team
Development & Infrastructure

ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017, REGULATION 12

SCOPING CONSULTATION RESPONSE ON BEHALF OF ARGYLL & BUTE COUNCIL

THE SITE & PROPOSAL

The site for the proposed development is located approximately 3 km north of Loch Shira and approximately 4.7 km north of Inveraray, and covers approximately 844ha of land. The topography of the site and immediate vicinity is complex and largely consists of existing commercial forestry and rural upland farmland. The site varies in elevation ranging from approximately 100m AOD in the west, to approximately 470m AOD in the east. There are a number of notable hilltops bordering the site including Stuc Scardan which borders the eastern boundary. There are no notable summits located within the site.

The site has several watercourses running through it, with the primary watercourse being the River Aray, running from north to south within, and adjacent to, the western extent of the site boundary. The remaining watercourses within the site, including Allt Sheileachan in the north and Allt a' Mhadaidh in the centre are all tributaries of the River Array and are likely to flow westwards down the slopes contained within the site. In addition to watercourses, Lochan a' Mhadaidh partially enters the site in the east.

Inveraray is the closest settlement, approximately 4.7km to the south. The closest residential property is Ladyfield Farm approximately 1km west of the closest indicative turbine location (T13). There are other residential properties situated nearby, largely located intermittently within Glen Aray along the A819 to the west, and within Glen Shira to the east.

The Glen Etive and Glen Fyne SPA is located to the north and east of the site, abutting the northern and eastern edges of the site boundary. There are also a number of ecological designations located within 10km of the site, including: Glen Shira SAC, approximately 2.25km east of the site; Strone Point, North Loch Fyne SSSI, approximately 4.3km south of the site; Ardchyline Wood SSSI, located approximately 5km south of the site; and Beinn an Loachain SSSI, located approximately 7.9km southeast of the site.

Sensitive landscape receptors include the Inveraray Garden and Designed Landscape and Inveraray Castle (GDL00223) located approximately 800m south of the site at its closest point; Ben Lui Wild Land Area (WLA) 4.3km northeast; and the Loch Lomond and the Trossachs National Park (LLTNP) approximately 10km southeast of the site at its closest point.

There are several areas of Ancient Woodland surrounding the site, with 2 small areas designated as Ancient Woodland to the west of the proposed turbine array.

There are 3 Scheduled Monuments within 5km and a further 47 within 15km of the site boundary; the nearest Scheduled Monument is Inveraray Castle, Cross (SM253), located approximately 4.2km south of the nearest indicative turbine location (T18).

There are 104 Listed Buildings within 5km of the site boundary, with a further 73 within 15km. There are 37 Category A Listed Buildings within 5km of the site; the nearest Category A Listed Building is Inveraray Castle Estate, MAAM Steading (LB11518), approximately 1.4km southeast of the nearest indicative turbine location (T22).

The nearest Listed Building is Category B Glen Array School and Outhouse (LB11523), located directly south of the site boundary, and 1.1km west of the nearest indicative turbine location (T16).

The proposal is for a wind farm development consisting of the erection, 40 year operation, and subsequent decommissioning of up to 22 turbines, each up to 200m in height to blade tip and ancillary infrastructure. Ancillary infrastructure will likely include: a substation, electrical infrastructure, external turbine transformers, new access tracks and site entrance, temporary construction compound, crane hardstandings, borrow pit(s), and a permanent meteorological mast, as well as the option for an energy storage facility. It is noted that the ancillary infrastructure proposed may change as the final parameters of the proposal are identified throughout the iterative EIA process.

The Council considers that the content of the 'Scoping Report' dated June 2021 is broadly acceptable, and it is considered that the proposed scope of the environmental assessments detailed therein will form a generally appropriate structure for EIAR preparation. In accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, Argyll and Bute Council (ABC) would comment as follows on the information to be provided in the EIAR.

SITE SELECTION AND ALTERNATIVES

It is noted from the Scoping Report that the EIAR will set out the site selection process and the alternatives that have been considered prior to and during the EIA process, as required by the EIA Regulations. It will contain a description of the process of site selection that led to the proposal to develop a wind farm at the site, setting out the economic and environmental reasons for site selection. The development design strategy will also be set out as well as the changes made at each iteration and the reasons for these changes, with reference to the design principles and input from the consultation process. ABC is satisfied with this approach.

BUILT ELEMENTS

The EIAR should identify the location of all built elements, which should be sited to avoid habitats of importance, wetlands, areas of deep peat and blanket bog, watercourses and abstractions, in order that areas of particular vulnerability to damage from development, or which have higher pollution sensitivity, may be protected from unnecessary impacts. The assessment should address the construction, operational and decommissioning phases of the development. It should also be noted that ABC would expect the access to/from the site to the junction with the public road to be included within the site edged red.

GRID CONNECTION

It is acknowledged that grid connection is subject to a separate design and consent process, and is not intended to be considered as part of the EIA, however, it is normal for general information on the route of the grid connection to be set out in the EIAR.

DECOMMISSIONING

It is noted from the Scoping Report it is proposed that the development will be operational for a period of up to 40 years, following which time it is expected that the development will be decommissioned or repowered. For the purpose of the Scoping Report, it has been assumed that the development will be decommissioned, as repowering will involve an additional application for consent and a further EIA

POLICY & LEGISLATIVE CONTEXT

It is noted from the Scoping Report that the EIAR will consider the planning and renewable energy policy context relevant to the proposal. It is further acknowledged that a Planning

Statement would accompany the application to undertake an in-depth appraisal of the proposal and assess its compliance with relevant planning policies. ABC is satisfied with this approach and the documents intended to be considered.

LANDSCAPE & VISUAL

The Scoping Report sets out the proposed methodology and approach to be applied in the production of the Landscape and Visual Impact Assessment (LVIA) and presents the suggested scope of the LVIA in terms of those landscape and visual receptors to be scoped in and out of the LVIA based on a preliminary assessment. The purpose of the LVIA is to identify and record the potential significant effects that the proposal many have of physical elements of the landscape; landscape character; areas that have been designated for their scenic or landscape-related qualities; and views from various locations such as settlements, routes, hilltops and other sensitive locations. The potential cumulative effects that may arise from the addition of the proposal in conjunction with other wind farms are also considered. The LVIA will consider the potential effects of the development during: construction, operation and decommissioning.

Study Area & Cumulative Impact

It is noted that in accordance with guidance for a turbine height of up to 200m, the Study Area for the LVIA will cover a radius of 45km. This is considered to be the maximum radius within which a significant landscape and/or visual effect could arise for the height of turbine proposed. It is also noted that a review of the wind farm context within a 45km radius has been undertaken and it is considered that any cumulative effects would arise as a result of the pattern of development within the 45km Study Area. In regard to Cumulative Impact ABC is pleased to note that Carr Duibh (Scoping) has been included and would advise that the status of Blarghour has changed to consented. ABC would be happy to comment further once the list is finalised.

Assessment & Methodology

It is noted from the Scoping Report that the LVIA will follow OPEN's methodology devised specifically for the assessment of wind farm proposals, which generally accords with the 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' (GLVIA3), as well as NatureScot Guidance and Landscape Institute Technical Notes. ABC is content with this and trusts that the views of NatureScot will also be sought in this regard.

Argyll and Bute Wind Energy Capacity Study, 2017 (LWECS)

The Capacity Study is a material consideration in the determination of wind farm proposals and it is recommended that it is considered fully in the LVIA process, taking into account adjacent Landscape Character Types (LCTs) impacted by the proposal as well as the receiving LCT. The LWECS shows the site to be located in a Landscape Character Type (LCT) classified as LCT6a Loch Fyne Upland Forest Moor Mosaic, with LCT4 Mountain Glens occurring to the west and east, and LCT20 Rocky Mosaic to the south. The LWECS advises that there is no scope for turbines over 130m in this Landscape Character Types, which suggests that the landscape within which the proposal is intended to be located is not capable of accommodating taller turbines without significant adverse impacts.

Landscape Character Types

It is noted that it is proposed that the assessment of the effects on landscape character will focus on the area lying within 20km of the proposal, including LCT6a which extends along the eastern side of Loch Fyne beyond the 20km radius. ABC considers that LCT20 Rocky Mosaic (West Loch Fyne) should be included in the LVIA as the proposal is adjacent to it. ABC understands that the advice of NatureScot and Loch Lomond and the Trossachs National Park will also be sought in this regard.

Landscape Designations and Wild Land

The site is not covered by either a national or local level landscape designation. There are, however, a number of different landscape designations occurring across the 45km Study Area including: Loch Lomond and the Trossachs National Park; National Scenic Areas; Gardens & Designed Landscapes; Areas of Panoramic Quality; and Wild Land Areas. ABC is content with the list of designations proposed to be considered in the LVIA and trusts that the advice of NatureScot and Loch Lomond and the Trossachs National Park will also be considered.

Viewpoint Selection

A preliminary viewpoint list is provided in Table 6.3 of the Scoping Report, along with the visual receptors they represent and the landscape designations in which they occur. ABC considers that further viewpoints should be considered to represent water based users of Loch Fyne and Loch Awe. It would also be helpful to see a wireline from Dun Na Cuaiche, as it is difficult to ascertain whether there is any visibility from the ZTV which has been provided. ABC trusts that the advice of NatureScot and Loch Lomond and the Trossachs National Park will also be considered in this regard.

Residential Visual Amenity Assessment

It is noted that an RVAA will be undertaken for properties those that lie within a 2km radius of the proposal, which will be prepared in accordance with the Landscape Institute's Technical Guidance Note 2/19 'Residential Visual Amenity Assessment' (RVAA). The RVAA will consider the effect on views from each property, as well as views from the associated garden grounds and access tracks. ABC is content with this approach.

Potential Effects of Turbine Lighting

It is noted that it is likely that aviation lighting will be required in accordance with CAA guidance. Night-time visualisations should be representative of all key sensitive receptors, and in accordance with NatureScot guidance.

Questions for Consultees

Q6.1: Do you have any comments on the proposed methodology? ABC is content with this and trusts that the views of NatureScot will be sought in this regard.

Q6.2: Are you in agreement with the proposed 45 km Study Area? ABC is content with this and trusts that the views of NatureScot will be sought in this regard.

Q6.3: Are you in agreement that the assessment of the effects on landscape character receptors should focus on those LCTs/LCUs which are highlighted as being relevant to the LVIA in Table 6.1? ABC considers that LCT20 Rocky Mosaic (West Loch Fyne) should be included in the LVIA as the proposal is adjacent to it. ABC understands that the advice of NatureScot and Loch Lomond and the Trossachs National Park will also be sought in this regard.

It is understood that the advice of NatureScot and Loch Lomond and the Trossachs National Park will also be sought in this regard.

Q6.4: Are you in agreement that the assessment of the effects on landscape designations and WLAs should focus on those areas which are highlighted as being relevant to the LVIA in Table 6.2? ABC is content with the list of landscape designations and WLAs proposed to be considered in the LVIA. It is understood that the advice of NatureScot and Loch Lomond and the Trossachs National Park will also be sought in this regard.

Q6.5: Do you have any comments or suggestions in relation to the Preliminary Representative Viewpoint Locations shown in Table 6.3 and illustrated on Figure 6.2? ABC considers that further viewpoints should be considered to represent water based users of Loch Fyne and Loch Awe. It would also be helpful to see a wireline from Dun Na Cuaiche, as it is difficult to ascertain whether there is any visibility from the ZTV which has been provided. ABC trusts that the advice of NatureScot and Loch Lomond and the Trossachs National Park will also be considered in this regard.

Q6.6: Do you have any comments on the approach to assessing the effects of turbine lighting? This should be assessed in accordance with NatureScot guidance.

Q6.7: Do you have any comments or suggestions on the approach to cumulative landscape and visual assessment? Please see comments above regarding Blarghour and Car Dhuibh

ORNITHOLOGY

ABC trusts the advice of NatureScot, RSPB and the Argyll Raptor Study Group will be sought in this regard. ABC's Local Biodiversity Officer notes that ornithological surveys will be required and recommends that the Argyll Bird Club should be consulted. (Please refer to full consultation provided at Appendix A) any Ornithological advice.

Questions for Consultees

Q7.1: Do consultees agree that the range of surveys carried out to date (March 2020 to March 2021) and the remaining proposed surveys (March 2021 to March 2022) are sufficient and appropriate for the EIA? Please see above

Q7.2: Are there any other relevant organisations who should be contacted, or other information sources referenced, with respect to the ornithology assessment? Argyll Bird Club

Q7.3: Do consultees believe that based on results to date, the species considered as IOFs for assessment are: golden eagle, hen harrier, merlin, black grouse, golden plover and greenshank? Please see above

Q7.4: Do consultees agree that there is no potential connectivity between the Site and any designated site, except for the Glen Etive and Glen Fyne SPA. Please see above

ECOLOGY

ABC's Local Biodiversity Officer (LBO) advises that Ecology and Ornithological Surveys are required with mitigation. The LBO notes that some species records exist for Atlantic salmon, European Eel and Red Squirrel. The LBO asks that Bat sp. Otter, Badger as well as Fresh Water Pearl Mussel are included in the ecological surveys. Furthermore, in terms of Cumulative Impact it is noted that the applicant recognises there are a number of other wind farm applications in the area and will follow specific guidance and policy as applicable. (Please refer to detailed response at Appendix A). The Council's LBO has provided the following advice in regard to the Ecology questions:

Questions for Consultees

Q8.1: Do consultees agree that the range of surveys that will be carried out is sufficient and appropriate for the EIA? The LBO has provided advice relating to biodiversity in terms of the Ecological surveys- species, habitat mapping, Geology and Peat- location of borrow pits and restoration plans, peat depth mapping and Peat Management Plan and Hydrological and hydrogeological interest- fish and Fresh Water Pearl Mussel surveys are required.

Advisory: The LBO asks that the applicant includes details of a CEMP and the employment of an Ecological Clerk of Works in order to ensure mitigation outlined in the above surveys and management plans are implemented along with Toolbox talks drafted so as to ensure that all appropriate measures are followed

Q8.2: Are there any other relevant consultees or organisations who should be contacted, or other sources of information that should be referenced with respect to the ecology assessment? The LBO advises that you consult The Argyll Fisheries Trust, The British Lichen Society – latter in relation to Ancient Woodlands, The Argyll Bird Club, The Scottish Wildlife Trust, The Lorne Natural History Society and The Woodland Trust.

Q8.3: Do consultees believe that there are any particular habitats or protected species which need to be considered in the assessment? The LBO has responded to this under the heading of habitats and species i.e. FWPM, Otter,

Q8.4: Do consultees agree that there is no potential for connectivity between the Development and the Glen Shira SAC, and that consequently effects related to all designated sites can be scoped out, with no Appropriate Assessment required as part of the Habitats Regulations Appraisal process? This is acceptable.

ARCHAEOLOGY & CULTURAL HERITAGE

<u>The West of Scotland Archaeology Service (WoSAS)</u> advise that they generally agree with the proposed assessment for cultural heritage subject to the undernoted comments. They agree that a walkover survey is required but wonder how this will be accomplished across so much existing woodland (section 9.3). They would add to the setting assessment any former non-statutory register (NSR) category C or V sites out to 5km.

Questions for Consultees

Q9.1: Do the consultees agree with the proposed methodology and scope of assessment? Agree (subject to the above comments)

Q9.2: Do consultees have any information regarding current or recent archaeological work or projects being undertaken within or in the vicinity of the Site particularly those whose results are not yet be recorded in the HER or in the National Record of the Historic Environment? A limekiln has been discovered by recent overhead line works (WOSASPIN 69708) and maybe impacted by the proposed access.

Q9.3: Are the consultees aware of any further sites with statutory protection within the wider landscape whose settings may be affected by the Development? Not at present.

Q9.4: Do the consultees have details of any cultural heritage sites in the vicinity of the Development site which it considers may raise significant issues within the EIA process for this Development? Recorded sites within/near the application area are noted and can be dealt with through avoidance or recording. WOSASPIN 1582 (an NSR site cat V) is within the application area though unaffected by the proposals apart from its setting which maybe a significant impact on a significant site).

HYDROLOGY & HYDROGEOLOGY

Flood Risk

The Council's Flood Risk/Drainage Impact Officer - notes that no information pertaining to historical flooding at the site has been supplied. The site is largely free from the indicative limits of fluvial flooding as per the SEPA Flood Maps (2014). Where the fluvial flood limits do overlay the site these areas are constrained to the River Aray and Allt Sheileachan along the western and northern boundaries respectively. It should be noted that many of the smaller tributaries throughout the site have catchment areas of less than 3km^2 and are thus too small to be included on the SEPA Fluvial Flood Maps. The primary risk to the site appears to be from surface water flooding, with localised instances of flooding expected across much of the catchment.

Upon review of the supplied turbine layout, it would appear that no turbines are within the indicative limits of flooding. The EIA Scoping Report informs that all turbines will be set at least 50m away from any watercourse. This is acceptable. Regarding surface water flood risk, risk is localised within the site and tends to follow small undulations in the topography. The turbines appear to be overlain by the small areas of surface water flood extent.

Further should watercourse crossings be needed to access the turbines, these should be designed in a way so as not to reduce the existing capacity of the channel. If possible, these should be designed to convey the 200 year plus climate change flow. It is recommended that this be made a planning condition. In designing the crossings, considerations should be given to options such as bottomless culverts, and it is recommended that any changes to crossings should not reduce the existing capacity of the crossing e.g. culverts should not be made smaller.

No drainage design plans have been supplied. Given the risk of surface water flooding across the site, it is recommended that drainage of surface water be designed in accordance with CIRIA C753 and SuDS guidance. It is also recommended that sections 2 to 3 of the checklist provided in the Flood Risk/Drainage Officer's response (Appendix A) are addressed regarding the drainage design. Surface water drainage should be designed such that post development surface water runoff does not exceed the pre-development surface water runoff. Please refer to the detailed conditions relating to: the design of watercourse crossings and surface water drainage recommended by the Flood Risk/Drainage Officer in the event that consent is granted detailed in their response at Appendix A.

The Council's Regulatory Services Officer – Private Water Supplies – has advised that it appears that there is a single private water supply in the area highlighted, the supply is AABMK1201 (Ladyfield, NGR 209230/715597) and the supply is served by a surface source (burn). Consequently, as part of any EIA the wider private water supply assessment should consider specifically the supply to this property along with any other properties in the area.

The Council's Local Biodiversity Officer (LBO) has provided the following advice in regard to Hydrology and Hydrogeology: Freshwater surveys to be updated included in Hydrological and Hydrogeological surveys.

Questions for Consultees

Q10.1: Are consultees content with the proposed methodology and scope of the hydrology and hydrogeology assessment? Please refer to advice provided above from Flood Risk/Drainage Impact Officer.

Q10.2: Does the Council, NatureScot, SEPA or other consultees have any information that would be useful in the preparation of the hydrology and hydrogeology assessment? Please refer to advice provided above from Flood Risk/Drainage Impact Officer.

GEOLOGY & PEAT

It is noted that an assessment of the impact of the proposal on geology and peat will be undertaken within EIAR. This will establish the baseline conditions, inform the assessments and designs while determining any suitable mitigation measures required.

ABC's Local Biodiversity Officer - welcomes that the applicant is to carry out a Peat depth survey so as to inform positioning of works and access in light of this the LBO asks that a Peat Management Plan is submitted with this mapping process for approval. The LBO also notes that Borrow pits have yet to be identified, In view of this, the LBO would like the locations mapped and a Restoration Plan included and submitted for approval.

Questions for Consultees

Q11.1: Are consultees content with scoping out solid geology from further assessment? ABC trusts the advice of SEPA and any other relevant consultees will be sought in this regard.

Q11.2: Are consultees content with the proposed methodology for peat slide risk assessment? ABC understands that the methodology for the peat land slide risk assessment is usually reviewed by a consultant appointed by the ECU and other relevant consultees and has no comment to make.

NOISE, VIBRATION, LIGHTING AND AIR QUALITY

The Council's Environmental Health Officer has advised that on the turbine layout included in the Scoping Report the nearest occupied residential properties are located approximately 1km from the nearest turbine. The main issues for their consideration would be: Operation noise; Construction noise and vibration; Air pollution, such as dust during the construction phase; Lighting during the construction phase; and private water supplies (please refer to hydrology and hydrogeology section).

Operation noise

The scoping report has identified operational noise as an impact to be considered by any environmental impact assessment. The report states that noise will be assessed in accordance with the methodology set out in ETSU-R-97 and the Institute of Acoustics Good Practice Guide. It is expected that a noise impact assessment (NIA) containing sufficient detail and calculations would be provided with the application. In addition:

- Any NIA should consider the potential impact at any dwelling which is lawfully existing or a site which has planning permission for use as a dwelling.

- If it is anticipated that mitigation measures (e.g. operation of turbines in noise reduced mode) may be required to achieve prospective noise limits then details should be included in the NIA
- It is acceptable for turbine noise predictions to be undertaken using the characteristics of an appropriate candidate turbine. It should be expected that any planning approval will include a condition which requires the demonstration of compliance of the turbines to be installed with any noise limits.
- Where the occupiers of any properties are considered to have a financial interest in the development and a higher noise limit of 45dB $LA_{90,\ 10min}$ is proposed, details of the properties concerned and factors supporting the financial interest shall be provided to the Planning Authority.
- The NIA should also consider the potential impact of any fixed (non-turbine) noise-generating equipment on the nearest noise-sensitive properties. The NIA should outline any proposed mitigation measures.
- The report identifies the potential for the cumulative noise impact with other similar developments and the consultants have identified relevant sites which are both operational and currently within the planning system at the application or appeal stage.
- Where calculations have been undertaken and corrections have been made in accordance with IoA Good Practice Guide recommendations (e.g. across a valley or topographical screening) the NIA should include a table providing full details.

Construction noise and vibration

The scoping report indicates that construction activity will not warrant a detailed construction noise assessment due to the remote nature of the development. It is unclear at this stage if there will be any access tracks which may be in close proximity to residential properties. It would be expected that the application would present finalised details of access arrangements and propose mitigation measures.

Air Quality

The applicants should consider the potential for dust emissions from the site and access roads /tracks during the construction phase on nearby sensitive properties and provide details of any proposed mitigation measures within the proposed construction environmental management plan.

Lighting

The applicant should consider the potential for light pollution during the construction phase on any nearby sensitive properties.

Private water supplies

The potential effect on any nearby private water supplies will be commented on by Environmental Health Private Water Supplies Team in a separate response (please refer to hydrology and hydrogeology section).

Questions for Consultees

Q12.1: Are consultees content with the proposed methodology and scope of assessment? Please refer to advice from Environmental Health Officer above.

Q12.2: Do the Council and consultees have details of any further cumulative developments in the locality which it considers may raise significant issues within the

EIA process for the Development? Please refer to advice from Environmental Health Officer above.

Q12.3: Are consultees content to scope out Low Frequency Noise and Infrasound, Amplitude Modulation, Ground Borne Vibration, a detailed assessment of Construction and Decommissioning noise, and noise from the substation or BESS (if required)? Please refer to advice from Environmental Health Officer above.

TRAFFIC AND TRANSPORT

The Council's Area Roads Engineer has advised that they would have no objection to the proposed development subject to conditions in the event that consent was granted. They note that the site is to be accessed from the A819 Inveraray – Dalmally Road. Conditions would be required to ensure that the connection of the site access with the public road is 160 x 2.40 x 1.05 metres, and that the junction layout is agreed with Roads & Infrastructure Services, prior to any work starting on site. They also wish it to be noted that no surface water should be discharged onto the public road, and a Roads Opening Permit will be required.

Questions for Consultees

Q13.1: Are Consultees content with the proposed methodology and scope of the traffic and transport assessment? Please refer to advice from Area Roads Engineer above.

Q13.2: Are the Council/Statutory Consultees aware of any specific access restrictions or limitations on the proposed abnormal loads route?' Please refer to advice from Area Roads Engineer above.

Q13.3: Are Consultees content to scope out operational and decommissioning traffic from further assessment? Please refer to advice from Area Roads Engineer above.

Q13.4: Are you aware of any relevant policies or guidance documents not specifically mentioned in this section of the Report? Please refer to advice from Area Roads Engineer above.

FORESTRY

It is noted from the Scoping Report that the approach will be set out which would be used to integrate the proposal into the existing woodland structure. A Wind Farm Forest Plan would be prepared, which would detail felling and replanting proposals, illustrating the forestry requirements associated with the construction and operation of the proposal. The site is located in an area with extensive commercial woodlands which are privately owned. The land available for the development is largely forested with the remainder comprising open ground and margins beyond the woodland edge. It is noted that Scottish Forestry are the key consultee on this matter and they will be consulted as part of the EIA process. The Council has no further comment.

Questions for Consultees

Q14.1: Do the consultees agree with the proposed methodology and scope of assessment? Please refer to advice of Scottish Forestry

Q14.2: Are the consultees aware of any new guidance which should be taken into account? Please refer to advice of Scottish Forestry

LAND USE, SOCIO-ECONOMICS, TOURISM AND RECREATION

It is noted that a land use, socio-economic, tourism and recreation assessment will be included within the EIAR. This will consider the likely socio-economic impact of the proposal on the population, economy and use of the land within and around the development. There is no established guidance for conducting a socio-economic assessment as part of the EIA process. Desk-based information sources could be used to assess the likely scale of effects, supplemented by consultation with local stakeholders. Cross reference should be made to other technical assessments to consider potential effects on recreational assets and other leisure and tourism attractions in the surrounding area, for example due to visual impact, traffic, and noise. SPP in regard to wind farm development sets out a number of assessment criteria. These include consideration of effects on the local and national economy and tourism and recreation interests, in addition to benefits and disbenefits for communities. Tourism and recreation are important industries for the economy of Argyll and Bute and the local area. This chapter of the EIAR should address the consequences of the development for users of the countryside, and tourism and recreation interests, including any deterrent influence the proposal may have, along with any attractive influence the presence of the proposal may generate. The proposal should not result in the unacceptable loss of amenity to individuals who enjoy recreation pursuits on land or water.

Questions for Consultees

Q15.1: Do Consultees agree with the proposed method of assessment for impacts on land use, socio-economics, recreation and tourism? Yes

Q15.2: Are Consultees aware if any additional sensitive economic activities in the area that would not be covered in the proposed method of assessment? No

Q15.3: Whilst a full desk-based search will be undertaken, are Consultees aware of any key sensitive receptors (Including Public Rights of Way etc.) that should be considered within the EIA Report? National Park (variety of users) and water-based recreation

Q15.4: Are Consultees aware of any additional relevant consultees? Mountaineering Scotland, VisitScotland and Scottish Rights of Way and Access Society (ScotWays)

Q15.5: Are you aware of any relevant policies or guidance documents not specifically mentioned in this section of the Report? No

OTHER ISSUES

CLIMATE CHANGE AND CARBON BALANCE

It is noted that climate change, including carbon balance will be dealt with in the 'Other Issues' chapter of the EIA Report. It is noted from the Scoping Report that a carbon balance assessment will be undertaken using the most up to date version of the Scottish Government Windfarm Carbon Calculator Tool. Furthermore, that details on the expected carbon savings which are predicted as a result of the operation of the proposed development will also be provided. It is also noted that no significant effects will arise as a consequence of the proposed developments vulnerabilities and resilience to climate change and that this matter is intended to be scoped out. The Council is satisfied with this approach.

SHADOW FLICKER

It is noted from the Scoping Report that the final layout and candidate turbine have yet to be selected, consequently, it is difficult to determine whether or not the proposed development will have a significant effect on the surrounding properties from shadow flicker. It is noted that a Shadow Flicker Assessment will be undertaken to determine whether or not there will be any impacts on surrounding properties. This assessment should identify whether any shadow flicker effects would occur at any sensitive receptors and calculate the approximate times of day and year that these effects would occur. In accordance with the Scottish Government's advice all properties within (10 rotor diameters – as a general rule) of the turbine locations should be taken into consideration in the assessment.

AVIATION

Wind turbines have the potential to cause a variety of adverse effects on aviation. It is noted that the site lies in an area where there is little by way of significant and military aviation infrastructure. Furthermore, that the assessment of effects of the turbines will be based upon the guidance in the CAA Publication CAP 764 and Guidelines on Wind Turbines and Aviation Interests Interim Guidelines. The Council understands that local Air Navigation and Air Traffic Services Providers are best placed to provide expert advice in this regard, and that Civil Aviation Authority (CAA), National Air Traffic Services En Route Plc (NATS) and Ministry of Defence (MoD), Glasgow Airport and any private airfields will be consulted on the proposal. The Council is satisfied with the intended approach.

AVIATION LIGHTING

It is noted from the Scoping Report that it is anticipated that due to the location of the proposed development it is unlikely to cause a significant impact to aviation interests. The scope of any aviation impact assessment, if required, will be based on the outcome of consultation discussions with the relevant aviation consultees. Furthermore, that the effects of aviation lighting will be included in the EIA report, should visible lighting be required during hours of darkness on all turbines, or if there is uncertainty surrounding which form of lighting will be utilised. Visible red lighting is deemed to be the worst case scenario. In the event that lighting will be required an assessment should be incorporated into the Landscape & Visual Impact Assessment and nighttime visualisations should be provided all in accordance with NatureScot Guidance on this matter.

TELECOMMUNICATIONS, TELEVISION RECEPTION & UTILITIES

Wind farms have the potential to interfere with electro-magnetic signals and utilities passing above ground and physically with existing infrastructure below ground. This can therefore potentially affect television reception, fixed telecommunication links and other utilities. It is noted from the Scoping Report that to identify any existing infrastructure constraints, both consultation and a desk-based study will be conducted. Consultation with relevant telecommunication and utilities consultees will include: Television and telecommunications providers as appropriate; and Water, gas and electricity utilities providers. The probability of a significant impact on fixed radio links and broadcast television signals will be assessed on the basis of site proximity to transmitter-receiver paths and rebroadcast links and calculation of Ofcom-recommended clearance zones. Potential changes to the telecommunications environment as a result of the proposed development will be predicted by an assessment of the proximity of turbines to radio facilities and consultations with telecommunications providers. Since the introduction of digital television signals, effects on television reception have substantially reduced. Given the absence of residential properties in close proximity to the site, effects on television reception are considered extremely unlikely. Should affects upon reception be identified as a result of the proposed development, mitigation is available to ensure these effects are not significant. The outcome of this consultation process, including any mitigation action required, should be detailed in the EIA Report. The Council is satisfied with this approach.

HEALTH AND SAFETY, INCLUDING MAJOR ACCIDENTS & DISASTERS

The EIA Regulations state that an EIA must identify, describe and assess in an appropriate manner, the expected effects deriving from the vulnerability of the proposed development to risks, so far as relevant to the proposed development, of major accidents and natural disasters. It is noted that throughout all phases of the development, cognisance will be given to; Wind Turbine Safety Rules Third Edition; Guidance & Supporting Procedures on the Application of Wind Turbine Safety Rules, Third Edition and Onshore Wind Health & Safety Guidelines. Furthermore, that Health and Safety during construction and decommissioning will be subject to relevant legislation and best practice, including site inductions, risk assessments, and method statements as implemented by the Construction Management Plan. Consequently there is no further requirement for Health and Safety to be assessed within the EIA and it is proposed to be scoped out of further assessment. It is noted from the Scoping Report that the proposed development is not located within an area known for natural disasters such as hurricanes, tornadoes, volcanic eruptions, earthquakes or tsunamis. As the most probable of natural disasters to affect the Development, flood risk will be assessed within the hydrological assessment in the EIA Report. None of the identified climate change trends listed will affect the Development with the exception of increased windstorms. Risks associated with ice build-up, lightning strike and structural failure are removed or reduced through inbuilt turbine mechanisms in modern machines. Therefore, it is concluded that no significant effects will arise due to health and safety including major accidents and natural disasters as a result of the Development, and this topic can be scoped out of the EIA. The Council is satisfied with this approach.

WASTE

It is noted from the Scoping Report that at this stage, the exact quantities and types of waste are unknown. However, that a Site Waste Management Plan will be prepared prior to construction and will detail how waste streams are to be managed following the Waste Hierarchy. The SWMP would be agreed and implemented prior to construction commencing on site. Therefore it is not considered necessary for waste to be assessed further within the EIA and it is proposed to be scoped out of further assessment. A Site Waste Management Plan (SWMP) will be prepared prior to construction and will detail how waste streams are to be managed, following the Waste Hierarchy207 of prevention, reuse, recycle, recover and as a last resort, disposal to landfill. The SWMP will be agreed and implemented prior to construction commencing on site. Therefore, it is not considered necessary for waste to be assessed further within the EIA and is scoped out of further assessment. The Council understands that the advice of SEPA will be sought in this regard.

Questions for consultees

Q16.1: Are consultees content to scope out the Development's vulnerabilities and resilience to climate change? The Council is content for this to be scoped out of the assessment.

Q16.2: Are consultees content to scope out Major Accidents and Disasters from further assessment? The Council is content for this to be scoped out of the assessment.

Q16.3: Are consultees content to scope out Waste from further assessment? The Council understands that the advice of SEPA will be sought in this regard.

A16

Arlene Knox
Senior Planning Officer
Major Applications
15th February 2022

Consultations undertaken

Argyll & Bute Council Local Biodiversity Officer – (received 22nd January 2022)
Argyll & Bute Council Environmental Health Officer (received 19th August 2021)
Argyll & Bute Council Regulatory Services Officer – Private Water Supplies (received 24th January 2022)
Argyll & Bute Council Area Roads Engineer (received 10th August 2021)
Argyll & Bute Council Access Manager – no response
Argyll & Bute Council Archaeological Advisors the West of Scotland Archaeology Service – (received 26th January 2022)
Argyll & Bute Council Flood Risk Assessor (received 17th August 2021)

APPENDIX A - ARGYLL & BUTE COUNCIL CONSULTEE RESPONSES – 21/01557/SCOPE

Argyll & Bute COUNCIL

Infrastructure Design
Argyll and Bute Council
Civic Centre
38 East Clyde Street
Helensburgh G84 7PG

FLOOD RISK MANAGEMENT - OBSERVATIONS ON PLANNING APPLICATION

Planning Ref No: 21/01557/SCOPE Design File Ref: R122004/ Date Received: 30 July 2021 Planning Application: SCOPE Type	Site Grid Reference: 210195 715322 Applicant: Scottish Government Proposed Development: S36 Scoping consultation for proposed wind farm Location: Ladyfield Wind Farm Inveraray Argyll And Bute Documents submitted: EIA scoping report, site plan.

RECOMMENDATION	~~No Objections~~ / No Objections subject to Conditions ~~/ Refuse / Defer Decision~~				
FLOODING AND DRAINAGE CHECKLIST **Meets Requirements- Yes/No/Not Applicable**					
1. Fluvial/Coastal/ Pluvial Flood Risk Management		**2. Surface Water Drainage Proposals**		**3. SUDS Design and Implementation**	
(a) Records of previous flooding incidents at the design location included in the application	No	(a) Drainage Layout and construction details provided with locations of surface water discharge shown.	N/A	(a) SUDS required and adequate levels of treatment provided as detailed in WAT-RM-08(SEPA)	N/A
(b) Site lies outwith flood plains as indicated by SEPA Fluvial & Coastal Flood Maps for the required return period (1:200 year event).	No	(b) . Design calculations for proposed SWD system including freeboard allowance submitted. The 1 in 200 year plus CC flood event contained on site	N/A	(b)Design Calculations and construction details in accordance with CIRIA C753 or other approved provided and meets requirements	N/A
(c) Do proposed FFL's exceed 1 in 200 year event plus CC plus 0.6 m freeboard. For coastal sites CFB level used with allowances for UKCP18 CC, wave height plus 0.6 m freeboard	Yes	(c) Existing site drainage identified and proved. Capacity and ownership identified. Relevant permissions granted for connections or removal.	N/A	(c) Section 7 Agreement with Scottish Water required and agreed between Roads Authority & Scottish Water	N/A
(d) Flood Risk Assessment provided and meets requirements	N/A	(d)) Method statement detailing surface water containment during construction provided and meets requirements of GBR's detailed in WAT-SG-12(SEPA)	N/A	(d)Suitable maintenance regime for SUDS documented and agreed by all relevant parties in application	N/A
(e) Methodology for estimating run off and design flows acceptable	N/A	(e) Drainage Statement/Assessment provided as detailed in Drainage Assessment- A Guide For Scotland SUDSWP and relevant Planning Advice Notes (PAN)	N/A	(e) Site investigation / Soil Classification of site and method of determination for permeability provided and meets requirements	N/A
(f) Overland Flow risk, to and from site estimated and cut off drainage or other measures considered appropriate	N/A				

Item Ref.	COMMENTS
1	This application is for a Scoping Consultation on the proposed development of 20 turbines. The site is located between Glen Aray and Glen Shira approximately 6km north of Inverary. The A819 forms the western site boundary, with the River Aray running just to the east. The site is bounded by open land to the east. At present the site is currently undeveloped land. The site is largely contained within the River Aray catchment with many smaller tributaries also within the site boundary.
1a	No information pertaining to historical flooding at the site has been supplied within the application.
1b	The site is largely free from the indicative limits of fluvial flooding as per the SEPA Flood Maps (2014). Where the fluvial flood limits do overlay the site these areas are constrained to the River Aray and Allt Sheileachan along the western and northern boundaries respectively. It should be noted that many of the smaller tributaries throughout the site have catchment areas of less than 3km² and are thus too small to be included on the SEPA Fluvial Flood Maps. The primary risk to the site appears to be from surface water flooding, with localised instances of flooding expected across much of the catchment.
1c	Upon review of the supplied turbine layout, it would appear that no turbines are within the indicative limits of flooding. The EIA scoping report (prepared by ARCUS) informs that all turbines will be set at least 50m away from any watercourse. This is acceptable.

	Regarding surface water flood risk, risk is localised within the site and tends to follow small undulations in the topography. The turbines appear to generally be located on higher topography within the site, and as such, do not appear to be overlain by the small areas of surface water flood extent.
1d	Further should watercourse crossings be needed to access the turbines; these should be designed in a way so as not to reduce the existing capacity of the channel. If possible, these should be designed to convey the 200 year plus climate change flow. It is recommended that this be made a planning condition. In designing the crossings, considerations should be given to options such as bottomless culverts, and it is recommended that any changes to crossings should not reduce the existing capacity of the crossing, e.g. culverts should not be made smaller.
2-3	No drainage design plans have been supplied. Given the risk of surface water flooding across the site, it is recommended that drainage of surface water be designed in accordance with CIRIA C753 and SuDS guidance. It is also recommended that sections 2 to 3 of the checklist above are addressed regarding the drainage design. Surface water drainage should be designed such that post development surface water runoff does not exceed the pre-development surface water runoff.

CONDITIONS/~~REASONS FOR DEFERMENT~~	
	It is recommended that planning conditions to the effect of the following are attached to any consent granted for this application: 1. Any proposed watercourse crossings should be designed to convey the 1 in 200 year plus climate change (56% allowance) flood event. 2. Surface water drainage should be designed in accordance with CIRIA C753 and ensure that post development surface water runoff does not exceed the pre-development surface water runoff. The surface water drainage should be in operation prior to the start of construction.

Signed : JBA Consulting	**Contact No.:** REDACTED
Position:	
Organisation: JBA Consulting	**Date:**

A19

Argyll and Bute Council
Comhairle Earra Ghàidheal agus Bhòid

Memorandum

Planning & Regulatory Services		**Date:**	19 August 2021
To:	centralvalidationteam@argyll-bute.gov.uk	**Your Ref**	21/01557/SCOPE
Attn:	Planning	**Our Ref:**	21/02653/PLANS
From:	Nicole Hamilton Environmental Health Officer	**Extension:**	4625

THE TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017
REQUEST FOR A 'SCOPING OPINION' UNDER REGULATION 14

PROPOSAL: S36 Scoping consultation for proposed wind farm (22 turbines up to 200 meters high to blade tip)

Thank you for your consultation dated 30th July 2021 requesting a scoping opinion in relation to the above proposal.

The proposed development is for a new wind farm and associated infrastructure on land approximately 4.7km North of Inveraray. It is anticipated that the development will consist of up to 22 turbines with a maximum blade tip height of 200m, with a total generating capacity of over 50MW. In support of the proposal the applicant has provided a scoping report which sets out the matters it is proposed to assess in support of any future planning application. Additional infrastructure is proposed in the application by the installation of a substation and external turbine transformers within the site. There is also potential for an energy storage facility.

On the turbine layout included in the Scoping Report (SR) the nearest occupied residential properties are located approximately 1km from the nearest turbine. The main issues of concern to this department would be:

- Operational Noise
- Construction Noise and vibration
- Air Pollution, such as dust during construction phase
- Lighting during construction phase
- Private Water Supplies

1. Operational Noise

The scoping report has identified operational noise as an impact to be considered by any environmental impact assessment. The SR states that noise will be assessed in accordance with the methodology set out in ETSU-R-97 and the IoA Good Practice Guide. It is expected that a noise impact assessment (NIA) containing sufficient detail and calculations would be provided with the application. In addition:

- Any NIA should consider the potential impact at any dwelling which is lawfully existing or a site which has planning permission for use as a dwelling.
- If it is anticipated that mitigation measures (e.g. operation of turbines in noise reduced mode) may be required to achieve prospective noise limits then details should be included in the NIA.
- It is acceptable for turbine noise predictions to be undertaken using the characteristics of an appropriate candidate turbine. It should be expected that any planning approval will include a condition which requires the demonstration of compliance of the turbines to be installed with any noise limits.

A20

- Where the occupiers of any properties are considered to have a financial interest in the development and a higher noise limit of 45dB $LA_{90, 10\ mins}$ is proposed, details of the properties concerned and factors supporting the financial interest shall be provided to the Planning Authority.
- The NIA should also consider the potential impact of any fixed (non-turbine) noise-generating equipment on the nearest noise-sensitive properties. The NIA should outline any proposed mitigation measures.
- The report identifies the potential for the cumulative noise impact with other similar developments and the consultants have identified relevant sites which are both operational and currently within the planning system at the application or appeal stage.
- Where calculations have been undertaken and corrections have been made in accordance with IoA Good Practice Guide recommendations (e.g. across a valley or topographical screening) the NIA should include a table providing full details.

2. Construction Noise and Vibration

The scoping report indicates that construction activity will not warrant a detailed construction noise assessment due to the remote nature of the development. It is unclear at this stage if there will be any access tracks which may be in close proximity to residential properties. It would be expected that the application would present finalised details of access arrangements and propose mitigation measures.

3. Air Quality

The applicants should consider the potential for dust emissions from the site and access roads/tracks during the construction phase on any nearby sensitive properties and provide details of any proposed mitigation measures within the proposed construction environmental management plan.

4. Lighting

The applicant should consider the potential for light pollution during the construction phase on any nearby sensitive properties.

5. Private Water Supplies

The potential effect on any nearby private water supplies will be commented on by Environmental Health Private Water Supplies Team in a separate response.

Nicole Hamilton
Environmental Health Officer
REDACTED

A21

Development and Infrastructure - Roads and Amenity Services
OBSERVATIONS ON PLANNING APPLICATION

Application No.	21 01557 SCOPE		
Contact	James Ross		
REDACTED			
Grid Reference	1	Dated	
Received	30/07/2021		
Return By Date	20/08/2021		
Applicant	ARCUS	Call By Date	
Proposed Development	S36 Scoping for windfarm (22 turbines, 200 m tip)	District	Mid-Argyll
Location	Ladyfield Wind Farm, Inveraray	**Recommendation**	
Type of consent	Scope	**No objection subject to conditions**	
Drawing Refs.			

Comments

1. This site is accessed from the A819 Inveraray - Dalmally Road.

Conditions/Reasons for refusal/deferment

1. Connection of site access to public road, 160 x 2.40 x 1.05 metres.
2. Junction layout to be agreed with Roads & Infrastructure Services, prior to any work starting on site.

Notes for Intimation to Applicant

(i) Construction Consent (S21)*	*Not Required*
(ii) Road Bond (S17)*	*Not Required*
(iii) Road Opening Permit (S56)*	*Required*
(iv) No surface water discharge*	*Required*

*Relevant Section of the Roads (Scotland) Act 1984

Signed:	J. Ross	Date	10/08/2021	ID	5981
		Actual Return Date	10/08/2021	Replied	

From: Middleton, Jaqui
Sent: 24 January 2022 17:43

To: Knox, Arlene <Arlene.Knox@argyll-bute.gov.uk>
Subject: RE: 21/01557/SCOPE Ladyfield AABMK1201 [OFFICIAL]

Classification: OFFICIAL

Hi Arlene,

I have checked our maps and it appears that there is a single private water supply in the area highlighted the supply is AABMK1201 (Ladyfield, NGR 209230 / 713597) and the supply is served by a surface source (burn) I would therefore ask that as part of any EIA the wider private water supply assessment considers specifically the supply to this property along with any other properties in the area.

I hope this reply is sufficient, however if you would want a more formal response please let me know.

Kind regards

Jacqui Middleton
EHO – Public Health and Housing
Argyll and Bute Council
Kilmory
Lochgilphead
PA31 8RT

Please note:
I often work flexibly & may send emails outside normal office hours, however there is no need to respond to my emails outside your own work pattern.

A23

From: Robins, Paul (NRS)
To: maki, planning; Knox, Arlene
Subject: 21/01557/SCOPE - S36 Scoping consultation for proposed wind farm (22 turbines up to 200 meters high to blade tip), Ladyfield Wind Farm Inveraray Argyll And Bute (OFFICIAL)
Date: 26 January 2022 10:26:56
Attachments: image003.png
image001.png

OFFICIAL

Dear Arlene,

I apologise for the delay in responding to the above planning application and scoping report. Generally I agree with the proposed assessment for cultural heritage subject to the undernoted comments.

I agree that a walkover survey is required but wonder how will this be accomplished across so much existing woodland (section 9.3).

I would add to the setting assessment any former non-statutory register (NSR) category C or V sites out to 5km.

Key questions.
Q9.1 – I agree (subject to the above comments)
Q9.2 – A limekiln has been discovered by recent overhead line works (WOSASPIN 69708) and maybe impacted by the proposed access.
Q9.3 – Not at present.
Q9.4 – Recorded sites within/near the application area are noted and can be dealt with through avoidance or recording. WOSASPIN 1582 (an NSR site cat V) is within the application area though unaffected by the proposals apart from its setting which maybe a significant impact on a significant site).

Please contact me by email if you require any further information or advice.

Regards

Paul

Paul Robins
Senior Archaeologist
West of Scotland Archaeology Service
231 George Street, Glasgow, G1 1RX
Tel: 0141 287 8335 email: Paul.Robins@wosas.glasgow.gov.uk

HISTORY HERITAGE & ARCHAEOLOGY • 2017 •

WoSAS Archaeological Impact Mitigation System – Recipient of a Commendation in Development Management, 2014 Scottish Awards for Quality in Planning

OFFICIAL

Glasgow - proud host of the 26th UN Climate Change Conference (COP26) - UK2021.

A24

Argyll and Bute Council

Comhairle Earra Gháidheal agus Bhóid

Development and Infrastructure Services

Executive Director: Kirsty Flanagan

Marina Curran-Colthart

Local Biodiversity Officer,

Argyll and Bute Council.

Development and Infrastructure,

Municipal Buildings,

Albany Street,

Oban,

Argyll, PA34 4AW

Our Ref: 21/01557/SCOPE

28 January 2022

Central Applications Team

1A Manse Brae

Lochgilphead

PA31 8RD

Dear Central Validation Team,

THE TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

REQUEST FOR A 'SCOPING OPINION' UNDER REGULATION 14

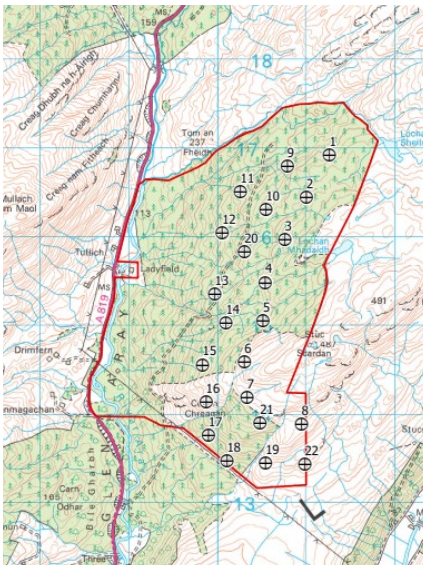
PROPOSAL: S36 Scoping consultation for proposed wind farm (22 turbines up to 200 meters high to blade tip), Ladyfield Wind Farm Inveraray Argyll And Bute

Thank you for consulting me on the above scoping opinion for proposed windfarm (22 no. turbines with a tip height of 200m high to blade tip) at Ladyfield Windfarm, Inveraray, Argyll and Bute.

I note the contents of the scoping request and the associated maps relating to Ecological and Ornithological Interest which covers biodiversity

1.0 Site Location and Description:

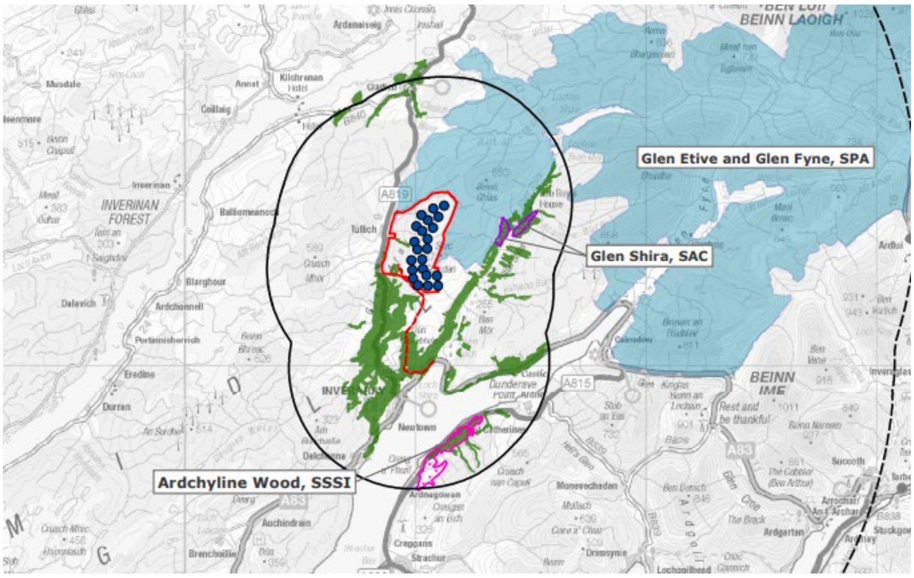
A25



The Site is located just off the Dalmally to Inveraray- A819 and is located adjacent or within the following features:

1. The River Aray and includes unnamed burns,
2. within plantation forestry,
3. the indicative access track is through peatlands- blanket bog a priority habitat and part of the Ancient Woodland Inventory leading to the A83.

2.0 Designations: several areas of Ancient Woodland Inventory (AWI) are close but out with the proposed development site boundary with the exception of an area of AWI within the site boundary and the proposed access track leading to the A83.
National Designations local to the proposed development- Ardchyline Wood (AWI) – SSSI for biological interest- Upland Oak Wood; Glen Shira- SAC – Western Acidic Oak woodlands and Glen Etive and Glen Fyne –SPA- latter reference details for Golden eagle:
https://media.nature.scot/record/~fa659c4c0d



3.0 Proposed Development is summarised as follows:

- 22 no. turbines with a tip height of 200m high to blade tip located on approximately 844ha.
- Access track and Access to A83

A26

- Borrow Pits
- Electrical Infrastructure including underground cabling , building/substation, energy storage facility
- Temporary Construction Compound- cabins, car parking, lay down areas and potential concrete batching
- Anemometry mast
- Crane hard standing

3.1 Construction Works:

It is estimated that it would take approximately up to 18 months to construct the Proposed Development.

Construction works would include the following main activities:

- working of borrow pits;
- tree felling in terms of AWI and plantation forestry;
- construction of the temporary construction compound;
- construction of site access tracks, passing places and any watercourse crossings;
- construction of culverts under tracks to facilitate drainage and maintain existing hydrology;
- construction of turbine foundations and transformer plinths;
- construction of an onsite substation and energy storage system;
- excavation of trenches and cable laying adjacent to site tracks;
- movement onto site and delivery and erection of wind turbines;
- commissioning of the wind farm; and
- restoration of temporary construction areas.

4.0

5.0

6.0 Ecology and Ornithological Surveys are required with mitigation:

I note that some species records exist for Atlantic salmon, European Eel and Red Squirrel; in view of this, I ask that Bat sp. Otter, Badger as well as FWPM in the ecological surveys.

- Ecological surveys- Habitats mapped, European Protected Species and Protected Species.
- Freshwater surveys to be updated included in Hydrological and Hydrogeological surveys
- Geology and Peat- I welcome that the applicant is to carry out a Peat depth survey so as to inform positioning of works and access in light of this I ask that a Peat Management Plan is submitted with this mapping process for approval.
  I note that Borrow pits have yet to be identified, In view of this, I would like the locations mapped and a Restoration Plan included and submitted for approval.
- Ornithological surveys

Mitigation

Where the EIA identifies likely significant adverse environmental effects, mitigation measures will be proposed in order to avoid, reduce, offset or compensate those effects. These mitigation measures may be embedded in the design or compensatory. Such embedded mitigation measures will likely include the movement or loss of turbines, access tracks and other infrastructure; and management and operational measures.

In line with the mitigation hierarchy identified in the Planning Advice Note (PAN) 1/2017[45] and 1/2013[46], the strategy of avoidance, reduction, offsetting and compensation seeks:

- First to avoid significant adverse effects;
- Then to minimise those which remain; and
- Lastly, where no other remediation measures are possible, to propose appropriate compensation.

In addition, enhancement measures may be incorporated into design of the Development to maximise environmental benefits.

Although PAN 1/2013 and 1/2017 refer to Town and Country Planning, as opposed to Section 36 applications, the guidance outlined remains applicable here. The residual effects will then be assessed to determine any effects predicted to remain following implementation of the recommended mitigation measures.

Cumulative effects: the applicant recognises there are a number of other windfarm applications in the area and will follow specific guidance and policy as applicable.

Key Questions for Council/Consultees

Q8.1 Do consultees agree that the range of surveys that will be carried out is sufficient and appropriate for the EIA?

I have provided advice relating to biodiversity in terms of the Ecological surveys- species, habitat mapping, Geology and Peat- location of borrow pits and restoration plans , peat depth mapping and Peat Management Plan and Hydrological and hydrogeological interest- fish and FWPM surveys are required.

Advisory: I ask that the applicant includes details of a CEMP and the employment of an Ecological Clerk of Works in order to ensure mitigation outlined in the above surveys and management plans are implemented along with Toolbox talks drafted so as to ensure that all appropriate measures are followed.

Q.8. 2 Are there any relevant consultees or organisations who should be contacted or other sources of information that should be referenced in respect of ecological assessment?

I advise that you consult The Argyll Fisheries Trust, The British Lichen Society – latter in relation to Ancient Woodlands, The Argyll Bird Club, The Scottish Wildlife Trust, The Lorne Natural History Society and The Woodland Trust.

Q.8. 3 Do consultees believe that there are particular habitats or protected species which should be considered in the assessment?

I have responded to this under the heading of habitats and species i.e. FWPM, Otter,

Q.8. 4. Do consultees agree that there is no potential connectivity between the development and the Glen Shira SAC and that consequently effects related to all designated sites can be scoped out, with no Appropriate Assessment required as part of the Habitats Regulations Appraisal process?

This is acceptable.

I hope you find my comments useful, if you require clarification, please do not hesitate to contact me.

Yours sincerely,

Marina Curran-Colthart, Local Biodiversity Officer, Argyll and Bute Council.

https://www.argyll-bute.gov.uk/sites/default/files/biodiversity_technical_note_feb_2017_4.pdf

https://www.nature.scot/sites/default/files/2019-09/Pollinators%20in%20Planning%20and%20Construction%20Guide.pdf

A29

ARGYLL DISTRICT SALMON FISHERY BOARD

Cherry Park, Inveraray, Argyll, PA32 8XE

Energy Consents Unit
Scottish Government
4th Floor
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

11th August 2021

Your Ref. ECU003291

Dear Energy Consents Unit,

SCOPING REQUEST FOR LADYFIELD WIND FARM, ARGYLL.

The Argyll District Salmon Fishery Board is responsible under the Salmon and Freshwater Fisheries (Consolidation)(Scotland) Act 2003 for the protection of salmonids in their District. The Argyll Fisheries Trust acts as scientific advisers to the Board. Our response covers all species of fish and their habitat. We provide the following response to the questions posed in the hydrology section of the document:

Q10.1: Are consultees content with the proposed methodology and scope of the hydrology and hydrogeology assessment?

We highlight that fish are not discussed in the Scoping Request. We know that Atlantic salmon, Brown trout (including sea trout) and European eels are present in the River Aray and the River Shira catchments and have the potential to be impacted by this development.

The locations of access roads and turbine locations are not provided in the Scoping request, so we advise that the general development of the site should specifically consider fish and fisheries. We highlight that stream crossings (which have the potential to fragment fish habitats) and consideration is given to the design, construction and mitigation of drainage of the site and specifically the infrastructure that has potential to affect water quality and fish habitat within and downstream of the site.

Q10.2: Does the Council, NatureScot, SEPA or other consultees have any information that would be useful in the preparation of the hydrology and hydrogeology assessment?

The opinion of the Argyll DSFB is that fisheries data are necessary to properly inform the consultation, build and commissioning process. Fish habitat and fish population surveys should be undertaken prior to the development to inform the design and construction phases of the project as well as post construction surveys to ensure Argyll DSFB that there is no

Chairman – Roger Brook
Clerk –Robert Younger Tel: 01499 302322 E-mail: robert.younger@fishlegal.net
Administrative Bookkeeper – Alyssa Stewart Tel: 01499 302322 E-mail: as@argyllfisheriestrust.co.uk

significant impact on fish populations or their habitats. Argyll Fisheries Trust hold historical data on fish populations and habitat in the Rivers Array and Shira which may be of importance to this assessment.

Yours sincerely,

Robert Younger
Clerk to the Board

A31

OUR REF; WID11584

Dear Sir/Madam

Thank you for your email dated 14/07/2021.

We have studied this Windfarm proposal with respect to EMC and related problems to BT point-to-point microwave radio links.

The conclusion is that, the Project indicated should not cause interference to BT's current and presently planned radio network.

Regards

Lisa Smith
Engineering Services – Radio Planner
Networks

A32

Good afternoon

Thank you for your email.

I write to confirm that the assets of Crown Estate Scotland are not affected by this proposal and we therefore have no comments to make.

Best regards

Olivia Morrad
Assistant Portfolio Co-ordinator
Crown Estate Scotland
REDACTED

Our team are currently working from home. Mail is occasionally being collected from our offices (addresses are at www.crownestatescotland.com/contact-us). Where possible, please email or call us rather than post mail.

A33

Defence Infrastructure Organisation

Jill Roberts
Ministry of Defence
Safeguarding Department
St George's House
DMS Whittington
Lichfield
Staffordshire
WS14 9PY

REDACTED

Your Reference: ECU00003291

Our Reference: DIO 10052148

Mr Lee Crosby
Energy Consents Unit
Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

08 September 2021

By email only

Dear Lee

Application reference:	ECU00003291
Site Name:	Ladyfield
Proposal:	THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 201 REQUEST FOR SCOPING OPINION FOR PROPOSED SECTION 36 APPLICATION FOR LadyField Wind Farm 22 Turbines @ 200m

Thank you for consulting the Ministry of Defence (MOD) in relation to the above Section 36 Scoping Opinion through your communication dated 14 July 2021

The Defence Infrastructure Organisation (DIO) Safeguarding Team represents the MOD as a consultee in UK planning and energy consenting systems to ensure that development does not compromise or degrade the operation of defence sites such as aerodromes, explosives storage sites, air weapon ranges, and technical sites or training resources such as the Military Low Flying System.

I am writing to tell you that, subject to the provision of appropriate lighting, the MOD has no objection to the proposed development.

The application concerns a development of 22 turbines with maximum blade tip heights of 200.00 metres above ground level. The development has been assessed using the location data Grid References below as provided by Arcus Consulting UK.

Turbine no.	Easting	Northing
1	211266	716919
2	211007	71,439
3	210766	715962
4	210544	715482
5	210520	715053
6	210310	714183
7	210340	714183
8	210952	713883
9	210792	716794
10	210552	716298
11	210265	716505
12	210058	716034
13	20,977	715353
14	210100	715026
15	209839	714555
16	209878	714138
17	209905	713757
18	210112	713469
19	210547	713448
20	210310	715824
21	210484	713892
22	210991	713439

The principal safeguarding concerns of the MOD with respect to this development of wind turbines relates to their potential to create a physical obstruction to air traffic movements.

Physical Obstruction

In this case the development falls within Low Flying Area 14, an area within which fixed wing aircraft may operate as low as 250 feet or 76.2m above ground level to conduct low level flight training. The addition of turbines in this location has the potential to introduce a physical obstruction to low flying aircraft operating in the area.

In the interests of air safety, the MOD will request that the development should be fitted with MOD accredited aviation safety lighting in accordance with the Civil Aviation Authority, Air Navigation Order 2016.

Defence Infrastructure Organisation Safeguarding wishes to be consulted and notified of any alterations or other submissions relating to this proposal in order that amendments can be checked for any additional impact on defence interests. Even the slightest change to the form and layout of the scheme may have significant impacts.

I trust this adequately explains our position on the matter. If you require further information or would like to discuss this matter further, please do not hesitate to contact me.

Further information about the effects of wind turbines on MOD interests can be obtained from the following websites:

MOD: https://www.gov.uk/government/publications/wind-farms-ministry-of-defence-safeguarding

A35

Yours sincerely,

Jill Roberts

Dear Lee,

Thank you for your correspondence concerning the proposed Ladyfield wind farm.

Fisheries Management Scotland (FMS) represents the network of Scottish District Salmon Fishery Boards (DSFBs) including the River Tweed Commission (RTC), who have a statutory responsibility to protect and improve salmon and sea trout fisheries and the fishery trusts who provide a research, educational and monitoring role for all freshwater fish.

FMS act as a convenient central point for Scottish Government and developers to seek views on local developments. However, as we do not have the appropriate local knowledge, or the technical expertise to respond to specific projects, we are only able to provide a general response with regard to the potential risk of such developments to fish, their habitats and any dependent fisheries. Accordingly, our remit is confined mainly to alerting the relevant local DSFB/Trust to any proposal.

The proposed development falls within the Argyll District Salmon Fishery Board district, and the catchment relating to the Argyll Fisheries Trust. It is important that the proposals are conducted in full consultation with these organisations (see link to FMS member DSFBs and Trusts below). We have also copied this response to these organisations.

Due to the potential for such developments to impact on migratory fish species and the fisheries they support, FMS have developed, in conjunction with Marine Scotland Science, advice for DSFBs and Trusts in dealing with planning applications. We would strongly recommend that these guidelines are fully considered throughout the planning, construction and monitoring phases of the proposed development.

• LINK TO ADVICE ON TERRESTRIAL WINDFARMS
• LINK TO DSFB CONTACT DETAILS
• LINK TO FISHERY TRUST CONTACT DETAILS

Regards,

Brian

Brian Davidson | Dir Communications & Administration
Fisheries Management Scotland
11 Rutland Square, Edinburgh, EH1 2AS
REDACTED
www.fms.scot

GLASGOW AIRPORT
PROUD TO SERVE SCOTLAND

FAO Lee Crosbie
Energy Consents Unit
By Email

29th July 2021

Dear Lee

Re: REQUEST FOR SCOPING OPINION FOR PROPOSED SECTION 36 APPLICATION FOR Lady Field Wind Farm
Our reference: GLA4016

I refer to your request for scoping opinion received in this office on 14th July 2021.

The scoping report submitted has been examined from an aerodrome safeguarding perspective and we would make the following observations:

- The site is located outwith the obstacle limitation surfaces and radar consultation for Glasgow Airport.

- It is within the instrument flight procedure safeguarding area, however, development below 300m above ground level will not require further assessment.

Yours sincerely

Kirsteen MacDonald

Safeguarding Manager
Glasgow Airport
REDACTED

A38

Lee

1. On behalf of Glasgow Prestwick Airport (GPA) Ltd – I have reviewed the Scoping Report (and associated documents) available on the Energy Consents Unit portal for the proposed Lady Field Wind Farm (**ECU00003291**).
2. The proposed scope of the Environmental Impact Assessment (EIA) seems appropriate.
3. Preliminary Line of Sight (LOS) analysis at proposed tip heights of the Lady Field Wind Farm– indicates all turbines will be significantly terrain shielded from GPA's primary radars and our initial Operational Assessment indicates no operational impact to ATC.
4. The proposed development has no impact on our published Instrument Flight Procedures (IFP's).
5. Consequently, GPA would be **unlikely to object** to this development should it come to a full section 36 planning application.
6. GPA however remain interested in how the Developer proposes to address the issue of aviation warning obstruction lighting scheme as required by the UK CAA for obstacles greater than 150m in height above local ground level in accordance with Article 222 of the UK Air Navigation Order (ANO) 2016.
7. GPA respectfully request that we are consulted with, should this proposed development be submitted as a formal Section 36 Planning application.

With Kind Regards

Steve Thomson

A39

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

By email to: econsents_admin@gov.scot

Lee Crosbie
Energy Consents Unit
4th Floor, 5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Enquiry Line: 0131-668-8716
HMConsultations@hes.scot

Our case ID: 300052741
Your ref: ECU00003291

27 August 2021

Dear Lee Crosbie

The Electricity Act 1989
The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017
Ladyfield Wind Farm
Scoping Report

Thank you for your consultation which we received on 14 July 2021 about the above scoping report. We have reviewed the details in terms of our historic environment interests. This covers World Heritage Sites, scheduled monuments and their settings, category A-listed buildings and their settings, inventory gardens and designed landscapes, inventory battlefields and historic marine protected areas (HMPAs).

The relevant local authority archaeological and cultural heritage advisors will also be able to offer advice on the scope of the cultural heritage assessment. This may include heritage assets not covered by our interests, such as unscheduled archaeology, and category B- and C-listed buildings.

Proposed Development
I understand that the proposed development comprises 22 wind turbines to a maximum blade tip height of 200m, plus associated ancillary infrastructure on land approximately 4.7 kilometres north of Inveraray.

Scope of assessment
Based on the information provided so far, we consider there is the potential for significant adverse impacts on the setting of historic environment assets, particularly around Inveraray, including:

- **Inveraray Castle (GDL 00223)**
- **Inveraray Castle (LB 11552) & other associated listed buildings such as Watch Tower, Dun Na Cuaiche (LB 11543), Carloon, Doocot (LB 11540), Garden Bridge, River Array (LB 11544) and Aray Bridge (LB 11545).**

As presently proposed, the impacts of the proposed windfarm could reach levels such that we might object to the proposed development. Further information such as visualisations is required to enable us to provide a more definite view on the principle of the proposed development.

Potential direct impacts
We can confirm that there are no scheduled monuments, category A listed buildings, Inventory battlefields, gardens and designed landscapes or World Heritage Sites within the proposed development boundary.

Potential impacts on the setting of assets
There are a number of nationally important historic environment assets within our remit in the vicinity of the development whose settings have the potential to be significantly adversely impacted by it. The annex to this letter gives details of a number of assets which appear likely to experience impacts. This list should not be treated as exhaustive and is only intended as a reference to those assets which at this stage appear most likely to be significantly impacted.

Potential cumulative impacts
We recommend that the potential cumulative impacts of the proposed development in combination with other developments in the vicinity be assessed. This should assess the incremental impact or change when the proposed development is combined with other present and reasonably foreseeable developments.

Scoping report
We welcome that cultural heritage effects are scoped in to the assessment. We welcome that the operational effects of the proposal on the setting of cultural heritage assets as well as direct impacts from construction will be assessed; we have provided further comments in the attached annex. We strongly recommend that our Managing Change Guidance Note on Setting is used to inform setting assessments and further information on good practice in cultural heritage assessment can be found in Appendix 1 of the EIA Handbook.

Further information
The Historic Environment Policy for Scotland (HEPS 2019) was adopted on the 01 May 2019 and replaced the Historic Environment Scotland Policy Statement (HESPS 2016). The Historic Environment Policy for Scotland is a strategic policy document for the whole of the historic environment and is underpinned by detailed policy and guidance. This includes our Managing Change in the Historic Environment Guidance Notes. All of these documents are available online at www.historicenvironment.scot/heps.

Practical guidance and information about the EIA process can also be found in the EIA Handbook (2018). Technical advice is available on our Technical Conservation website at http://conservation.historic-scotland.gov.uk/.

A41

We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is Urszula Szupszynska who can be contacted REDACTED by email on urszula.szupszynska@hes.scot.

Yours sincerely

Historic Environment Scotland

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

Annex

Historic Environment Scotland's interest
Based on the information provided at this stage we consider that there is the potential for significant adverse effects on the setting of nationally important designated assets located in the vicinity of the development site application boundary. As presently proposed, the impacts of the proposed windfarm could reach levels such that we would object to the proposed development. We would be happy to provide further advice about the principle of the development as further information such as visualisations become available. We recommend that further consultation with us is undertaken as soon as possible in the iterative design process for the development so that we can provide advice at a useful and constructive stage in the process.

The designated historic environment assets identified below are in the vicinity of the development and have the potential to be impacted by it. Our comments have focused on those assets where we consider that significant adverse impacts to their settings are most likely. This list is not considered to be exhaustive, and we would recommend that a wider search is undertaken of the surrounding area for potential impacts in the first instance; any impacts to the settings of assets should be assessed appropriately to determine whether these will be significant.

We generally recommend that a ZTV is used to identify potential setting impacts in the first instance and that consideration should be given to including assets where even though the ZTV indicates that no direct intervisibility would be possible there is the potential for turbines to appear in the background of key views towards these assets.

While the provision of the ZTV in the Scoping Report is a useful starting point, we would welcome sight of a larger-scale ZTV with heritage assets highlighted on them and provisional wireframes and photomontages in advance of any EIA Report and planning application and would be happy to advise on the initial findings of this assessment.

- **Inveraray Castle (GDL 00223)**

Inveraray Castle is one of the most grandly conceived and culturally significant designed landscapes in Scotland reflecting over 300 years of landscape intervention and evolution by the Earls and Dukes of Argyll. The parklands, woodland plantations and key buildings within the policies have been orchestrated around the castle on a vast scale taking full advantage of the rugged natural topography and inland sea setting. Guided by numerous important designers, Inveraray is an archetypal example of the 'Sublime' in Scottish landscape. The planned town of Inveraray is an integral and indivisible component of the Inveraray designed landscape. It embodies improvement ideals of the Scottish Enlightenment and is among the earliest experiments in town planning. The surrounding high moorland and distant mountains provide a spectacular setting for the castle, planned town and GDL.

The proposed wind farm is located less than 1km to the north of the designed landscape, on forested hills on the eastern side of Glen Aray. The designed landscape is located around the valley and mouth of the River Aray where it enters Loch Fyne. Its wooded valley sides, the location of the proposed wind farm, form an important part of the setting of the GDL. Although the submitted ZTV is not detailed enough to make a clear assessment, it appears to show large areas of the GDL where there could be visibility of up to 22 turbines.

The GDL provides the setting for a number of Category A-listed buildings which have been carefully designed and situated to accentuate the natural elements of the landscape with a planned visual relationship between them. These include the Rustic watchtower on the summit of Dun Na Cuaiche and the large circular tower doocot at Carloon, both of which are listed at Category A. The introduction of Gothick and rustic styles of architecture at Inveraray as a counterpart to the immense and rugged natural landscape reflected a growing appreciation of the 'Sublime' in Scottish landscape from the mid-1700s and is a fundamental characteristic of the GDL.

We would therefore expect the EIA Report to assess the impact of the proposed development on the Inveraray Castle GDL. This should consider impacts on views across, from and towards the GDL.

The built structures form important elements in both static views and contrived sequential views as one moves through the GDL. The castle provides the principal focal point of the GDL and there are important views towards the Castle in its designed landscape setting from summit of Aray Bridge, from its formal gardens to the south and on approach to the castle from the Winterton Gate in which the proposed development may be visible.

There are also a series of important views from the parklands around the castle towards the Garden Bridge and Carloon Doocot to the NW and the Dun na Cruaiche Watch Tower to the NE in which there might be views of the proposed wind farm.

In terms of views towards the GDL, there are important views from Loch Fyne and from the road on its south side. These views show the castle and its planned town and the Aray Bridge surrounded by parkland juxtaposed with the Dun na Cruaiche Watch Tower and the dramatic mountain setting. These are views in which the Sublime rugged natural topography and inland sea setting of the GDL can be understood, experienced and appreciated. We would expect the EIA Report to assess the impact of the proposals on these longer views of the GDL from across Loch Fyne.

The castle and its associated structures are closely inter-related with the GDL, in which they form focal points. We have therefore considered the more detailed impacts on individual structures in the GDL in the following sections of this scoping response relating to listed buildings.

- **Inveraray Castle (LB 11552) & other associated listed buildings**

Located c.4km south of the proposed wind farm, Inveraray Castle forms the centrepiece of its Inventory designed landscape. Begun in 1746 to designs by Roger Morris, the building is an important and influential example, blending Gothick and castellated elements with classical order and proportion, to simultaneously reflect dualistic ideas of both ancestry and progress.

The EIA Report should provide a detailed assessment of the setting of the castle, including consideration of views from, towards and sequential views on approach to the castle.

Set within its mature parklands on the banks of the River Aray, the castle provides the principal focal point of the GDL and there are a series of important views from the parklands around the castle towards the Garden Bridge and Carloon Doocot to the NW, the Dun na Cruaiche Watch Tower to the NE and the ornamental Aray Bridge to the SE. While the wind farm would not be visible in views to the SE towards the Aray Bridge, it would potentially be visible in views towards the Garden Bridge and the Doocot to the NW and towards the Watch Tower to the NE.

The EIA Report should assess impact of the proposals on views from the principal rooms of the castle, which are laid out on the upper ground floor and flank the two main entrances, which are located on the SW and NE fronts.

In terms of views towards the Castle, there are important views of the castle from the summit of the Aray Bridge and from the formal gardens to the south of the Castle in which the turbines may be visible.

We would also expect the EIA Report to analyse sequential views of the castle, including views on the modern approach to the Castle from the **Wintertown Gate, proceeding from Castle Lodge** at the north end of the town's **Front Street**, westwards across the Wintertown Park and arriving at the castle at the public car park on its NW side.

- **Watch Tower, Dun Na Cuaiche (LB 11543)**

To the northeast of the castle, Dun Na Cuaiche (the hill of the cup) and the watchtower on its summit, is a dominant part of the natural topography which makes a significant contribution to the setting of the castle and the overall experience of the designed landscape. Designed by Roger Morris in 1747-8, the Watch Tower is contemporary with the work by the same architect at the Castle.

The Gothick folly serves as both a viewpoint and an eye-catcher. As a viewpoint, it provides the principal high ground viewpoint for the castle, town, parklands and plantations, with the loch, moorland and mountains of Argyll forming the wider backdrop. While views from within the watch tower itself are channelled towards the castle, town and designed landscape, there are wider panoramic views of the landscape and Loch Fyne from the vicinity of the watch tower which take in the location of the proposed wind farm.

It also serves as an eyecatcher and views towards the distinctive tower set prominently on its rocky summit from the Castle and its GDL, the planned town and from across Loch Fyne should be considered in any assessment of impacts on its setting.

We therefore expect the EIA Report to assess impact on views both towards the watch tower, including longer views from the south side of Loch Fyne, and views from the watch tower towards the proposed development.

- **Carloon, Doocot (LB 11540)**

The large cylindrical tower Doocot was designed by Roger Morris in 1747. Located at the northern end of the park on the banks of the River Aray and flanked by mature woodland, it is an important element of the designed landscape, drawing the eye into the furthest reaches of the parkland. As an eyecatcher it terminates the vista of the Oak Walk avenue. It is visible from both the **Garden Bridge**, over a kilometre away at the south end of the Oak Walk avenue and from the summit of the Aray Bridge, 2 km to the SE. The wind farm may be visible in these important planned views towards the Carloon Doocot and we would expect the EIA Report to assess the impacts on its setting, specifically views towards it from the Aray Bridge, the Garden Bridge and Oak Walk Avenue.

- **Garden Bridge, River Array (LB 11544)**

This classical bridge was designed by John Adam in c.1761. An important built element within the GDL, it forms part of the historic Grand Approach, an older entrance route through the estate, which was established in 1775 and which approached the castle from the NW. The Garden Bridge is also axially aligned with the Carloon Doocot. The EIA Report should assess the impact of the proposed wind farm on both views towards and from the summit of the bridge.

- **Aray Bridge (LB 11545)**

This classical bridge designed by Robert Milne in 1774 carries the main road across the mouth of the River Aray to the SE of Inveraray Castle, and marked the formal approach

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

to the estate and planned town from the N. From the summit of the humpback bridge there are important views of the Castle in its designed landscape setting as well as a view towards the Carloon Dovecot along the axis of the Oak Walk avenue 2 km to the NW. The wind farm may be visible in these important views from the bridge and should be assessed.

- **Ardanaiseig House GDL**

Located approximately 7km to the north of the proposed windfarm, we welcome the proposal in the Scoping Report to assess the impact of the development on the setting of this Inventory designed landscape.

Scheduled monuments

We consider that a 5km boundary for automatically scoping in sites is not particularly effective for assessing historic environment interests, particularly given the height of the proposed turbines.

The ZTV indicates that the area most likely affected would be a north-south corridor roughly following topography and the A819. There are few scheduled monuments within this corridor, but there are a significant number of monuments on Loch Awe to the north and north-west of the development site, and to a lesser extent some clustered around Loch Fyne to the south. These may also be affected.

We agree with the approach as set out in Paragraph 9.4 of the scoping report, that consideration should be given to heritage assets along Loch Awe where views southwards across the loch may contribute to their cultural significance, and this includes a number of crannogs and island castles such as 'SM 2219 Fraoch Eilean, castle' and similar consideration should also be given to assets around Loch Fyne.

Specific assets

For the three monuments that lie within 5km of the development site (and hence are automatically scoped in), we have the following comments:

SM253 Inveraray Castle, cross is located in garden ground on the south-east front of Inveraray Castle and comprises a late-medieval disc-headed cross with a socket stone that was brought to Inveraray from Tiree during the late 19th Century and re-erected as a garden ornament close to the castle. Its cultural significance is vested in its survival as a well-preserved cross and base that contribute to our understanding of sculpture and ecclesiastical organisation in Scotland. Its setting is now localised and anchored around its appropriation as part of the designed landscape surrounding the castle and therefore a significant adverse impact is unlikely.

SM254 Inveraray, cross, Front Street is located on the shorefront in Inverary and comprises a market cross of 15th century date that has been relocated at least twice. its setting is focused on the immediate townscape that surrounds it and therefore a significant adverse impact is unlikely.

SM4186 Keppochan, cup marked stone 600m ESE of is located above Claddich on the southern shore of Loch Awe and comprises a cup marked stone of prehistoric date. Its setting is likely focused on Loch Awe below it and therefore a significant adverse impact is unlikely.

Further afield, **SM 2219 Fraoch Eilean, castle** is located in a strong defensive location on an island in Loch Awe and comprises a multi-phase castle dating from the 13th to 18th centuries. Whilst the ZTV is not sufficiently detailed to show whether the turbines would be visible from the castle, its setting is one that could potentially be affected upon by the introduction of turbines in views towards the shore from the monument. As such, there is the potential for an adverse impact on its setting, so we would expect an EIA Report to fully assess the impact of the proposed wind turbines on the setting of the monument. A visualisation (wireframe or photomontage) to show the proposed turbines from the monument or immediately adjacent to the island would be helpful.

There are also a selection of monuments in the Kilchrenan area that have sensitive settings, such as **SM 4120 Caisteal Suidhe Cheannaidh, dun 470m NW of Achnacraobh** and a number of cairns closer to the shore of Loch Awe. Whilst these monuments have settings that relate more to Loch Awe than the mountains to the east of Loch Awe, wider views could still potentially be affected by the turbines, and hence impact on their settings is possible and the potential impacts on their settings should therefore be considered and visualisations provided if and where appropriate.

Scoping report
We welcome that the scoping report states that direct impacts and impacts on the setting of assets will be assessed and that mitigation for any significant effects will be identified. As indicated above, we would welcome further early consultation as the design of the project progresses so that we can provide advice regarding impacts on the setting of assets at a useful and constructive stage in the project design process.

We welcome the information provided regarding the baseline historic environment at this stage. Consultation with HES and the West of Scotland Archaeological Service (WoSAS) is proposed, and as noted above we would welcome further consultation on this proposal should it go forward.

We note that 5km study area is being proposed for the assessment of potential impacts on the setting of assets. We understand that a sieving exercise will be undertaken for heritage assets between 5 and 15 km from the Development to select heritage assets that may receive a change in setting that affects their cultural significance.

We recommend that the assessment will adhere to the guidance provided in our Managing Change guidance note on setting and the EIA Handbook.

Summary
We consider that the layout as currently proposed has the potential to cause significant adverse effects on the setting of heritage assets including Inveraray Castle GDL; Inveraray Castle and its associated listed buildings.

We request that further pre-application consultation is undertaken with us as early as possible in the iterative design process so that we can provide effective advice at a useful stage in the EIA process regarding the potential for significant impacts on assets within our remit and any required mitigation. We are also happy to provide further advice on the requirement for visualisations as the design progresses.

Historic Environment Scotland
27 August 2021

Historic Environment Scotland – Longmore House, Salisbury Place, Edinburgh, EH9 1SH
Scottish Charity No. **SC045925**
VAT No. **GB 221 8680 15**

A49

Dear Sir/Madam,

PROPOSAL: REQUEST FOR SCOPING OPINION FOR PROPOSED SECTION 36 APPLICATION FOR LADYFIELD WIND FARM
LOCATION: 4.7km North of Inveraray

With reference to the above proposed development, it is confirmed that our calculations show that, at the given position and height, this development lies outwith the safeguarding zone for any Highalnds and Islands Airport.

Therefore, Highlands and Islands Airports Limited has no objections to the proposal and need not be consulted further.

Yours faithfully,

Safeguarding Team
Highlands and Islands Airports Limited
Head Office, Inverness Airport, Inverness IV2 7JB
✉ safeguarding@hial.co.uk www.hial.co.uk

Our Ref: SG31805

Dear Sir/Madam

The proposed development has been examined from a technical safeguarding aspect and does not conflict with our safeguarding criteria. Accordingly, NATS (En Route) Public Limited Company ("NERL") has no safeguarding objection to the proposal.

However, please be aware that this response applies specifically to the above consultation and only reflects the position of NATS (that is responsible for the management of en route air traffic) based on the information supplied at the time of this application. This letter does not provide any indication of the position of any other party, whether they be an airport, airspace user or otherwise. It remains your responsibility to ensure that all the appropriate consultees are properly consulted.

If any changes are proposed to the information supplied to NATS in regard to this application which become the basis of a revised, amended or further application for approval, then as a statutory consultee NERL requires that it be further consulted on any such changes prior to any planning permission or any consent being granted.

Yours faithfully

NATS

NATS Safeguarding

E: natssafeguarding@nats.co.uk
4000 Parkway, Whiteley,
Fareham, Hants PO15 7FL
www.nats.co.uk

NATS Public

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NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

Energy Consents Unit
Scottish Government

By email only to: econsents_admin@gov.scot

31 August 2021
Our ref: CPA162524
Your ref: ECU00003230

Dear Sir / Madam,

THE ELECTRICITY ACT 1989

THE ELECTRICITY WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

SCOPING OPINION REQUEST – LADYFIELD WIND FARM PROPOSAL, ARGYLL AND BUTE

Thank you for your consultation dated the 14th July 2021 request comments on the scope of the Environmental Impact Assessment for the proposed Ladyfield Wind Farm (hereafter referred to as 'the Proposal').

We understand the Proposal will consist of up to 22 turbines with a maximum tip height of up to 200 metres (m) along with ancillary infrastructure including access tracks, hard-standings, underground cabling, control building and substation compound, battery storage units, temporary construction compound and laydown areas, and borrow pits. The Proposal will be located on land approximately 4 kilometres (km) north of Inveraray in Argyll and Bute.

1. Summary

The key issues NatureScot require to be addressed in detail as part of the EIA process include:

- Landscape and visual impacts, including impacts on locally and nationally important landscapes and cumulative impacts;
- Impacts on Glen Etive and Glen Fyne Special Protection Area (SPA) for breeding golden eagles;
- Ornithological impacts, including direct impacts on golden eagle territories and various other Schedule 1 bird species.

Our initial advice, based on our current understanding of the Proposal is that it is located in a highly sensitive and prominent location which may give rise to natural heritage concerns which could prove difficult to overcome. **As such, there is a possibility that we may object to an application for permission to build a wind farm of this scale in this location**. These comments are made without prejudice to any future planning application**.**

The Enterprise Centre, Kilmory Industrial Estate, Lochgilphead, Argyll PA31 8SH
An t-Ionad Iomairt, Raon-Gnìomhachais Chille Mhoire, Ceann Loch Gilb, Earra-Ghàidheal PA31 8SH
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2. Our Advice

2.1. Landscape and Visual

We advise that this location is unlikely to be able to accommodate the nature, height and scale of wind farm development proposed. The Proposal is located in a highly sensitive location which may give rise to significant impacts on natural heritage resources, especially in relation to landscape. NatureScot expect cumulative landscape issues to be particularly relevant and the landscape and visual impacts are likely to be significant. **As such, there is a possibility that NatureScot may object to an application for permission to build a wind farm of this scale in this location.**

The height, scale and number of turbines proposed and the requirement for aviation lighting in this highly sensitive location is likely to raise issues of national interest and potentially result in an objection from NatureScot to this Proposal.

The Proposal site is surrounded by a large number of locally and nationally designated and important landscapes which reflect the sensitivity and special qualities of the area (Scoping Figure 6.4a). While we would expect that the LVIA reflects all likely significant impacts, it is advised, in particular, that the 22 x 200m high turbines could potentially result in significant adverse impacts, including cumulative and night time impacts, in relation to highly sensitive landscapes including:

- Views and setting of Inveraray Castle Designed Landscape (including the town of Inveraray) especially as appreciated from Inner Loch Fyne area including e.g. key routes (A83 and A815, NCRs etc), hills, recreational locations and settlement.
- Views from within Inveraray Castle Designed Landscape and conservation area of Inveraray.
- People's appreciation and enjoyment of the special landscape qualities of Loch Lomond and The Trossachs National Park (LLTTNP).
- People's experience of Ben Lui Wild Land Area and Loch Etive Mountains WLA and their wild land qualities.
- Both Loch Awe area and Loch Fyne area where the width of the receiving uplands allows relatively close views of the Proposal from both lochs/ coasts, including the sensitive settled coastal edge/ loch shore. It should be noted that the distinctive Inner Loch Fyne area, and northern Loch Awe area have particular sensitivities as highlighted in the Argyll and Bute Landscape Wind Energy Capacity Study (LWECS).

The location of the Proposal is also contrary to the spatial recommendations for wind energy development in the Argyll and Bute Landscape Wind Energy Capacity Study (LWECS). The Proposal is located in the Loch Fyne Upland Forest Mosaic landscape character type which has no scope for very large turbines (>130 m tip height) and some scope for the large turbines (80 – 130 m).

We have the following responses to make to the specific questions raised in Section 6.9 of the Scoping Report:

Q6.1 – No additional comments.

Q6.2 - We agree to a 45km study area.

Q6.3 - We think it is premature to scope out the LCTs/ LCUs over 10 km distant as shown in table 6.1, where there are areas of visibility given the scale and lit nature of this proposal and advise that these should be included for further consideration at this stage. A reduced radius would need to be justified and agreed.

We highlight that the Proposal is immediately adjacent to (c1km) LCT20 Rocky Mosaic (West Loch Fyne) and it should be included. The assessment of effects on landscape receptors should focus on potential significant effects. Landscape effects should include effects on the landscape experience including e.g. sense of remoteness, cultural / historical aspects that influence the character and experience of the landscape. All LCTs that could be significantly affected should be included.

Q6.4 - While we generally concur with the focus in Table 6.2 landscape designations and WLAs, we request one or two draft wirelines to show worst case scenario from each of the following designations with visibility at c20km before scoping these receptors out: Knapdale Melfort APQ, Ben Nevis and Glen Coe NSA, Ardchattan Priory, Ben More-Ben Ledi WLA. Confirmation of no lighting visibility from these receptors should also be provided.

Q6.5 - We advise (informed by a desk based study) that there are some obvious viewpoint omissions and additional viewpoints which should be explored and considered for assessment viewpoints – please see Annex 1 for further details.

Q6.6 – Please see our advice in Annex 1.

2.2. Ornithology

We advise that this will likely be a challenging site in relation to the sensitive bird interest, in particular to golden eagles and we have already provided pre-application advice to the consultant in relation to the scope of the ornithology surveys.

Given the sensitive location of the Proposal directly adjacent to the Glen Etive and Glen Fyne SPA, the EIA Report will need to include a robust assessment of the impacts on golden eagle, not only in relation to the SPA, but also in the context of its population NHZ population and transient birds. To help you do this, we suggest that satellite tag data for the two golden eagles in the vicinity of the Proposal area should be obtained from Natural Research Projects Ltd.

In addition, we wish to highlight that the Golden Eagle Topography (GET) model has recently become available to developers to help consider impacts on golden eagles[1]. NatureScot would be pleased if the Applicant would contact us to discuss the use of this model, in relation to the Proposal.

Cumulative impacts on ornithological interests from other operational and consented wind farm developments should be assessed at the Natural Heritage Zone (NHZ) level.

As the Proposal is located within commercial forestry, the Applicant will need to take into account whether any ongoing forestry work has affected the recorded activity, and also what foraging habitat changes there may be from felling and restructuring should this happen during the lifetime of the proposed wind farm.

We have the following responses to make to the specific questions raised in Section 7.7 of the Scoping Report:

Q7.1 - We note that ornithology surveys have been ongoing at the site since March 2020 and are due for completion in March 2022. The proposed survey methodology appears to be in line with NatureScot guidance[2]**,** although until we receive the EIAR and associated technical appendices, we cannot confirm that we are content with the ornithology surveys and assessments undertaken.

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[1] NatureScot statement on modelling to support the assessment of forestry and wind farm impacts on golden eagles (2021).
[2] Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms (2017).

Q7.2 – We are not aware of any other other relevant organisations who should be contacted with respect to the ornithology assessment.

Q7.3 –We agree with the list of species considered as IOFs based on the survey results to date. This list may need revised if the Year 2 survey work picks up any additional IOFs.

Q7.4 – We agree that there is no potential connectivity between the Proposal and any other designated sites, with the exception of the Glen Etive and Glen Fyne SPA.

2.3. Ecology

We have the following responses to make to the specific questions raised in Section 8.7 of the Scoping Report:

Q8.1 - The proposed scope of surveys and assessment of the key ecological receptors identified in the Scoping Report should adequately assess the overall ecological impacts. Any deviations from guidance should be explained in the EIA Report (EIAR).

Q8.2 – We are not aware of any other relevant consultees who should be contact with respect to the ecological assessment and scope of baseline information gathering.

Q8.3 – We agree with the list of sensitive habitats and species scoped into the EIA as detailed in Section 8.5.

Q8.4 – We agree that there is no potential connectivity between the Proposal and Glen Shira SAC. As such, no further consideration of this designation is required.

We note that access to the site will be taken from the A83 and will utilise existing forestry tracks where possible. Any new tracks should be subject to appropriate ecological surveys and assessment. If track widening works are required then ecological surveys should also be conducted in those areas if there is a possibility of protected species or habitats being present.

2.4. Hydrology and Hydrogeology

We refer the Applicant to SEPA for advice on the methodology and scope of the hydrology and hydrogeology assessment.

2.5. Geology and Peat

The scoping layout indicates that parts of the site are underlain with Class 1 and Class 2 peatlands which are nationally important carbon rich soils, deep peat and priority peatland habitats[3]. As such, there is a requirement for a complete peat probing survey to be undertaken, and an associated NVC survey, to ascertain the quality and distribution of peatland and priority habitats across the site as per NatureScot guidance[4].

Albeit that these classifications may change in light of detailed site specific surveys, we advise that efforts are made to avoid the siting of turbines and associated infrastructure on areas of nationally important peatland and areas of deep peat. The EIA Report should demonstrate that any significant effects have been substantially overcome by siting, design or other mitigation. Details of all mitigation, including a peatland management plan and a habitat management plan should be included in the EIAR.

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[3] Carbon and Peatland Map (2016).
[4] Advising on carbon-rich soils, deep peat and priority peatland habitat in development management.

We refer the Applicant to SEPA for advice on the questions posed in Section 11.8 of the Scoping Report.

2.6. General Scoping Advice

We refer the Applicant to our '*general scoping and pre-application advice'* note[5] which provides advice on other considerations which should be taken into account in the EIAR. When formatting the EIAR for submission, we wish to highlight the following requirements:

- For ease of use, text chapters and appendices of EIAR should be presented on A4 paper (rather than A3);
- Landscape figures to be provided in a ring binder (rather than being spiral or otherwise bound), for ease of use during site visits; and
- **A full hard copy of the landscape figures should be sent directly to the NatureScot case officer** – all other supporting information can be electronic but please ensure that file sizes are <10MB per pdf.
- **Ensure that electronic file names clearly indicate their content (e.g. Wind Farm Name - LVIA Figure 6.2a – VP1 - LOCATION). If figures are not labelled appropriately, we will request that they are amended and reissued.**

3. Conclusion

NatureScot aims to work with the renewable energy sector to secure good development in appropriate locations. Notwithstanding other significant impacts associated with ornithology, which may become evident, we advise that should the Applicant wish to progress this proposal, they may wish to explore a significant reduction in turbine height and numbers, and a revised layout, with the aim of minimising the potential significant adverse effects on landscape. With that aim in mind, we look forward to working with the Applicant and ECDU further on this Proposal. **As the Proposal currently stands, it is likely to raise issues of national interest which may lead to an objection from NatureScot.**

Please do not hesitate to contact me should you have any queries on our advice above.

Yours sincerely,

[by email]

Catriona Laird
Operations Officer – Mid Argyll and Kintyre
Argyll and Outer Hebrides
Catriona.laird@nature.scot

[5] General pre-application and scoping advice for onshore wind farms (2020).

Annex 1 – Landscape and Visual Advice

1. Wild Land Assessment

Ben Lui Wild Land Area (WLA) and Loch Etive Mountains WLA

Given the proposed turbines are up to 200m tall, this Proposal could introduce turbine visibility and lighting into parts of the WLAs that are currently not influenced by wind farm development. Night time lighting is a particular issue for wild land areas. We advise that a Wild Land Assessment, including an assessment of cumulative effects and aviation lighting effects, should be carried out for both these WLAs using our guidance[6].

We request further information is submitted to establish the scope of the Wild Land Assessments at this early stage. A brief justification accompanied by a legible detailed ZTV for the WLAs and a cumulative ZTV showing the additional visibility of this Proposal, together with 3 or 4 wirelines (with lit turbines marked) illustrating the likely effects from different parts of the WLA would be helpful, including representative low and high elevation, and interior and peripheral locations. Any news areas of visibility; especially where the qualities are strongly expressed are of particular interest. The focus should be on how the Proposal could potentially affect the wild land qualities – please refer to the WLA descriptions on our website. This brief overview should allow us to make a recommendation on the scope of the assessment.

2. Viewpoint Selection

We reserve our advice until legible ZTVs on a 1:50,000 OS base map and other information outlined is made available in accordance with guidance. Draft wirelines from the draft viewpoint locations being considered would also be very useful at this early stage.

While we welcome the draft viewpoint selection, we advise the applicant needs to consider further viewpoints to be sufficiently representative given the level of visibility and range of visual receptors. For example, 8 of the 17 draft proposed viewpoints are from roads or tracks.

We would be happy to advise on a revised viewpoint selection if provided with:

- ZTVs (both hub and tip) at A0 scale with detailed 1:50,000 OS base map in paper and electronic form;
- ZTV / Designations map with VPs mapped on it;
- A table of fully representative revised viewpoints with justification for their inclusion including distance, direction, designation, character type, etc, in accordance with guidance;
- Draft wirelines if available;
- Lighting information as per guidance to advise on night time VPs including light intensity ZTV; and
- Detailed ZTVs for both WLAs and Inveraray Castle Designed Landscape (ICDL).

We advise (informed by a desk based study) that there are some obvious viewpoint omissions and additional viewpoints which should be explored and considered for assessment viewpoints. The onus is on the landscape consultant to identify a representative range of viewpoints. Should omissions become apparent at EIAR stage, we may request further viewpoint information. Any omitted viewpoint wirelines should be included as an Appendix in the EIAR.

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[6] Assessing impacts on Wild Land Areas – Technical Guidance (2020).

The proximity to ICDL, and other highly sensitive landscapes including the small scale Rocky Mosaic, Mountain Glens and Steep Ridgeland and Mountains indicate that ICDL, glen, coastal, water-based, and upland views are likely to be key. Some initial suggestions for additional LVIA assessment viewpoints to explore include representative views from:

- Key views of / and from ICDL including key approach views such as the road bridge over the River Aray and key planned views.
- LLTNP including key hill views e.g. Beinn Lochain, Beinn Bheula.
- Glen Shira including scattered settlement.
- Water based users of Loch Fyne and Loch Awe including any ferry routes/ recreational water users.
- Loch Fyne coast in particular the stretch between St Catherine's and Newton area to include recreational and residential users e.g. beaches, caravan parks, hotels, picnic sites etc.
- Northern Loch Awe area in particular the area of visibility in upper Loch Awe water and coast including key routes, key hill views, beaches, caravan parks, hotels, picnic sites etc.
- Key approach/ gateway views to Loch Fyne and Loch Awe.
- Key recreational areas and routes e.g. beaches, LDRs, NCRs, popular hills in closer proximity such as Stob an Eas etc.
- (scattered) settlement
- Tourist attractions e.g. Auchindrain Township.

In addition, VP17 'A85, Pass of Brander' is incorrect and should be named 'A85 layby'. This needs to represent the worst case scenario, which is likely to be from the layby at NN099258.

Draft Night Time Viewpoints

We request the pre-application lighting information detailed in our guidance (including e.g. lighting ZTVs and wirelines) to allow us to agree night time visualisation viewpoint locations at this early stage. We advise that the locations for night-time viewpoints should be carefully reconsidered as 3 road viewpoints (VPs 1, 3 and 7) are unlikely to be representative of the range of potential significant effects. The Ben Lui WLA and Loch Etive Mountains WLA should be considered for representative night time viewpoints.

3. <u>Potential lighting effects</u>

The EIA / LVIA should include a Night Time Lighting Assessment as this is particularly relevant for very large typology turbines such as these. The requirement for aviation lighting of turbines is a fairly recent issue for the wind energy sector and we have relatively limited experience of assessing the effects and understanding the impacts. Nonetheless, the effects of aviation lighting could be significant in some locations and should be assessed through the EIA process.

Wind farms tend to be located in areas which contain limited artificial lighting. Darkness/dark skies in these areas may be valued by many people, a proportion of whom may be actively seeking out and enjoying good views of the night sky. In our experience turbine lights can be seen over considerable distances, with some clearly visible at 20-30 km. A flashing effect can also occur, depending on wind direction, as turbine blades pass in front of the nacelle-mounted lighting.

Turbine lighting could therefore adversely affect people's experience and enjoyment of darkness / dark skies and of sunset and sunrise views (noting that turbine lights are switched on before dusk and off after dawn). As a result, we recommend that these effects should be carefully assessed and that mitigation is employed wherever possible.

Note that the effects of aviation lighting should be factored into the Wild Land Assessment.

The assessment should take into account the baseline darkness / artificial lighting characteristics and people's likely use of different areas during darkness and low light (dusk / dawn) conditions. In some cases, there may be the need to select some of the LVIA assessment viewpoints on the basis of the turbine lighting impacts, as opposed to day-time visual effects. Edge of settlement locations are likely to be better lighting assessment viewpoints, compared with locations within towns/ villages (i.e. given the influence of existing street lighting, etc.). As for any component of the wind turbine, they should assess for all, where lighting will not be visible then they can just add a simple statement in the assessment table.

Importantly we advise that:

- Night-time visualisations from a limited but proportionate number (we suggest two or three) of representative viewpoints. These may be selected on the basis of sensitivity or regular usage during low-light conditions.

- Lighting is shown at both 200cd and 2000cd on separate visuals. Our experience shows that the visibility of aviation lights and their perceived strength depends on the night time lighting context. There is also some doubt as to how well the dimming of the lights works in the real world where conditions cover a huge range of variability. Production of visuals at 200cd and 2000cd will help to clarify the lighting scenarios and ensure that aviation lighting effects are not underplayed.

- Photomontages should illustrate cumulative effects of lighting if there are other wind farms with lighting proposed nearby.

A59

giving nature a home
rspb Scotland

Lee Crosbie
Case worker
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

09 August 2021

Dear Lee,

Scoping opinion for proposed Ladyfield Wind Farm under Regulation 12 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, land between Inveraray and Cladich, Argyll and Bute.

Thank you for consulting RSPB Scotland regarding this scoping opinion for a windfarm development at Ladyfield by Ridge Clean Energy Limited. The proposal consists of a wind farm in the order of 22 turbines with a maximum blade tip height of 200m. The proposal will also include access tracks, ancillary buildings, a substation, external turbine transformers, temporary construction compound, hardstanding, borrow pits and potentially a meteorological mast and energy storage facility. A draft scoping report was enclosed with this consultation and will be referenced as required in this response. It is situated within an area of mainly commercial forestry, to the west of Loch Fyne, grid reference NN 10500 15500.
RSPB Scotland advises that an Environmental Impact Assessment (EIA) for this proposal should establish the potential impacts of the development on important bird populations within the area, particularly in relation to raptors and divers.

Bird Species of Conservation Concern
The following Annex 1 bird species may all occur within or close to the proposal: golden eagle, white-tailed eagle, hen harrier, red-throated diver. Other Birds of Conservation Concern and important Local Biodiversity Action Plan (LBAP) species include black grouse. The potential impacts on all of these species should be adequately covered within the EIAR.

Survey requirements
We advise that an EIAR for the proposed development should include a comprehensive study of bird use, throughout the year, in the area of and adjacent to the windfarm site, in order to obtain an understanding of the potential impacts of the proposal on bird populations within the area. This should follow the standard ornithological requirements/techniques contained within NatureScot Guidance – 'Recommended bird survey methods to inform impact assessment of onshore windfarms' (Revised 2017) which is available at https://www.nature.scot/recommended-bird-survey-methods-inform-impact-assessment-onshore-windfarms

South Scotland Regional Office
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rspb.org.uk

BirdLife INTERNATIONAL

The surveys should establish what raptors and other species are using the site area through vantage point observation surveys, plotting of flightlines and related information and followed up by collision risk assessment to determine any potential impacts.
An assessment of the forestry and open ground / loch habitat suitability should be undertaken and should consider present usage in comparison to the potential alteration of habitat and displacement effects which may occur due to the development.
The EIAR should include an assessment of any access routes, construction, and maintenance tracks to enable consideration of the entire development. We would advise that options for the grid connection should also be considered by the EIAR, to enable a full assessment of the projects impacts. In relation to any overhead grid connections, it is important to ensure that the route does not represent an issue for bird species, particularly any regular waterfowl movements within the area.
Any anemometer mast related to this proposal should be fitted with bird diverters to ensure that potential risk of bird collision is minimised.

Golden and white-tailed eagle
This site lies within an area of open ground which forms part of the GLAE1 golden eagle pair's home range and there are also several other golden eagle territories in the surrounding area including the pair known as GF1 and the proposal directly backs on to the Glen Etive and Glen Fyne SPA. Therefore, a cumulative assessment of impacts on the ability of the range to support golden eagles should be undertaken. N.B. There are already five active windfarms within a 20km area and these should also be included within any assessment. Golden eagle range reports have been produced by NatureScot for Natural Heritage Zone 14 'Argyll West and Islands', these should be accessed to inform the EIAR of the impacts this proposal will have on the active territories within this area. As mentioned in the scoping report, GET modelling should also be used to assess the implications of this proposal on the golden eagle territories in this area. There is also satellite tag information for a number of golden eagles within this NHZ and the developers should consult NatureScot to see if this information is available. As well as the fieldwork already mentioned above, further detailed survey work into the current occupation level especially foraging and home range usage within the area is required. A Habitats Regulations Appraisal (HRA) will be required.
White-tailed eagles are increasingly being reported from around this area, via both visual sightings and satellite tag information. We advise that since there is a possibility that birds may occupy this area within the project lifetime, ongoing assessment and mitigation are required. Survey work should therefore occur throughout the planning and installation periods (as well as post-construction).
Argyll Raptor Study Group should be contacted in relation to all raptor species as they will be able to provide more up to date information relating to the species that may be using the area surrounding this proposal.

Black grouse
We have historic records of black grouse within the area surrounding the proposal. Black grouse are a red-listed UKBAP species which has undergone long term range contractions and population declines. Over recent years the population across Argyll has also continued to show signs of decline. Any proposal should fully assess impacts on this species, including noise, and should avoid siting turbines close to any lek sites, especially those comprising of 4 or more birds. Consideration should also be given to mitigation works for the species within the site and surrounding area.

Red-throated divers
There is potential for red throated divers to use the lochs within the proposal area for breeding, any proposal should be designed to avoid impacts if the species is recorded during surveys. Turbines should be setback distances of 1km from lochans used by this species. Cumulative impacts with other active, consented, and proposed windfarms should be considered, and wider safeguarding applied to the Argyll diver populations.

Habitats & habitat management/mitigation
The EIAR should include a full survey, impact assessment and proposals for mitigation in relation to important habitats on this site. Mitigation should ideally minimise any impact and avoid areas of high-quality habitats found upon the site.

Particular attention should be given to peatlandn the Peatland and Carbon 2016 map, several proposed turbines, namely turbines 6, 7, 8, 19 and 22, would be situated on Class 2 peat. A full assessment of the carbon implications of this proposal should be undertaken by using the latest version of the Scottish Government's Carbon Calculator.
Consideration should be given to mitigation in regard to loss of further open ground habitat within this area which will result from the proposal directly from the turbines mentioned above and a barrier effect of the whole proposal. The EIAR should consider what mitigation measures are required to minimise the impact on important species and contain detailed ecological justification for any such proposals. Ideally, this should include relevant timeframes for mitigation in relation to site development.

Designated sites
Although the proposed site lies outwith any sites designated for their nature conservation importance, it does lie adjacent to Glen Etive and Glen Fyne golden eagle SPA. An assessment of the potential for this development to impact upon these sites should be carried out in line with the procedures for European sites as set out in the Habitats Regulations. The eagle range/s within the area of this proposal border ranges from within the SPA.

Cumulative impacts
An assessment of cumulative bird impacts in relation to other existing, consented, and proposed projects (predominantly forestry and wind farms), within this natural heritage zone (NHZ) should be undertaken. This should assess impacts on the NHZ populations especially applicable to golden eagle. NatureScot have guidance on the assessment of cumulative effect of windfarms which should be referred to. This proposal as mentioned above would sit between active windfarms (An Suidhe, Blarghour Farm and Clachan Flats) to the south west, west and east. There are another two wind farms Blarghour to the west and Creag Dhubh to the south east of the proposal that are currently at application stage. There are also three further windfarm scoping applications near this proposal, Balliemeanoch, Car Duibh and Eredine. All of the windfarms mentioned above either fall fully or partially within 10km of the proposal. Outwith the neighbouring windfarms there is currently another two active windfarms, one proposal has been consented and another at scoping within 20km. Within 30km there is again further windfarm developments with three active, one consented and a further five at scoping stage. This proposal if consented would be further infilling in this area of Argyll.

Conclusion
The location and size of the proposal necessitates detailed survey work (as per NatureScot guidance) and further in-depth modelling and research to be able to ascertain the full impact on bird interests present on the site. The surveys are required to determine potential collision risk of bird species and whether habitat loss/alteration, displacement and barrier effects are likely to impact upon them. More specifically, research and modelling are required to assess the consequences for golden eagles resulting from cumulative home range habitat loss.
We hope you find these comments helpful. Should you require clarification of any of the above points please do not hesitate to contact me.

Yours Sincerely,

Alasdair Lemon
Conservation Officer

A62

Please find attached Scoping Opinion response from Scottish Forestry.

In answer to the specific questions posed in the Scoping Request:

Q14.1: Do the consultees agree with the proposed methodology and scope of assessment?

Yes, the methodology and scope seem comprehensive. Cumulative impact may be an issue in the area due to the felling associated with the proposed SSEN transmission line and this should be considered in the report.

Q14.2: Are the consultees aware of any new guidance which should be taken into account?

All relevant guidance is published on our website. New additions include: Scottish Forestry Phytophthora ramorum Action Plan and Scottish Forestry - Cultivation Guidance (which may be relevant to any Compensatory Planting Plan)

Elaine Jamieson
Operations and Development Officer
Scottish Forestry

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Scottish Forestry / Coilltearachd na h-Alba

Scottish Forestry is the Scottish Government agency responsible for forestry policy, support and regulation.

In light of the ongoing public health advice to reduce unnecessary social contact during the outbreak of Covid-19, we have activated our Business Continuity Plan. More information can be found on our website.

Scottish Forestry

Scoping Opinion –PROPOSED SECTION 36 APPLICATION FOR Lady Field Wind Farm

Forestry and Woodlands

Scotland's forests make a substantial contribution to the economy at both national and local levels, they provide considerable environmental benefits and help to improve people's quality of life. The Scottish Government aims to maintain and enhance Scotland's forest and woodland resources for the benefit of current and future generations. To achieve this, we need to prevent inappropriate woodland losses (Scotland's Forestry Strategy, 2019).

The third National Planning Framework also recognises that Scotland's woodlands and forestry are an economic resource, as well as an environmental asset. The Climate Change Plan places emphasis on the fact that Scotland's woodlands deliver a wide range of benefits, including inward investment and jobs, climate change adaptation and mitigation, and the enhancement of the health and well-being of Scotland's communities. The Scottish forestry sector is worth almost £1 billion per year and employs over 25,000 people.

There is therefore a strong presumption in favour of protecting Scotland's woodland resources and the Scottish Government provides policy direction in the policy on control of woodland removal. Woodland removal should be kept to a minimum and where woodland is felled it should be replanted. The policy supports woodland removal only where it would achieve significant and clearly defined additional public benefits. In some cases, including those associated with development, a proposal for compensatory planting may form part of this balance.

The criteria for determining the acceptability of woodland removal is explained in the policy and the applicant should take them into account when preparing the proposal. Beyond this, the applicant should refer to guidance documents issued by Scottish Forestry (and previously by Forestry Commission- FC) in relation to good forestry practice and sustainable forest management.

Woodland Management and tree felling
Where woodland removal is proposed for development, the relevant Environmental Impact Assessment (EIA) regulations will apply and the EIA Report should justify and provide evidence for the need for woodland removal and the associated mitigation measures.

The first consideration for the applicant should be whether the underlying purpose of the proposal can reasonably be met without resorting to woodland removal. Design approaches that reduce the scale of felling required to facilitate the development must be considered and integration of the development with the existing woodland structure is a key part of the consenting process.

Integration of the project into future forest design plans is a key part of the development process. **The removal of large areas of woodland will not be supported.** When a proposed development or infrastructure requires to go through forestry, consideration should be given to forest design guidelines. The EIA Report should include a stand-alone chapter on 'Woodland management and tree felling' (a forest plan) prepared by a suitably qualified professional and supported by existing records, site surveys and aerial photographs. In order to present the relevant information about the forest and to secure compliance with the UK Forestry Standard, the applicant should consider the appropriate scope/scale for such plan.

In certain cases a forest plan of the proposed development area only is not appropriate. The applicant should consider the whole ownership, or multiple ownerships, or expands the scope of the forest plan so that to present the relevant information about that forest. Details of the proposed mitigation measures must be included in the EIA Report, not left to post-consent habitat management plans (or others) to decide and implement.

The chapter should describe and recognise the social, economic and environmental values of the forest and the woodland habitat and take into account the fact that, once mature, the forest would have been managed into a subsequent rotation, often through a restructuring (re-designing) proposal, according to the UK Forestry Standard, that would have increased the diversity of tree species and the landscape design of the forest.

The chapter should describe the baseline conditions of the forest, including its ownership. This will include information on species composition, age class structure, yield class and other relevant crop information. The chapter should describe the changes to the forest structure, the woodland composition and describe the work programme:

- the proposed areas of woodland for felling to accommodate the proposed infrastructures, including access roads, tracks, underground pipes and cables and any ancillary structures. Details of the area to be cleared around those structures should also be provided, along with evidence to support the proposed scale and phasing of felling;

- trees felled must be replanted on-site or compensated for (off-site planting) and these areas must be clearly identified in the plan. On-site replanting must always be considered first. The replanting operations must be appropriately described, including changes to the species composition, age class structure, timber production and traffic movements. Tree/shrub species must be suited to the site and the objectives of management;

- areas of open ground in the forest that are designed for biodiversity or landscape enhancement or for recreation opportunities should not be considered for on-site replanting (to compensate for woodland removal in other parts of the forest).

The applicant should consider the potential cumulative impact of existing and the proposed development on the forest resource in respect to the local and regional context. In particular consideration must be given to the implication of felling operations on such things as habitat connectivity, biodiversity, water management, landscape impact, impact on timber transport network and forestry policies included in the local and regional Forestry and Woodland Strategies and local development plans.

A long term forest plan should be provided as part of the EIA Report (as a technical appendix for context) to give a strategic vision to deliver environmental and social benefits through sustainable forest management and describes the major forest operations over a 20 years period.

UK Forestry Standard
The UK Forestry Standard is the Government's reference standard for sustainable forest management in the UK and provides a basis for regulation and monitoring. The Scottish Government expects all forestry plans and operations in Scotland to comply with the standards. Both felling operations and on and off-site compensatory planting must be carried out in accordance to good forestry practice- the EIA Report must clearly state that the project will be developed and implemented in accordance with the standard. A key component of this is to ensure that even-age woodlands are progressively restructured in a sustainable manner: felling coupes should be phased to meet adjacency requirements and their size should be of a scale which is appropriate in the context of the surrounding woodland environment.

Scottish Forestry
On the 1st of April 2019 Forestry Commission Scotland transferred into a new agency of Scottish Government called Scottish Forestry, responsible for forestry policy, support and regulation.

Scottish Forestry is the main forestry consultee and should be consulted throughout the development of the proposal to ensure that proposed changes to the woodland are appropriate and address the requirements of policy on control of woodland removal and the principles of sustainable forest management.

It is important that pre-application discussions takes place with the local Scottish Forestry Conservancy office, the planning authority and other relevant key agencies, at the earliest possible stage of the project, to ensure all parties have a shared understanding of the nature of the proposed development, information requirements and the likely timescale for determination. This collaborative approach will ensure that all forestry issues are identified and mitigated at the earliest opportunity. The applicant should allow sufficient time in their project plan to accommodate such advice.

Elaine Jamieson
3.8.21

A66

Friday, 16 July 2021

Local Planner
Energy Consents Unit
5 Atlantic Quay
Glasgow
G2 8LU

Development Operations
The Bridge
Buchanan Gate Business Park
Cumbernauld Road
Stepps
Glasgow
G33 6FB

Development Operations
Freephone Number - 0800 3890379
E-Mail - DevelopmentOperations@scottishwater.co.uk
www.scottishwater.co.uk

Dear Sir/Madam

SITE: Ladyfield Wind Farm, Near Inveraray, PA32 8XJ
PLANNING REF: ECU00003291
OUR REF: DSCAS-0044504-QMG
PROPOSAL: Wind Farm (Generating station of >50 < 100 MW Capacity)

Please quote our reference in all future correspondence

Audit of Proposal

Scottish Water has no objection to this planning application; however, the applicant should be aware that this does not confirm that the proposed development can currently be serviced and would advise the following:

Drinking Water Protected Areas

A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed activity.

Surface Water

For reasons of sustainability and to protect our customers from potential future sewer flooding, Scottish Water will not accept any surface water connections into our combined sewer system.

There may be limited exceptional circumstances where we would allow such a connection for brownfield sites only, however this will require significant justification from the customer taking account of various factors including legal, physical, and technical challenges.

In order to avoid costs and delays where a surface water discharge to our combined sewer system is anticipated, the developer should contact Scottish Water at the earliest opportunity with strong evidence to support the intended drainage plan prior to making a connection request. We will assess this evidence in a robust manner and provide a decision that reflects the best option from environmental and customer perspectives.

General notes:

- Scottish Water asset plans can be obtained from our appointed asset plan providers:
    - Site Investigation Services (UK) Ltd
    - Tel: 0333 123 1223
    - Email: sw@sisplan.co.uk
    - www.sisplan.co.uk
- Scottish Water's current minimum level of service for water pressure is 1.0 bar or 10m head at the customer's boundary internal outlet. Any property which cannot be adequately serviced from the available pressure may require private pumping arrangements to be installed, subject to compliance with Water Byelaws. If the developer wishes to enquire about Scottish Water's procedure for checking the water pressure in the area, then they should write to the Customer Connections department at the above address.
- If the connection to the public sewer and/or water main requires to be laid through land out-with public ownership, the developer must provide evidence of formal approval from the affected landowner(s) by way of a deed of servitude.
- Scottish Water may only vest new water or waste water infrastructure which is to be laid through land out with public ownership where a Deed of Servitude has been obtained in our favour by the developer.
- The developer should also be aware that Scottish Water requires land title to the area of land where a pumping station and/or SUDS proposed to vest in Scottish Water is constructed.
- Please find information on how to submit application to Scottish Water at our Customer Portal.

Next Steps:

- ### All Proposed Developments

  All proposed developments require to submit a Pre-Development Enquiry (PDE) Form to be submitted directly to Scottish Water via our Customer Portal prior to any formal Technical Application being submitted. This will allow us to fully appraise the proposals.

  Where it is confirmed through the PDE process that mitigation works are necessary to support a development, the cost of these works is to be met by the developer, which Scottish Water can contribute towards through Reasonable Cost Contribution regulations.

- ### Non Domestic/Commercial Property:

Since the introduction of the Water Services (Scotland) Act 2005 in April 2008 the water industry in Scotland has opened to market competition for non-domestic customers. All Non-domestic Household customers now require a Licensed Provider to act on their behalf for new water and waste water connections. Further details can be obtained at www.scotlandontap.gov.uk

- **Trade Effluent Discharge from Non Dom Property:**
  - Certain discharges from non-domestic premises may constitute a trade effluent in terms of the Sewerage (Scotland) Act 1968. Trade effluent arises from activities including; manufacturing, production and engineering; vehicle, plant and equipment washing, waste and leachate management. It covers both large and small premises, including activities such as car washing and launderettes. Activities not covered include hotels, caravan sites or restaurants.
  - If you are in any doubt as to whether the discharge from your premises is likely to be trade effluent, please contact us on 0800 778 0778 or email TEQ@scottishwater.co.uk using the subject "Is this Trade Effluent?". Discharges that are deemed to be trade effluent need to apply separately for permission to discharge to the sewerage system. The forms and application guidance notes can be found here.
  - Trade effluent must never be discharged into surface water drainage systems as these are solely for draining rainfall run off.
  - For food services establishments, Scottish Water recommends a suitably sized grease trap is fitted within the food preparation areas, so the development complies with Standard 3.7 a) of the Building Standards Technical Handbook and for best management and housekeeping practices to be followed which prevent food waste, fat oil and grease from being disposed into sinks and drains.
  - The Waste (Scotland) Regulations which require all non-rural food businesses, producing more than 50kg of food waste per week, to segregate that waste for separate collection. The regulations also ban the use of food waste disposal units that dispose of food waste to the public sewer. Further information can be found at www.resourceefficientscotland.com

I trust the above is acceptable however if you require any further information regarding this matter please contact me on **0800 389 0379** or via the e-mail address below or at planningconsultations@scottishwater.co.uk.

Yours sincerely,

Pamela Strachan
Development Operations Analyst
Tel: 0800 389 0379
developmentoperations@scottishwater.co.uk

Scottish Water Disclaimer:

"It is important to note that the information on any such plan provided on Scottish Water's infrastructure, is for indicative purposes only and its accuracy cannot be relied upon. When the exact location and the nature of the infrastructure on the plan is a material requirement then you should undertake an appropriate site investigation to confirm its actual position in the ground and to determine if it is suitable for its intended purpose. By using the plan you agree that Scottish Water will not be liable for any loss, damage or costs caused by relying upon it or from carrying out any such site investigation."

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Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

Our ref: 2125
Your ref: ECU00003291

If telephoning ask for:
Julie Gerc

4 August 2021

Lee Crosbie
Energy Consents Unit
Scottish Government, 4th Floor
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

By email only to:
Econsents_Admin@gov.scot

Dear Sir / Madam

Environmental Impact Assessment) (Scotland) Regulations 2017
Planning Application: Wind farm of approximately 22 turbines and associated infrastructure. Inveraray, Argyll and Bute
SEPA Reference: 2125

Thank you for consulting SEPA on the scoping opinion for the above development proposal by your email received on 14 July 2021.

The issues set out in the appendix below are those which from experience often arise in windfarm projects. They will not all be relevant in a specific case. If an issue can be scoped out then, provided the evidence as to why it has been scoped out is provided in the subsequent Environmental Impact Assessment Report, you are encouraged to do so.

From SEPA's experience, the following key issues will usually need to be addressed. To **avoid delay and potential objection**, the information outlined below and relevant issues in the attached appendix must be submitted in support of the application.

a) Map and assessment of all engineering works within and near the water environment including buffers, details of any flood risk assessment and details of any related applications made under the Controlled Activities Regulations (CAR). With relation to flood risk, if, having considered the site and potential for flood risk, it appears that the only apparent issue could relate to design of watercourse crossing, then provided crossings are designed to accommodate the 1 in 200 year event and other infrastructure is located well away from watercourses it is unlikely that there will be a need for detailed information on flood risk.

b) Map and assessment of impacts upon Groundwater Dependent Terrestrial Ecosystems and buffers. Where it is clear that much of the site is likely to be peatland and/or wetland, we suggest you may wish to go straight to carrying out NVC survey without carrying out Phase 1 and Sniffer assessments (see appendix for details).

c) Map and assessment of impacts upon groundwater abstractions and buffers. Where there are no abstractions within 250 m of excavations then this should be confirmed in the EIA Report.

d) Peat depth survey and table detailing re-use proposals. Where much of the site is on peat, we expect the application to be supported by a comprehensive site specific Peat Management Plan.

e) Map and table detailing forest removal if on afforested area. Note that habitat survey information is not required for areas which are heavily forested or recently felled. However, if springs/flushes are found after felling, these must be marked, avoided and any infrastructure microsited off these sensitive areas.

f) Map and site layout of borrow pits.

g) Schedule of mitigation including pollution prevention measures.

h) Quarry or Borrow Pit Site Management Plan of pollution prevention measures.

i) Map of proposed waste water drainage layout.

j) Map of proposed surface water drainage layout.

k) Map of proposed water abstractions including details of the proposed operating regime.

l) Decommissioning statement.

Specific comments

SEPA is generally satisfied with the proposed methodology and scope of the hydrology and hydrogeology assessment.

The site is located in an area which is used predominantly for commercial woodland and appropriate management of forest removal and forest waste will be required.

Section 11.6.1 of the scoping report would appear to have a missing word “Turbines and other infrastructure will be located in areas of peat than 1 m depth” It is assumed that site infrastructure will be located in areas of peat less than 1m depth.

Regulatory advice for the applicant

1.1. Engineering works within the water environment may require authorisation under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Management of surplus peat or soils may require an exemption under The Waste Management Licensing (Scotland) Regulations 2011. Proposed crushing or screening will require a permit under The Pollution Prevention and Control (Scotland) Regulations 2012. Consider if other environmental licences may be required for any installations or processes.

1.2. Details of regulatory requirements and good practice advice for the applicant can be found on the Regulations section of our website.

If you have any queries relating to this letter, please contact me by e-mail at planning.sw@sepa.org.uk.

Yours faithfully

Julie Gerc
Senior Planning Officer
Planning Service

In line with government guidance a number of SEPA's SW planning service are now home working. Please do not leave telephone messages but email planning.sw@sepa.org.uk, not individual email addresses, and we will respond where possible by email.
Please note that due to revised working arrangements because of the Covid -19 (Corona virus) outbreak we may take longer to respond to your email than usual.

Appendix 1: Detailed scoping requirements

This appendix sets out our scoping information requirements. There may be opportunities to scope out some of the issues below depending on the site. Evidence must be provided in the submission to support why an issue is not relevant for this site in order **to avoid delay and potential objection.**

If there is a delay between scoping and the submission of the application then please refer to our website for our latest information requirements as they are regularly updated; current best practice must be followed.

We would welcome the opportunity to comment on the draft submission. As we can process files of a maximum size of only 25MB the submission must be divided into appropriately named sections of less than 25MB each.

1. Site layout

1.1. All maps must be based on an adequate scale with which to assess the information. This could range from OS 1: 10,000 to a more detailed scale in more sensitive locations. Each of the maps below must detail all proposed upgraded, temporary and permanent site infrastructure. This includes all tracks, excavations, buildings, borrow pits, pipelines, cabling, site compounds, laydown areas, storage areas and any other built elements. Existing built infrastructure must be re-used or upgraded wherever possible. The layout should be designed to minimise the extent of new works on previously undisturbed ground. For example, a layout which makes use of lots of spurs or loops is unlikely to be acceptable. Cabling must be laid in ground already disturbed such as verges. A comparison of the environmental effects of alternative locations of infrastructure elements, such as tracks, may be required.

2. Engineering activities which may have adverse effects on the water environment

2.1. The site layout must be designed to avoid impacts upon the water environment. Where activities such as watercourse crossings, watercourse diversions or other engineering activities in or impacting on the water environment cannot be avoided then the submission must include justification of this and a map showing:

a) All proposed temporary or permanent infrastructure overlain with all lochs and watercourses.

b) A minimum buffer of 50m around each loch or watercourse. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse and drawings of what is proposed in terms of engineering works.

c) Detailed layout of all proposed mitigation including all cut off drains, location, number and size of settlement ponds.

2.2. If water abstractions or dewatering are proposed, a table of volumes and timings of groundwater abstractions and related mitigation measures must be provided.

2.3. Further advice and our best practice guidance are available within the water engineering section of our website. Guidance on the design of water crossings can be found in our Construction of River Crossings Good Practice Guide.

2.4. Refer to our flood risk Standing Advice for advice on flood risk. Watercourse crossings must be designed to accommodate the 0.5% Annual Exceedance Probability (AEP) flows, or information provided to justify smaller structures. If it is thought that the development could result in an increased risk of flooding to a nearby receptor then a Flood Risk Assessment must be submitted in support of the planning application. Our Technical flood risk guidance for stakeholders outlines the information we require to be submitted as part of a Flood Risk Assessment. Please also refer to Controlled Activities Regulations (CAR) Flood Risk Standing Advice for Engineering, Discharge and Impoundment Activities.

3. Disturbance and re-use of excavated peat and other carbon rich soils

3.1. Scottish Planning Policy states (Paragraph 205) that "Where peat and other carbon rich soils are present, applicants must assess the likely effects of development on carbon dioxide (CO_2) emissions. Where peatland is drained or otherwise disturbed, there is liable to be a release of CO_2 to the atmosphere. Developments must aim to minimise this release."

3.2. The planning submission must a) demonstrate how the layout has been designed to minimise disturbance of peat and consequential release of CO_2 and b) outline the preventative/mitigation measures to avoid significant drying or oxidation of peat through, for example, the construction of access tracks, drainage channels, cable trenches, or the storage and re-use of excavated peat. There is often less environmental impact from localised temporary storage and reuse rather than movement to large central peat storage areas.

3.3. The submission must include:

a) A detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements (including peat storage areas) overlain to demonstrate how the development avoids areas of deep peat and other sensitive receptors such as Groundwater Dependent Terrestrial Ecosystems.

b) A table which details the quantities of acrotelmic, catotelmic and amorphous peat which will be excavated for each element and where it will be re-used during reinstatement. Details of the proposed widths and depths of peat to be re-used and how it will be kept wet permanently must be included.

3.4. To avoid delay and potential objection proposals must be in accordance with Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and Minimisation of Waste and our Developments on Peat and Off-Site uses of Waste Peat.

3.5. Dependent upon the volumes of peat likely to be encountered and the scale of the development, applicants must consider whether a full Peat Management Plan (as detailed in the above guidance) is required or whether the above information would be best submitted as part of the schedule of mitigation.

3.6. Please note we do not validate carbon balance assessments except where requested to by Scottish Government in exceptional circumstances. Our advice on the minimisation of peat disturbance and peatland restoration may need to be taken into account when you consider such assessments.

4. Disruption to Groundwater Dependent Terrestrial Ecosystems (GWDTE)

4.1. GWDTE are protected under the Water Framework Directive and therefore the layout and design of the development must avoid impact on such areas. The following information must be included in the submission:

a) A map demonstrating that all GWDTE are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions. If micro-siting is to be considered as a mitigation measure the distance of survey needs to be extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it.

b) If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all GWDTE affected.

4.2. Please refer to Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems for further advice and the minimum information we require to be submitted.

5. Existing groundwater abstractions

5.1. Excavations and other construction works can disrupt groundwater flow and impact on existing groundwater abstractions. The submission must include:

a) A map demonstrating that all existing groundwater abstractions are outwith a 100m radius of all excavations shallower than 1m and outwith 250m of all excavations deeper than 1m and proposed groundwater abstractions. If micro-siting is to be considered as a mitigation measure the distance of survey needs to be extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it.

b) If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all existing groundwater abstractions affected.

5.2. Please refer to Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems for further advice on the minimum information we require to be submitted.

6. Forest removal and forest waste

6.1. Key holing must be used wherever possible as large scale felling can result in large amounts of waste material and in a peak release of nutrients which can affect local water quality. The supporting information should refer to the current Forest Plan if one exists and measures should comply with the Plan where possible.

6.2. Clear felling may be acceptable only in cases where planting took place on deep peat and it is proposed through a Habitat Management Plan to reinstate peat-forming habitats. The submission must include:

a) A map demarcating the areas to be subject to different felling techniques.

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b) Photography of general timber condition in each of these areas.

c) A table of approximate volumes of timber which will be removed from site and volumes, sizes of chips or brash and depths that will be re-used on site.

d) A plan showing how and where any timber residues will be re-used for ecological benefit within that area, supported by a Habitat Management Plan. Further guidance on this can be found in Use of Trees Cleared to Facilitate Development on Afforested Land – Joint Guidance from SEPA, SNH and FCS.

7. Borrow pits

7.1. Scottish Planning Policy states (Paragraph 243) that “Borrow pits should only be permitted if there are significant environmental or economic benefits compared to obtaining material from local quarries, they are time-limited; tied to a particular project and appropriate reclamation measures are in place.” The submission must provide sufficient information to address this policy statement.

7.2. In accordance with Paragraphs 52 to 57 of Planning Advice Note 50 Controlling the Environmental Effects of Surface Mineral Workings (PAN 50) a Site Management Plan should be submitted in support of any application.

7.3. The following information should also be submitted for each borrow pit:

a) A map showing the location, size, depths and dimensions.

b) A map showing any stocks of rock, overburden, soils and temporary and permanent infrastructure including tracks, buildings, oil storage, pipes and drainage, overlain with all lochs and watercourses to a distance of 250 metres. You need to demonstrate that a site specific proportionate buffer can be achieved. On this map, a site-specific buffer must be drawn around each loch or watercourse proportionate to the depth of excavations and at least 10m from access tracks. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse, drawings of what is proposed in terms of engineering works.

c) You need to provide a justification for the proposed location of borrow pits and evidence of the suitability of the material to be excavated for the proposed use, including any risk of pollution caused by degradation of the rock.

d) A ground investigation report giving existing seasonally highest water table including sections showing the maximum area, depth and profile of working in relation to the water table.

e) A site map showing cut-off drains, silt management devices and settlement lagoons to manage surface water and dewatering discharge. Cut-off drains must be installed to maximise diversion of water from entering quarry works.

f) A site map showing proposed water abstractions with details of the volumes and timings of abstractions.

g) A site map showing the location of pollution prevention measures such as spill kits, oil interceptors, drainage associated with welfare facilities, recycling and bin storage and vehicle washing areas. The drawing notes should include a commitment to check these daily.

h) A site map showing where soils and overburden will be stored including details of the heights and dimensions of each store, how long the material will be stored for and how soils will be kept fit for restoration purposes. Where the development will result in the disturbance of peat or other carbon rich soils then the submission must also include a detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements and excavation areas overlain so it can clearly be seen how the development minimises disturbance of peat and the consequential release of CO_2.

i) Sections and plans detailing how restoration will be progressed including the phasing, profiles, depths and types of material to be used.

j) Details of how the rock will be processed in order to produce a grade of rock that will not cause siltation problems during its end use on tracks, trenches and other hardstanding.

8. Pollution prevention and environmental management

8.1. One of our key interests in relation to developments is pollution prevention measures during the periods of construction, operation, maintenance, demolition and restoration.

8.2. A schedule of mitigation supported by the above site specific maps and plans must be submitted. These must include reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils at any one time) and regulatory requirements. They should set out the daily responsibilities of ECOWs, how site inspections will be recorded and acted upon and proposals for a planning monitoring enforcement officer. Please refer to Guidance for Pollution Prevention (GPPs).

9. Life extension, repowering and decommissioning

9.1. Proposals for life extension, repowering and/or decommissioning must demonstrate accordance with SEPA Guidance on the life extension and decommissioning of onshore wind farms. Table 1 of the guidance provides a hierarchical framework of environmental impact based upon the principles of sustainable resource use, effective mitigation of environmental risk (including climate change) and optimisation of long term ecological restoration. The submission must demonstrate how the hierarchy of environmental impact has been applied, within the context of latest knowledge and best practice, including justification for not selecting lower impact options when life extension is not proposed.

9.2. The submission needs to demonstrate that there will be no discarding of materials that are likely to be classified as waste as any such proposals would be unacceptable under waste management licensing. Further guidance on this may be found in the document Is it waste - Understanding the definition of waste.

RESPONSE FROM STRACHUR COMMUNITY COUNCIL

TO WHOM IT MAY CONCERN:
In my capacity as secretary of Strachur Community Council, Argyll, I am responding to the e-mail of 14th June from Lee Crosbie, Energy Consents Unit, alerting us to the Request for Scoping Opinion, Ladyfield Wind farm, Argyll. I would like to inform you that Strachur Community Council has no comments to make at this stage, but would hope to be kept informed of any further developments regarding this proposal.
Yours faithfully,
Iain Wilkie
Secretary, Strachur Community Council

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Development Management and Strategic Road Safety
Roads Directorate

Buchanan House, 58 Port Dundas Road, Glasgow G4 0HF
REDACTED

TRANSPORT SCOTLAND
CÒMHDHAIL ALBA

Lee Crosbie
Energy Consents Unit
The Scottish Government
5 Atlantic Quay
150 Broomielaw
Glasgow
G2 8LU

Econsents_Admin@gov.scot

Your ref:
ECU00003291

Our ref:
GB01T19K05

Date:
02/08/2021

Dear Sirs,

ELECTRICITY ACT 1989

THE ELECTRICITY (APPLICATIONS FOR CONSENT) REGULATIONS 2017

REQUEST FOR SCOPING OPINION FOR PROPOSED SECTION 36 APPLICATION FOR LADY FIELD WIND FARM

With reference to your recent correspondence on the above development, we acknowledge receipt of the Scoping Report (SR) prepared by Arcus Consultancy Services in support of the above development.

This information has been passed to SYSTRA Limited for review in their capacity as Term Consultants to Transport Scotland – Roads Directorate. Based on the review undertaken, we would provide the following comments.

Proposed Development

The development comprises 22 turbines with tip heights of up to 200m located approximately 4.7km north of Inveraray in Argyll and Bute. The nearest trunk road to the site is the A83(T) from which it is proposed that access will be taken.

Site Access

We note from Figure 2.2 of the SR that there is an existing Site Entrance, located on the A83(T) approximately 2km north of the junction with the A819 in Inveraray, however, we note that this appears to be no more than a farm/ residential access, and will require substantial upgrading to accommodate both HGVs and abnormal loads.

Transport Scotland would state that any proposed changes to the trunk road network must be discussed and approved (via a technical approval process) by the appropriate Area Manager. At this application stage, we would advise that 1:500 scale plans of any new or modified access from the trunk road should be submitted along with appropriately scaled visibility splay plans. This will allow the standard of the junction to be assessed.

It would be helpful to engage with the Area Manager for the A83(T) who is Neil MacFarlane, contacted on neil.macfarlane@transport.gov.scot or 0141 272 7433. Neil will be able to provide advice in relation to the trunk road access.

Assessment of Environmental Impacts

Chapter 13 of the SR presents the proposed methodology for the assessment of Traffic and Transport. This states that it is anticipated that the A83(T), A85(T) and the A819 are to be included in the assessment Study Area. We note that the thresholds as indicated within the Institute of Environmental Management and Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic are to be used as a screening process for the assessment. Transport Scotland is in agreement with this approach.

The SR also indicates that potential trunk road related environmental impacts such as driver delay, pedestrian amenity, severance, safety etc will be considered and assessed where appropriate (i.e. where Institute of Environmental Management and Assessment Guidelines for further assessment are breached). These specify that road links should be taken forward for assessment if:

- Traffic flows will increase by more than 30%, or
- The number of HGVs will increase by more than 30%, or
- Traffic flows will increase by 10% or more in sensitive areas.

The SR indicates that baseline traffic data will be extracted from DfT traffic flow information and will be factored to take into account traffic growth between the date of recording and the anticipated date of construction. Transport Scotland can confirm that it is acceptable to use NRTF low growth factors in this instance.

It is noted that any impacts associated with the operational or decommissioning phases of the development are to be scoped out of the EIAR. We would consider this to be acceptable in this instance.

Abnormal Loads Assessment

We note that the port of delivery and associated delivery route are not yet known, however, it is anticipated that wind turbine components will be transported from Glasgow.

Transport Scotland will require to be satisfied that the size of turbines proposed can negotiate the selected route and that transportation will not have any detrimental effect on structures within the trunk road route path.

A full Abnormal Loads Assessment report should be provided with the Environmental Impact Assessment Report (EIAR) that identifies key pinch points on the trunk road network. Swept path analysis should be undertaken and details provided with regard to any required changes to street furniture or structures along the route.

I trust that the above is satisfactory and should you wish to discuss any issues raised in greater detail, please do not hesitate to contact Alan DeVenny at SYSTRA's Glasgow Office on 0141 343 9636.

Yours faithfully

Gerard McPhillips

Transport Scotland
Roads Directorate

cc Alan DeVenny – SYSTRA Ltd.

Marine Scotland Science advice on freshwater and diadromous fish and fisheries in relation to onshore wind farm developments.

July 2020

Marine Scotland Science (MSS) provides internal, non-statutory, advice in relation to freshwater and diadromous fish and fisheries to the Scottish Government's Energy Consents Unit (ECU) for onshore wind farm developments in Scotland.

Atlantic salmon (*Salmo salar*), sea trout and brown trout (*Salmo trutta*) are of high economic value and conservation interest in Scotland and for which MSS has in-house expertise. Onshore wind farms are often located in upland areas where salmon and trout spawning and rearing grounds may also be found. MSS aims, through our provision of advice to ECU, to ensure that the construction and operation of these onshore developments do not have a detrimental impact on the freshwater life stages of these fish populations.

The Electricity Works (Environmental Impact Assessment) (EIA) (Scotland) Regulations (2017) state that the EIA must assess the direct and indirect significant effects of the proposed development on water and biodiversity, and in particular species (such as Atlantic salmon) and habitats protected under the EU Habitats Directive. Salmon and trout are listed as priority species of high conservation interest in the Scottish Biodiversity Index and support valuable recreational fisheries.

A good working relationship has been developed over the years between ECU and MSS, which ensures that these fish species are considered by ECU during all stages of the application process of onshore wind farm developments and are similarly considered during the construction and operation of future onshore wind farms. It is important that matters relating to freshwater and diadromous fish and fisheries, particularly salmon and trout, continue to be considered during the construction and operation of future onshore wind farms.

In the current document, MSS sets out a revised, more efficient approach to the provision of our advice, which utilises our generic scoping and monitoring programme guidelines (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren). This standing advice provides regulators (e.g. ECU, local planning authorities), developers and consultants with the information required at all stages of the application process for onshore wind farm developments, such that matters relating to freshwater and diadromous fish and fisheries are addressed in the same rigorous manner as is currently being carried out and continue to be fully in line with EIA regulations. At the request of ECU, MSS will still be able to provide further and/or bespoke advice relevant to freshwater and diadromous fish and fisheries e.g. site specific advice, at any stage of the application process for a proposed development, particularly where a development may be considered sensitive or contentious in nature.

MSS will continue undertaking research, identifying additional research requirements, and keep up to date with the latest published knowledge relating to the impacts of onshore wind farms on freshwater and diadromous fish populations. This will be used to ensure that our guidelines and standing advice are based on the best available evidence and also to continue the publication of the relevant findings and knowledge to all stakeholders including regulators, developers and consultants.

MSS provision of advice to ECU

- MSS should not be asked for advice on pre application and application consultations (including screening, scoping, gate checks and EIA applications). Instead, the MSS scoping guidelines and standing advice (outlined below) should be provided to the developer as they set out what information should be included in the EIA report;
- if new issues arise which are not dealt with in our guidance or in our previous responses relating to respective developments, MSS can be asked to provide advice in relation to proposed mitigation measures and monitoring programmes which should be outlined in the EIA Report (further details below);
- if new issues arise which are not dealt with in our guidance or in our previous responses, MSS can be asked to provide advice on suitable wording, within a planning condition, to secure proposed monitoring programmes, should the development be granted consent;
- MSS cannot provide advice to developers or consultants, our advice is to ECU and/or other regulatory bodies.
- if ECU has identified specific issues during any part of the application process that the standing advice does not address, MSS should be contacted.

MSS Standing Advice for each stage of the EIA process

Scoping

MSS issued generic scoping guidelines (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren) which outline how fish populations can be impacted during the construction, operation and decommissioning of a wind farm development and informs developers as to what should be considered, in relation to freshwater and diadromous fish and fisheries, during the EIA process.

In addition to identifying the main watercourses and waterbodies within and downstream of the proposed development area, developers should identify and consider, at this early stage, any areas of Special Areas of Conservation where fish are a qualifying feature and proposed felling operations particularly in acid sensitive areas.

If a developer identifies new issues or has a technical query in respect of MSS generic scoping guidelines then ECU should be informed who will then co-ordinate a response from MSS.

Gate check

The detail within the generic scoping guidelines already provides sufficient information relating to water quality and salmon and trout populations for developers at this stage of the application.

Developers will be required to provide a gate check checklist (annex 1) in advance of their application submission which should signpost ECU to where all matters relevant to freshwater and diadromous fish and fisheries have been presented in the EIA report. Where matters have not been addressed or a different approach, to that specified in the advice, has been adopted the developer will be required to set out why.

EIA Report

MSS will focus on those developments which may be more sensitive and/or where there are known existing pressures on fish populations (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/fishreform/licence/status/Pressures). The generic scoping guidelines should ensure that the developer has addressed all matters relevant to freshwater and diadromous fish and fisheries and presented them in the appropriate chapters of the EIA report. Use of the gate check checklist should ensure that the EIA report contains the required information; the absence of such information may necessitate requesting additional information which may delay the process:

Developers should specifically discuss and assess potential impacts and appropriate mitigation measures associated with the following:

- any designated area, for which fish is a qualifying feature, within and/or downstream of the proposed development area;
- the presence of a large density of watercourses;
- the presence of large areas of deep peat deposits;
- known acidification problems and/or other existing pressures on fish populations in the area; and
- proposed felling operations.

Post-Consent Monitoring

MSS recommends that a water quality and fish population monitoring programme is carried out to ensure that the proposed mitigation measures are effective. A robust, strategically designed and site specific monitoring programme conducted before, during and after construction can help to identify any changes, should they occur, and assist in implementing rapid remediation before long term ecological impacts occur.

MSS has published guidance on survey/monitoring programmes associated with onshore wind farm developments (https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/Freshwater/Research/onshoreren) which developers should follow when drawing up survey and/or monitoring programmes.

If a developer considers that such a monitoring programme is not required then a clear justification should be provided.

Planning Conditions

MSS advises that planning conditions are drawn up to ensure appropriate provision for mitigation measures and monitoring programmes, should the development be given consent. We recommend, where required, that a Water Quality Monitoring Programme, Fisheries Monitoring Programme and the appointment of an Ecological Clerk of Works, specifically in overseeing the above monitoring programmes, is outlined within these conditions and that MSS is consulted on these programmes.

Wording suggested by MSS in relation to water quality, fish populations and fisheries for incorporation into planning consents:

1. No development shall commence unless a Water Quality and Fish Monitoring Plan (WQFMP) has been submitted to and approved in writing by the Planning Authority in consultation with Marine Scotland Science and any such other advisors or organisations.

2. The WQFMP must take account of the Scottish Government's Marine Scotland Science's guidelines and standing advice and shall include:

    a. water quality sampling should be carried out at least 12 months prior to construction commencing, during construction and for at least 12 months after construction is complete. The water quality monitoring plan should include key hydrochemical parameters, turbidity, and flow data, the identification of sampling locations (including control sites), frequency of sampling, sampling methodology, data analysis and reporting etc.;
    b. the fish monitoring plan should include fully quantitative electrofishing surveys at sites potentially impacted and at control sites for at least 12 months before construction commences, during construction and for at least 12 months after construction is completed to detect any changes in fish populations; and
    c. appropriate site specific mitigation measures detailed in the Environmental Impact Assessment and in agreement with the Planning Authority and Marine Scotland Science.

3. Thereafter, the WQFMP shall be implemented within the timescales set out to the satisfaction of the Planning Authority in consultation with Marine Scotland Science and the results of such monitoring shall be submitted to the Planning Authority on a 6 monthly basis or on request.

Reason: To ensure no deterioration of water quality and to protect fish populations within and downstream of the development area.

Sources of further information

NatureScot (previously "SNH") guidance on wind farm developments - https://www.nature.scot/professional-advice/planning-and-development/advice- planners-and-developers/renewable-energy-development/onshore-wind- energy/advice-wind-farm

Scottish Environment Protection Agency (SEPA) guidance on wind farm developments – https://www.sepa.org.uk/environment/energy/renewable/#wind

A joint publication by Scottish Renewables, NatureScot, SEPA, Forestry Commission Scotland, Historic Environment Scotland, MSS and Association of Environmental and Ecological Clerks of Works (2019) Good Practice during Wind Farm Construction - https://www.nature.scot/guidance-good-practice-during-wind-farm- construction.

Marine Scotland Science advice on freshwater and diadromous fish and fisheries in relation to onshore wind farm developments.

July 2020

Annex 1

MSS – EIA Checklist

The generic scoping guidelines should ensure that all matters relevant to freshwater and diadromous fish and fisheries have been addressed and presented in the appropriate chapters of the EIA report. Use of the checklist below should ensure that the EIA report contains the following information; the absence of such information ***may necessitate requesting additional information*** which could delay the process:

MSS Standard EIA Report Requirements	Provided in application YES/NO	If YES – please signpost to relevant chapter of EIA Report	If not provided or provided different to MSS advice, please set out reasons.
1. A map outlining the proposed development area and the proposed location of: ○ the turbines, ○ associated crane hard standing areas, ○ borrow pits, ○ permanent meteorological masts, ○ access tracks including watercourse crossings, ○ all buildings including substation, battery storage;			

- permanent and temporary construction compounds; - all watercourses; and - contour lines;			
2. A description and results of the site characterisation surveys for fish (including fully quantitative electrofishing surveys) and water quality including the location of the electrofishing and fish habitat survey sites and water quality sampling sites on the map outlining the proposed turbines and associated infrastructure;			
3. An outline of the potential impacts on fish populations and water quality within and downstream of the proposed development area;			
4. Any potential cumulative impacts on the water quality and fish populations associated with adjacent (operational and consented) developments including wind farms, hydro schemes, aquaculture and mining;			
5. Any proposed site specific mitigation measures as outlined in MSS generic scoping guidelines and the joint publication “Good Practice			

during Wind Farm Construction" (https://www.nature.scot/guidance-good-practice-during-wind-farm-construction);			
6. Full details of proposed monitoring programmes using guidelines issued by MSS and accompanied by a map outlining the proposed sampling and control sites in addition to the location of all turbines and associated infrastructure			
7. A decommissioning and restoration plan outlining proposed mitigation/monitoring for water quality and fish populations.			

Developers should specifically discuss and assess potential impacts and appropriate mitigation measures associated with the following:	Provided in application YES/NO	If YES – please signpost to relevant chapter of EIA Report	If not provided or provided different to MSS advice, please set out reasons.
1. Any designated area, for which fish is a qualifying feature, within and/or downstream of the proposed development area;			
2. The presence of a large density of watercourses;			
3. The presence of large areas of deep peat deposits;			

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4. Known acidification problems and/or other existing pressures on fish populations in the area; and			
5. Proposed felling operations.			

Environmental Impact Assessment – Technical Appendix 6.1: LVIA Methodology

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

ERM

The business of sustainability

TABLE OF CONTENTS

1 INTRODUCTION

This technical appendix of the Environmental Impact Assessment Report (EIA Report) presents the methodology used within the landscape and visual impact assessment (LVIA) of the Development presented in Chapter 6: LVIA in Volume 1 of the EIA Report.

The LVIA identifies and assesses the likely significant effects resulting from the Development on both the landscape as an environmental resource and on people's views and visual amenity.

The LVIA methodology presented in this appendix is structured as follows:

- introduction;
- guidance, data sources and surveys;
- overview of LVIA methodology;
- types of landscape and visual effects;
- evaluation of significance
- assessing landscape effects;
- assessing visual effects;
- assessing night-time visual effects;
- assessing cumulative landscape and visual effects; and
- nature of effects;
- visual representations.

2 GUIDANCE, DATA SOURCES AND SURVEYS

2.1 Guidance

The following sources have been used in the formulation of methodology for the assessment and the presentation of visual representations:

- Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3);
- Carys Swanwick Department of Landscape University of Sheffield and Land Use Consultants for The Countryside Agency and NatureScot (2002). Landscape Character Assessment Guidance for England and Scotland;
- NatureScot (2021) Assessing the Cumulative Impact of Onshore Wind Energy Developments;
- NatureScot (2020). Assessing impacts on Wild Land Areas - Technical Guidance;
- NatureScot (2017) Siting and Designing Wind Farms in the Landscape Version 3a;
- NatureScot (2017). Visual Representation of Wind Farms, Version 2.2;
- Landscape Institute (2019) Technical Guidance Note 2/19 Residential Visual Amenity Assessment; and
- Landscape Institute (2019). Visual representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19.

2.2 GLVIA3

The LVIA has been undertaken in accordance with the Landscape Institute and IEMA (2013) Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA3). OPEN's LVIA methodology generally follows the guidance set out in GLVIA3. Where it diverges from specific aspects of the guidance, in a small number of areas, reasoned professional justification for this is provided as follows.

GLVIA3 sets out an approach to the assessment of magnitude of change in which three separate considerations are combined within the magnitude of change rating. These are the size or scale of the effect, its geographical extent and its duration and reversibility. This approach is to be applied in respect of both landscape and visual receptors. OPEN considers that the process of combining all three considerations in one rating can distort the aim of identifying significant effects of windfarm development. For example, an increased magnitude of change, based on size or scale, may be reduced to a lower rating if it occurred in a localised area and for a short duration. This might mean that a potentially significant effect would be overlooked if effects are diluted down due to their geographical extents and/or duration or reversibility.

OPEN has chosen to keep the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are stated separately in relation to the assessed effects (i.e. as short/medium/long-term and temporary/permanent) and are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

OPEN's assessment methodology utilises six word scales of magnitude of change – high, medium-high, medium, medium-low, low and negligible; which are preferred to the 'maximum of five categories' suggested in GLVIA3 (3.27), as a means of clearly defining and summarising magnitude of change judgements.

These are not new diversions and follow practice established on other large scale onshore wind farm projects.

2.3 Information and Data Sources

The assessment is initiated through a desk study of the Development and the LVIA Study Area. This desk study identifies aspects of the landscape and visual resource that are considered in the LVIA, including landscape related planning designations, landscape character typology, wild land areas, operational and potential cumulative windfarms, and views from routes and settlements.

The desk study utilises Geographic Information System (GIS) and ReSoft WindFarm software to explore the potential visibility of the Development. The resultant Zone of Theoretical Visibility (ZTV) diagrams and wirelines provide an indication of which landscape and visual receptors are likely to be key in the assessment.

Landscape characterisation information and data has been obtained from the following sources:

- Argyll and Bute Wind Energy Capacity Study (Argyll and Bute Council 2017);
- Perth and Kinross Landscape Study to Inform Planning for Wind Energy (Perth and Kinross Council 2010); and
- Stirling Landscape Sensitivity and Capacity Study for Wind Energy Development (Stirling Council January 2015).

2.4 Desk Based and Site Survey Work

The assessment is initiated through a desk study of the Development boundary and LVIA study area. ZTV analysis of the Development has been carried out, as has mapping of landscape character, landscape related designations and principal visual receptors.

The LVIA undertaken as part of the EIA Report has been informed by desk-based studies, stakeholder consultations and field survey work undertaken within the LVIA Study Area. The landscape and visual baseline have been informed by desk-based review of landscape character assessments, publications describing the special qualities of designated landscapes, visual receptor mapping and the ZTV, to identify receptors that may be affected by the Development and produce written descriptions of their key characteristics and value.

The landscape of the site was assessed for any particular features that contribute to the landscape character of the site or are important to the wider landscape setting. In particular, the form and pattern of the land was assessed from the site and surrounding area to better understand its character and to take these qualities into account in the siting and design of the Development. The landscape character types for the Study Area were reviewed and the key characteristics of the landscape were identified. The field surveys provided an experience of the character types of the Study Area and verification of how these areas might be affected by the Development.

Visual amenity was surveyed including both static and sequential views from receptors representative of the range of views and viewer types likely to experience the Development. Views from a variety of distances, aspects, elevations and extents were included. Receptor types include individual properties and settlements; main transport routes; main visitor locations; areas of cultural significance; the range of landscape character types within the Study Area; and the cumulative effects of the Development in combination with other existing or proposed wind farms in the Study Area.

Interactions have been identified between the Development and landscape and visual receptors, to predict potentially significant effects arising. For those receptors where a detailed assessment is required, primary data acquisition has been undertaken through a series of surveys. These surveys include field survey verification of the ZTV from landscape character types (LCTs), micro-siting of viewpoint locations, panoramic baseline viewpoint photography and visual assessment surveys from representative viewpoints and principal visual receptors. Site surveys allow the assessors to judge the likely scale, distance, extent and prominence of the Development directly. These surveys were undertaken between January 2022 and March 2023.

3 OVERVIEW OF LVIA METHODOLOGY

3.1 Introduction

The LVIA is based on the project description in Chapter 2: Development Description.

The LVIA assesses the likely effects that the construction and operation of the Development on the landscape and visual resource, encompassing physical landscape, effects on landscape character and designated landscapes, visual effects and cumulative effects.

The assessment is undertaken through an evaluation of sensitivity of landscape and visual resource, taking account of the value and susceptibility of the receptor to the Development. This is combined with an assessment of the magnitude of change resulting from the Development, which takes account of the size and scale of the proposed change. By combining assessments of sensitivity and magnitude of change, a level of landscape or visual effect can be evaluated and determined. The resulting level of effect is described in terms of whether it is significant or not significant, and the geographical extent, duration and the type of effect is described as either direct or indirect; temporary or permanent (reversible); cumulative; and beneficial, neutral or adverse.

3.2 Defining the LVIA Study Area

The definition of a Study Area for the LVIA is an important and established part of LVIA, which is recommended in LVIA guidance (Landscape Institute, 2013 and NatureScot, 2017).

The LVIA study area covers a radius of 45 km from the Development, as illustrated in Figure 6.1 as agreed in the EIA Scoping Opinion and stakeholder consultations.

The LVIA Study Area is defined based on guidance, relevant legislation, consultation feedback, the ZTV for the Development and the emerging findings of the LVIA to ensure that is an appropriate Study Area based on the threshold of significance, defining an outer limit within which significant effects could occur using professional judgement.

Institute of Environmental Management and Assessment Guidance (IEMA, 2015 and 2017) recommends a proportionate EIA focused on the significant effects. An overly large SLVIA study area may be considered disproportionate if it makes the understanding of the key impacts of the Development more difficult.

This is supported by Landscape and Visual Impact Assessment (LVIA) Guidance produced by the Landscape Institute (GLVIA3) (Landscape Institute, 2013) (para 3.16). This guidance recommends that *'The level of detail provided should be that which is reasonably required to assess the likely significant effects'*. Para 5.2 and p70 also states that *'The study area should include the site itself and the full extent of the wider landscape around it which the Proposed Development may influence in a significant manner'.*

Other wind farm specific guidance, such as NatureScot's Visual Representation of Wind Farms Guidance (NatureScot, 2017) recommends that ZTV distances are used for defining study area based on wind turbine height. This guidance recommends a 45 km radius for wind turbines greater than 150 m to blade tip (para 48, p12).

The LVIA focuses on locations from where it may be possible to see the Development, as defined by the blade tip ZTV, which is presented in Figure 6.5a and 6.5b. Consideration of the blade tip ZTV indicates that theoretical visibility of the Development mainly occurs within 45 km and that beyond this distance, the geographic extent of visibility will become very restricted.

At distances over 45 km, the horizontal spread of the Development will also occupy a small portion of available views and the apparent height (or 'vertical angle') of the wind turbines would also appear very small, therefore significant visual effects are unlikely to arise at greater than this distance, even if the wind turbines are theoretically visible.

Landscape and visual effects as a result of the Development are scoped out beyond 45 km as agreed in the EIA Scoping Opinion and stakeholder consultations.

Large sections of the Study Area between 20 km and 45 km have limited or no theoretical visibility of the Development. Where theoretical visibility is shown on the ZTV potentially significant effects are limited by distance and intervening woodland or forestry. ABC and NatureScot agreed in their scoping responses that the landscape character assessment be focussed on a 20 km Study Area. Taking all of this into account and in order to focus the assessment on potential for significant effects, the LVIA identified an area of 20 km around the Development within which the detailed assessment of effects on landscape character and cumulative effects assessment are undertaken.

Visual receptors have been considered within a 45 km Study Area, with a more detailed focus for those receptors found closer to the site i.e. Public Rights of Way and local recreational routes within 10 km. For individual properties, a Residential Visual Amenity Assessment (RVAA) has been carried out within a 2 km Study Area, in accordance with Landscape Institute (LI) guidance. See Appendix A6.2 for further description of the RVAA Study Area.

4 TYPES OF LANDSCAPE AND VISUAL EFFECTS

The LVIA is intended to determine the effects that the Development would have on the landscape and visual resource.

For the purpose of assessment, the potential effects on the landscape and visual resource are grouped into three categories: landscape effects, visual effects and cumulative landscape and visual effects, each of which is briefly described as follows.

4.1 Landscape Effects

The LVIA considers the effects of the Development on the landscape as a resource. Landscape effects are either direct effects on the physical fabric of the site, or effects on landscape character. The assessment of landscape effects is carried out as follows:

- Assessment of physical effects: physical effects are direct effects on the physical fabric of the site, such as the removal of trees and alteration to ground cover. This category of effects is made up of landscape elements, which are the components of the landscape such as hedgerows or woodland that may be physically affected by the Development.
- Assessment of effects on landscape character: landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that alter this pattern of elements, or through visibility of

the Development, which may alter the way in which the pattern of elements is perceived. This category of effects is considered in terms of landscape character receptors, which fall into two groups; landscape character types/areas and landscape designations.

4.2 Visual Effects

The LVIA considers the effect of the Development on views and visual amenity. Visual effects include effects on visual receptors, i.e. groups of people that may experience an effect, and views (viewpoints). The visual assessment is carried out as follows:

- An assessment of the effects of the Development on views from principal visual receptors, including residents of settlements, motorists using roads, people using recreational routes, features and attractions throughout the Study Area (as ascertained through the baseline study); and
- An assessment of the effects of the Development on representative viewpoints that have been selected to assess the effect on locations relevant to these visual receptors and from specific viewpoints, chosen because they are key or promoted viewpoints in the landscape.

4.3 Cumulative Effects

Cumulative landscape and visual effects arise where the study areas for two or more wind farms overlap so that both are experienced at proximity where they may have a greater incremental effect, or where wind energy developments may combine to have a sequential effect, irrespective of any overlap in study areas. This means that the addition of the Development to a situation where other wind farms are apparent in the baseline or a potential future baseline landscape and visual context may result in a greater effect than where the Development is seen in isolation. The main assessment of the effects of the Development takes into account its addition to a baseline landscape that contains the operational/under construction wind farms. The cut-off date of February 2023 has been applied in respect of establishing the cumulative context to enable the LVIA chapter and visualisations to be completed, reviewed and printed prior to the submission date.

5 EVALUATION OF SIGNIFICANCE

The objective in assessing the effects of the Development is to predict the significant effects of the Development on the landscape and visual resource. In accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) the LVIA effects are assessed to be either significant or not significant.

The significance of effects is assessed through a combination of the sensitivity of the landscape receptor or view and the magnitude of change that would result from the addition of the Development. While this methodology is not reliant on the use of a matrix to determine the conclusion of a significant or not significant effect, a matrix is included in Table A6.1.2 below to illustrate how combinations of sensitivity and magnitude of change ratings can give rise to significant effects. On this basis potential impacts are assessed as of negligible, minor, moderate / minor, moderate, moderate-major and major. In those instances where the magnitude has been assessed as 'no change' and the level of effect is recorded as 'no effect'.

For the purposes of this assessment, any effects with a significance level of major and major / moderate have been deemed significant in EIA terms (dark grey shaded boxes in Table A6.1.2). 'Moderate' levels of effect have the potential, subject to the assessor's professional judgement, to be considered as significant or not significant, depending on the sensitivity and magnitude of change factors evaluated (light grey shaded boxes in Table A6.1.2). These assessments are explained as part of the assessment, where they occur. Significance can therefore occur at a range of levels depending on the magnitude and sensitivity, however in all cases, a significant effect is considered more likely to occur where a combination of the variables results in the Development having a defining effect on the landscape character or view. Definitions are not provided for the individual categories of significance shown in the matrix and the reader should refer to the detailed definitions provided for the factors that combine to inform sensitivity and magnitude.

Effects assessed as being either Moderate-Minor, Minor or Negligible level are assessed as not significant (white boxes in Table A6.1.2).

In line with the emphasis placed in GLVIA3 upon the application of professional judgement, an overly mechanistic reliance upon a matrix is avoided through the provision of clear and accessible narrative explanations of the rationale underlying the assessment made for each landscape and visual receptor.

Table A6.1.2 – Matrix used to guide determination of effect significance

Magnitude of Change	**Sensitivity of Resource or Receptor**				
	High	**Medium-high**	**Medium**	**Medium-low**	**Low**
High	**Major (significant)**	**Major (significant)**	**Major-moderate (significant)**	Moderate (Significant or Not Significant)	Moderate (Significant or Not Significant)
Medium-high	**Major (significant)**	**Major-moderate (significant)**	Moderate (Significant or Not Significant)	Moderate (Significant or Not Significant)	Moderate-minor (Not significant)
Medium	**Major-moderate (significant)**	Moderate (Significant or Not Significant)	Moderate (Significant or Not Significant)	Moderate-minor (Not significant)	Minor (Not significant)
Medium-low	Moderate (Significant or Not Significant)	Moderate (Significant or Not Significant)	Moderate-minor (Not significant)	Minor (Not significant)	Minor (Not significant)
Low	Moderate-minor (Not significant)	Moderate-minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Negligible (Not significant)
Negligible	Minor (Not significant)	Minor (Not significant)	Minor (Not significant)	Negligible (Not significant)	Negligible (Not significant)

Significant effects occur where the Development would provide a defining influence on a landscape element, landscape character receptor or view; or where changes of a lower magnitude occur on a landscape element, landscape character receptor or view that is of particularly high sensitivity.

A not significant effect occurs where the effect of the Development is not material, whereby the baseline characteristics of the landscape element, landscape character receptor or view continue to provide the definitive influence, or where the small scale of change experienced by a high sensitivity receptor is such as to be considered not significant.

Significant cumulative effects occur where the addition of the Development to the baseline under consideration (which may include other wind energy developments), leads to windfarms becoming a prevailing landscape and visual characteristic or where the Development adversely contrasts with the scale or design of an existing or proposed development.

6 ASSESSING LANDSCAPE EFFECTS

Landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that physically alter this pattern of elements, or through visibility of the Development, which may alter the way in which the pattern of elements is perceived. This category of effects is made up of physical effects and effects on landscape character (landscape character types and designated areas).

6.1 Assessment of Physical Effects

The physical effects of the Development are restricted to the area of the site where existing landscape elements may be changed. Physical effects are the direct effects as a result of the Development on the fabric of the site, such as the removal of trees and alteration to ground cover. The objective of the assessment of physical effects is to determine what the likely physical effects of the Development would be, which landscape elements would be affected, and whether these effects would be significant or not significant. The variables considered in the sensitivity of landscape elements and the magnitude of change that the Development would have on them are described as follows.

6.1.1 Sensitivity of Landscape Elements

The sensitivity of a landscape element is an expression of its value and quality, and the potential to mitigate the effect.

- The value of a landscape element is a reflection of its importance in the pattern of elements which constitute the landscape character of the area. For example, the value of woodland is likely to be increased if it provides an important component of the local landscape character. If a landscape element is particularly rare, as a remnant of an historic landscape layout for example, its value is likely to be increased; and
- The susceptibility of a landscape element is a reflection of the degree to which the element can be restored, replaced or substituted. For example, it may be possible to restore ground cover following the excavation required for the building of turbine foundations, and this would reduce the sensitivity of this element.

The evaluation of sensitivity is described for each receptor in the assessment. Levels of sensitivity: high, medium-high, medium, medium-low and low, are applied. The sensitivity of each receptor is a product of the specific combination of value, quality and potential for mitigation as evaluated by professional judgement.

6.1.2 Magnitude of Change on Landscape Elements

The magnitude of change on landscape elements is quantifiable and is expressed in terms of the degree to which a landscape element would be removed or altered by the Development, the extent of existing landscape elements that would be lost and the contribution of that element to the character of the landscape. Definitions of magnitude of change are applied in order that the process of assessment is made clear. These are:

- **High**: where the Development would result in the complete removal or substantial alteration of a landscape element;
- **Medium**: where the Development would result in the removal of a notable part of a landscape element or a notable alteration to a landscape element;
- **Low**: where the Development would result in the removal of a minor part of a landscape element or a minor alteration to a landscape element;
- **Negligible**: where the Development would result in the removal of a negligible amount of a landscape element or is barely discernible; and
- **None**: where the Development would result in no change to the landscape element.

There may also be intermediate levels of magnitude of change, such as medium-high or medium-low, where the change falls between definitions.

6.1.3 Significance of Effects on Landscape Elements

The significance of the effect on landscape elements is dependent on all of the factors considered in the sensitivity of the receptor and the magnitude of change upon it, and by applying professional judgement to assess whether or not the Development would have an effect that is significant or not significant.

A significant effect would occur where the degree of removal or alteration of the landscape element is such that the landscape element would be redefined (although the landscape character may not necessarily be redefined). If the landscape element is of a high sensitivity, a significant effect can occur with a limited degree of removal or alteration. A not significant effect would occur where the form of the landscape element is not redefined as a result of the Development. If the landscape element is of lower sensitivity, it may undergo a higher level of removal or alteration yet remain as a not significant effect.

6.2 Assessment of Effects on Landscape Character

The objective of the assessment of effects on landscape character is to determine what the likely effects of the Development would be, which landscape character receptors would be affected, and whether these effects would be significant or not significant. The methodology for the assessment of effects on landscape character involves the undertaking of a baseline study, evaluation of sensitivity, magnitude of change and an assessment of significance.

6.2.1 Landscape Baseline and Preliminary Assessment

The landscape baseline provides an understanding of the landscape in the area that may be affected - its constituent elements, its character, distinctiveness, condition and value, and the way this varies spatially. The landscape baseline describes aspects of the landscape that may be significantly affected, as defined in Schedule 4 of the EIA Regulations. Establishing the landscape baseline will, when reviewed alongside the description of the Development, form the basis for the identification and description of the landscape effects of the Development. The baseline description of the landscape that may be affected is primarily determined by the physical footprint of the Development components and their ZTV.

An overview of the landscape baseline is described, and a preliminary assessment identifies landscape receptors that may experience significant effects, which require to be assessed in full. A detailed description of the baseline is provided for each landscape receptor that may experience significant effects, allowing the full baseline to be described for landscape receptors that may be significantly affected. Those receptors which are identified as not having the potential to undergo significant effects and significant cumulative effects are not included in the subsequent detailed assessment but are noted with reasons given for their exclusion.

The baseline study of each landscape character receptor collates and presents information relevant to the assessment drawn from a combination of desk study and fieldwork. The baseline study covers the following issues:

- the description of the landscape character receptor drawn from the relevant documentation such as the Landscape Character Assessment or citations in respect of landscape designations;
- a description of the landscape character receptor based on field work to determine how typical or not the landscape character receptor is in relation to documented descriptions;
- those features and patterns of the landform, land-cover and land use which make the landscape character receptor distinctive;
- the visual and sensory experience of the landscape and how it associates with other landscapes including, in particular, the landscape character receptor where the Development is located; and
- how change in this landscape character receptor, either through natural or human processes, is presently affecting character and how they are predicted to affect character in the future. This may include operational windfarms where they are a feature of the baseline landscape context.

The landscape baseline also describes current pressures that may cause change in the landscape in the future, in particular drawing on information for wind energy developments that are not yet present in the landscape but are at other stages in the Development and consenting process. Operational and under construction wind energy developments are regarded as part of the baseline landscape character of the area. Any changes resulting from the Development are assessed within this context in the assessment of landscape and visual effects.

6.2.2 Sensitivity of Landscape Character Receptors

The sensitivity of a landscape character receptor is an expression of the combination of the judgements made about the susceptibility of the receptor to the specific type of change or the development proposed, and the value related to that receptor.

6.2.2.1 Value of the Landscape Receptor

The value of a landscape character receptor is a reflection of the value which society attaches to that landscape. The assessment of the landscape value is classified as high, medium-high, medium, medium-low or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following range of factors:

- **Landscape designations**: A receptor that lies within the boundary of a recognised landscape related planning designation will be of increased value, depending on the proportion of the receptor that is covered and the level of importance of the designation; international, national, regional or local. It is important to note that the absence of designations does not preclude local resource value, as an undesignated landscape character receptor may be important as a resource in the local or immediate environment, particularly when experienced in comparison with other nearby landscapes.
- **Landscape quality**: The quality of a landscape character receptor is a reflection of its attributes, such as scenic quality, sense of place, rarity and representativeness and the extent to which these attributes have remained intact. A landscape with consistent, intact and well-defined, distinctive attributes is generally considered to be of higher quality and, in turn, higher value, than a landscape where the introduction of inappropriate elements has detracted from its inherent attributes.
- **Landscape experience**: The experience of the landscape character receptor can add to its value and relates to a number of factors including the perceptual responses it evokes, the cultural associations that may exist in literature or history, or the iconic status of the landscape in its own right, the recreational value of the landscape for outdoor pursuits, and the contribution of other values relating to the nature conservation or archaeology of the area.

6.2.2.2 Susceptibility to Change

The susceptibility of a landscape character receptor to change is a reflection of its ability to accommodate the changes that would occur as a result of the addition of the Development. The assessment of the susceptibility of the landscape receptor to change is classified as high, medium-high, medium, medium-low or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following criteria:

The specific nature of the Development: The susceptibility of landscape receptors is assessed in relation to change arising from the specific development proposed, including the specific components and features of the Development proposed, its size, scale, location, context and characteristics.

- **Landscape character**: The key characteristics of the existing landscape character of the receptor is considered in the evaluation of susceptibility as they determine the degree to which the receptor may accommodate the influence of the Development. For example, a landscape that is of a particularly wild and remote character may have a higher susceptibility to the influence of the Development due to the contrast that it would have with the landscape, whereas a developed, industrial landscape, where built elements and structures are already part of the landscape character, may have a lower susceptibility. However, there are instances when the quality of a landscape may have been degraded to an extent whereby it is considered to be in a fragile state and therefore a degraded landscape may have a higher susceptibility to the Development.

- **Landscape association**: The extent to which the Development would influence the character of the landscape receptors across the Study Area, relates to the associations that exist between the landscape receptor where the Development is located and the landscape receptor from which the Development is being experienced. In some situations this association would be strong where the landscapes are directly related, for example the influence on a valley landscape by an enclosing upland landscape where the Development is set along the skyline, and in other situations weak where the landscape association is less important; for example, where the Development lies inland of a coastal landscape that has its main focus outwards over the sea.

6.2.2.3 Sensitivity Rating

An overall sensitivity assessment of the landscape receptor is made by combining the assessment of the value of the landscape character receptor and its susceptibility to change. An overall level of sensitivity is applied for each landscape receptor: high, medium-high, medium, medium-low and low; by combining individual assessments of the value of the receptor and its susceptibility to change. The basis for the assessments is made clear using evidence and professional judgement in the evaluation of sensitivity for each receptor. Criteria that tend towards higher or lower sensitivity are set out in Table A6.1.3.

Table A6.1.3 – Landscape Sensitivity to Change Criteria

Sensitivity factor	Higher	Lower
Value	Designation: Designated landscapes with national policy level protection or defined for their natural beauty.	Landscapes without formal designation. Despoiled or degraded landscape with little or no evidence of being valued by the community.
	Quality: Higher quality landscapes with consistent, intact and well-defined, distinctive attributes.	Lower quality landscapes with indistinct elements or features that detract from its inherent attributes.
	Rarity: Rare or unique landscape character types, features or elements.	Widespread or 'common' landscape character types, features or elements.
	Aesthetic / scenic: Valued perceptual aspects, or designated wildlife, ecological or cultural heritage features that contribute to landscape character.	Limited aesthetic / perceptual aspects, wildlife, ecological or cultural heritage features, or limited contribution to landscape character.
	Perceptual qualities: Landscape with perceptual qualities of wildness, remoteness or tranquillity.	Landscape where potential qualities of wildness, remoteness or tranquillity are no longer present or experienced, often as a result of existing development influences.
Susceptibility	Strength and robustness: Fragile landscape vulnerable and lacking the ability to accommodate change.	Robust landscape that is capable of reasonably accommodating change without undue adverse effects.
	Landscape scale: A smaller scale landscape, with complex, distinctive or small-scale landforms.	A landscape of a suitably large enough scale to accommodate the development, with simple, broad and homogenous landforms.
	Openness / enclosure: Openness may increase susceptibility if there is wider visibility, however open landscape may also be larger scale and simple which would decrease susceptibility.	Enclosed landscapes can offer more screening potential, limiting visibility to a smaller area, however they may also be smaller scale and more complex which would increase susceptibility
	Skyline: Distinctive undeveloped skylines with landmark features.	Developed, non-distinctive skylines without landmark features.
	Relationship with other development: Little association with other contemporary	Strong or direct association with other similar contemporary developments and

Sensitivity factor	Higher	Lower
	development, or strong associations occur with smaller scale or historic development.	landscape character influenced by development.
	Perceptual qualities: Perceptual qualities associated with particular scenic qualities, wildness or tranquillity.	Contemporary, cultivated / settled or developed landscapes with fewer perceptual qualities are likely to have a lower susceptibility.
	Landscape association: Adjacent landscape character context connected by associated character and views.	Host landscape character is separate from surrounding / adjacent landscape character with weak association.
Sensitivity to change	High ◄────► Medium	◄────► Low

6.2.3 Landscape Magnitude of Change

The magnitude of change on views is an expression of the scale of the change that would result from the Development and is dependent on a number of variables regarding the size or scale of the change. An assessment is also made of the geographical extent of the area over which this would occur and the duration and reversibility of such changes. The basis for this assessment is made clear using evidence and professional judgement, based on the following criteria.

6.2.3.1 Size or Scale of Change

This criterion relates to the size or scale of change to the landscape that would arise as a result of the Development, based on the following factors:

- **Landscape elements**: the degree to which the pattern of elements that makes up the landscape character would be altered by the Development, through removal or addition of elements in the landscape, in this instance. The magnitude of change would generally be higher if key features that make up the landscape character are extensively removed or altered, and if many new components are added to the landscape;
- **Landscape characteristics**: the extent to which the Development would change, physically or perceptually, the characteristics that may be important in the creation of the distinctive character of the landscape. This may include the scale of the landform, its relative simplicity or irregularity, the nature of the landscape context, the grain or orientation of the landscape, the degree to which the receptor is influenced by external features and the juxtaposition of the Development with these key characteristics;
- **Landscape designation**: In the case of designated landscapes, the degree of change is considered in light of the effects on the special landscape qualities which underpin the designation and the effect on the integrity of the designation. All landscapes change over time and much of that change is managed or planned. Often landscapes will have management objectives for 'protection' or 'accommodation' of development. The scale of change may be localised, or occurring over parts of an area, or more widespread affecting whole landscape receptors and their overall integrity.
- **Distance**: The size and scale of change is also strongly influenced by the proximity of the Development to the receptor and the extent to which the development can be seen as a characterising influence on the landscape. Consequently, the scale or magnitude of change is likely to be lower in respect of landscape receptors that are distant from the Development and / or screened by intervening landform, vegetation and built form to the extent that the scale of their influence on landscape receptors is small or limited. Conversely, landscapes closest to the development are likely to be most affected. Host landscapes (where the development is located within a 'host' landscape character unit) will be directly affected whilst adjacent areas of landscape character will be indirectly affected.

- **Amount and nature of change**: The amount of the Development that will be seen. Visibility of the Development may range from one wind turbine blade tip to all of the wind turbines; generally, the greater the amount of the Development that can be seen, the higher the scale of change. The degree to which the Development is perceived to be on the horizon or 'within' the landscape. Generally, the magnitude of change is likely to be lower if the Development is largely perceived to be on the horizon at distance, rather than 'within' the landscape.

6.2.3.2 Geographical Extent

The geographical extent over which the landscape effects would be experienced is also assessed, which is distinct from the size or scale of effect. This evaluation is not combined in the assessment of the level of magnitude, but instead expresses the extent of the receptor that would experience a particular magnitude of change and can therefore affect the geographical extents of the significant and non-significant effects.

The extent of the effects would vary depending on the specific nature of the Development and is principally assessed through analysis of the extent of visibility of physical change to the landscape or the extent to which the landscape character would change through visibility of the Development.

6.2.3.3 Duration and Reversibility

The duration and reversibility of landscape effects has been based on the period over which Development are likely to exist (during construction and operation) and the extent to which these elements has been removed (during decommissioning) and its effects reversed at the end of that period. Long-term, medium-term and short-term landscape effects are defined as follows:

- long-term – more than 10 years (may be defined as permanent or reversible);
- medium-term – 5 to 10 years; and
- short-term – 0 to 5 years.

6.2.3.4 Magnitude of Change Rating

The 'magnitude' or 'degree of change' resulting from the Development is described as 'High', 'High-medium', 'Medium', 'Medium-low' 'Low' or 'Negligible'. In assessing magnitude of change, the assessment focuses on the size or scale of change. The geographic extent, duration and reversibility are stated separately in relation to the assessed effects (i.e., as short/medium / long-term and temporary/permanent). The basis for the assessment of magnitude for each receptor has been made clear using evidence and professional judgement. The levels of magnitude of change that can occur are defined in Table A6.1.4.

Table A6.1.4 – Landscape Magnitude of Change Definitions

Magnitude of change	Definition
High	The Development will result in a high level of alteration to the baseline characteristics or special qualities of the landscape, forming the prevailing influence and/or introducing elements that are uncharacteristic in the baseline landscape. The addition of the Development will result in a large-scale change, loss or addition to the baseline landscape.
Medium-high	Intermediate rating with combination of criteria from high magnitude (described above) and medium magnitude (described below).
Medium	The Development will result in a medium level of alteration to the baseline characteristics or special qualities of the landscape, forming a readily apparent influence and/or introducing elements that are potentially uncharacteristic in the baseline landscape. The addition of the Development will result in a medium-scale change, loss or addition to the baseline landscape.
Medium-low	Intermediate rating with combination of criteria from medium magnitude (described above) and low magnitude (described below).
Low	The Development will result in a low level of alteration to the baseline characteristics or special qualities of the landscape, providing a slightly apparent influence and/or introducing elements

Magnitude of change	Definition
	that are characteristic in the baseline landscape. The addition of the Development will result in a small-scale change, loss or addition to the baseline landscape.
Negligible	The Development will result in a negligible alteration to the baseline characteristics or special qualities of the landscape, providing a barely discernible influence and/or introducing elements that are substantially characteristic in the baseline landscape. The addition of the Development will result in negligible change, loss or addition to the baseline landscape.

6.2.4 Significance of Effects on Landscape Character Receptors

The significance of the effect on each landscape character receptor is dependent on all of the factors considered in the sensitivity of the receptor, and the magnitude of change resulting from the Development. These judgements on sensitivity and magnitude are combined to arrive at an overall assessment as to whether the Development would have an effect that is significant or not significant on the landscape character receptor. An assessment of the factors considered in the evaluation of the sensitivity of each landscape character receptor and the magnitude of the change resulting from the Development are presented in the assessment in order that the relevant considerations which have informed the significance can be considered transparently. The matrix shown in Table A6.1.2 helps to inform the threshold of significance when combining sensitivity and magnitude to assess significance.

A significant effect would occur where the combination of the variables results in the Development having a defining effect on the landscape character receptor, or where changes of a lower magnitude occur on a landscape character receptor that is of particularly high sensitivity. A not significant effect would occur where the effect of the Development is not definitive, and the landscape character of the receptor continues to be characterised principally by its baseline characteristics, or where the small scale of change experienced by a high sensitivity receptor is such as to be considered not significant. A major loss or irreversible effect over an extensive area, on elements and/or perceptual aspects that are key to the character of nationally valued landscapes are likely to be of greatest significance. Reversible effects, over a restricted area, on elements and/or perceptual aspects that contribute to but are not key characteristics of the character of landscapes that are of lower value, are likely to be of least significance.

OPEN has chosen to keep the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are therefore stated separately in relation to the assessed effects (i.e. as short/medium/long-term and temporary/permanent) and are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

7 ASSESSING VISUAL EFFECTS

7.1 Introduction

Visual effects are concerned wholly with the effect of the Development on views, and the general visual amenity available to people and are defined by the Landscape Institute in GLVIA 3, paragraphs 6.1 as follows: *"An assessment of visual effects deals with the effects of change and development on views available to people and their visual amenity. The concern ... is with assessing how the surroundings of individuals or groups of people may be specifically affected by changes in the context and character of views."*

Visual effects are identified for different receptors (people) who will experience the view at their place of residence, within their community, during recreational activities, at work, or when travelling through the area. Visual effects may include changes to an existing static view, sequential views, or wider visual amenity as a result of development or the loss of particular landscape elements or features already present in the view.

The level of visual effect (and whether this is significant) is determined through consideration of the sensitivity of each visual receptor (or range of sensitivities for receptor groups) and the magnitude of change that will be brought about by the construction, operation and decommissioning of the Development.

The assessment of visual effects is carried out in two parts:

- an assessment of the effects that the Development would have on a series of viewpoints that have been selected to represent the views available to people from representative or specific locations within the Study Area; and
- an assessment of the effects that the Development would have from principal visual receptors, including residents of settlements, motorists using roads and people using recreational routes, features and attractions throughout the Study Area.

The LVIA therefore includes viewpoint analysis prepared for a series of representative viewpoints and presented as supporting assessment in the LVIA. The viewpoint analysis assists in defining the direction, elevation, geographical spread and nature of the potential visual effects and identify areas where significant effects are likely to occur. This approach seeks to provide clarity and confidence to consultees and decision makers by allowing the detailed judgements on the magnitude of visual change to be more readily scrutinised and understood. The viewpoint analysis is used to assist the visual assessment of visual receptors reported in the LVIA.

7.2 Visual Baseline and Preliminary Assessment

The visual baseline establishes the area in which the Development may be visible, the different groups of people who may experience views of the Development, the viewpoints where they would be affected and the nature of the views at those points. The visual baseline describes aspects of the visual amenity that may be significantly affected, as defined in Schedule 4 of the EIA Regulations. The baseline description of the groups of people (referred to as visual receptors) and viewpoints that may be affected is primarily determined by the ZTV.

Plans mapping the ZTV are used to analyse the extent of theoretical visibility of the Development, across the Study Area and to assist with viewpoint selection. The ZTV does not however, take account of the screening effects of buildings, localised landform and vegetation, unless specifically noted (see individual figures). As a result, there may be roads, tracks and footpaths within the study area which, although shown as falling within the ZTV, are screened or filtered by built form and vegetation, which will otherwise preclude visibility. The ZTV provides a starting point in the assessment process and accordingly tend towards giving a 'worst case' or greatest calculation of the theoretical visibility.

An overview of the visual baseline is described, and a preliminary assessment identifies visual receptors that may experience significant effects, which require to be assessed in full. A full description of the baseline is provided for each visual receptor that may experience significant effects, allowing the full baseline to be described for visual receptors that may be significantly affected. Those receptors which are identified as not having the potential to undergo significant effects are not included in the subsequent detailed assessment but are noted with reasons given for their exclusion.

The baseline study establishes the visual baseline, including the area from which the Development may be visible, the different groups of people who may experience views of the Development (visual receptors), the viewpoints where they would be affected and nature of views at these points. The baseline study establishes the visual baseline in relation to the following matters:

- the area from which the Development may be visible, that is land from which it may potentially be seen, is established and mapped using an initial ZTV of the Development;

- the location, type and number of visual receptors experiencing visibility of the Development, the likely views experienced and the activity / occupation they are engaged in;
- selection of viewpoints from within the ZTV, including representative viewpoints selected to represent the experience of different types of visual receptor and specific viewpoints selected because they are key/promoted viewpoints in the landscape;
- the location, character and type of each viewpoint with an indication of the type of visual receptor likely to be experiencing the view from each viewpoint;
- the nature of the view in terms of both the direction of view towards the Development as well as the wider available view, making reference to the principal orientation, focal features, and visible extents in terms of both horizontal degrees and distance;
- the character of the view in terms of its content and composition, its horizontal and vertical scale as well as depth and sense of perspective, important attributes such as prominent skylines and focal points and ultimately identifying the defining patterns and features which characterise the view; and
- the influence of human intervention and how the addition of artefacts and modification through land use affect the baseline situation. This may include operational windfarms where they are a feature of the baseline visual context.

The visual baseline also describes current pressures that may cause change to the visual amenity of the area in the future, in particular drawing on information for wind energy developments that are not yet present in the landscape but are at other stages in the project and consenting process. Operational and under construction wind energy developments are regarded as part of the baseline visual context. Any changes resulting from the Development are assessed within this context in the assessment of landscape and visual effects.

7.3 Sensitivity of Visual Receptors

The sensitivity of visual receptors is determined by a combination of the value of the view and the susceptibility of the visual receptors to the change that the Development would have on the view.

7.3.1 Value of the View

The value of a view or series of views is a reflection of the recognition and the importance attached either formally through identification on mapping or being subject to planning designations, or informally through the value which society attaches to the view(s). The value of a view is classified as high, medium-high, medium, medium-low or low and the basis for this assessment is made clear using evidence and professional judgement, based on the following criteria:

- **Formal recognition**: The value of views can be formally recognised through their identification on OS or tourist maps as formal viewpoints, sign-posted and with facilities provided to add to the enjoyment of the viewpoint such as parking, seating and interpretation boards. Specific views may be afforded protection in local planning policy and recognised as valued views. Specific views can also be cited as being of importance in relation to landscape or heritage planning designations, for example the value of a view would be increased if it presents an important vista from a designed landscape or lies within or overlooks a designated area such as a National Scenic Area, which implies a greater value to the visible landscape.
- **Informal recognition**: Views that are well-known at a local level can have an increased value, even if there is no formal recognition or designation. Views or viewpoints are sometimes informally recognised through references in art or literature and this can also add to their value. A viewpoint that is visited or used by a large number of people would tend to have greater importance than one gained by very few people, although this is not always the case.

7.3.2 Susceptibility to Change

Susceptibility relates to the nature of the viewer experiencing the view and how susceptible they are to the potential effects of the Development. A judgement to determine the level of susceptibility therefore relates to the nature of the viewer and their experience from that particular viewpoint or series of viewpoints, as follows:

- **Nature of the viewer**: The nature of the viewer is described by the occupation or activity which they are engaged in at the viewpoint or series of viewpoints. The most common groups of viewers considered in the visual assessment include residents, road-users, workers and walkers. Viewers whose attention is focused on the landscape, walkers, for example are likely to have a higher sensitivity, as would residents of properties that gain constant views of the Development. Viewers travelling in cars or on trains would tend to have a lower sensitivity as their view is transient and moving. The least sensitive viewers are usually people at their place of work as they are less sensitive to changes in the view; however, this also depends on the nature of their work and the workplace which they occupy.
- **Experience of the viewer**: The experience of the visual receptor relates to the extent to which the viewer's attention or interest may be focused on the view and the visual amenity they experience at a particular location. The susceptibility of the viewer to change arising from the Development may be influenced by the viewer's attention or interest in the view, which may be focused in a particular direction, from a static or transitory position, over a long or short duration, and with high or low clarity. For example, if the principal outlook from a route is aligned directly towards the Development, the experience of the visual receptor would be altered more notably than if the experience related to a glimpsed view seen at an oblique angle from a car travelling at high speed. The visual amenity experienced by the viewer varies depending on the presence and relationship of visible elements, features or patterns experienced in the view and the degree to which the landscape in the view may accommodate the influence of the Development.

7.3.3 Sensitivity Rating

An overall level of sensitivity is applied for each visual receptor or view: high, medium-high, medium, medium-low, low; by combining individual assessments of the value of the receptor and its susceptibility to change. Each visual receptor, meaning the particular person or group of people likely to be affected at a specific viewpoint, is assessed in terms of their sensitivity. The basis for the assessments is made clear using evidence and professional judgement in the evaluation of each receptor. Criteria that tend towards higher or lower sensitivity are set out in Table A6.1.5.

Table A6.1.5 – Sensitivity to Change Criteria

Sensitivity factor	Higher	Lower
Value	Specific viewpoint identified in OS maps and / or tourist information and signage.	Viewpoint not identified in OS maps or tourist information and signage.
	Facilities provided at viewpoint to aid the enjoyment of the view.	No facilities provided at viewpoint to aid enjoyment of the view.
	View afforded protection in planning policy.	View is not afforded protection in planning policy.
	View is within or overlooks a designated landscape, which implies a higher value to the visible landscape.	View is not within, nor does it overlook, a designated landscape.
	View has informal recognition and well-known at a local level, as having particular scenic qualities.	View has no informal recognition and is not known as having particular scenic qualities.
	View or viewpoint is recognised through references in art or literature.	View or viewpoint is not recognised in references in art or literature.
	View has high scenic qualities relating to the content and composition of the visible landscape.	View has low scenic qualities relating to the content and composition of the visible landscape.

Sensitivity factor	Higher	Lower
Susceptibility	Viewer who is likely or liable to be influenced by the Development.	Viewer who is unlikely or not liable to be influenced by the Development.
	Viewers such as walkers, or tourists, whose main attention and interest are on their surroundings.	Viewers whose main attention is not focused on their surroundings, such as people at work, or specific forms of recreation.
	Residents that gain static, long-term views of the Development in their principal outlook.	Viewers who are transient and dynamic, such as those travelling in cars or on trains, where the view is of short duration.
	Viewpoint is visited or used by a large number of people.	View is visited or gained by very few people.
	A view that is focused in a specific directional vista, with notable features of interest in a particular part of the view.	Open views with no specific point of interest, or specific directional vista away from direction of the Development.
	Viewers are focused on the experience of a high level of visual amenity at the location due to its overall pleasantness as an attractive visual setting or backdrop to activities.	The visual amenity experienced at the location by viewers is less pleasant or attractive than might otherwise be the case. Presence of existing built element features influence visual amenity experienced.
Sensitivity to change	High ◄──► Medium ◄──► Low	

7.4 Visual Magnitude of Change

The magnitude of change on views is an expression of the scale of the change that would result from the Development and is dependent on a number of variables regarding the size or scale of the change. A separate assessment is also made of the geographical extent of the area over which this would occur and the duration and reversibility of such changes.

7.4.1 Size or Scale

An assessment is made about the size or scale of change in the view that is likely to be experienced as a result of the Development, based on the following criteria:

- **Distance**: the distance between the visual receptor or viewpoint and the Development. Generally, the greater the distance, the lower the magnitude of change, as the Development would constitute a smaller scale component of the view;
- **Size**: the amount and size of the Development that would be seen. Visibility may range from one blade tip to all of the turbines. Generally, the larger the Development appears in the view, and the more of the Development that can be seen, the higher the magnitude of change;
- **Scale**: the scale of the change in the view, with respect to the loss or addition of features in the view and changes in its composition. The Development may appear in a similar part of the view to that which includes an operational windfarm or it may appear close to or as an extension to an existing windfarm and its scale of change is assessed in the context of these existing views;
- **Field of view**: the vertical / horizontal field of view available and the proportion of the view that is affected by the Development. Generally, the more of the proportion of view that is affected, the higher the magnitude of change would be. If the Development extends across the whole of the open part of the outlook, the magnitude of change would generally be higher as the full view would be affected; Conversely, if the Development covers just a part of an open, expansive and wide view, the magnitude of change is likely to be reduced as the Development would not affect the whole open part of the outlook;
- **Contrast**: the scale and character of the context within which the Development would be seen and the degree of contrast or integration of any new features with existing landscape

elements, in terms of scale, form, mass, line, height, colour and motion. Contrasts and changes may arise particularly as a result of the more notable rotation movement of the wind turbine blades, as a characteristic that gives rise to effects of the Development;

- **Consistency of image**: the consistency of image of the Development in relation to other developments. The magnitude of change of the Development is likely to be lower if its wind turbine height, arrangement and layout design are broadly similar to other windfarm developments in the views, as they are more likely to appear as relatively simple and logical components of the landscape;
- **Skyline/background**: whether the Development will be viewed against the skyline or a background landscape may affect the level of contrast and magnitude. If the Development add to an already developed skyline the magnitude of change will tend to be lower.
- **Number**: generally, the greater the number of separate Development seen simultaneously or sequentially, the higher the magnitude of change. Further effects will occur in the case of separate developments and their spatial relationship to each other will affect the magnitude of change. For example, development that appears as an extension to an existing development will tend to result in a lower magnitude of change than a separate, new development.
- **Nature of visibility**: the nature of visibility is a further factor for consideration. The Development may be subject to various phases of development change and the way the Development may be viewed could be intermittent or continuous and / or seasonally, due to periodic management or leaf fall.

7.4.2 Geographical Extent

The geographic extent over which the visual effects will be experienced has also been assessed. This is distinct from the size or scale of effect and is described in terms of the physical area or location over which it will be experienced (described as a linear or area measurement). The extent of the effects will vary according to the specific nature of the Development and is principally assessed through ZTV, field survey and viewpoint analysis of the extent of visibility likely to be experienced by visual receptors. The geographical extent of visual effects is described as per the following examples.

The geographical extent can be described as an area measurement or proportion of the total area of the receptor affected. For example, effects on people within a particular area such as a country park or area of common land can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people within that area. The geographical extent of that visual effect can be expressed as approximately '5 hectares' or '10%' of an area of land or defined recreational area.

The geographical extent can be described as a linear measurement (m or km) according to the length of route affected. For example, effects on people travelling on a route through the landscape such as a road or footpath can be illustrated via a 'representative viewpoint' that represents a similar visual effect, likely to be experienced by larger numbers of people along that route. The geographical extent of that visual effect can be expressed as approximately '2 km' or '10%' of the total length of the route.

The geographical extent of a visual effect experienced from a specific viewpoint may be limited to that location alone, for example a public viewpoint recommended in tourist literature such as a well visited hill summit or a particular location within a built up or well vegetated area, where an uncharacteristically open or restricted view exists.

7.4.3 Duration and reversibility

The duration and reversibility of visual effects are based on the period over which the Development are likely to exist (during construction and operation) and the extent to which the Development will be removed (during decommissioning), with effects reversed at the end of that period.

Long-term, medium-term and short-term visual effects are defined as follows:

- long-term – more than 10 years (may be defined as permanent or reversible);
- medium-term – 5 to 10 years; and
- short-term – 0 to 5 years.

7.4.4 Visual magnitude of change rating

The 'magnitude' or 'degree of change' resulting from the Development is described as 'High', 'High-medium', 'Medium', 'Medium-low' 'Low' and 'Negligible' as defined in Table A6.1.6. The basis for the assessment of magnitude for each receptor has been made clear using evidence and professional judgement.

Table A6.1.6 – Visual Magnitude to Change Definitions

Magnitude of change	Definition
High	The Development will result in a high level of alteration to the existing view, forming the prevailing influence and/or introducing elements that are uncharacteristic in the baseline view. The addition of the Development will result in a large-scale change, loss or addition to the baseline view.
Medium-high	Intermediate rating with combination of criteria from high magnitude (described above) and medium magnitude (described below).
Medium	The Development will result in a medium level of alteration to the existing view, forming a readily apparent influence and/or introducing elements that are potentially uncharacteristic in the baseline view. The addition of the Development will result in a medium-scale change, loss or addition to the baseline view.
Medium-low	Intermediate rating with combination of criteria from medium magnitude (described above) and low magnitude (described below).
Low	The Development will result in a low level of alteration to the existing view, providing a slightly apparent influence and/or introducing elements that are characteristic in the baseline view. The addition of the Development will result in a small-scale change, loss or addition to the baseline view.
Negligible	The Development will result in a negligible alteration to the existing view, providing a barely discernible influence and/or introducing elements that are substantially characteristic in the baseline view. The addition of the Development will result in negligible change, loss or addition to the baseline view.

Examples of criteria that tend towards higher or lower magnitude of change that can occur on views and visual receptors are set out in Table A6.1.7.

Table A6.1.7 – Visual Magnitude to Change Criteria

Magnitude of change	Definition
High	The Development will be the prevailing feature, forming the major focus of visual attention due to its large vertical scale and lateral spread, filling a large proportion of the field of view, with contrasts in form, line, colour, texture, luminance or motion contributing to the prevailing influence. • Size and Scale: A large scale and prevailing change to the view. • Number: Involving the loss/addition of a large number of features / elements. • Distance: Typically appearing closer to the viewer in the fore to middle ground. • Field of View: Affecting a large vertical angle and wide horizontal FoV. • Nature of Visibility: Multiple phase development, continuously and sequentially visible. • Contrast: Strong degree of contrast with surroundings with little or no screening. • Skyline: Visible on the skyline as a new feature. • Consistency of Image: Contrasting with other developments, lacking in visual rationale.

Magnitude of change	Definition
	Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by larger numbers of people, relative to the activity, and may also be experienced from a specific viewpoint.
Medium	The Development will be plainly visible, so will not be missed by casual observers, but will not strongly attract visual attention or dominate the view because of its apparent size. The Development is obvious and will have sufficient size to contrast with other seascape/landscape elements, but with insufficient visual contrast to strongly attract visual attention and insufficient size to occupy most of an observer's field of view. • Size and Scale: A medium scale and readily apparent change to the view. • Number: Involving the loss/addition of a number of features / elements. • Distance: Typically appearing in the middle ground. • FoV: Affecting a medium vertical angle and moderate horizontal FoV. • Nature of Visibility: Multiple phase development, intermittently and sequentially visible. • Contrast: Contrast with surroundings and may benefit from some screening. • Skyline: Visible on the skyline along with other features. • Consistency of Image: Different from other developments, some visual rationale. Typically experienced from representative viewpoints illustrating a visual effect likely to be experienced by a medium number of people, relative to the activity, and may also be experienced from a specific viewpoint.
Low	The Development will be visible when scanning in its general direction; otherwise it may be missed by casual observers. Small and/or faint, but when the observer is scanning the horizon or looking more closely at an area, can be detected and sometimes noticed by casual observers; however, most people would not notice it without some active looking. • Size and Scale: A small scale and slightly apparent change, could being missed by the casual observer. • Number: Involving the loss/addition of a small number of features / elements. • Distance: Typically appearing in the background. • FoV: Affecting a small vertical angle and narrow horizontal FoV. • Nature of Visibility: Simple, single development, intermittently and infrequently visible. • Contrast: Some parity / 'fits' with surroundings and may benefit from screening. • Skyline: Partly visible on a developed skyline or not visible on the skyline. • Consistency of Image: Similar from other developments with visual rationale, appearing reasonably well accommodated within its surroundings. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity and may also be experienced from a specific viewpoint.
Negligible	The Development will be visible only after extended viewing and is near the limit of visibility or is barely visible, such that it would not be seen by a person who was unaware of it in advance and therefore looking for it. Even under those circumstances, it may be seen only after looking at it closely for an extended period. • Size and Scale: A very small scale or barely negligible change, need to 'look for it'. • Number: Involving the loss/addition of a small number of features / elements. • Distance: Typically appearing in the far distance. • FoV: Affecting a very small vertical and narrowest horizontal FoV. • Nature of Visibility: Simple, single development, intermittently and infrequently visible. • Contrast: Blends with surroundings and / or is well screened. • Skyline: Partly visible on a developed skyline or not visible on the skyline. • Consistency of Image: Similar from other developments with strong visual rationale, appearing well accommodated within its surroundings. Typically experienced from illustrative viewpoints likely to be experienced by low numbers of people, relative to the activity and may also be experienced from a specific viewpoint.

7.4.5 Significance of Effects on Views

The significance of the effect on each view is dependent on all of the factors considered in the sensitivity of the view, and the magnitude of change resulting from the Development. These judgements on sensitivity and magnitude are combined to arrive at an overall assessment as to whether the Development would have an effect that is significant or not significant on the visual receptor.

Table A6.1.2 helps to inform the threshold of significance when combining sensitivity and magnitude to assess the significance of effect.

A significant effect would occur where the combination of the variables results in the Development having a defining effect on the view or where changes of a lower magnitude occur on a view or visual receptor that is of particularly high sensitivity. A not significant effect would occur where the appearance of the Development is not definitive, and the view continues to be defined principally by its baseline characteristics or where the small scale of change experienced by a high sensitivity receptor is such as to be considered not significant. Irreversible, long-term effects on people who are particularly sensitive to changes in views and visual amenity are more likely to be significant, as are effects on people at recognised viewpoints. Large-scale changes which introduce new, non-characteristic or discordant elements into the view are also more likely to be significant than small changes or changes involving features already present within the view.

OPEN has chosen to keep the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are therefore stated separately in relation to the assessed effects (i.e. as short/medium/long-term and temporary/permanent) and are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

The assessment of visual effects assumes clear weather and optimum viewing conditions. This means that effects that are assessed to be significant may be not significant under different, less clear conditions. Viewing conditions and visibility tend to vary considerably and therefore the likelihood of effects resulting from the Development would vary greatly dependent according to the prevailing viewing conditions.

8 ASSESSING NIGHT-TIME VISUAL EFFECTS

8.1 Introduction

The assessment of night-time visual effects is based on the description of proposed wind turbine lighting set out in Chapter 2: Development Description and the relevant ICAO/CAA regulations and standards, including Air Navigation Order 2016: Civil Aviation (CAA, 2016).

The Civil Aviation Authority (CAA) requires that 'en-route obstacles' at or above 150 m above ground level are lit with visible lighting to assist their detection by aircraft. As such, there is potential that parts of the Development may be visible at night. The effect of the Development at night would result from visible lighting located on the nacelles, and on the towers, of all turbines. The LVIA assesses the visual effects of visible aviation lighting in Appendix A6.3 which includes specific lighting ZTVs and night time visualisations.

Specific requirements for aviation and navigational lighting would be agreed with the relevant stakeholders post-consent and prior to construction. The CAA requires that all obstacles at or above 150 m above ground level are fitted with visible lighting and in the case of wind turbines these should be located on the nacelle. There is an additional requirement for lights to be provided at an intermediate level of half the nacelle height. These would need to be fitted around the towers to allow for 360-degree horizontal visibility.

A description of the turbine lighting requirements and a proposed turbine lighting is found within Chapter 2: Development Description in Volume 1 of the Ladyfield Renewable Energy Park EIA Report. Based on this, the lighting scenario assessed in Appendix 6.3 is represents the Worst-Case Aviation Lighting Scheme, which assumes visible aviation lighting located on all turbine hubs and intermediate lighting on all towers.

Technical Appendix A6.5 describes the lighting parameters and approach to assessing night time effects in more detail in relation to the Development.

8.2 Night-time visual effects

The effect of the visible lights will be dependent on a range of factors, including the intensity of lights used, the clarity of atmospheric visibility and the degree of negative/positive vertical angle of view from the light to the receptor. In compliance with EIA regulations, the likely significant effects of a 'worst-case' scenario for WTG lighting are assessed and illustrated in this visual assessment.

A worst-case approach is applied to the assessment that considers the potential effects of medium-intensity 2,000 cd lights in clear visibility. It should be noted however, that medium intensity lights are only likely to be operated at their maximum 2,000 cd during periods of poor visibility. A further assessment of the likely residual effects is therefore made factoring in embedded mitigation, i.e. that the 2,000 cd aviation lights will be dimmed to 10% of their value (200 cd) if meteorological conditions permit (when visibility is greater than 5 km). This scenario also covers the effects that may arise for receptors that view the turbine aviation lights from locations that are 1.5 degrees below the horizontal, where the Air Navigation Order 2016 (CAA, 2016) allows aviation lights to be reduced to 10% peak intensity (200 cd). Photomontages showing both 2,000 cd and 200 cd are provided from representative viewpoints to support these assessments.

It should be noted that the WTGs would also include infra-red lighting on the WTG hubs, which would not be visible to the human eye. Details of the lighting would be agreed with the MoD. The focus of the night-time visual assessment in this assessment is on the visible lighting requirements of the Development.

The assessment of the lighting of the Development is intended to determine the likely effects on the visual resource i.e. it is an assessment of the visual effects of aviation lighting on views experienced by people at night. The assessment of WTG lighting does not consider effects of aviation lighting on landscape character (i.e. landscape or seascape effects).

ICAO indicates a requirement for no lighting to be switched on until 'Night' has been reached, as measured at 50 cd/m^2 or darker. It does not require 2,000 cd medium intensity to be on during 'twilight', when landscape character may be discerned. The aviation navigational lights may be seen for a short time during the twilight period when some recognition of landscape features/ profiles/ shapes and patterns may be possible. It is considered however, that level of recognition does not amount to an ability to appreciate in any detail landscape character differences and subtleties, nor does it provide sufficient natural light conditions to undertake a landscape character assessment.

The proposed aviation lighting will not have significant effects on the perception of landscape or seascape character, which is not readily perceived at night in darkness, particularly in rural areas. The matter of visible aviation navigation lighting assessment is wholly a visual concern and the assessment presented focusses on that premise.

8.3 Significance criteria for night-time visual effects

The nature of the daytime and night-time effects from visible aviation navigation lighting are clearly very different, in that during day light hours visibility of moving WTG rotors gives rise to effects that are very different to the pinpoint effects of lighting at night. It is considered therefore, that the same criteria should not be used to assess these differences in daytime and night-time effect.

In relation to the sensitivity of visual receptors, this is defined through the application of professional judgement in relation to the interaction between the 'value' of the view experienced by the visual receptor and the 'susceptibility' of the visual receptor (or 'viewer', not the view) to the particular form of change likely to result from the Development.

The factors weighed in reaching a decision on 'value' of the view are not all applicable at night-time, in the same way they may be during the day. It is not appropriate, for example, to attribute value to views at night when the detail of the view, or of elements that add value to it within a landscape, cannot readily be discerned. Furthermore, the popularity of a viewpoint during the day may be completely different to its use at night. Value factors assessed for day-time viewpoints may therefore be of less relevance to the value judgement for night-time viewpoints, which is factored into the following assessments.

In reaching a view on the significance of the likely visual effects from the visible aviation lighting, it is relevant to consider what parts of the landscape - where darkness qualities are well displayed - are likely to be affected by visibility of the aviation lights and, in turn, to understand what people might be doing in these areas at night to be susceptible to visibility of aviation lights. Descriptions of 'susceptibility' provided for daytime viewpoints and receptors in Section 7 are considered appropriate for the purposes of establishing receptor sensitivity at night-time, however the susceptibility of people experiencing night-time views will depend on the degree to which their perception is affected by existing baseline lighting. In brightly lit areas, or when travelling on roads from where sequential experience of lighting may be experienced, the susceptibility of receptors is likely to be lower than from within areas where the baseline contains no or limited existing lighting.

In relation to the other key component in determining significance of effect, the magnitude of change, reference to 'loss of important features' and 'composition of the view' are not readily discernible or relevant at night and, on this basis, a distinct set of criteria to explain the magnitude of change at night, as a consequence of the appearance of aviation lights, is set out in Table A6.1.8 below.

Table A6.1.8: Magnitude of change definitions for night-time visual effects

Magnitude of change	Definition
High	Addition of aviation navigation lighting results in large scale of change/large intrusion to the existing night-time baseline conditions/darkness in the view, due to a full and/ or close range view of visible aviation lighting and/ or a high degree of contrast/ low degree of integration with level of baseline lighting in the view. Results in obtrusive light which compromises or diminishes the view of the night sky.
Medium	Addition of aviation lighting results in moderate scale of change/moderate intrusion to the existing night-time baseline conditions/ darkness in the view, due to partial and/ or middle distance view of visible aviation lighting and/ or moderate level of contrast/ integration with level of baseline lighting in the view. Results in light that may partially compromise or diminish the view of the night sky, but which is not considered obtrusive.
Low	Addition of aviation navigation lighting results in small scale of change/minor intrusion to the existing night-time baseline conditions/ darkness in the view, due to limited and/ or distant view of aviation lighting and/ or low degree of contrast/ high degree of integration with level of baseline lighting in the view. Results in light that does not compromise or diminish the view of the night sky, nor is it considered obtrusive.
Negligible	Addition of aviation navigation lighting results in a largely indiscernible change/negligible intrusion to the existing night-time baseline conditions/ darkness in the view, due to glimpsed view of lighting and/ or slight degree of contrast/ very high degree of integration with level of baseline lighting in the view. Results in light that does not compromise or diminish the view of the night sky, nor is it considered obtrusive.

The significance of effects of aviation navigation lighting is assessed through a combination of the sensitivity of the visual receptor and the magnitude of change that would result from the visible aviation lighting, taking into account the considerations described above, and informed by the matrix in Table A6.1.2, which gives an understanding of the threshold at which significant effects may arise.

A significant effect occurs where the aviation navigation lighting would provide a defining influence on a view or visual receptor. A not significant effect would occur where the effect of the aviation navigation lighting is not material, and the baseline characteristics of the view or visual receptor continue to provide the definitive influence. In this instance the aviation lighting may have an influence, but this influence would not be definitive.

In determining significance, particular attention is paid to the potential for 'Obtrusive Light' i.e. whether the lighting impedes a particular view of the night sky; creates sky glow, glare or light intrusion (ILP, 2011) in a prominent, incongruous or intrusive way.

9 ASSESSING CUMULATIVE LANDSCAPE AND VISUAL EFFECTS

9.1 Introduction

Assessment of cumulative effects is required by the EIA Regulations. Cumulative effects have been defined in a broad generic sense as *"impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project"* (Hyder, 1999, p7).

In GLVIA3 (Landscape Institute and IEMA, 2013, p120) the guidelines define cumulative landscape and visual effects as those that "*result from additional changes to the landscape and visual amenity caused by the Development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future*."

NatureScot's guidance, 'Assessing the Cumulative Impact of Onshore Wind Energy Developments' (2021) is widely used across the UK to inform the specific assessment of the cumulative effects of wind farms. This guidance provides the basis for the methodology for the cumulative assessment.

NatureScot's guidance, Assessing the Cumulative Impact of Onshore Wind Energy Developments (NatureScot 2021) is widely used across the UK to inform the specific assessment of the cumulative effects of windfarms. Both GLVIA3 and NatureScot's guidance provide the basis for the methodology for the cumulative LVIA undertaken. NatureScot (2021) presents the following guidance:

"The purpose of a Cumulative Landscape and Visual Impact Assessment (CLVIA) is to describe, visually represent and assess the ways in which a proposed wind farm would have additional impacts when considered with other consented or proposed wind farms. It should identify the significant cumulative impacts arising from the proposed wind farm."

"The assessment should be proportionate to the likely impacts and all CLVIA should accord with the guidelines within GLVIA3. The emphasis should be on the production of relevant and useful information, highlighting why the proposals assessed have been included and why others have been excluded, rather than the provision of a large volume of information."

In line with guidance (NatureScot 2021), the SLVIA focuses on the key cumulative impacts which are likely to influence decision making, rather than assessing every potential cumulative effect.

The degree to which cumulative effects occur, or may occur, as a result of more than one wind farm development being constructed or becoming operational are a result of:

- The distance between individual wind farms/relevant developments;
- The interrelationship between their ZTVs;
- The overall character of the landscape and its sensitivity to wind farms/other relevant development;
- The siting, scale and design of the wind farms/developments themselves; and
- The way in which the landscape is experienced.

9.2 Scope of the Cumulative Assessment

GLVIA3, p120 highlights that *'the focus of the cumulative assessment will be on the additional effect of the project in conjunction with other developments of the same type (as for example, in the case of wind farms)'*.

In accordance with this guidance, the cumulative assessment focuses on the addition of the Development to other wind farm development. Wind energy development data was sourced directly from relevant local authorities, a range of wind energy developer web sites and local authority online planning application portals. The cumulative assessment includes all wind turbine developments that are operational, under construction, consented or at planning application stage and are over 50 m to tip in height. It is considered that turbines below 50 m in height are unlikely to result in significant cumulative effects with the Development.

The cumulative Study Area covers a radius of 45 km. The extent of the detailed cumulative assessment within this area is then defined relative to key landscape and visual receptors and anticipated effects, focussing on potential significant cumulative effects, and refining to a list of projects to those within 'influencing distance'.

Based on surrounding topography and the locations of wind farm developments within this 45 km Study Area it is considered that there is no likelihood of significant cumulative effects between the Development and any of the cumulative sites that lie beyond 20 km of the Development. For this reason, the detailed assessment within the LVIA has focussed on the cumulative sites within 20 km of the Development. Cumulative ZTVs have been produced for existing and under construction wind farms plus consented and undetermined wind farm applications within 20 km. Where wind farms are in close proximity to each other they have been grouped for ZTV production to help illustrate the theoretical visibility of the existing baseline.

Cumulative wirelines are prepared for all 20 LVIA viewpoints and additional four wirelines, with all developments within the 45 km search area shown in the wirelines to illustrate the Development in the wider context of other wind energy developments and support the approach to cumulative assessment.

The cumulative situation changes frequently as applications are made or withdrawn, and the layouts of submitted application wind farms are changed. It is therefore necessary to decide and agree on a cut-off date when the sites and layouts to be included are fixed. The cumulative assessment includes operational, consented and application stage wind energy developments as of February 2023. Any changes in the cumulative situation after this date are not incorporated in the assessment.

Cumulative wind farms within the 45 km Study Area are shown on Figure 6.12. Diagrams showing Cumulative Zone of Theoretical Visibility (CZTV) for those relevant developments within 20 km of the Development are shown on Figures 6.14 to 6.20.

In terms of the timescale of proposals for inclusion, both NatureScot guidance and GLVIA3 advise in their guidance that the assessment of the cumulative impacts associated with the Development should encompass the effects of the proposal in combination with existing, under construction, consented and application stage wind farms awaiting determination.

Schemes that are at the pre-planning or scoping stage are not generally considered in the assessment of cumulative effects because firm information on which to base the assessment is not available. Scoping stage sites are mapped on Figure 6.12 for reference but are not considered further due to layout and design uncertainties at the pre-application stages.

9.3 Cumulative Development Scenarios

GLVIA3 (Landscape Institute and IEMA, 2013, p120) advises in relation to the baseline, taking 'the Development' to mean the main proposal that is being assessed, *"it is considered that existing schemes and those which are under construction should be included in the baseline for both landscape and visual effects assessments (the LVIA baseline). The baseline for assessing* *cumulative landscape and visual effects should then include those schemes considered in the LVIA and in addition potential schemes that are not yet present in the landscape but are at various stages in the development and consenting process".* The LVIA follows this approach and the cumulative effects that would potentially arise from the addition of the Development into a context that includes existing or under construction wind farms are assessed, with the effects considered against the landscape and visual baseline.

The likely significant cumulative effects of the Development are assessed in relation to three relevant scenarios within the cumulative assessment:

- The consented scenario: the cumulative assessment assesses the effect of the Development in addition to wind farms already present in the landscape (operational/under construction wind farms) and wind farms that are likely to soon be present (consented wind farms) ('the consented scenario'). This scenario assumes that all consented wind energy developments have become operational and are part of a theoretical baseline situation. The cumulative assessment in the consented scenario identifies the magnitude of change that would arise due to the contribution of the Development, when considered with operational, under construction and consented wind energy developments in the landscape. The effects identified are considered as having some likelihood to arise, on the assumption that consented wind farms will be built and become operational; however, it is often the case that consented wind farms are not ultimately built, which reduces the likelihood of consented scenario effects arising.
- The application stage scenario: a further hypothetical scenario is also assessed, that not only takes into the account the operational, under construction and consented wind farms, but also those that have valid (but as yet underdetermined) planning applications ('the application stage scenario'). The application stage scenario assumes that all application stage wind energy developments have become operational and are part of a theoretical baseline situation. The cumulative assessment in the application stage scenario identifies the magnitude of additional cumulative change that would arise due to the contribution of the Development, when considered with operational, consented and application stage wind energy developments in the landscape. The effects identified are considered as being less likely to arise, as it is unlikely that all application stage wind farms will gain consent.

9.4 Types of Cumulative Effect

The aim of the cumulative assessment is to identify the additional changes which would be brought about by the Development when considered in conjunction with other wind farms. In accordance with guidance (NatureScot, 2021), the LVIA for each receptor considered assesses the effect arising from the addition of the Development to the cumulative situation, and not the overall effect of multiple wind farms. Adjacent developments may complement one another, or may be discordant with one another, and it is the increased or reduced level of significance of effects which arises as a result of this change that is assessed in the cumulative assessment.

However, in considering the detailed cumulative effects described within the LVIA, a broad statement relating to the combined cumulative effect of multiple wind farms in the area has also been provided in Section 6.11 of the LVIA chapter.

9.4.1 Cumulative Landscape Effects

The cumulative development of wind farms within a particular area may build up to create different types of landscape. Significant cumulative landscape effects may arise where a 'Landscape with wind farms' is created, as a result of the addition of the Development to other existing or proposed wind farms, which results in wind turbines becoming sufficiently prolific that they become a prevailing or key landscape and visual characteristic.

The significance of the cumulative landscape effect from the addition of the Development reflects the intensification of wind farms within the landscape, which is assessed as follows:

- The Development forms a separate isolated feature from other wind farms within the landscape, too infrequent and of insufficient influence to be perceived as a characteristic of the area. The cumulative landscape effect of the Development is unlikely to be significant;
- The addition of the Development results in wind farms forming a key characteristic of the landscape, exerting sufficient presence as to establish or increase the extent of a 'landscape with wind farms', but not of sufficient dominance to be a defining characteristic of the area. The cumulative landscape effect of the Development may be significant or not significant, depending on the sensitivity of the receptor, magnitude of the change and specific effects arising from the Development; and
- The addition of the Development results in wind farms forming the prevailing characteristic of the landscape, seeming to define the landscape as a 'wind farm landscape' character type. The cumulative landscape effect of the Development is likely to be significant.

These effects can occur at varying scales, for example, effecting a local character type, or at a regional level, which is assessed as part of the geographic extent assessment in the LVIA.

9.4.2 Cumulative Visual Effects

Cumulative visual effects consist of combined and sequential effects:

- Combined visibility occurs where the observer is able to see two or more developments from one viewpoint. Combined visibility may either be 'in combination', where several wind farms are within the observer's main angle of view at the same time, or 'in succession', where the observer has to turn to see the various wind farms. The cumulative visual effect of the Development may be significant or not significant depending on factors influencing the cumulative magnitude of change, such as the degree of integration and consistency of image with other wind farms in combined views; and the position of the development relative to other wind farms and the landscape context in successive views.
- Sequential visibility occurs when the observer has to move to another viewpoint to see different developments. Sequential effects are assessed along regularly used routes such as major roads, railway lines and footpaths. The occurrence of sequential effects range from 'frequently sequential' (the features appear regularly and with short time lapses between, depending on speed of travel and distance between the viewpoints) to 'occasionally sequential' (long time lapses between appearances, because the observer is moving slowly and/or there are large distances between the viewpoints). The cumulative visual effect of the Development is more likely to be significant when frequently sequential.

The methodology for the assessment of cumulative landscape and visual effects involves the undertaking of a baseline study of the existing and potential future wind farm/other relevant development influence, an evaluation of sensitivity, magnitude of change and the resulting significance of cumulative effects.

9.4.3 Cumulative Sensitivity of Landscape and Visual Receptors

In evaluating cumulative sensitivity, the value component of the assessments of sensitivity would not change, however, in an evolving wind farm/other relevant development context, the susceptibility of a landscape and visual receptor to the introduction of the Development may increase or decrease. This is therefore re-evaluated based on the criteria contained in the landscape and visual susceptibility criteria sections of this methodology.

9.4.4 Cumulative Magnitude of Change

The cumulative magnitude of change is an expression of the degree to which landscape character receptors and visual receptors/views would be changed by the addition of the Development to wind farms/other relevant developments that are already operational, consented or at application stage. Where required, scoping stage wind farms and other early-stage developments may exceptionally be included. The cumulative magnitude of change is assessed according to a number of criteria, described as follows:

- The location of the Development in relation to other wind farm developments. If the Development is seen in a part of the view or setting to a landscape receptor that is not affected by other development, this would generally increase the cumulative magnitude of change as it would extend influence into an area that is currently unaffected by development. Conversely, if the Development is seen in the context of other sites, the cumulative magnitude of change may be lower as development is not being extended to otherwise undeveloped parts of the outlook or setting. This is particularly true where the scale and layout of the Development is similar to that of the other sites as where there is a high level of integration and cohesion with an existing site the various developments may appear as a single site;
- The extent of the developed skyline. If the Development would add notably to the developed skyline in a view, the cumulative magnitude of change would tend to be higher as skyline development can have a particular influence on both views and landscape receptors;
- The number and scale of developments seen simultaneously or sequentially. Generally, the greater the number of clearly separate developments that are visible, the higher the cumulative magnitude of change would be. The addition of the Development to a view or landscape where a number of smaller developments are apparent would usually have a higher cumulative magnitude of change than one or two large developments as this can lead to the impression of a less co-ordinated or strategic approach;
- The scale comparison between developments. If the Development is of a similar scale to other visible developments, particularly those seen in closest proximity to it, the cumulative magnitude of change would generally be lower as it would have more integration with the other sites and would be less apparent as an addition to the cumulative situation;
- The consistency of image of the Development in relation to other developments. The cumulative magnitude of change of the Development is likely to be lower if its turbine height, arrangement and layout design are broadly similar to other developments in the landscape, as they are more likely to appear as relatively simple and logical components of the landscape;
- The context in which the developments are seen. If developments are seen in a similar landscape context, the cumulative magnitude of change is likely to be lower due to visual integration and cohesion between the sites. If developments are seen in a variety of different landscape settings, this can lead to a perception that wind farm development is unplanned and uncoordinated, affecting a wide range of landscape characters and blurring the distinction between them; and
- The magnitude of change of the Development as assessed in the main assessment. The lower this is assessed to be, the lower the cumulative magnitude of change is likely to be. Where the Development itself is assessed to have a negligible magnitude of change on a view or receptor there would not be a cumulative effect as the contribution of the Development would equate to the 'no change' situation.

Definitions of cumulative magnitude of change are applied in order that the process of assessment is made clear. These are:

- High: where the addition of the Development to the landscape or view would result in a major incremental change, loss or addition to the cumulative wind farm/development situation;
- Medium: where the addition of the Development would result in a moderate incremental change, loss or addition to the cumulative windfarm/development situation;
- Low: where the addition of the Development would result in a minor incremental change, loss or addition to the cumulative situation;
- Negligible: where the addition of the Development to other wind energy developments in the landscape or view would result in a negligible incremental change, loss or addition to the cumulative situation; and
- None: where the addition of the Development to other wind energy developments in the landscape or view would have no change to the cumulative windfarm situation and its addition equates to a 'no change' situation.

There may also be intermediate levels of cumulative magnitude of change: medium-high and medium-low; where the change falls between two of the definitions.

9.4.5 Significance of Cumulative Effects

The objective of the cumulative assessment is to determine whether any effects that the Development would have on landscape receptors and visual receptors, when seen or perceived in combination with other existing and proposed sites, would be significant or not significant. Significant cumulative landscape and visual effects arise where the addition of the proposed wind turbines or other similar/large scale development to a specific baseline, leads to windfarms becoming a prevailing landscape and visual characteristic of a receptor that is sensitive to such change. Cumulative effects may evolve as follows:

- A small scale, single wind farm would often be perceived as a new or 'one-off' landscape feature or landmark within the landscape. Except at a local site level, it usually cannot change the overall existing landscape character, or become a new characteristic element of a landscape;
- With the addition of further windfarm development, windfarms can become a characteristic element of the landscape, as they appear as landscape elements or components that are repeated. Providing there was sufficient 'space' or undeveloped landscape/skyline between each windfarm, or the overlapping of several windfarms was not too dense; the Developments or other similar/large scale developments would appear as a series of developments within the landscape and would not necessarily become the dominant or defining characteristic of the landscape nor have significant cumulative effects; and
- The next stage would be to consider larger commercial windfarms/developments and/or an increase in the number of windfarms/developments within an area that either overlap or coalesce and/or 'join-up' along the skyline. The effect is to create a landscape where the windfarm element is a prevailing characteristic of the landscape. The result would be to materially change the existing landscape character of a landscape type, or the landscape in a view and resulting in a significant cumulative effect. A landscape characterised by windfarm development may already exist as part of the baseline landscape context.

Less extensive, but nevertheless significant cumulative landscape and visual effects may also arise as a result of the addition of the Development where it results in a landscape or view becoming defined by the presence of more than one wind farm or similar/large scale development, so that other patterns and components are no longer definitive, or where the Development contrasts with the scale or design of an existing or Development. Higher levels of significance may arise from cumulative landscape and visual effects related to the Development being in close proximity to other wind farms when they are clearly visible together in views, however provided that the Development is designed to achieve a high level of visual integration, with few notable visual differences between wind farms, these effects may not necessarily be significant. In particular, the effects of a wind farm extension are often less likely to be significant, where the effect is concentrated, providing that the design of the wind farms are compatible and that the overall capacity of the landscape is not exceeded.

The capacity of the landscape or view may be assessed as being exceeded where the landscape or visual receptor becomes defined by wind farm development, or if the Development extends across landscape character types or clear visual/topographic thresholds in a view. More substantial cumulative effects may result from wind farms that have some geographical separation, but remain highly inter-visible, potentially resulting in extending effects into new areas, such as an increased presence of wind farm development on a skyline, or the creation of multiple, separate wind farm defined landscapes.

10 NATURE OF EFFECTS

10.1 Overview

The nature of effects refers to whether the landscape and/or visual effect of the Development is positive or negative (herein referred to as 'beneficial' and 'adverse').

The EIA Regulations 2017 state that the ES should define *'the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development'*.

Cumulative effects have been described in Section 9, and *'short-term, medium-term and long-term, permanent and temporary'* effects are described in Section 6 and 7 under the heading 'Duration of Effect'.

Transboundary effects are scoped out of the LVIA as the LVIA study area does not overlap with EU member states.

10.2 Direct and indirect effects

Direct landscape effects relate to the host landscape and concern both physical and perceptual effects on the receptor.

Indirect landscape effects relate to those landscapes and receptors which separated by distance or remote from the development and therefore are only affected in terms of perceptual effects. The Landscape Institute also defines indirect effects as those which are not a direct result of the development but are often produced away from it or as a result of a complex pathway.

Visual effects are considered as direct effects, as the view itself may be directly altered by the Development.

10.3 Positive and negative effects

The nature of effects refers to whether the landscape and/or visual effect of the Development is positive or negative (herein referred to as 'beneficial' and 'adverse').

Guidance provided by the Landscape Institute on the nature of effect in GLVIA3 states that "in the LVIA, thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity", but it does not provide guidance as to how that may be established in practice. The nature of effect is therefore one that requires interpretation and, where applied, this involves reasoned professional opinion.

In relation to many forms of development, the LVIA will identify 'beneficial' and 'adverse' effects by assessing these under the term 'Nature of Effect'. The landscape and visual effects of windfarms are difficult to categorise in either of these brackets as, unlike other disciplines, there are no definitive criteria by which the effects of windfarms can be measured as being categorically 'beneficial' or 'adverse'. In some disciplines, such as noise or ecology, it is possible to quantify the effect of a windfarm in numeric terms, by objectively identifying or quantifying the proportion of a receptor that is affected by the Development and assessing the nature of that effect in justifiable terms. However, this is not the case in relation to landscape and visual effects where the approach combines quantitative and qualitative assessment.

Generally, in the development of 'new' wind farms, a precautionary approach is adopted by OPEN, which assumes that significant landscape and visual effects will be weighed on the adverse side of the planning balance. Unless it is stated otherwise, the effects considered in this assessment are considered to be adverse. Beneficial or neutral effects may, however, arise in certain situations and are stated in the assessment where relevant, based on the following definitions:

- Beneficial effects contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The Development contributes to the landscape by virtue of good design, even if it contrasts with the existing character. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components;
- Neutral effects occur where the Development fits with the existing landscape character or visual amenity. The Development neither contributes to nor detracts from the landscape and visual resource and can be accommodated with neither beneficial or adverse effects, or where

the effects are so limited that the change is hardly noticeable. A change to the landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation; and
- Adverse effects are those that detract from the landscape character or quality of visual attributes experienced, through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the landscape and visual resource, or through the removal of elements that are key in its characterisation.

10.4 Duration and Reversibility

The EIA Regulations (2017) require a description of the likely significant effects on factors including (among other things) 'short-term, medium-term and long-term, permanent and temporary effects'.

Duration (short, medium or long-term) and reversibility (permanent or temporary) are separate but linked considerations. Duration of effects are judged on a scale as long-term, medium-term and short-term effects, defined in this methodology as follows:

- Long-term – more than 10 years;
- Medium-term – 5 to 10 years.
- Short-term – 0 to 5 years.

Reversibility is a judgement about the degree of permanence or temporary nature of an effect, determined by the prospects and the practicality of the particular effect being reversed and the time period over which this may occur. Some forms of development can be considered permanent, while others can be considered temporary or reversible since they have a limited operational life and would be removed and/or the land reinstated.

The effect of the Development is considered to be long term and reversible, in that the wind turbines and infrastructure can be removed and their effects largely reversed at the end of the 40 year operational period.

The effect of the construction of the Development is assessed as temporary and short-term in this LVIA. Other infrastructure and operations such as the construction processes and plant (including tall cranes and heavy machinery for turbine erection) and construction and storage compounds would be apparent only during the initial construction period of the Development and are assessed as short-term and reversible effects. Borrow pit excavation would also be short-term as borrow pits could be restored at the end of the construction process, although a permanently altered ground profile may remain evident.

GLVIA3 sets out an approach to the assessment of magnitude of change in which three separate considerations are combined within the magnitude of change rating. These are the size or scale of the effect, its geographical extent and its duration and reversibility. OPEN considers that the process of combining all three considerations in one magnitude of change rating can distort the aim of identifying significant effects of wind farm development. For example, an increased magnitude of change, based on size or scale, may be reduced to a lower rating if it occurred over a localised geographic extent and for a short duration. This might mean that a potentially significant effect would be overlooked if effects are diluted down due to their geographical extents and/or duration or reversibility.

OPEN has chosen to keep these the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are therefore stated separately in relation to the assessed effects (i.e. as short/medium/long-term and temporary/permanent) and are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

Should decommissioning of any part of the Development be required e.g. failure of a wind turbine beyond economic repair, it is considered that any effects would be less than those resulting from construction of the Development, and as such this potential for decommissioning has been scoped out of further assessment.

11 VISUAL REPRESENTATIONS

11.1 Overview

ZTVs and visualisations (wirelines or wirelines and photomontages) are graphical images produced to assist and illustrate the LVIA and the cumulative assessment. The methodology used for viewpoint photography and photomontages has been produced in accordance with the NatureScot guidance on Visual Representation of Wind Farms, Version 2.2 (2017), the Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA 3) (Landscape Institute and IEMA, 2013) and the Landscape Institute Technical Guidance Note on Visual Representation of Development Proposals (2019).

11.2 ZTVs

The ZTVs are based on Ordnance Survey Terrain 5 digital terrain model (DTM) data, to produce detailed ZTV plots. The computer model will include the entire study area and takes account of atmospheric refraction and the Earth's curvature. The resulting ZTV plots have been overlaid on Ordnance Survey mapping at an appropriate scale and presented as figures using desktop publishing or graphic design software.

Cumulative ZTV plots based on the intervisibility of the Development and other relevant developments within the study area have also been produced.

There are limitations which should be considered in the interpretation and use of the ZTV as follows:

- Where the ZTV has been calculated using Ordnance Survey Terrain 5 DTM, this will not account for the screening effects of vegetation or built form unless added in the form of OS Vectormap data or digitally added and stated on the figure.
- The ZTVs are based on theoretical visibility from 2 m above ground level.
- The Blade Tip ZTV does not indicate the decrease in visibility that occurs with increased distance from the array area. The nature of what is visible from 3 km away will differ markedly from what is visible from 10 km away, although both are indicated on the Blade Tip ZTV as having the same level of visibility.
- There is a wide range of variation within the visibility shown on the ZTV, for example, an area shown on the blade tip ZTV as having visibility of seven WTGs may gain views of the smallest extremity of blade tips, or of seven full WTGs. This can make a considerable difference in the effects of the Development on that area.

These limitations mean that while the ZTV is used as a starting point in the assessment, providing an indication of where the Development will be theoretically visible and tending to present a worst-case or over-estimate the actual visibility. The information drawn from the ZTV is checked by field survey observation.

The LVIA includes a Horizontal Angle ZTV to show the horizontal field of view (in degrees) that may be affected by views of the wind turbines.

11.3 Baseline photography

11.3.1 Overview

Once a view has been selected, the location is visited, confirmed, and assessed with the aid of a wireline or similar visualisation in the field. A photographic record is taken to record the view and the details of the viewpoint location and associated data are recorded to assist in the production of visualisations and to validate their accuracy.

The following photographic information is recorded:

- date, time, weather conditions and visual range;
- GPS recorded 12 figure grid reference accurate to ~1 to 3 m;
- GPS recorded Above Ordnance Datum (AOD) height data;
- use of a fixed 50 mm focal length lens is confirmed;
- horizontal field of view (in degrees); and
- bearing to Development.

The photographs used to produce the photomontages were taken at the optimum time of day and location to capture the best results. They have been taken using Canon EOS 5D and 6D Digital SLR cameras, with a fixed lens and a full-frame (35 mm negative size) complementary metal oxide semiconductor (CMOS) sensor. The photographs were taken on a tripod with a pano-head at a height of approximately 1.5 m above ground.

Whilst no two-dimensional image can fully represent the real viewing experience, the visualisation aims to provide a realistic representation of the offshore elements, based on current information and photomontage methodology.

Guidelines for LVIA (GLVIA3) para 8.22 state – *'In preparing photomontages, weather conditions shown in the photographs should (with justification provided for the choice) be either:*

- *representative of those generally prevailing in the area; or*
- *taken in good visibility, seeking to represent a maximum visibility scenario when the development may be highly visible'.*

In preparing photomontages for the LVIA, photographs have been taken in favourable weather conditions during periods of 'very good' or 'excellent' visibility conditions - seeking to represent a maximum visibility scenario when the Development may be most visible.

11.4 Visualisations

Photomontages have been produced in accordance with NatureScot Visual Representation of Windfarms Guidance (NatureScot, 2017) and Landscape Institute (2019) Technical Guidance Note (TGN) 06/19 Visual Representation of Development Proposals.

A photomontage is a visualisation which superimposes an image of a Development upon a photograph or series of photographs. Photomontage is a widespread and popular visualisation technique, which allows changes in views and visual amenity to be illustrated and assessed, within known views of the 'real' landscape.

To create the baseline panorama, the frames are individually cylindrically projected and then digitally joined to create a fully cylindrically projected panorama using Adobe Photoshop or PTGui software. This process avoids the wide-angle effect that will result should these frames be arranged in a perspective projection, whereby the image is not faceted to allow for the cylindrical nature of the full 360-degree view but appears essentially as a flat plane.

Tonal alterations are made using Adobe software to create an even range of tones across the photographs once joined.

The baseline photographs and cumulative wireline visualisations shown for each viewpoint cover a 90-degree field of view (or in some cases, up to 360-degree), which accords with NatureScot guidance. These are cylindrically projected images and should be viewed flat at a comfortable arm's length.

The photographs are also joined to create planar projection panoramas using PTGui software. These are used in the creation of the 53.5 degree field of view photomontages.

Wireline representations that illustrate the Development and set within a computer-generated image of the landform are used in the assessment to predict theoretical appearance of the WTGs. These are produced with Resoft WindFarm software and are based on OS Terrain 5 DTM. There are limitations in the accuracy of digital terrain model (DTM) data so that landform may not be picked up precisely and may result in WTGs being more or less visible than is shown, however, the use of OS Terrain 5 minimises these limitations. Where descriptions within the assessment identify the numbers of WTGs visible this refers to the illustrations generated and therefore the reality may differ to a degree from these impressions.

Daytime visualisations and wirelines show a wind turbine model which represents the maximum development scenario of the Development and allow the potential proportions of the wind turbines to be appreciated from the visualisations.

Fully rendered photomontages have been produced for the agreed viewpoints using Resoft WindFarm software, to provide a photorealistic image of the appearance of the Development. In the daytime photomontages modelled representations are combined with the baseline view photographs to create a photorealistic rendered photomontage image of the development.

'Panoramic photomontages' are produced in the SLVIA with a 53.5° HFoV, based on relevant guidance (NatureScot, 2017) and due to their suitability to encompass the horizontal spread of the Development and show the turbines at a representative scale and distance. In some views, two adjacent 53.5° photomontages will be required to capture the horizontal spread of the Development.

The 53.5 degree field of view wirelines and photomontages are prepared using a planar projected image and should also be viewed flat at a comfortable arm's length. These images are each printed on paper 841 x 297 mm (half A1) which provides for a relatively large scale image.

In the wirelines, the wind turbines are shown with the central WTGs facing the viewer directly, with the full rotor diameter visible at its tallest extent. In the photomontages, the WTG rotors are shown with a random appearance with the central wind turbines facing the viewer directly.

Rendering of the wind turbines in the photomontages is as photorealistic as possible to the conditions shown in each viewpoint photograph. There may be some variation in the appearance and visibility of the wind turbines between the viewpoints, as they are rendered to suit the conditions shown in each of the different viewpoint photographs, which have some unavoidable degree of variation in terms of lighting and weather conditions. The key requirement is that the wind turbines need to be rendered with sufficient contrast against the skyline backdrop to illustrate their maximum visibility scenario in each image. Photomontages have been prepared to depict how the Development will appear to illustrate the worst-case. The full suite of viewpoint photomontages should be viewed to gain an impression of the likely visual effects of the Development.

11.5 Night-time visualisations

The visual effect of the Development at night has been assessed in Appendix A6.5, informed by the night-time photomontage visualisations produced from representative viewpoints, to visually represent aviation lighting at night. Photomontages showing aviation lighting at both 2,000 cd and 200 cd aviation are provided to support the assessment.

Night-time visualisations have been produced using a combination of using Resoft's WindFarm software's aviation module software for positioning of the lights, 3D modelling software that can simulate lighting conditions, referencing existing lighting imagery/atmospheric conditions from the baseline photographs and professional judgement using photoshop.

The appearance of the lights in the night-time photomontages emulates how lights appear in the other parts of the baseline photographs. A light shown in a photograph tends to have a slight 'halo' (or bokeh) around it due to the way a camera lens renders out-of-focus points of light. This is not the way lights are seen in reality, as they tend to much more defined as point sources. However, the proposed lighting has been shown in this way for consistency with the lights in the baseline photographs.

11.6 Information on limitations of visualisations

The photographs and other graphic material such as wirelines and photomontages used in this assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what has been apparent to the human eye. The assessments are carried out from observations in the field and therefore may include elements that are not visible in the photographs. Limitations of photomontages are set out further below.

The photomontage visualisations of the Development (and any wind farm proposal) have a number of limitations when using them to form a judgement on visual impact. These include the following:

- a visualisation can never show exactly what the Development will look like in reality due to factors such as: different lighting, weather and seasonal conditions which vary through time and the resolution of the image;
- the images provided give a reasonable impression of the scale of the WTGs and the distance to the WTGs but can never be 100% accurate;
- a static image cannot convey turbine movement, or flicker or reflection from the sun on the turbine blades as they move;
- the viewpoints illustrated are representative of views in the area, but cannot represent visibility at all locations;
- to form the best impression of the impacts of the Development proposal these images are best viewed at the viewpoint location shown;
- the images must be printed and viewed at the correct size (260 mm by 820 mm);
- images should be held flat at a comfortable arm's length. If viewing these images on a wall or board at an exhibition, stand at arm's length from the image presented to gain the best impression;
- it is preferable to view printed images rather than view images on screen. Images on screen should be viewed using a normal PC screen with the image enlarged to the full screen height to give a realistic impression; and
- there are practical limitations to shooting viewpoint photographs only in very good or excellent visibility and at particular times of day. The photographs shown in the visualisations show the most favourable weather conditions available during photographic survey work.

11.7 Technical methodology - visualisations

In accordance with the requirements of Landscape Institute (2019) Technical Guidance Note 06/19 Table A6.1.9 sets out the technical information for the preparation of the visualisations contained in EIA Report Volume 2c.

Table A6.1.9: Technical methodology - Visualisations

Category	Details
Photography	
Visualisation type	Type 4 – where survey of viewpoint locations is not required
Camera location	Established via hand-held Garmin GPS
Level of accuracy of location	1-3m (depending on satellites)
Camera	Canon EOS 5D Mark II and Canon EOS 6D Digital SLR. Full-frame (35mm negative size) CMOS sensor.
Lens	50mm fixed f1.4 lens
Tripod	Set to approximately 1.5m. Nodal Ninja panoramic head with Adjust Leveller. Nodal Ninja panoramic head set to take photographs at 20 degree increments

Category	Details
Photography process	Camera used on fully manual settings. Photographs taken in RAW image format. Bracketed exposures are taken for each view and those depicting the clearest images are selected to prepare the panoramic image
Preparation of panoramic photographs	PTGUI v12.8 is used to join and cylindrically project the images. Adobe Photoshop 2021 used to correct tonal alterations and create an even range of exposure across the photographs so that the individual photographs are not apparent. Planar panoramic images are prepared using Resoft Windfarm software or Hugin Panorama Stitcher
3D Model/Visualisations	
Topographic height data	Ordnance Survey Terrain 5 (5m resolution). Ordnance Survey Terrain 50 (50m resolution)
Use of coordinates in software	Coordinates are brought in from the surveyed GPS coordinates. Positions checked using aerial photography.
Markers for horizontal alignment	Existing OWF WTGs and their known coordinates.
Markers for vertical alignment	Existing OWF WTGs and their known coordinates.
Rendering software	Resoft Windfarm v.5.2.5.3 (Wind turbines in wirelines and photomontages). Sketchup or AutoCAD Map 3D 2018 (OSPs, Met Mast and jacket foundations). Autodesk 3ds Max 2018. Visual Nature Studio V 3.10.
Limitations	
Terrain data	There may therefore be local, small-scale landform that is not reflected in the data and subsequently the visualisation but may alter the real visibility of the Development, either by screening theoretical visibility or revealing parts of the Development that are not theoretically visible.
Movement	Static images are unable to capture the movement within the view or of the WTGs

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Environmental Impact Assessment – Technical Appendix 6.2: Assessment of Effects on the Special Qualities of Loch Lomond and The Trossachs National Park

Ladyfield Renewable Energy Park

October 2023

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The business of sustainability

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1 Introduction

This Appendix contains the assessment of effects on the Special Landscape Qualities (SLQs) of the Loch Lomond and the Trossachs National Park (LLTNP). It follows guidance set out in NatureScot's Working Draft 11 entitled 'Guidance for Assessing the Effects on Special Landscape Qualities' (Scottish Natural Heritage, 2018)[1]. The guidance is aimed specifically at landscape professionals undertaking Landscape and Visual Impact Assessments (LVIA) for developments or land use changes with potential to impact on the SLQs of National Scenic Areas (NSAs) or National Parks (NPs).

The assessment has also been carried out in line with EIA regulations set out in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[2], as amended and Guidelines for Landscape and Visual Impact Assessment: Third Edition (Landscape Institute and IEMA, 2013) ('GLVIA3')[3].

The following figures are of particular relevance to the assessment of effects on the NP and have been used in the assessment process.

Figure 6.3: Landscape Designations and Wild Land Areas;

Figure 6.9a and 6.9b: Landscape Designations and Wild Land Areas with Zone of Theoretical Visibility (ZTV);

Figure 6.36: Viewpoint 13: Ben Lui;

Figure 6.37: Viewpoint 14: Beinn Ime; and

Figure 6.39: Viewpoint 16: Beinn Lochain.

The draft guidance presents an approach that is intended to be "*proportionate to the scale and stage of the development, be clear and transparent so that the reasoning that informs judgements can be tracked and convey the complexity of effects*". It sets out a four-step approach presented in the associated Pro Forma under the following four headings;

- Step 1: The Proposal – gain as full an understanding of the proposal as possible.
- Step 2: Definition of the Study Area and Scope of the Assessment - identifying the area likely to be affected.
- Step 3: The Analysis of Impacts and Effects on SLQs.
- Step 4: Summary of Impacts on the SLQs, implications for the NSA/NP and possible future effects on SLQs and recommendations for mitigation.

2 Role of National Parks

Scotland has two National Parks, designated under the provisions of the National Parks (Scotland) Act 2000, comprising LLTNP and the Cairngorms National Park. The aims of the designation are:

- *"To conserve and enhance the natural and cultural heritage*
- *To promote the sustainable use of the natural resources of the area*
- *To promote understanding and enjoyment of the special qualities of the area by the public*
- *To promote sustainable social and economic development of the communities of the area"*[4]

The LLTNP was established in 2002 and its delivery is governed by the Loch Lomond and the Trossachs National Park Authority, an executive non-departmental public body.

[1] Scottish Natural Heritage (2018). 'Guidance for Assessing the Effects on Special Landscape Qualities – Working Draft 11'

[2] Scottish Government (2017) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 [Online]. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made (accessed 13/01/2022)

[3] Landscape Institute and IEMA. (2013). Guidelines for Landscape and Visual Impact Assessment: Third Edition

[4] National Parks (Scotland) Act 2000

National Planning Framework 4 (NPF4)[5] is a statement of Scottish Government policy on how nationally important land use planning matters should be addressed. With regard to National Designations, Policy 4 of NPF4 states;

"Development proposals that will affect a National Park, National Scenic Area, Site of Special Scientific Interest or a National Nature Reserve will only be supported where:

i. The objectives of designation and the overall integrity of the areas will not be compromised; or

ii. Any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance."

The role of this assessment is to provide an appropriate level of information to enable decision makers and consultees to reach a conclusion regarding the potential effects on the qualities of the LLTNP.

This assessment is carried out with specific reference to the effect that the Development may have on the 'special qualities' of the LLTNP. SLQs are defined as "*the characteristics that, individually or combined, give rise to an area's outstanding scenery*"[6]. The special qualities of the LLTNP are documented in Commissioned Report No. 376: The Special Landscape Qualities of the Loch Lomond and The Trossachs National Park[7].

3 Step 1: The Proposal

The aim of Step 1 is to "*gain as full an understanding of the proposal as possible*" by setting out the key aspects of the proposal that have potential to affect the SLQs.

The Development would comprise 13 x 180 m high turbines and associated infrastructure. This would include a substation, external turbine transformers, new and upgraded access tracks and site entrance, temporary construction compound, crane hardstandings, borrow pit(s), as well as a permanent meteorological mast and energy storage facility. The Site Layout is shown on Figure 2.1.

The LLTNP is located approximately 11 km to the south-east of the Development. The designation covers an area of approximately 1,865 km^2 and extends from the Cowal Peninsula in the west to Loch Earn in the east, and from Glen Dochart in the north to Balloch in the south. The majority of the NP is located within the Study Area, although the easternmost parts of the NP are beyond 45 km from the Development.

The ZTVs in Figures 6.9a and 6.9b show that theoretical visibility is very limited across the majority of the area. Limited pockets of intermittent theoretical visibility occur over high ground in the mountain ranges of Breadalbane, focussed on and around Ben More, Ben Lui, Ben Vorlich and Beinn Ime. There are also more concentrated areas of theoretical visibility on high ground above Lochgoilhead and Bernice, albeit within the Argyll Forest where the enclosure of the tree cover would limit actual visibility.

The Development could potentially affect the SLQs of the LLTNP owing principally to the indirect effects that visibility of the wind turbines would have at a minimum distance of approximately 11 km from the closest boundary of the NP and at distances greater than 11 km in localised parts of the LLTTNP, where visibility would arise.

4 Step 2: Definition of the Study Area and Scope of the Assessment

The aim of Step 2 is to identify the extent of the area likely to be affected through consideration of the location of the LLTNP relative to the Development, the extent to which the Development

[5] Scottish Government (2023). National Planning Framework 4

[6] Scottish Natural Heritage and Loch Lomond and The Trossachs National Park Authority (2010). The special landscape qualities of the Loch Lomond and The Trossachs National Park. Scottish Natural Heritage Commissioned Report, No. 376 (iBids and Project no. 648).

[7] Ibid.

would alter the NP, in this case as a result of its visibility only, and how it would affect people's experience of the NP from both within and outwith the NP boundaries.

4.1 Location of the LLTNP Relative to the Development

The LLTNP covers an area of approximately 1865 km^2 across the western parts of the Southern Highlands, and comprises four areas: Argyll Forest, Loch Lomond, The Trossachs and Breadalbane. The landscape consists of rugged mountains and low-lying glens, with lochs a prominent feature throughout. The dramatic highlands contrast with pastoral lowlands, and small settlements are situated within agricultural land on lower ground. Woodlands and forestry are also a common feature across lower ground throughout the landscape.

The Development lies a minimum distance of approximately 11 km from the closest north-western edge of the NP. The Development would, therefore, have no direct effects on the NP. The ZTVs in Figures 6.9a and 6.9b show theoretical visibility to occur in very limited, localised patches, mostly concentrated on high ground in the Argyll Forest and Breadalbane landscape areas, as identified within the Special Landscape Qualities Commissioned Report[8].

4.2 Potential for Cumulative Effects

The potential for cumulative effects to arise relates to the interactions of the Development with operational, under construction, consented and application stage wind farms. The locations of the cumulative wind farms are shown in Figure 6.12.

The closest wind farms to the NP include the operational Cruach Mhor Wind Farm, approximately 3 km to the west of the south-western NP boundary; the operational Clachan Flats Wind Farm, approximately 6 km to the west of the western NP boundary; and the application stage Creag Dhubh Wind Farm, approximately 1.5 km to the north-west of the western NP boundary. Consented Blarghour lies approximately 15 km to the west of the western NP boundary and there are also a number of operational wind farms to the west, including An Suidhe at approximately 15 km and Carraig Gheal at approximately 23 km beyond the NP boundary. Clachan Flats Wind Farm is located within 6 km of the Development and is considered to be the key development in relation to cumulative effects.

In light of these and other Developments, there is the potential for a significant cumulative effect to arise across parts of the NP from which the Development would be visible.

4.3 Potential for Night-time Effects

The potential for night-time effects relating to the aviation lighting on the turbines will be limited owing to the minimum distance of approximately 11 km between the Development and the closest boundary of the NP. The Night-time Assessment is presented in Appendix A6.5 and includes the methodology applied and the scope of the assessment in terms of the lighting requirements. The maximum design scenario considers aviation lighting set on the hubs of the thirteen proposed turbines at a height of 150 m, and with a blade tip hight of 180 m. The lights will emit a flashing red light of medium intensity, measured as 2,000 candelas (cd). The lights will carry a detection system responding to humidity in the atmosphere, such that when visibility is greater than 5 km the intensity of the lights will be reduced to 10% of their maximum intensity, which equates to 200cd. When visibility is less than 5 km, the weather conditions will also act to reduce the intensity of the lights, and for the purposes of the assessment, this is assumed to also be 200cd.

Furthermore, the Hub Lighting ZTVs in Figures 6.6a and 6.6b show the limited extents of the NP from which the aviation lighting associated with the Development would be visible, with limited pockets of intermittent theoretical visibility occurring on the summits and upper west facing slopes of the mountain ranges of Breadalbane, including Ben More, Ben Lui, Ben Vorlich and Beinn Ime.

[8] Scottish Natural Heritage and Loch Lomond and The Trossachs National Park Authority (2010). The special landscape qualities of the Loch Lomond and The Trossachs National Park. Scottish Natural Heritage Commissioned Report, No. 376 (iBids and Project no. 648).

There are also more concentrated areas of theoretical visibility on high ground above Lochgoilhead and Bernice, albeit within the Argyll Forest where the enclosure of the tree cover would limit actual visibility.

While there is potential for night-time lighting to be visible from the NP, the low intensity of the lights as experienced over such distances, combined with the limited extents from which they would be visible, would limit their influence on the NP. The effects of the night-time lighting on the SLQs would not give rise to a significant effect and are, therefore, not considered further in the assessment.

4.4 Summary of Step 2

The LLTNP covers a large area across the western part of the southern Highlands, but the limited extent of theoretical visibility across the NP as shown on Figures 6.9a and 6.9b, means that only parts of the NP have been considered in the following assessment. Visibility is largely contained within the Breadalbane and Argyll Forest landscape areas of the NP, and the Loch Lomond and The Trossachs areas have, therefore, been scoped out of further assessment. The Study Area for assessment of effects on the NP as a result of the Development is limited to the Breadalbane and Argyll Forest areas of the NP.

The NP covers an area which is farmed and settled in parts, where human influences occur and are visible both within and beyond the boundaries of the designation. These are typically small in scale and rural in character within the NP and with larger scale existing Developments, including wind farm developments, located outwith. The scope of the assessment considers the cumulative effects with other large-scale developments.

5 Step 3: Analysis of Impacts and Effects on the Special Landscape Qualities

Step 3 sets out the assessment of effects on the NP that would potentially arise as a result of the Development. Within Step 3, the following four key considerations are made;

- Identify those SLQs with potential to be affected;
- Establish the key landscape characteristics that underpin the SLQs;
- Assess the effects of the Development on the relevant SLQs; and
- Consider the potential for mitigation and determine the level of effect.

Table A6.2.1 sets out a preliminary assessment to identify those SLQs with potential to be affected by the Development. Table A6.2.2 then establishes the key characteristics that underpin the SLQs with reference to NatureScot's NP citation and Landscape Character Assessment, with information supplemented with the experiences of the assessor gained through site work. Table A6.2.2 also sets out the effects that all relevant SLQs would undergo as a result of the Development and determines the potential level of effect.

NatureScot's draft guidance requests mention of mitigation measures. The likely visual effects of different layout scenarios have been investigated as the most effective means to mitigate potential landscape and visual effects. An iterative design process has been followed, in which the number of turbines has been reduced and their positions pulled back from the southern boundary to reduce the potential effects on Inveraray Castle and the wider landscapes to the south-east, including Loch Fyne and LLTTNP. The iterative design process, which has taken into account all relevant environmental and technical constraints, is presented in Chapter 3: Site Selection and Design, with a description of layout improvements relevant to the LVIA presented in Chapter 6 at section 6.5.2.

5.1 Sensitivity of the LLTNP

The value of the LLTNP is high. This is because it is a national designation, applied in this area to signify the national importance of the landscape.

The susceptibility of the NP to the effects of the Development is medium and prevented from being rated high by the following factors. Firstly, as shown in the ZTVs in Figures 6.9a and 6.9b, visibility of the Development would be very limited in extents, such that only very small patches of high ground across parts of the northern and western areas of the NP would be affected by this specific Development. From these parts of the NP, a range of human influences across the landscape beyond the boundary of the NP are evident. Secondly, existing operational wind farms are located in close proximity to the boundary of the NP and exert an influence across those parts of the NP where the Development would also be visible, as shown in the cumulative ZTVs in Figures 6.13 to 6.19. The Development would not form the closest wind farm to the LLTTNP as operational Clachan Flats occupies Clachan Hill on the eastern side of the Development, closer to the LLTNP boundary.

The combination of the value of this NP and its susceptibility to the effects of the Development results in an overall **medium-high** sensitivity.

5.2 Identify those SLQs with Potential to be Affected

In respect of the LLTNP, there are 26 SLQs which apply across the Study Area. These comprise eight General Qualities, seven SLQs of the Argyll Forest and 11 SLQs of Breadalbane. The majority of the SLQs would not be affected, either owing to the fact the Development would be located outwith the NP boundary, and many of the SLQs are not susceptible to indirect effects or effects arising in respect of the wider setting, or to the fact that there is no theoretical visibility of the Development from within the area of relevance to the SLQ. The three SLQs assessed in detail have potential to be indirectly affected either from within the NP, or from outwith the NP, whereby the setting of the NP, as seen within the wider landscape context, could be affected. Table A6.2.1 below presents the 26 SLQs attributed to the Study Area identified for this assessment, highlighting the three which have the potential to be significantly affected, and which, therefore, require a detailed assessment.

Table A6.2.1: LLTNP SLQs within the Assessment Study Area

Special Landscape Quality	Susceptibility to the Development
General Qualities	
A world-renowned landscape famed for its rural beauty	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
Wild and rugged highlands contrasting with pastoral lowlands	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
Water in its many forms	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
The rich variety of woodlands	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
Settlements nestled within a vast natural backdrop	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
Famous through-routes	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
Tranquillity	There is the potential that visibility of the Development could affect the perceived tranquillity of the LLTNP.

Special Landscape Quality	Susceptibility to the Development
The easily accessible landscape splendour	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
Argyll Forest	
A remote area of high hills and deep glens	The ZTVs in Figures 6.9a and 6.9b show that visibility of the Development across this area would be limited in nature, largely restricted to the very highest summits across the Argyll Forest area, from which views towards existing wind farm development are likely to be available. As such, indirect effects comprising limited visibility of the Development would not affect this SLQ.
A land of forests and trees	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
Arrochar's mountainous and distinctive peaks	There is the potential that visibility of the Development could affect the mountainous and distinctive peaks around Arrochar.
The variety of glens	The ZTVs in Figures 6.9a and 6.9b show that visibility of the Development would be restricted to high ground. Glens would not be affected by visibility of the Development and, therefore, there would be no effect on this SLQ.
The slender jewel of Loch Eck	Indirect effects comprising visibility of the Development at a minimum of 11 km from the closest NP boundary would not affect this SLQ which relates principally to the landscape within the NP boundary.
The dramatic pass of Rest and Be Thankful	The ZTVs in Figures 6.9a and 6.9b show that the landscape around the Rest and Be Thankful would not be affected by visibility of the Development and, therefore, there would be no effect on this SLQ.
The seaside architecture of Kilmun and Blairmore	The ZTVs in Figures 6.9a and 6.9b show that the landscape around Kilmun and Blairmore would not be affected by visibility of the Development and, therefore, there would be no effect on this SLQ.
Breadalbane	
Steep mountains and long glens	There is the potential that visibility of the Development could affect the steep mountains and long glens of Breadalbane.
Crossroads within remote mountain ranges	The ZTVs in Figures 6.9a and 6.9b show shows that visibility of the Development would be restricted to high ground. Crossroads within remote mountain ranges would not be affected by visibility of the Development and, therefore, there would be no effect on this SLQ.
A landscape of distinctive glens and straths	The ZTVs in Figures 6.9a and 6.9b show shows that visibility of the Development would be restricted to high ground. Glens and straths would not be affected by visibility of the Development and, therefore, there would be no effect on this SLQ.
The narrow Strathyre and Loch Lubnaig ribbon	The ZTVs in Figures 6.9a and 6.9b show shows that there would be no visibility of the Development from this part of the NP and, therefore, there would be no effect on this SLQ.
Beautiful Balquhidder	The ZTVs in Figures 6.9a and 6.9b show shows that there would be no visibility of the Development from this part of the NP and, therefore, there would be no effect on this SLQ.

Special Landscape Quality	Susceptibility to the Development
Wide and straight Loch Earn	The ZTVs in Figures 6.9a and 6.9b show shows that there would be no visibility of the Development from this part of the NP and, therefore, there would be no effect on this SLQ.
The rocky pass of Glen Ogle	The ZTVs in Figures 6.9a and 6.9b show shows that there would be no visibility of the Development from this part of the NP and, therefore, there would be no effect on this SLQ.
Killin and the Falls of Dochart	The ZTVs in Figures 6.9a and 6.9b show shows that there would be no visibility of the Development from this part of the NP and, therefore, there would be no effect on this SLQ.
Expansive Glen Dochart	The ZTVs in Figures 6.9a and 6.9b show shows that there would be no visibility of the Development from this part of the NP and, therefore, there would be no effect on this SLQ.
Wide Strath Fillan	The ZTVs in Figures 6.9a and 6.9b show that there would be no visibility of the Development from this part of the NP and, therefore, there would be no effect on this SLQ.
Sinuous Glen Falloch	The ZTVs in Figures 6.9a and 6.9b show that there would be no visibility of the Development from this part of the NP and, therefore, there would be no effect on this SLQ.

5.3 Assess the Effects of the Development on the Relevant SLQs

The three SLQs with potential to be significantly affected by the Development are assessed in detail in Table 6.2.2 below. The descriptions of the SLQs are presented in the left-hand column, while the assessment of effects that the Development would have on these SLQs is assessed in the right-hand column.

Table 6.2.2: Effects of the Development on the Relevant SLQs

Special Landscape Quality	Assessment of effects
SLQ: Tranquillity	
"It is easy to find tranquillity within the Park, to find uncrowded places where there is a predominance of natural sounds and sights, whether beside a shimmering loch, following the course of a mountain burn, walking the sheltered woodlands or climbing an open hill. This sense of peacefulness is enhanced by the small scale of human settlement within the expansive landforms, and by the general absence of large-scale development."	The ZTVs in Figures 6.9a and 6.9b indicate those parts of the LLTNP from which the Development would be theoretically visible and show that visibility is limited to small patches of high ground across parts of the NP from where long-distance views can be experienced. The addition of large-scale wind energy development has the potential to influence the sense of tranquillity experienced across these parts of the LLTNP. However, the Development is considered to have only a minimal influence on this SLQ. From the areas in which the Development would be visible, existing large-scale infrastructure already exerts an influence on views of the landscape beyond the NP. Existing human elements which have an influence on the tranquillity experienced across high ground within the Study Area include operational wind farms such as Clachan Flats and Cruach Mhor; transport corridors including the A82, A83 and A85; and hydro-electric developments. Several of these features, including Clachan Flats, would be seen in closer proximity to the NP than the Development. The introduction of the Development beyond the boundary of the NP in limited views from high ground is considered to have only a minimal influence on the *"predominance of natural sounds and sights"*. The Development would present a somewhat distant feature, at a minimum of 11 km, that would have a limited influence on the SLQ of 'tranquillity'.

Special Landscape Quality	Assessment of effects
	Taking these factors into account, the magnitude of change would be **low** and when combined with the **medium-high** sensitivity, the effect of the Development on this SLQ would be **moderate / minor** and **not significant**. The nature of the effect would be adverse.
SLQ: Arrochar's mountainous and distinctive peaks	
"A distinctive mountain group, popularly called the Arrochar Alps, fills the northern corner, and extends into the Loch Lomond area. The hills are visually striking, curiously-shaped, and rocky with craggy peaks and crests. Each is distinctive and recognisable. They are highly visible from the shores and open waters of Loch Long and Loch Lomond and offer spectacular panoramas from their summits. Their proximity to the sea means that snow seldom lies deep on the summits. *These hills are important in the history of Scottish mountaineering, principally because they provide good climbing and are easily accessible from Glasgow, whether by train or car or, in the past, by steamer to Arrochar. Although popular with climbers, nevertheless the tops harbour a sense of remoteness and stillness, away from the busy road through Glen Croe at the head of Loch Long."*	The ZTVs in Figures 6.9a and 6.9b indicate those parts of this area from which the Development would be theoretically visible. This is generally focussed towards two broad areas: high ground to the east of Loch Goil and hill summits to the north and west of Arrochar itself, including Beinn Ime, Beinn Narnain, the Cobbler, Ben Vane and Ben Vorlich. Visibility of the Development would be restricted to the summits of these hills, with landform screening views from the majority of the ascent. These views would be long-distance, at a minimum of approximately 15 km. The Development would alter only a small proportion of the "*spectacular panoramas*" visible from the summits and seen by the moderate number of walkers on the hills. Existing man-made infrastructure is likely to be visible in such long-ranging views, including operational wind farms beyond the boundary of the NP. The Development would be in keeping with the emerging pattern of wind energy development located to the north-west of the NP. From much of this area, the Development would be seen at a greater distance than the operational Clachan Flats and would occupy a sector of the view in which An Suidhe and Clachan Flats are already visible. The Development would not extend the horizontal field of view occupied by turbines into a new sector of the view. As such, the Development is considered to have a limited influence on this SLQ. Taking these factors into account, the magnitude of change would be **low** and when combined with the **medium-high** sensitivity, the effect of the Development on this SLQ would be **moderate / minor** and **not significant**. The nature of the effect would be adverse.
SLQ: Steep mountains and long glens	
"Breadalbane is a great tract of hills and mountains rising steeply and dramatically from the glen floors: Ben Lui, Cruach Ardrain, Ben More, Ben Vorlich, Ben Ledi, and others. These form the Southern Highlands – the southernmost extent of the Grampian mountains. The hills dominate the scene, with human activity constrained."	The Breadalbane area of the LLTNP is the northernmost part of the designation. It is located broadly to the north of the range of hills west of Ben Ledi. The ZTVs in Figures 6.9a and 6.9b indicates those parts of this area from which the Development would be theoretically visible. Within the Study Area, this is restricted to three main areas: high ground around the summit of Ben Ledi; summits in the Ben More range, including Ben More itself, Stob Binnein, Stob Coire an Lochain, Stob Garbh, Cruach Ardrain, An Caisteal, Beinn a Chroin and Beinn Chabhair; and several summits to the south of Loch Doine, including Ceann na Baintighearna, Stob Breac and Stob a Choin. From each of these hills, visibility of the Development would be restricted to the summit, with landform screening views from the majority of the ascent. These views would be long-distance, at a minimum of approximately 17.5 km as seen from Ben Lui, and the Development would alter only a small proportion of the available panoramic views. Existing human elements are likely to be visible in such long-ranging views, including operational wind farms beyond the boundary of the NP. The Development would be in keeping with the emerging pattern of wind energy development located to the west of the NP and avoid a spread into other largely undeveloped sectors surrounding the NP.

Special Landscape Quality	Assessment of effects
	The Development is not considered likely to present a large enough change to the baseline view to become the dominant element in the view, and the hills would continue to "*dominate the scene*". As such, the Development is considered to have a limited influence on this SLQ Taking these factors into account, the magnitude of change would be **low** and when combined with the **medium-high** sensitivity, the effect of the Development on this SLQ would be **moderate / minor** and **not significant**.

5.4 Cumulative Effects

The cumulative assessment considers the following scenarios;

- Cumulative Scenario 1 assesses the effects of adding the Development to a cumulative situation comprising all operational, under construction and consented wind farms.
- Cumulative Scenario 2 assesses the effects of adding the Development to a cumulative situation comprising all operational, under construction, consented and application wind farms.

The plan in Figure 6.12 shows that there are a number of cumulative developments within close proximity to the LLTNP. Wind farm developments relevant to the cumulative assessment of the Development are listed in Table A6.2.3 below.

Table A6.2.3: Cumulative Wind Farms

Wind Farm	Status	Number of turbines	Turbine height	Distance & direction from closest NP boundary
Clachan Flats	Operational	9	93 m	North-west 6.36 km
An Suidhe	Operational	23	80 m	North-west 10.56 km
Carraig Gheal	Operational	20	110 / 125 m	North-west 12.47 km
Beinn Ghlas	Operational	14	55 m	North-west 14.95 km
A Chruach	Operational	21	126.5 m	West 21.87 km
Cruach Mhor	Operational	35	71 m	West 25.70 km
Blarghour	Consented	17	136.5 m	North-west 15.07 km
A Chruach II	Consented	2	135 m	West 22.76 km
Creag Dhubh	Consented	9	114.9 / 124.3 / 130.6 / 144.4 m	North 10.43 km
Blarghour Variation	Application	14	180	North-west 15.07 km
An Carr Dubh	Application	26	200	North-west 14.02 km
Glasvaar	Application	11	149.9	West 22.47 km

The cumulative ZTVs in Figures 6.13 to 6.19 illustrate the limited extents to which the operational and proposed developments would be visible from the LLTNP. Visibility of wind farm development is generally restricted to the north and west-facing slopes of high ground around the north-western edge of the LLTNP. Further south and west, and on lower ground around the north-west, intervening landform generally limits views of existing and proposed wind energy development.

The cumulative wirelines for Viewpoint 13: Ben Lui, Viewpoint 14: Beinn Ime and Viewpoint 16: Beinn Lochain, presented in Figures 6.36, 6.37 and 6.39, illustrate the existing pattern of operational and proposed wind farms to the west of the NP.

5.4.1 Scenario 1

The operational wind farms with an influence on the LLTNP are largely located to the north-west of the western boundary, across the hills of Argyll. These developments have been included in the assessment of effects of the addition of the Development to the current baseline in Section 1.5.3 above. This assessment found that the Development would not result in significant effects on any of the SLQs of the NP.

The main consented wind farms of relevance to the cumulative assessment are Blarghour, located to the west of the Site on the hills above Glen Aray and Creag Dubh located on the enclosing hills to the east of Loch Fyne. Blarghour is located to the west of the NP boundary, at a minimum distance of approximately 15 km. The Development would be located in the same sector of the view as Blarghour Wind Farm in views from those parts of the NP to the east. Figure 6.17 shows the parts of the LLNTP from which both developments would be visible. From some parts of the LLTNP, particularly to the north, the Development would be seen in front of Blarghour. The Development would, therefore, bring wind farm development into closer proximity than the consented development but would not increase the horizontal extent occupied by wind farm development. From other areas, the Development would be seen alongside the consented Blarghour. These areas generally comprise high ground along the western NP boundary, and from these parts, the Development would be seen to be in-keeping with the existing pattern of wind farm development on the hills to the north-west.

Creag Dubh is located to the west of the NP boundary, at a minimum distance of approximately 1.5 km. The Development would be located in the same sector of the view as Creag Dubh Wind Farm in views from those parts of the NP to the south. Figure 6.18 shows the parts of the LLNTP from which both developments would be visible. From some parts of the LLTNP, particularly to the south, Creag Dubh would be seen in close range and to the front of the Development. The Development would be seen as a more distant wind farm occupying a smaller proportion of the wider view and with turbines appearing comparatively smaller in scale than Creag Dubh Wind Farm. From other areas to the north, the Development would be seen in the western sector while Creag Dubh would be seen in the southern sector and although this would be seen to increase the extent of wind farm development, the separation distance combined with the contained extent of the Development would limit the cumulative effect. These areas generally comprise high ground along the western NP boundary, and from these parts, the Development would be seen to be in-keeping with the existing pattern of wind farm development on the hills to the north-west.

Other consented wind farms within the Study Area are limited and small in scale, comprising the single turbine Strachur House, and two turbines within A Chruach II Wind Farm, which would form an extension to the existing operational A Chruach Wind Farm. While these developments would contribute to the cumulative context, the limited scale and extent of Strachur House and A Chruach II would reduce the cumulative interaction with the Development. The position of the Development to the north-west of the NP boundary, on the hills surrounding Glen Aray, would ensure it appears largely in keeping with the existing pattern of wind energy development and reduce cumulative interactions with Blarghour Wind Farm. The cumulative magnitude of change is therefore considered to be **low**.

The combination of the medium-high sensitivity and the low cumulative magnitude of change would give rise to a **moderate / minor** and **not significant** cumulative effect on the NP in respect of Scenario 1. The nature of the effect would be adverse.

5.4.2 Scenario 2

The addition of the Development to the operational, consented and application stage wind farms is considered under Scenario 2. In addition to the operational and consented wind farms assessed for Scenario 1, Scenario 2 includes the application stage Blarghour Variation (which would replace the consented Blarghour Wind Farm), An Carr Dubh, Glasvaar and Ardtaraig. These developments are all located to the west of the NP boundary. Considering the addition of the Development to a baseline which includes these developments in addition to the operational and consented developments, the cumulative magnitude of change is considered to be **low**. This is as a result of several factors, as described below.

The Development would be located in the same sector of the view as the existing and proposed developments and would therefore not extend the horizontal extent of wind farm development into other sectors, as experienced from those localised parts of the NP from where visibility arises. The Development would be seen in views to the west and north from localised patches of high ground concentrated in northern and western parts of the NP. From these areas, the focus of views is likely to be to the south and east, over the more scenic and dramatic mountainous landscapes within the NP. The sector of views to the north-west, in which the Development would be seen, is less remarkable and more influenced by existing wind farms and other human artefacts.

The turbines within the Development would be larger in size than most of the operational and consented turbines but similar in size to the application turbines at Blarghour Variation and An Carr Dubh. They would be seen at a minimum distance of approximately 15 km which would be similar with the range of application Blarghour Variation and An Carr Dubh and seen in a similar westerly to northerly sector of the view. The addition of the Development to this cumulative context is moderated by the similarities in location and appearance but also increased by the concentration of turbines within this part of the setting to the NP. In terms of scale comparison, the scale of the Development would be reduced in those parts of the NP where consented Creag Dubh would only be a minimum of approximately 1.5 km from the closest NP boundary.

The ZTVs in Figures 6.9a and 6.9b indicate that visibility of the Development is limited to high ground, predominantly hill summits, within the NP. Visibility from lower elevations is largely restricted by intervening landform. Due to the difference in elevation between the Site and the areas which are likely to experience visibility of the Development, the turbines would typically be seen backclothed against the landscape beyond. The wirelines and photomontages in Figures 6.36, 6.37 and 6.39 illustrate this effect. The Development is therefore considered unlikely to add to the developed skyline.

The Development would appear largely in keeping with the existing pattern of wind energy development across the Study Area. From some northern parts of the Argyll Forest area of the NP, the Development would be seen to the north in closer proximity than the application stage Ardtaraig and Glasvaar, which are seen to the west and south-west respectively. It would be seen slightly more distant than the operational An Suidhe and Clachan Flats, and the application stage Blarghour Variation and An Carr Dubh, and much more distant than consented Creag Dubh.

There are parts of the NP to the north within Breadalbane, including from the summit of Ben Lui as illustrated by Figure 6.36, in which the Development would present the closest visible wind farm, due to the screening of Clachan Flats by intervening landform. However, the Development would still appear at a broadly similar distance to other wind farm developments. It would appear at a similar scale and extent as other wind farm developments to the west of the NP, including application stage Blarghour Variation and application An Carr Dubh, and would appear cohesive with the existing pattern of development. Existing wind energy development across the Study Area is predominantly located in the Craggy Upland LCT, and the location of the Development also in this LCT would reinforce this association.

The main assessment of effects on the NP found that there would be visibility of the Development from a limited extent of the NP, and that as such it would have a limited indirect influence on the SLQs of the NP. As a result of this, it can also be concluded that cumulative interactions with other operational, consented and proposed wind farms would also be limited by the limited extents of visibility across the NP.

As a result of the above factors, the cumulative magnitude of change resulting from the Development is considered to be **low**. The combination of the high sensitivity and the low cumulative magnitude of change would give rise to a **moderate / minor** and **not** significant cumulative effect on the LLTNP in respect of Scenario 2. The nature of the effect would be adverse.

6 Step 4: Summary of Effects on the Special Landscape Qualities

The assessment has considered the effect of the Development on the three relevant SLQs of the LLTNP. The finding is that the effects on these SLQs would not be significant. All other SLQs relating to different aspects of the LLTNP and their setting, would not be significantly affected. The Development lies outwith the LLTNP, at a minimum distance of approximately 11 km to the north-west, such that there would be no direct effects on the LLTNP, only indirect effects associated with its visibility. The ZTVs in Figures 6.9a and 6.9b illustrate the limited extent of visibility across the LLTNP as a whole and the localised extent of visibility across the closer summits.

The LLTNP has 43 SLQs. 17 of these SLQs would not be affected by the Development as they relate to parts of the LLTNP beyond the Study Area, which have been scoped out due to having no theoretical visibility of the Development. As such there would be no direct or indirect effects on these SLQs. 23 of the SLQs relate to areas in which there is theoretical visibility of the Development, but which are considered not to have the potential to be affected due to not being susceptible to indirect effects. The three remaining SLQs with potential to be affected comprise 'tranquillity', 'Arrochar's mountainous and distinctive peaks' and 'steep mountains and long glens', both of which may be indirectly affected through visibility of the Development in views from the LLTNP.

Table 6.2.2 presents the findings of the assessment on these three SLQs, which are that the effects would not be significant on 'tranquillity', 'Arrochar's mountainous and distinctive peaks' or 'steep mountains and long glens'. These findings relate chiefly to a combination of the limited extents of visibility in those parts of the LLTNP where the SLQs are experienced, the substantial separation distances between the Development and those areas where visibility would occur, the limited proportion of the wider view that the proposed turbines would occupy and the existing influences from surrounding modern artefacts and contemporary land uses, including existing operational wind farms.

While there is potential for cumulative effects to arise through the addition of the Development, these would not be significant owing principally to the notable separation distance between the Development and the LLTNP, the closer proximity of some of the existing and proposed wind farms, the location of the Development in the same sector where wind farm development is already an established influence and the limited extents and distant nature of visibility along the western boundary of the NP.

While the Development would have effects on three of the 43 SLQs of the LLTNP, the effects would be not significant. The overall effect on the LLTNP would be **not significant** as the objectives of the designation and the overall integrity of the LLTNP as a whole would not be compromised.

Environmental Impact Assessment – Technical Appendix 6.3: Assessment of Effects on Ben Lui WLA

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

ERM

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1 INTRODUCTION

Wild Land effects are considered in this Appendix A6.3 of the LVIA in respect of the Ben Lui Wild Land Area (WLA). This Appendix has been prepared to accompany Chapter 6: LVIA in Volume 1 of the Ladyfield Renewable Energy Park (hereafter referred to as 'the Development') EIA Report.

WLA 06 – Ben Lui lies a minimum of approximately 5 km to the north-east of the Development, as shown on Figures 6.3, 6.9a and 6.9b. The NatureScot 'Description of Wild Land Areas' (2016) for WLA 06 Ben Lui provides a useful initial brief overview of this WLA:

"The western half of this relatively small WLA lies within Argyll and Bute and the eastern half is in Stirling. It has an area of 145 km^2 and is roughly rectangular in shape, extending some 23 km from east to west. It consists of a complex range of steep, high and sometimes craggy hills, composed of mostly quartz and mica schists with pockets of limestone and slate, penetrated by several steep glens and surrounded by grass and heather moorland. The hills are generally more massive in the south-west, but those in the north-east, including Ben Lui, appear more prominent, both from within and beyond the WLA."

The inclusion of a detailed assessment of the potential effects of the Development on the Ben Lui WLA was set out in the Scoping Request of June 2021 and agreed through the Scoping Comments received from NatureScot in August 2021. Since this time, National Planning Framework 4 (NPF4)[1] has been adopted. The adopted NPF4 presents the following statement in respect of planning controls relative to WLAs, that the draft version did not include; '*Buffer zones around wild land will not be applied, and effects of development outwith wild land areas will not be a significant consideration*'. Despite the position that the effects of the Development on the Ben Lui WLA will not present a significant consideration in the planning balance, there is still the potential that it may give rise to significant effects on landscape character. To that end, this LVIA includes a detailed assessment of these effects as agreed at the scoping stage of this project.

2 GUIDANCE

The assessment follows guidance set out in NatureScot's publication 'Assessing Impacts on Wild Land Areas - technical guidance' (2020)[2]. The NatureScot technical guidance (2020) sets out the suggested approach to the assessment of effects on wild land. As noted in paragraph 4 of the guidance, the assessment methodology broadly follows that of GLVIA3[3], and is based around the following five stages (as described in Table 1 of NatureScot guidance):

- 'Step 1 - Define the study area and scope of the assessment;
- Step 2 – Verify the WLA baseline;
- Step 3 – Assess the sensitivity of the qualities;
- Step 4 – Assess the magnitude of the effects; and
- Step 5 – Judge the significance of effects'

Paragraph 13 of the guidance notes that "*the assessment approach…should be…concise and proportionate, focused on likely significant effects on the qualities;"*

While the wild land assessment methodology broadly follows that set out in GLVIA3, there are several points that are beneficially explained prior to the assessment itself, as discussed below.

The assessment has also been carried out in line with EIA regulations set out in the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017[4], as amended and

[1] Scottish Government (2023). National Planning Framework 4

[2] NatureScot (2020). Assessing Impacts on Wild Land Areas - technical guidance.

[3] Landscape Institute and Institute of Environmental Management & Assessment (2013), Guidelines for Landscape and Visual Impact Assessment, Third Edition

[4] Scottish Government (2017) The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 [Online]. Available at: https://www.legislation.gov.uk/ssi/2017/101/contents/made (accessed 13/01/2022)

Guidelines for Landscape and Visual Impact Assessment: Third Edition (Landscape Institute and IEMA, 2013) ('GLVIA3')[5].

2.1 The Status of WLAs

The status of WLAs is clearly set out in paragraph 8; "*WLAs have not been identified on scenic grounds and are not a statutory designation.*"

There is also an acceptance (paragraph 9) that WLAs are not 'wilderness' and that human influences can and do form part of the baseline character of WLAs:

"…Whilst the WLA map identifies areas where wildness is most strongly expressed, these are not 'wilderness', empty of any human activities or influence. They reflect Scotland's long history of past occupation and current use and management, albeit that evidence of such is often light and limited in extent."

An important phrase in this paragraph is 'light and limited in extent' as this presents a measure with which to assess the existing external influence of development, and operational wind farms in particular, on the WLA, and indicates to what degree this influence can be accommodated within an area that is considered to be 'wild land'.

2.2 The Need for a WLA assessment

The need for a WLA assessment is discussed in Paragraphs 5 and 6 of the NatureScot guidance, which note that:

'This guidance should only be applied to proposals whose nature, siting, scale or design are likely to result in a significant effect on the qualities of a WLA. Given this, assessments are more likely for proposals within a WLA, and are less-likely for proposals outwith the WLA.

An assessment will only be required where it has been deemed necessary by the competent authority. You are encouraged to discuss the need for an assessment with the competent authority at an early stage.'

While the Development lies outwith this WLA, a precautionary approach to assess the effects on the Ben Lui WLA has been taken and a detailed wild land assessment has been carried out.

While NatureScot have also requested a detailed assessment through their scoping response, it is also important to note that, according to NatureScot guidance, effects on the wildness qualities expressed in WLAs can only be experienced from within WLAs, and not from within the area surrounding them. Paragraph 3 of the guidance notes that "*This guidance sets out a methodology and general principles for assessing the impact of development and other proposals on WLAs, as they are experienced from within the WLA, not from outwith it.*"

2.3 Cumulative Effects

NatureScot guidance notes the following in relation to cumulative effects on WLAs:

'The potential for cumulative effects. Other proposals (either of the same or different type) which are likely to contribute to significant cumulative effects should be identified in discussion with the decision maker. The principles within our guidance document Assessing the cumulative impact of onshore wind energy developments specific to onshore wind energy development can be applied to other development and should aid this assessment.' (paragraph 16, third bullet point)

And:

'In judging significance, the following factors should be considered…The nature and extent of any likely cumulative effects. (paragraph 33)'

[5] Landscape Institute and IEMA. (2013). Guidelines for Landscape and Visual Impact Assessment: Third Edition

2.4 The Effects of Turbine Lighting

For visible medium intensity steady or fixed red aviation warning lights, ICAO indicates a requirement for no lighting to be switched on until 'Night' has been reached, as measured at 50cd/m^2 or darker. This is helpful as it does not require them to be on during 'twilight', when landscape character may be discerned. The 2016 Ben Lui WLA description does not include darkness as one of the wild land qualities. The wild land qualities that are described in the 2016 Ben Lui WLA description are evident within the context of landscape characteristics experienced during the day, that are not readily perceived at night in darkness. Appendix A6.5 comprises an assessment of the visual effects of the visible aviation lighting requirements of the Development. This includes the assessment of the night-time effects on walkers in respect of Viewpoint 15: Beinn Bhuidhe, which lies within the Ben Lui WLA and is representative of the potential visual effects.

2.5 Attributes, Responses and Qualities

The wild land assessment requires further judgements to be made to consider the change arising to particular 'wild land qualities'. WLAs take into account that wildness is a product of people's perceptual response to certain physical attributes in the landscape. 'Physical attributes' and 'perceptual responses' are therefore used as the measure by which changes in experience are assessed.

As acknowledged in NatureScot's Advice to Government in 2014[6], capturing the quality of wildness is a subjective matter that requires informed judgements as people respond differently according to their individual experience and expectations. However, as the 2020 NatureScot guidance recognises, there is sufficient commonality in appreciation to identify a set of attributes and responses that can be assessed if presented in a systematic, transparent and consistent way.

NatureScot identifies WLAs as having the following physical attributes:

- A high degree of perceived naturalness;
- The lack of modern human artefacts or structures;
- Little evidence of contemporary land uses;
- Landform which is rugged, or otherwise physically challenging; and
- Remoteness and / or inaccessibility.

NatureScot identifies WLAs as having the following perceptual responses evoked by these physical attributes:

- A sense of sanctuary or solitude;
- Risk or, for some visitors, a sense of awe or anxiety;
- Perceptions that the landscape has arresting or inspiring qualities; and
- Fulfilment from the physical challenge required to penetrate into these places.

These physical attributes are strongly expressed, and are of sufficient extent, to evoke the full range of perceptual responses in WLAs. The term 'wild land qualities' (WLQs) encompasses both physical attributes and perceptual responses – reflecting that it is a combination of factors that contributes to the value and appreciation of wildness. Development located outwith WLAs may only impact on perceptual responses to a WLA, since it cannot directly change the physical attributes of a WLA. The physical attributes of a WLA are still, however, relevant to this assessment, as they contribute to the perceptual responses experienced within the WLA, which can also be influenced by the Development outwith the WLA.

[6] Scottish Natural Heritage (2014). Wild Land Advice to Government

3 METHODOLOGY FOR ASSESSING EFFECTS ON WILD LAND AREAS

3.1 Introduction

As noted in NatureScot guidance[7], the wild land assessment methodology broadly follows that of GLVIA3 and is based around the five stages described in Table 1 of the guidance.

Steps 1 and 2 do not require detailed explanation of methodology and are carried out subsequently in this Appendix. The methodology for Steps 3, 4 and 5 is described below. These steps are assessed in accordance with GLVIA3 and largely follow OPEN's methodology, which is described in full in Appendix A6.1.

In this methodology, WLAs are considered as landscape character receptors rather than visual receptors. This is because the landscape of the WLA is a resource in itself and effects are assessed in terms of the effects on the WLQs of the WLA, as per NatureScot guidance, and not in terms of the effects on views gained by people who may be within the WLA.

3.2 Step 3: Assess the Sensitivity of WLA Qualities

NatureScot guidance summarises this step as follows:

'Through detailed field assessment within the study area, assess the sensitivity of the wild land qualities scoped in (including their physical attributes and perceptual responses), to the type and scale of change proposed'.

3.2.1 Value of Wild Land Areas

In applying GLVIA3 to the assessment, and as noted by NatureScot, it is necessary to attribute a value to the receptor, classified as high, medium, or low, or interim levels, as described in Appendix A6.1. The value attributed to nationally important designations, including National Parks (NP) and National Scenic Areas (NSA) is normally found to be at the upper end of the scale, or high.

Wild land is not an environmental designation and is not statutorily protected in the way that NPs and NSAs are for their scenic qualities. It is, however, recognised in NPF4 (Scottish Government, 2023) as a nationally important mapped resource, which should be afforded protection for its wildness qualities. Policy 4 of NPF4 states;

"Development proposals in areas identified as wild land in the Nature Scot Wild Land Areas map will only be supported where the proposal:

i. will support meeting renewable energy targets; or,

ii. is for small scale development directly linked to a rural business or croft, or is required to support a fragile community in a rural area.

All such proposals must be accompanied by a wild land impact assessment which sets out how design, siting, or other mitigation measures have been and will be used to minimise significant impacts on the qualities of the wild land, as well as any management and monitoring arrangements where appropriate. Buffer zones around wild land will not be applied, and effects of development outwith wild land areas will not be a significant consideration."

In applying this guidance to the Development, the conclusion would be that a wild land impact assessment would not be required as it lies a minimum of approximately 5 km outwith the Ben Lui WLA and therefore the effects will not be a "*significant consideration*". However, as the scoping for the Development was carried out in June 2021, and the production of a WLA assessment was requested by NatureScot, this detailed assessment of the effects of the Development on the Ben Lui WLA has been included to ensure previous commitments are met. NatureScot provide some further guidance on the relative value of WLAs compared to NPs and NSAs in its publication Spatial

[7] NatureScot (2020), Assessing Impacts on Wild Land Areas - technical guidance

Planning for Onshore Wind Turbines – Natural Heritage Considerations, Guidance (June 2015)[8]. Annex 1 to this document provides advice on the potential landscape objectives that may be applicable in different landscapes within Scotland in terms of their ability to accommodate wind farms, suggesting that some landscapes should be subject to a higher level of protection than others.

Annex 1 places WLAs in the middle category, where some landscape 'accommodation' of wind farms may be considered appropriate, noting that:

'Within local landscape designations and Wild land Areas, the degree of landscape protection will be less than for National Scenic Areas. In these areas, an appropriate objective may be to accommodate wind farms, rather than seek landscape protection.'

WLAs are therefore considered to have a lower inherent baseline value, in landscape terms, than nationally designated landscapes. In the terms of GLVIA3 and OPEN's methodology, it is reasonable therefore to attribute a medium-high value to WLA 06 Ben Lui, where it is not covered by any other nationally designated landscapes that might elevate its value. The exception to this rating occurs in the north-eastern part of the WLA which is covered by the Loch Lomond and The Trossachs National Park, where this designation elevates the value to high.

3.2.2 Susceptibility within Wild Land Areas

Susceptibility relates to the nature of the landscape receptor and how susceptible it is to the potential effects of the Development, as described in GLVIA3. Susceptibility varies across the WLA depending on the nature and strength of the WLQs, the particular perceptions that are experienced in different areas, and in the context of different external and internal influences.

OPEN's methodology assesses the susceptibility of landscape character receptors through a series of three criteria, as set out in Appendix A6.1. Two of these are relevant to the assessment of susceptibility of WLQs:

- The specific nature of the Development: the susceptibility of landscape receptors is specific to the change arising from the particular development that is proposed, including its individual components and features, and its size, scale, location, context and characteristics.
- Landscape character: the key characteristics of the existing landscape character of the receptor are considered in the evaluation of susceptibility as they determine the degree to which the receptor may accommodate the influence of the Development (in the wild land assessment this criterion relates to the documented WLQs, physical attributes and perceptual responses of the WLA).

The third criterion, 'landscape association', is not identified as a separate factor in the judgement of susceptibility within WLAs; this is because the WLQs make specific mention of landscape association where it is a relevant factor, and it is therefore not necessary to include it again when considering susceptibility.

A useful tool in the assessment of the levels of susceptibility across the WLA is NatureScot's 2014 analysis of the data that was gathered in order to inform the identification of WLAs. NatureScot gathered data for each of the 'physical attributes' of wild land and used these to create a 'relative wildness map'. The 'Jenks Natural Breaks Optimisation method' was then used to identify the natural breaks in the distribution of the relative wildness data in order that levels of wildness could be identified and mapped. As a result, eight classes of wildness were identified, with 8 being the highest and 1 being the lowest. See Figures 6.20a – 6.20e which show the relative wildness mapping for WLA 06 Ben Lui.

3.3 Step 4: Assess the Effects

NatureScot guidance notes this step as follows in Table 1:

[8] Scottish Natural Heritage (2015). Spatial Planning for Onshore Wind Turbines – Natural Heritage Considerations, Guidance.

'Assess the effects on individual and / or combinations of qualities, drawing out which physical attributes and perceptual responses will be affected, how and to what degree. This should reflect the size or scale of change, its extent and duration.'

OPEN's methodology for assessing magnitude of change on landscape character receptors is carried out through the application of a set of criteria as presented in Appendix 6.1.

Broadly, the magnitude of change that the Development will have on landscape receptors is assessed in terms of the size or scale of the change, the geographical extent of the area influenced and its duration and reversibility. The key elements of the Development that will influence the level of change on landscape character are the movement, form, material, colour and scale of the turbines, although infrastructure is also considered.

3.4 Step 5: Judgement of the Significance of Effects

NatureScot guidance summarises this step as follows in Table 1:

'Conclude on the overall significance (taking into account any mitigation), in terms of the study area and where relevant the wider WLA.'

On the basis that the NatureScot guidance is based on the principles of GLVIA3, OPEN's methodology for the assessment of the significance of effects (as described in Appendix 6.1) has also been used for the assessment of the significance of effects on wild land. OPEN's methodology describes the significance of effects as:

A significant effect will occur where the combination of the variables results in the Development having a defining effect on the view or receptor. A not significant effect will occur where the effect of the Development is not definitive, and the view or receptor continues to be characterised principally by its baseline characteristics. In this instance, a not significant effect would indicate that the Development may have an influence, but this influence will not be a defining one.

4 WLA ASSESSMENT

The following sections of this report assess the effects of the Development on WLA 06 Ben Lui following the five steps as described by NatureScot.

4.1 Step 1: Define the Study Area and Scope of the Assessment

NatureScot guidance summarises this step as follows:

'Identify a study area appropriate to the scale of the proposal and extent of likely significant effects on the WLA.'

Paragraph 16 of the guidance notes that:

'The rationale for the selection of the study area and scope of the assessment should be clearly stated and consider the following.

1. The extent of visibility and recognised routes / movement through the WLA. The scale of the proposal may not equate to the extent of effects (for example, a large proposal where visibility is limited to part of the WLA, a more focused study area may be appropriate).

2. The wild land qualities likely to be significantly affected. The focus of the assessment should be on the qualities likely to be affected rather than where the proposal is located.

3. The potential for cumulative effects.'

The WLA Study Area for the wild land assessment is discussed below in relation to these three considerations.

4.1.1 1. Extent of visibility and recognised routes/ movement through the WLA.

The ZTVs in Figures 6.9a and 6.9b show localised and intermittent theoretical visibility from the WLA. This is largely experienced from two main areas, comprising an area towards the south-western edge of the WLA in closest proximity to the Development, and an area of intermittent visibility focussed to the north of the WLA. The south-western area includes the summit of Beinn Bhuidhe and high ground to its west, including Beinn an t-Sithein, Stac a' Chiurn and Beinn Chas, as well as an area of higher ground between Lochan Shira and the northern edge of the WLA. Viewpoint 15 is located within this area on Beinn Bhuidhe. Visibility in the northern area is limited to the summits of the steep hills in this area, comprising Ben Lui, Ben Oss, Beinn a Chleibh, Ben Dubhchraig and Meall Tighearn. Viewpoint 13 is located on Ben Lui. There is also some very limited and intermittent theoretical visibility from the south-eastern part of the WLA including from Troisgeach, Meall an Fhudair and Beinn Damhain. Theoretical visibility is gained from a minimum of approximately 5 km from the western tip of the WLA to the west of Cruach Mhor, up to a maximum of approximately 21 km away from Beinn Dhubhchraig.

In relation to the next aspect of the first consideration 'recognised routes / movement through the WLA', the WLA description for WLA 06 defines the '*Rugged and highly natural mountains, penetrated by steep-sided glens that contain well-used routes and provide arresting views'* as one of the WLQs, describing that '*many glens have long been used as passes'.*

The WLA description also indicates that the WLA is used for hill walking and includes five Munros and two Corbetts. The area to the north around Ben Lui is identified as being easily accessible and popular with walkers, while the hills to the south-west are '*generally more difficult to access than those to the north-east, generally requiring a long walk in along private roads and tracks'*. Both areas are described as '*rugged and physically challenging to climb'*. Away from these mountainous areas, there are *'extensive areas with no paths or tracks, especially within the hills to the south-west'*. Conditions in these areas are often boggy underfoot, making accessing the interior challenging and time-consuming.

From the well-used passes through the glens of the WLA, outward views are very limited and there is no theoretical visibility of the Development, as shown in the ZTV on Figures 6.9a and 6.9b. There is theoretical visibility from the summits of the more popular hills to the north-east of the WLA. However, due to screening by the intervening landform, this visibility will be experienced only from the highest ground on these hills; from the majority of the access routes there will be no visibility of the Development. Viewpoint 13 – Ben Lui represents views from these walking routes. Within the area to the south-west, theoretical visibility is more widespread, and views of the Development will be available from the summits and flanks of high ground around Beinn Bhuidhe, as well as from access tracks which traverse this area at lower elevation to the west. However, routes within this area are limited and access is generally challenging. Viewpoint 15 – Beinn Bhuidhe represents views from the more frequently-visited parts of this area.

4.1.2 2. Wild Land Qualities

The second point noted in NatureScot guidance as being relevant in the *'rationale for the selection of the study area and scope of the assessment'* is consideration of the 'wild land qualities likely to be significantly affected'. This WLA has four WLQs. These are described below along with a judgement as to whether or not they may be significantly affected:

- WLQ 1 - *'Contrast between the more massive and remote hills in the south-west and the arresting, more visible and popular hills to the north-east.*'

The WLA citation notes that away from the popular hills there are '*extensive areas with no paths or tracks, especially within the hills to the south-west, allowing a stronger sense of remoteness and sanctuary'.*

The Development will have no direct effect on either mountainous area or on the contrast between them. From parts of the hills to the south-west, the Development would be visible, potentially reducing the remoteness and sanctuary experienced across this area. However, this sense of remoteness is already influenced by the presence of roads and other infrastructure such as operational wind turbines and electricity transmission infrastructure outwith the WLA. Taking this into account, the Development is not considered to result in a significant effect on the attributes that comprise this WLQ.

- WLQ 2 - 'Rugged and highly natural mountains, penetrated by steep-sided glens that contain well-used routes and provide arresting views.'

The WLA citation notes that '*Both upland areas have a high degree of naturalness, with many obvious glacial landforms and exposed rock, cliffs, boulders, scree and crags.'* The Development will not affect the landform of the mountains, and therefore is not considered to have the capacity to influence the sense of naturalness which arises from these geological features within the WLA.

The WLA citation notes that from the glens 'the proximity and massive scale of the enclosing hills are awe inspiring, and the corries, waterfalls, rock and scree faces provide a strong sense of naturalness'. The Development will have no direct effects on the experience from within the glens of the WLA, due to a lack of theoretical visibility within these more sheltered areas. As such, the Development will have no potential to influence the awe-inspiring experience or sense of naturalness from within the glens of the WLA. This WLQ does not make reference to outward views from the mountains.

- WLQ 3 - '*A landscape that is generally well-defined by surrounding human elements in views from higher slopes.'*

The WLA citation notes that the WLA's '*small extent is… evident from the various human artefacts that are generally visible around the margins'*. From the eastern part of the WLA, these include '*the busy A82 and A85, rail lines, the mine and farm buildings at Cononish and adjacent settlements of Crianlarich and Tyndrum'* and which affect the '*sense of remoteness and sanctuary of the eastern part'*. The Development will introduce further human elements into the landscape, in keeping with the current pattern of development on the fringes of the WLA. From high ground in the north-eastern part of the WLA, the Development will be seen at a greater distance than existing human influences to the east.

From western parts, '*hydroelectric dams, power stations, pipelines and high voltage electricity transmission lines are noticeable around the periphery'*. There are also views towards access tracks and power stations beyond the WLA which affect the *'sense of sanctuary'* within the WLA. The citation indicates that there is currently limited influence of wind farms on the wild land qualities, although '*Clachan Wind Farm affects the sense of sanctuary from nearby Beinn Bhuidhe'*. From western parts of the WLA, the Development will introduce a large-scale human influence in close proximity. The Development will also extend the influence of wind farm development in this direction, introducing additional turbines into views from higher ground. The Development is likely to be experienced from parts of the WLA on which Clachan Flats Wind Farm already exerts an influence. However, the Development will add further human elements at larger scale than the operational Clachan Flats, with the potential to further reduce the 'sense of sanctuary' experienced from the affected high ground. Although this will be in keeping with the current pattern of human elements in the surrounding landscape beyond the WLA, it is considered that the Development has potential to significantly affect the attributes that comprise this WLQ, due to its scale and proximity to localised parts of the WLA where actual visibility would arise.

- WLQ 4 - 'Few human artefacts within much of the upland area, in contrast to some of the glens where hydro development is a recurring feature.'

The Development will have no effect on the human artefacts present within the WLA. It is considered therefore that the Development does not have potential to significantly affect this WLQ.

4.1.3 3. The potential for cumulative effects

The third point noted in NatureScot guidance as being relevant in the '*rationale for the selection of the study area and scope of the assessment'* is consideration of the *'The potential for cumulative effects'*. Cumulative effects are assessed in detail at the end of the WLA assessment.

The wind farm development that is most relevant to the Development in the context of this WLA is the Operational Wind Farm at Clachan Flats. Clachan Flats is situated in closer proximity to the WLA than the Development and is also visible from much of the south-western part of the WLA where the largest concentration of theoretical visibility of the Development is also found, as shown on the cumulative ZTV in Figure 6.12. The operational Wind Farms of An Suidhe, Carraig Gheal and Beinn Ghlas may also give rise to cumulative effects, although these are located at a greater distance from the WLA than Clachan Flats, and intervisibility with the Development will be more intermittent.

Cumulative effects may also occur in relation to consented and application stage wind farm developments. Consented stage wind farms within the WLA Study Area are small scale, with the exception of Blarghour. However, its position on the hills to the west of Glen Aray, in keeping with the existing pattern of operational wind farm development, means that it is not considered likely to result in cumulative effects. Key application-stage wind farms in the area comprise Creag Dhubh. An Car Dubh is within close proximity and has been included in the LVIA and is therefore also included in the WLA cumulative assessment.

4.2 Identification of the WLA Study Area

The considerations described above indicate that the WLA Study Area for the assessment of effects on this WLA should focus on the south-western part of the WLA. This is the part of the WLA that lies at closest proximity to the Development and gains the highest level of theoretical visibility. It is also the part of the WLA that is most likely to be affected by potential cumulative effects. It can be defined as the part of the WLA that lies to the west of Beinn Bhuidhe, north of Clachan Hill and south of the Beinn Bhoidheach ridge. Other parts of the WLA have qualities that will not be significantly affected by the Development, gain very limited and distant theoretical visibility, and do not have potential for significant cumulative effects due to reduced cumulative interaction with the Development in combination with other wind farms. The WLQ that has potential to be most affected by the Development is WLQ 3 – 'A landscape that generally well-defined by surrounding human elements in views from higher slopes.'

4.3 Step 2: Establish the Baseline

NatureScot guidance summarises this step as follows in Table 1:

'Confirm the wild land qualities (set out in the WLA description) relevant to the study area, describing any major changes that have occurred since the description was prepared and the nature of their contribution to the WLA.'

The baseline study is informed by NatureScot's description of the WLA, the mapping of the eight classes of wildness (NatureScot, 2014), OPEN's site visits, and LVIA Viewpoints 13 and 15 which illustrate the outlook across and into the WLA from the north-eastern and south-western parts of the WLA but also the outlook from the WLA to the wider landscape.

It is important to note that while LVIA Viewpoints 13 and 15 provide a useful illustration of the views that can be gained from certain elevated locations within the WLA, the assessment of effects on viewpoints and on wild land areas is carried out separately and according to specific methodologies that vary in some respects. The assessment of visual effects at Viewpoints 13 and 15 should therefore not be considered to represent the assessment of effects on wildness qualities, and the viewpoints have been referenced simply to provide an illustration of views within the WLA Study Area.

4.3.1 Baseline Overview

The published description of the Ben Lui WLA (06) (NatureScot, 2017) provides the following overview of the Ben Lui WLA (06):

'The western half of this relatively small WLA lies within Argyll and Bute and the eastern half is in Stirling. It has an area of 145 km^2 and is roughly rectangular in shape, extending some 23 km from east to west.

It consists of a complex range of steep, high and sometimes craggy hills, composed of mostly quartz and mica schists with pockets of limestone and slate, penetrated by several steep glens and surrounded by grass and heather moorland. The hills are generally more massive in the south-west, but those in the north-east, including Ben Lui, appear more prominent, both from within and beyond the WLA.

The area is readily accessible from the Central Belt and none of the WLA lies over 10 km from a public road. Private tracks follow most of the larger glens, including Glen Fyne, which lies outside the WLA to the south of Inverchorachan. Extensive forest plantations define much of the northern edge and also extend partly along the west and southern boundaries. Busy glens with roads and rail lines lie beyond the WLA on three sides: Glen Falloch to the south-east, Strath Fillan to the north-east and Glen Lochy to the north. Crianlarich, Inverarnan and Tyndrum serve as gateways for visitors to the area.

The WLA is uninhabited, although it contains shielings in some more sheltered areas such as upper Glen Fyne. The land is used for deer stalking, sheep grazing, hill walking and hydro-electric power generation. Hydro infrastructure includes part of the Loch Sloy – Glen Shira scheme which, together with high-voltage electricity transmission lines that cut through the WLA, noticeably reduce the strength of the wild land attributes in places.

The Munro Ben Lui, which is often described as the 'Queen of Scottish Mountains' and 'probably the most Alpine-looking mountain in the Southern Highlands' lies in the north of the WLA. The WLA contains four other Munros and two Corbetts, with dedicated car parks located just outside the WLA at Clachan on the A83 and near Inverlochy and at Dalrigh on the A85.

The eastern portion of the WLA lies within the Loch Lomond and Trossachs National Park. The Special Qualities Report describes this as a 'great tract of hills and mountains rising steeply and dramatically from the glen floors…the bare upper hillsides and summits appear untouched, remote and wild, rising above the long glens where farming, forestry and infrastructure are found.' The part of the WLA which lies within Argyll and Bute is designated as an Area of Panoramic Quality.

The WLA lies immediately to the west of Ben More - Ben Ledi WLA (07) and from some summits and upper slopes, where intervening human elements are screened from view, the wild land qualities appear to extend into this area. By contrast the Loch Etive Mountains and Breadalbane-Schiehallion WLAs (09 and 10) lie to the north-west and north-east respectively but appear clearly separate due to some extensive intervening conifer plantations and settlements.

The extent and shape of the WLA is generally difficult to appreciate from surrounding areas as forest plantations, woodland and landform often screen views into the WLA, but there are some intermittent views of the north-eastern hills from sections of the A85 east of Dalmally and the A82 south-east of Tyndrum and north of Ardlui. The West Highland Way skirts the eastern boundary between Inverarnan and Crianlarich, providing intermittent views of Ben Lui and the adjacent hills for over 30,000 walkers a year.'

4.3.2 Cumulative Windfarm Baseline

4.3.2.1 Operational and Under Construction wind farms

Operational and under-construction wind farms are assumed to be part of the baseline conditions to which the other scenarios are added to inform the potential future cumulative wind energy context for the Development and the associated cumulative assessment of the WLA.

There are no operational wind farms within the WLA. However, Clachan Flats Wind Farm is located immediately adjacent to the south-western boundary of the WLA, to the south-west of Clachan Hill. This is referenced within WLQ3 in the Description:

"Wind farms impinge little on the wild land qualities, although Clachan wind farm affects the sense of sanctuary from nearby Beinn Bhuidhe."

Clachan Flats comprises nine 93 m high turbines. As described in Step 1, Clachan Flats is a key wind farm development in relation to the Development as it is visible from much of the same south-western area of the WLA.

In the wider LVIA Study Area, operational wind farms within 20 km comprise:

- An Suidhe, 23 x 80 m high turbines at a minimum of approximately 14.5 km to the south-west;
- Carraig Gheal, 20 x 110 m high turbines at a minimum of approximately 15 km to the west; and
- Beinn Ghlas, 14 x 55 m high turbines at a minimum of approximately 14.5 km to the north-west.

4.3.2.2 Consented, Application and Scoping Stage Wind Farms

As can be seen in Figure 6.12, there are several consented, application and scoping stage wind farms to the west and south west of Ben Lui WLA. Consented schemes include Blarghour and Strachur House. However, Strachur House is a single turbine scheme, located a minimum of approximately 15 km from the WLA. Due to its scale and distance, it is not considered likely to give rise to cumulative effects. Therefore, when considering the south-western area of the Ben Lui WLA, which is the focus of this assessment in relation to the Development, the key consented developments are Blarghour and Creag Dhubh.

Blarghour comprises 17 x 136.5 m high turbines and is located at a distance of 14 km to the west, seen between Carraig Gheal and An Suidhe Wind Farms in views from the WLA. Creag Dhubh Wind Farm comprises 9 x 145 m high turbines and is located at a distance of 10 km to the south-west of the WLA. The proposals contained within the application for An Car Dubh comprise up to 13 x 180 m high turbines.

4.3.3 Physical Attributes and Perceptual Responses

This step of the assessment carries out a review of the baseline physical attributes and perceptual responses of the WLA Study Area and their contribution to the identified WLQs of the area, as identified in the WLA description.

These are verified against the WLA description, noting that the strength to which the WLQs are expressed will vary in different parts of the WLA. In this case, it has been ascertained in Step 1 that the Development only has potential to significantly affect one of the WLQs (WLQ 3) and this, along with other factors, has been taken into consideration in the identification of the WLA Study Area. Table A6.3.1 below lists the physical attributes and perceptual responses of the WLA Study Area and their contribution to the identified WLA Study Area.

Table A6.3.1 –Physical Attributes and Perceptual Responses

Physical Attribute / Perceptual Response	**Strength of Physical Attribute / Perceptual Response and Contribution to Wild Land Quality (as described in WLA citation)**	**OPEN Comment / Subsequent Change to Baseline**
Physical Attributes		
High degree of perceived naturalness	*"Both upland areas have a high degree of naturalness, with many obvious glacial landforms and exposed rock, cliffs, boulders, scree and crags."* *"ATV tracks also indicate active management of grazing regimes, introducing evidence of contemporary land use and reducing the sense of naturalness."* *"Lochan Shira and Allt na Lairige reservoir lie within the WLA and are both dammed. The variable water levels are evident from the exposed mineral soil along the shorelines, affecting the sense of naturalness"*	This attribute is expressed to a moderate degree in the WLA Study Area. Within the WLA Study Area, this attribute is somewhat affected by human intervention including the dammed Lochan Shira and development beyond the WLA which is visible from this upland area.
The lack of modern human artefacts or structures And **Little evidence of contemporary land uses**	*"Its relatively small extent is also evident from the various human artefacts that are generally visible around the margins."* *"Within much of the upland area, fences, fence posts, stone cairns and walkers' paths are the only obvious human artefacts."* *"ATV tracks also indicate active management of grazing regimes, introducing evidence of contemporary land use"* *"From the western parts, hydro-electric dams, power stations, pipelines and high voltage electricity transmission lines are noticeable around the periphery."*	These attributes are expressed to a moderate-low degree in the WLA Study Area. In the south-western area of the WLA, which forms the focus of this assessment, these attributes are affected by several factors. These include ATV tracks and high-voltage electricity transmission infrastructure within the WLA. They also include, on the edges of the WLA, large-scale forestry, electricity transmission infrastructure and hydroelectric infrastructure, as acknowledged by the Description. Clachan Flats Wind Farm, on the periphery of the WLA, also contributes to this. These attributes are expressed to a higher degree in the interior of the WLA where there is little visibility of the Development.
Landform which is rugged, or otherwise physically challenging And **Remoteness and/or inaccessibility**	*"While the north-eastern hills are more arresting than those in the south-west, both ranges are rugged and physically challenging to climb, due to the combination of steep slopes, crags, cliffs and scree."* *"Although the area is readily accessible and nowhere is more than 10 km from a public road, the hills to the south-west are generally more difficult to access than those to the north-east, generally requiring a long walk in along private roads and tracks and less frequented by walkers."* *"Once away from the more popular hills, there are extensive areas with no paths or tracks"*	These attributes are expressed to a moderate-high degree within the WLA Study Area. Other parts of the WLA are more accessible and frequented by hillwalkers, but the hills within the WLA Study Area are less accessible. The terrain is also challenging across parts and a lack of paths makes the WLA Study Area more difficult to access.

Physical Attribute / Perceptual Response	Strength of Physical Attribute / Perceptual Response and Contribution to Wild Land Quality (as described in WLA citation)	OPEN Comment / Subsequent Change to Baseline
Perceptual Responses		
A sense of sanctuary or solitude	*"Once away from the more popular hills, there are extensive areas with no paths or tracks, especially within the hills to the south-west, allowing a stronger sense of remoteness and sanctuary."* *"Wind farms impinge little on the wild land qualities, although Clachan wind farm affects the sense of sanctuary from nearby Beinn Bhuidhe."* *"High-voltage electricity transmission lines cut through this WLA, appearing as very obvious human artefacts that also diminish the sense of sanctuary"* *"Some of the more recently constructed tracks climb into the open lower hills and have a wider influence on the sense of sanctuary as a consequence"*	This perceptual response is expressed to a moderate degree in the WLA Study Area. The south-western part of the WLA is less accessible than parts to the north-east and is less used for recreation, leading to a perception of solitude. However, the hills to the south-west within the WLA Study Area are located on the fringes of the WLA and have more open views towards human artefacts outwith the WLA, including coniferous forestry directly adjacent to the boundary, and energy generation infrastructure, including wind farms and hydroelectric infrastructure. Within the WLA Study Area, ATV tracks have introduced a human influence into the lower hills. These elements reduce the sense of sanctuary experienced within the WLA Study Area. This perceptual response is experienced to a greater degree in the glens and the interior of the WLA, beyond the WLA Study Area. Whilst the WLA Study Area is considered to have remoteness attributes and to inspire a sense of solitude, evidence of human artefacts in the surrounding landscape reduces the sense of sanctuary.
Risk or, for some visitors, a sense of awe or anxiety	*"Poorly drained flatter areas, some containing bog holes and peat hags increase the time needed to access the interior, while craggy and exposed bealachs and ridges with sudden drops increase the sense of risk."* *"Access tracks allow walkers a quicker option to access the hills, so reducing the physical effort required as well as the sense of risk, remoteness and solitude, especially when the tracks are used by maintenance vehicles."*	This perceptual response is expressed to a moderate degree within the WLA Study Area. The hills within the WLA Study Area are not considered to be as rugged as the hills to the north-east, although they are less accessible. There are limited access tracks or footpaths across these hills, although ATV tracks traverse the lower slopes of certain hills, particularly around Lochan Shira and the lower eastern slopes of Beinn Bhuidhe. This seeming isolation and the time required to access this area can lead to a sense of risk. However, from the hills within the WLA Study Area there are also outward views toward nearby human artefacts. Coniferous forestry on the fringes of the WLA at relatively close proximity emphasises the limited extent of the WLA and reduces the sense of risk.

Physical Attribute / Perceptual Response	Strength of Physical Attribute / Perceptual Response and Contribution to Wild Land Quality (as described in WLA citation)	OPEN Comment / Subsequent Change to Baseline
Perceptions that the landscape has arresting or inspiring qualities	*"Where there are views of Beinn Bhuidhe and the south-western hills, although obviously rugged, they appear much more rounded and less arresting than those to the north-east."* *"From the tops and upper slopes there are arresting views in all directions and the eye is drawn by the adjacent hill ranges… Although views of these extensive rugged mountain ranges contribute to the awe-inspiring qualities of this area, intervening forest plantations to the north, west and south form dark homogenous areas that interrupt the sense of a continuous mountain landscape and emphasise the limited extent of the WLA."*	This perceptual response is expressed to a moderate-low degree in the WLA Study Area. The WLA citation acknowledges that the hills to the south-west of the WLA are less arresting than the hills to the north-east. Coniferous forestry on the south-western fringes of the WLA also emphasises its boundary and creates a perception of separation between the hills within the WLA and more arresting, rugged mountain ranges beyond.
Fulfilment from the physical challenge required to penetrate into these places	*"Both ranges are rugged and physically challenging to climb, due to the combination of steep slopes, crags, cliffs and scree"* *"Once away from the more popular hills, there are extensive areas with no paths or tracks, especially within the hills to the south-west, allowing a stronger sense of remoteness and sanctuary."* *"Some of the more recently constructed tracks climb into the open lower hills and have a wider influence on the sense of sanctuary as a consequence."*	This perceptual response is expressed to a moderate-high degree within the WLA Study Area. Although ATV tracks traverse parts of the WLA Study Area, there are large parts which have limited footpaths and tracks. The terrain can be difficult underfoot in places, with boggy areas and rough ground making ascending the hills and walking across the area more physically challenging.

4.3.4 Wildness Mapping

A map of Wild Land Areas in Scotland was published by NatureScot in 2014 and is based on analysis of data representing the physical attributes of wild land, undertaken in February 2014. Mapping of the Ben Lui WLA (06) and its immediate surrounds are presented in Figures 6.20a – 6.20e. The maps are a 'snap-shot' at that point in time and do not reflect changes in development or land use since the data was captured. In broad terms the approach adopted by NatureScot takes each of the physical attributes in turn, identifies existing datasets that can best represent these, and separately maps each of them (Figures 6.20b - 6.20e) before combining all four of them in a single map of relative wildness (Figure 6.20a).

- Perceived naturalness (Figure 6.20b) – areas of highest perceived naturalness within the Ben Lui WLA (06) generally occur along the tops of the hill summits, including around Ben Lui, Ben Oss and Beinn Dubhcraig in the northern part of the WLA; and along the ridge formed by hills to the east and west of the River Fyne Valley, including Troisgeach, Meall an Fhudair, Ceann Garbh, Beinn an t-Sithein and Beinn Bhreac. Areas of lower perceived naturalness occur towards the outer edges of the Ben Lui WLA (06), including at Lochan Shira reservoir along the western boundary and Alt na Lairige reservoir at the southern boundary of the WLA.

- Rugged or challenging terrain (Figure 6.20c) – areas of most rugged and challenging terrain are generally concentrated on the summits of hills across the area, whereas land within valleys tends to be less rugged. Steep areas around the Ben Lui, Ben Oss and Beinn Dubhcraig hills, as well as around Beinn Bhuidhe and Troisgeach are particularly rugged.
- Remoteness from public mechanised transport (Figure 6.20d) – the Ben Lui WLA (06) generally has high levels of remoteness, particularly across higher ground. Areas of slightly lower remoteness occur towards the outer edges and the valleys which permeate the area, including the River Fyne and River Cononish valleys, and Gleann nan Caorann.
- Lack of built modern artefacts (Figure 6.20e) – some parts of the Ben Lui WLA (06) have low to moderate levels of lack of built modern artefacts. These areas are generally focussed on the valleys which penetrate the area from outside the WLA, through which development such as roads and electricity transmission infrastructure passes. Areas with higher levels of lack of modern artefacts are focussed towards higher ground and more rounded hills away from the most rugged and striking summits. The influence of operational wind farm developments built since February 2014 are also not reflected in the mapping, which have increased the presence of built modern artefacts in the surrounding landscape experienced from the tops and outer flanks of the Ben Lui WLA (06).
- Relative wildness (Figure 6.20a) - combining the above attributes in a single map of relative wildness, Figure 6.20a shows areas of highest perceived wildness within the Ben Lui WLA (06). These areas are generally focussed on higher ground, including the summits of hills around Ben Lui in the north, Troisgeach in the south-east and Beinn Bhuidhe in the south-west; as well as across less rugged, more rounded high ground throughout the area. Areas of lower relative wildness include within the valleys which penetrate the area from outside the WLA, as well as around the reservoirs towards the southern boundary of the WLA.

4.3.5 Baseline summary

The review indicates that in relation to some attributes and responses, the description included within the WLA description is considered to be broadly accurate. However, when considering the Ben Lui WLA Study Area (the south-western part of the WLA) these physical attributes are considered to only be expressed to a moderate-low degree in the case of 'a lack of modern human artefacts or structures' and 'little evidence of contemporary land uses'; a moderate degree for 'a high degree of perceived naturalness'; and a moderate-high degree for 'landform which is rugged, or otherwise physically challenging' and 'remoteness and/or inaccessibility' attributes. The perceptual responses are considered to be expressed to no more than a moderate degree, except in the case of 'fulfilment from the physical challenge required to penetrate into these places', which is reflected to a moderate-high degree within the WLA Study Area. The attributes and responses are expressed to a higher degree within the central areas of the WLA which are located outwith the WLA Study Area. This is particularly the case within glens in the 'interior', from which outward views are limited. See Figures 6.20a – 6.20e which illustrate the highest categories of wildness outwith the WLA Study Area.

4.4 Step 3 – Assess the Sensitivity of the WLA Qualities

Sensitivity is assessed by combining the value of the WLA and its susceptibility to the Development. NatureScot guidance summarises this step as follows in Table 1:

'Through detailed field assessment within the study area, assess the sensitivity of the wild land qualities scoped in (including their physical attributes and perceptual responses), to the type and scale of change proposed'.

The value of the WLA has been established previously as medium-high, except in the north-eastern part where it overlaps with LLTTNP, thus increasing the value of the WLA to high.

It has been ascertained in Step 1 that the Development has the potential to significantly affect the south-western part of the WLA (the WLA Study Area). The assessment of the susceptibility and sensitivity therefore focusses on the WLA Study Area and the quality of the WLA (WLQ 3) identified as having potential for significant effects. OPEN's methodology for assessing susceptibility is described previously in this Appendix.

The susceptibility of WLQs is specific to the change arising from the particular development that is proposed, including its individual components and features, and its size, scale, location, context and characteristics, as described in OPEN's methodology. In the case of the Development, the physical attributes of the WLA have no susceptibility as they cannot be affected by the Development due to its location outwith the WLA. These attributes include "*high degree of perceived naturalness*", "*landform which is rugged, or otherwise physically challenging*", "*remoteness and / or inaccessibility*" *"the lack of modern human artefacts or structures"* and "*little evidence of contemporary land uses".* While these physical attributes found within the WLA cannot be affected by development outwith the WLA, in respect of "the lack of modern human artefacts or structures" and "little evidence of contemporary land uses", the perceptual responses associated with these physical attributes can be affected by the additional influence of the Development outwith the WLA and therefore this raises their susceptibility to the Development.

The baseline presence and strength of the physical attributes and perceptual responses that contribute to the WLA Study Area, are of relevance to susceptibility, and are discussed in Step 2, above. This concluded that of the five physical attributes, 'landform which is rugged or otherwise physically challenging' and 'remoteness and / or inaccessibility' are expressed to a moderate-high degree in the WLA Study Area; 'a high degree of perceived naturalness' is expressed to a moderate degree; and 'the lack of modern human artefacts or structures' and 'little evidence of contemporary land uses' are expressed to a moderate-low degree.

Of the four perceptual responses, 'fulfilment from the physical challenge required to penetrate into these places' is expressed to a moderate-high degree; 'a sense of sanctuary or solitude' and 'risk or, for some visitors, a sense of awe or anxiety' are expressed to a moderate degree in the WLA Study Area; and 'perceptions that the landscape has arresting, or inspiring qualities' is expressed to a moderate-low degree.

In many cases, the lower strength of attributes and responses is due to the influences of human artefacts both within and outwith the WLA Study Area. These influences are common to the outer edges of the WLA and can also be noted at distance from the hilltops central to the WLA. This lack of these external influences underlies the higher degree of relative wildness of the interior glens which in combination with the more rugged terrain and sense of awe of the interior landscape helps to define the characteristic qualities of the WLA as a whole.

The factors of susceptibility can be summarised as follows – the location of the Development outwith the WLA; the strength of the attributes and responses, including some moderate-high but also some moderate-low; the human influences that are prevalent on the fringes of the WLA Study Area, including the existing Clachan Flats Wind Farm; and the relative lack of specific well visited destinations and routes within the WLA Study Area. Taking these factors into account, the WLA Study Area is considered to have a medium susceptibility to the Development. When combined with the medium-high value of the WLA Study Area, this leads to a medium-high sensitivity for the WLA Study Area.

4.5 Step 4 - Assess the Magnitude of the Effect

NatureScot guidance summarises this step as follows:

'Assess the effects on individual and / or combinations of qualities, drawing out which physical attributes and perceptual responses will be affected, how and to what degree. This should reflect the size or scale of change, its extent and duration.'

It has been ascertained in previous steps that the Development has potential to significantly affect one of the four WLQs of this WLA – WLQ 3 'A landscape that is generally well-defined by surrounding human elements in views from higher slopes.' The assessment of magnitude of change therefore focusses on this WLQ.

LVIA Viewpoint 15 (Figure 6.38) provides a useful illustration of the views that can be gained from within the WLA Study Area. However, the assessment of effects on viewpoints and on wild land areas is carried out separately and the assessment of effects at Viewpoint 15 should therefore not be considered in relation to the assessment of effects on wild land, and the viewpoints have been referenced simply to provide an illustration of views within the WLA Study Area.

The magnitude of change to the perception of wildness qualities would vary across the WLA Study Area due to the varied topography of the landscape and the resultant variable influence of the Development, as illustrated on the ZTVs as shown on Figures 6.9a and 6.9b. The maximum magnitude of change will be **medium-low**. This arises from the following considerations:

- There would be no direct physical effects on this WLA and effects would only be on the perceptual responses from within the WLA.
- The Development is a minimum of 5 km from the WLA Study Area and from the south-western area of the WLA the angle of view occupied by the Development is predicted to only be around approximately 13° (at viewpoint 15 Beinn Bhuidhe), ensuring that it will constitute a relatively contained feature in the wider setting to the WLA.
- The Development will affect the perception of only one of the WLA physical attributes 'the lack of modern human artefacts or structures'. This attribute is expressed to a moderate-low degree within the WLA, due to the influence of existing human elements in views outwith the WLA, including the existing operational Clachan Flats Wind Farm close to the WLA boundary. The Development will add to the wind farm influence already perceived from the WLA Study Area and thereby further diminish this attribute. However, it will be seen in an aspect of the setting to the WLA that is already notably affected by external human influence, including large scale forestry plantations, hydro-electric schemes and large-scale electricity transmission infrastructure.
- The Development will have no effect on the remaining four physical attributes including the 'landform which is rugged or otherwise physically challenging' and 'remoteness and / or inaccessibility' which are expressed to a moderate-high level in the WLA Study Area.
- It is considered that the Development will have a minimal effect on all four perceptual responses. This is due to the following factors:
    - The sense of sanctuary, solitude and risk experienced within the WLA Study Area have been reduced by human artefacts outwith the WLA, including coniferous forestry directly adjacent to the boundary, and energy generation infrastructure, including wind farms and hydroelectric infrastructure, as well as by additional tracks which cross the lower slopes of the hills within the WLA Study Area.
    - While the Development will introduce further human elements in views from the WLA, and while these will be out of keeping with the current pattern of development identified within the citation, it will introduce wind farm development into areas which are largely already influenced by Clachan Flats Wind Farm and will therefore have a minimal effect on the sense of sanctuary experienced within the WLA Study Area.
    - Much of the land within the WLA Study Area to the south-west is formed by rounded hills which are less arresting and awe-inspiring than the more frequently visited and more dramatic hills to the north-east.
    - The Development will have no direct effects on the terrain of the WLA Study Area and will not detract from the sense of fulfilment experienced as a result of the physical challenge required to access the WLA Study Area.
- The appearance of the Development in open elevated views from the south-western part of the WLA can increase its influence. However, from the majority of the WLA Study Area, the existing operational Clachan Flats will be visible at a similar distance to the Development. As such, the Development will not be considered to introduce wind farm development into outward views from the WLA. From higher elevations many more wind farm developments can be seen including: An Suidhe, A Cruach, Beinn Ghlas, Carraig Gheal and Cruach Mhor.

- The glens within the interior of the WLA, which express the physical attributes and perceptual responses of the WLA to a greater degree than other parts, will not experience any visibility of the Development.
- When the WLA is considered as a whole, the Development will affect a very limited part of it and will have a very limited or no effect on the parts of the WLA that present higher levels of wildness.

4.6 Step 5 - Judge the Significance of the Effects

NatureScot guidance summarises this step as follows in Table 1:

Conclude on the overall significance (taking into account any mitigation), in terms of the Study Area and where relevant the wider WLA.

The significance of the effect is assessed through a combination of the sensitivity and the magnitude of change that will arise on these as a result of the Development.

The steps above indicate that the Development only has the potential to have a significant effect on one of the four WLQs of WLA 06 (Ben Lui). This is WLQ 3 '*A landscape which is generally well-defined by surrounding human elements in views from higher slopes'.*

Steps 3 and 4 have ascertained a **medium-high** sensitivity for the WLA Study Area and that a maximum **medium-low** magnitude of change will arise as a result of the Development.

A combination of the factors considered in the maximum **medium-low** magnitude of change and the medium-high sensitivity will lead to a **moderate** and **not significant** effect on the wildness qualities present in the WLA Study Area. The effect on the WLA as a whole would, therefore, also be **not significant**. These effects will be long-term and reversible.

In OPEN's methodology, a combination of a medium-low magnitude of change and a medium-high sensitivity can lead to a moderate effect that is significant or not significant. In this case, the effect is judged to be not significant primarily because the Development:

- has potential to significantly affect only one of the four WLQ of the WLA;
- will affect the perception of only one physical attribute of those WLQs;
- will have minimal effect on the perceptual responses of the WLQs; and
- the Development lies outwith the WLA and will, therefore, have no direct physical effects upon it.

Whilst removing all visibility from the WLA is not possible, the siting and design of the Development ensures that it will have a very limited influence on the physical attributes and perceptual responses of the WLA. This has been achieved through the compact arrangement of turbines resulting from turbine removals in response to potential landscape and visual effects, which reduces the perceived prominence of the turbines when seen from the WLA.

4.7 Cumulative Effects

NatureScot guidance notes the following in relation to assessing cumulative effects on WLAs.

'The potential for cumulative effects. Other proposals (either of the same or different type) which are likely to contribute to significant cumulative effects should be identified in discussion with the decision maker. The principles within our guidance document 'Assessing the cumulative impact of onshore wind energy developments' specific to onshore wind energy development can be applied to other development and should aid this assessment' (paragraph 16)

OPEN's methodology for the assessment of cumulative effects on landscape character receptors and views is described in Appendix A6.1. This accords with guidance in 'Assessing the cumulative landscape and visual impact of onshore wind energy developments' (NatureScot, 2021)[9].

The cumulative assessment focusses on the WLA Study Area that is identified in Step 1 of this Appendix. This is because other parts of the WLA are covered by WLQs that will not be significantly affected by the Development. Moreover, the Development does not have sufficient influence on the other parts of the WLA to enable it to contribute to a significant cumulative effect.

Scenario 1 Cumulative Effects

Operational and under construction wind farms that influence the WLA are listed in the cumulative baseline section of this Appendix. When the Development is added to operational and under construction wind farms, the maximum cumulative magnitude of change on the WLA Study Area will be **medium-low**, arising at those locations where the Development is seen in conjunction with readily apparent visibility of the operational wind farms, including the adjacent Clachan Flats, as well as other developments seen at a greater distance. This arises because, as described in Step 4 above, the Development will introduce further wind energy development into views from this WLA, in which currently '*wind farms impinge little on the wild land qualities*'. However, the Development would be seen at a greater or similar distance to the operational Clachan Flats from most of the WLA Study Area. Although human elements visible from the south-western parts of the WLA are identified in the citation as largely being "*hydro-electric dams, power stations, pipelines and high voltage electricity transmission lines*", and the Development would be of a different type of development, it would be in keeping with the pattern of human elements being seen on the western periphery of the WLA.

The consented Blarghour would also be visible from the WLA under this scenario. The minimum distance of approximately 12 km between the WLA and Blarghour Wind Farm is considered to be in keeping with the existing pattern of wind farm development beyond the WLA to the west and south-west. As such, the addition of the Development to a cumulative baseline including this consented scheme is considered unlikely to have an additional effect on the WLQs of the south-western area.

The consented Creag Dhubh Wind Farm would also be visible from the WLA. The minimum distance of approximately 10.5 km between the WLA and Creag Dhubh is considered to be in keeping with the existing pattern of wind farm development beyond the WLA to the west and south-west. As such, the addition of the Development to a cumulative baseline including this consented scheme is considered unlikely to have an additional effect on the WLQs of the south-western area, due to its distance and position in relation to the WLA and existing wind farm development in the western and south-western sector of the view.

When considering the overall cumulative interaction of the Development within a changed baseline that includes these consented schemes, it is considered that the Development will extend the spread of development to the east and north of the current broad pattern of development. The Development will be seen in closer proximity than either of these consented wind farms in views from the WLA and would increase the perception of cumulative development from locations within the WLA. However, the Development will only introduce development at slightly closer proximity to some parts of the WLA, due to the existing presence of Clachan Flats Wind Farm close to the western edge of the WLA Study Area. On balance it is considered that whilst the cumulative magnitude of change will be moderated slightly by these factors, it will remain **medium-low** for this Scenario 1, resulting in a **moderate** and **not significant** effect.

[9] SNH (2012). Assessing the cumulative landscape and visual impact of onshore wind energy developments. [Online] Available at: Guidance - Assessing the cumulative landscape and visual impact of onshore wind energy developments | NatureScot. (Accessed 10/01/2023).

Scenario 2 Cumulative Effects

Scenario 2 considers the application stage wind farms in conjunction with the operational and consented wind farms. Blarghour Variation and An Carr Dubh are the two most relevant application wind farms owing to their close proximity to the Development and to the WLA. Blarghour Variation is located a minimum of approximately 11 km to the south-west of the closest boundary of the WLA and An Carr Dubh is located a minimum of approximately 15 km. These application wind farms will typically be seen to the rear of the Development and therefore appear smaller in scale, despite the turbines being similar in height.

The cumulative ZTV on Figure 6.19 shows that visibility of application Blarghour Variation and An Carr Dubh will occur across the western extents of the WLA where it will coincide with visibility of the Development. The addition of the Development will be seen in the context of these application stage wind farms in the same sector as well as closer range operational Clachan Flats and more distant operational Carraig Gheal and An Suidhe and consented Creagg Dhubh.

The cumulative magnitude of change will be medium-low. The development will be seen in the same sector as a number of other operational and application stage wind farms and will reflect the general pattern, size and appearance of the application stage wind farms, but appear larger than the operational wind farms. While it will add a relatively close range addition to the cumulative situation as seen from the western extents of the WLA, this is an area where there is a notable baseline influence from wind farm development and across the broader extents of the WLA there will be limited visibility of both the Development and the other cumulative wind farms. The medium-low cumulative magnitude of change combined with medium-high sensitivity gives rise to a not significant (moderate) cumulative effect for Scenario 2.

Environmental Impact Assessment – Technical Appendix 6.4: Residential Visual Amenity Assessment

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

ERM

The business of sustainability

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1 INTRODUCTION

This Appendix has been prepared to accompany Chapter 6: LVIA in Volume 1 of the Ladyfield Renewable Energy Park (hereafter the Development) EIA Report. In accordance with the third edition of 'Guidelines for Landscape and Visual Impact Assessment' (GLVIA3), the LVIA assesses the visual impact of the Development on public views and public visual amenity.

This Residential Visual Amenity Assessment goes a stage beyond the LVIA by assessing the impact on the visual component of the amenity and enjoyment of dwellings and their gardens which may reasonably be expected. Reference has been made to the Landscape Institute's Technical Guidance Note 2/19 'Residential Visual Amenity Assessment' (RVAA) which, whilst not being formally adopted guidance, provides a helpful background. The guidance sets out four 'Steps' which might be followed when undertaking a RVAA and highlights how it should be informed by the principles and processes of GLVIA3. Care has to be taken with different terminology and within the guidance, the term 'Residential Visual Amenity Threshold' is defined to mean;

"The threshold at which the visual amenity of a residential property is changed and adversely affected to the extent that it may become a matter of Residential Amenity and which, if such is the case, competent, appropriately experienced planners will weigh this effect in their planning balance."

This is not to be confused with 'Residential Amenity' more generally which is a planning matter referring to living conditions at a house, including its gardens and domestic curtilage and which will include not just visual amenity but also noise, shadow flicker and general disturbance. The effect on noise and shadow flicker are assessed in Volume 1 of the EIAR in Chapters 12 and 17 respectively. Matters such as financial involvement of affected properties in the scheme may also be relevant to the planning system. For these reasons, overall residential amenity should not be judged by landscape architects.

The 'Residential Visual Amenity Threshold' is the point at which private views potentially become matters of public interest with which the planning system will engage. Identifying whether any visual impacts on properties close to the Ladyfield Renewable Energy Park would potentially be of interest to the planning system is the purpose of this report.

2 APPROACH

With reference to the Technical Guidance, the approach adopted in this report is based on the four following Steps:

- Step 1: Definition of the study area and scope of the assessment, informed by the description of the Development, defining the study area extent and scope of the assessment with respect to the properties to be included.
- Step 2: Evaluation of baseline visual amenity at properties to be included having regard to the landscape and visual context and the Development proposed.
- Step 3: Assessment of likely change to visual amenity of included properties in accordance with GLVIA3 principles and processes.
- Step 4: Further assessment of predicted change to visual amenity of properties including an assessment of whether any effects will become matters of Residential Amenity to be weighed in the overall planning balance by the decision maker.

2.1 Step 1

Step 1 involves defining the extent of the study area and establishing the scope of the assessment. In respect of defining the extent of the study area, Landscape Institute Technical Guidance Note presents the following advice, '*When assessing relatively conspicuous structures such as wind turbines, and depending on local landscape characteristics, a preliminary study area of approximately 1.5 to 2 km radius may initially be appropriate in order to begin identifying properties to include in a RVAA.*'

In line with this guidance, the study area for the Development has been drawn out to the larger 2 km radius recommended. Whilst it is recognised that there are further residential properties beyond 2 km that may also experience a significant visual effect, the Technical Guidance Note explains that the 'exceptionally large' study areas of up to 3 km are disproportionate, further stating that '*The logic for these (exceptionally) large study areas was based on certain findings of LVIAs which identified significant visual effects from 'settlements' or from clusters of residential properties within this range. This fails to recognise that RVAA is a stage beyond LVIA. Consequently, many RVAAs, including those of windfarms with large turbines (150 m and taller), have included disproportionately extensive study areas incorporating too many properties. This appears to be based on the misconception that if a significant effect has been identified in the LVIA adjacent to a property at 2.5 km it will also potentially lead to reaching the Residential Visual Amenity Threshold.*'

Within the 2 km RVAA Study Area, 10 residential properties have been identified using Ordnance Survey Address Point data and then verified in the field. Two consented planning applications for residential properties have also been assessed. These are all individually numbered in Figure 6.4.1 and listed in Table 6.4.1 below.

The RVAA has been undertaken for both residential properties that appear to be occupied and in use as dwelling houses, as well as those that are subject to a consented planning application, on the basis that the houses might become inhabited during the lifetime of the Development.

The ZTV within this 2 km area shows theoretical visibility is almost continuous across the entire RVAA study area and with 13 turbines visible from practically all areas. All of the existing and proposed properties lie within the ZTV of the Development, as shown on Figure 6.4.1 and have therefore been evaluated and assessed in Step 2 and Step 3.

Table 6.4.1: Properties within 2 km of the Development Turbines

ID	Property	Grid Ref		Dist. Nearest Turbine (km)
1	Ladyfield Farm Baseline	209081	715643	1121
2	Ladyfield Farm Future Baseline – Replacement Dwelling	209028	715602	1144
3	Ladyfield Farm Future Baseline – Barn Conversion	209055	715609	1125
4	North Tullich	208909	716076	1264
5	Kennels Cottage	208890	716076	1283
6	Unnamed property to west of North Tullich	208882	716096	1287
7	South Tullich	208505	715431	1563
8	Drimfern	208319	714588	1747
9	Unnamed property to south-west of Drimfern	208271	714590	1794
10	West Drimfern	208192	714656	1856
11	Druim Breac	208095	714617	1959
12	Stronmagachan	208281	714112	1955

2.2 Step 2

Step 2 involves carrying out an evaluation of the baseline visual amenity at the properties to be included, through a combination of desk study and field work. The key considerations of this evaluation are set out in the Technical Guidance as follows:

- 'The nature and extent of all potentially available existing views from the property and its garden / domestic curtilage, including the proximity and relationship of the property to surrounding landform / landcover and visual foci. This may include primary / main views from the property or domestic curtilage as well as secondary / peripheral views; and
- Views as experienced when arriving or leaving the property, for example from private driveways / access tracks.'

In the course of carrying out the baseline evaluation, OPEN has surveyed the visual amenity of the residential properties from adjacent public roads, open land or footpaths. The locations of the residential properties within the 2 km study area are shown on RVAA Overview Plan which includes the blade tip height ZTVs (Figure 6.4.1).

RVAA sheets have been prepared for all properties within the study area that are considered to require assessment in the RVAA following Step 1. These assessments contain an OS map and aerial photograph of the property, the orientation of the principal facade of each property, the direction of the view/horizontal field of view which would be affected by the Development and the theoretical visibility of the Development. The RVAA sheets record details of the baseline residential amenity and the likely visual effects resulting from the Development. In respect of some of the properties where close range inspection was not possible, assumptions have been made regarding the principal façade and where the front and rear of the property occurs. While operational wind farms are typically included in the baseline evaluation and considered in the assessment of effects on residential visual amenity, there is no visibility of operational wind farms from the 12 properties assessed in this RVAA. A 53.5 degree wireline is presented to illustrate the theoretical visibility of the Development, in Figures 6.4.2 to 6.4.13.

2.3 Step 3

Step 3 involves carrying out an assessment of the likely change to the visual amenity of properties by applying the process of assessment advocated by GLVIA3, in which the sensitivity of the receptor is combined with the magnitude of change which would arise as a result of the Development, to determine whether the effect would be significant or not. The aim of Step 3 is to identify those properties at which effects have the potential to be of interest to the planning system and which may require further assessment in Step 4. This will only occur where a high magnitude of change is assessed at Step 3.

OPEN's methodology assumes that all occupiers of local residential property within this RVAA typically have a higher sensitivity than other visual receptors. OPEN attaches less weight to views from upper floor rooms in houses compared with ground floor principal rooms, an approach which is reflected in GLVIA3 (paragraph 6.36). The assessment of magnitude of change which would arise from the Development is determined by the factors influencing magnitude of change on views, the potential change to the outlook from each property, as well as other factors, such as areas of garden ground or property access drives immediately surrounding a property, that would be likely to be affected. Whilst it is not a determinative list, the key considerations of this assessment set out in the Technical Guidance are as follows:

- *'Distance of property from the Development having regard to its size / scale and location relative to the property (e.g. on higher or lower ground);*
- *Type and nature of the available views (e.g. panoramic, open, framed, enclosed, focused etc.) and how they may be affected, having regard to seasonal and diurnal variations;*
- *Direction of view / aspect of property affected, having regard to both the main / primary and peripheral / secondary views from the property;*

- *Extent to which development / landscape changes would be visible from the property (or parts of) having regard to views from principal rooms, the domestic curtilage (i.e. garden) and the private access route, taking into account seasonal and diurnal variations;*
- *Scale of change in views having regard to such factors as the loss or addition of features and compositional changes including the proportion of view occupied by the development, taking account of seasonal and diurnal variations;*
- *Degree of contrast or integration of new features or changes in the landscape compared to the existing situation in terms of form, scale and mass, line, height, colour and texture, having regard to seasonal and diurnal variations;*
- *Duration and nature of the changes, whether temporary or permanent, intermittent or continuous, reversible or irreversible etc.; and*
- *Mitigation opportunities – consider implications of both embedded and potential further mitigation.'*

While Appendix 6.1 of the EIA Report provides a description of the criteria that contribute to magnitude of change on views and a description of the magnitude ratings used in this RVAA, the magnitude of change assessed in respect of the RVAA differs slightly in that the focus is specifically on visual amenity and the potential for reaching the Residential Visual Amenity Threshold.

The significance of the effect on residential visual amenity experienced at each property is dependent on all of the factors considered in the sensitivity and the magnitude of change resulting from the Development. These judgements on sensitivity and magnitude are combined to arrive at an overall assessment as to whether the Development would have an effect that is significant or not significant on residential visual amenity.

2.4 Step 4

The Step 4 Assessment differs from the Step 3 Assessment in that it considers whether the visual effects likely to be experienced at a given property approach or surpass the 'Residential Visual Amenity Threshold'. As above, this is the point at which visual effects may become matters relevant to Residential Amenity and which are to be weighed in the overall planning balance.

In the RVAA, there is no specific definition of Residential Visual Amenity Threshold to base an assessment upon. The guidance makes clear that a number of criteria may be applicable which involve the exercise of professional judgement by a qualified landscape consultant. However, the Step 4 Assessment is triggered when the Development is found to give rise to a high magnitude of change in the Step 3 Assessment and is reported in the RVAA sheets for applicable properties.

3 SUMMARY OF RVAA RESULTS

The RVAA identifies 12 existing and consented residential properties between 1 km and 2 km of the Development. Residents of all 12 properties have potential views of the Development and detailed assessment sheets have therefore been prepared.

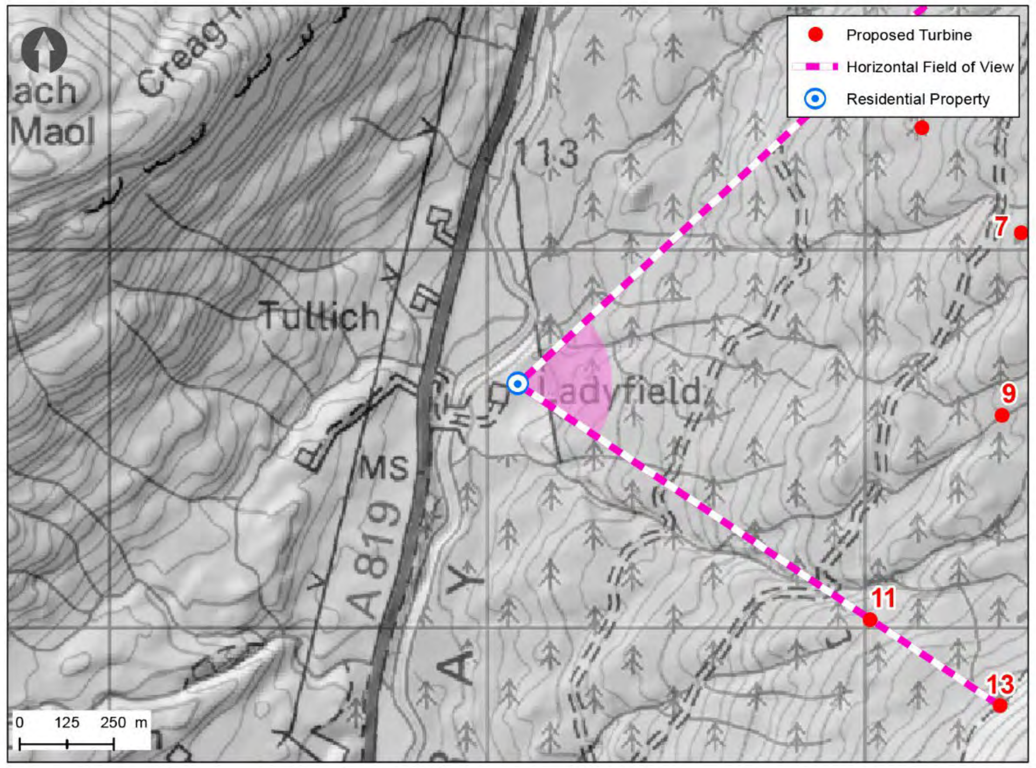
The effect of the Development on all 12 properties would be significant. The magnitude of change on eleven properties would be high, while there would be a medium-low magnitude of change on the remaining property. The high magnitude of change has meant that these 11 properties require also to be considered pursuant to Step 4. The conclusion of this Step 4 assessment is that there are four properties which approach the Residential Visual Amenity Threshold such that the planning system may be interested in the resulting visual effects. Two of these properties are existing, namely Property 1: Ladyfield Farm and Property 4: North Tullich. The two remaining properties have planning permission but are not yet built, namely Property 2: Ladyfield Farm Future Baseline – Replacement Dwelling and Property 3: Ladyfield Farm Future baseline – Barn Conversion.

4 RESIDENTIAL VISUAL AMENITY ASSESSMENT

The detailed RVAA is set out in this section.

1: Ladyfield Farm Baseline

Property : Ladyfield Farm Baseline



Property Description

OS Grid Ref:	209081 715643	Distance to Nearest Turbine:	1121 m	Elevation:	110.4 m AOD

Farmhouse		Stone-built		1 Storey	X	Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey		Uninhabited		Front Garden	
Semi-detached		Render		2 Storey		Garage(s)		Rear Garden	
Terraced		Timber-clad	X	Conservatory		Outbuildings	X	Side Gardens	X

Step 2: Existing Residential (Visual) Amenity

Ladyfield Farm is located to the east of the A819 and River Aray, on lower ground along the floor of Glen Aray. There is currently one inhabited dwelling within the property boundary and two uninhabited dwellings, although planning consent has been granted for two residential dwellings within the property boundary. This assessment considers the current scenario; please refer to properties 2 and 3 for an assessment of the effects on the consented proposals. Within the property boundary there is an uninhabited caravan, a derelict barn, and a small, inhabited cabin. The cabin is orientated north to south, with principal views to the south. In this direction, views mainly comprise the derelict barn which is visible in the foreground. The cabin also has a window to the west, and interior views are available of the steeply rising moorland hills to the west of Glen Aray beyond the wooded river corridor. From the surroundings of the dwelling, views to the north are contained in close proximity by landform and vegetation. To the east, there are open views over the rising landform below Creag Dhubh and Stuc Scardan. Coupes of commercial forestry at different stages are visible across these hills, as well as areas of clear felling. Access is taken from the A819. Vegetation between the A819 and the River Aray filters outward views from a section of this track, although near the property views are more open in all directions. There are small areas of cultivated land to the east and west of the access track. An overhead line supported on wooden poles passes over land within the property boundary.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	77º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.2 shows that all 13 of the turbines would be visible in close-proximity views to the east. The towers, hubs and blades of each of these turbines would be seen against the skyline. The Development would be readily visible from the surroundings of the dwelling, including the access track. Turbines to the south of the Development may also be visible in oblique views to the south-east from the principal, south-facing façade of the dwelling. With the minimum distance of 1121 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, and the scale of the turbines would appear at variance with the smaller scale features of forestry and farm fields in the surrounding landscape. The turbines would occupy a large proportion of the horizon to the east, considering the 77-degree horizontal field of view.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

Step 4: Residential Visual Amenity Threshold

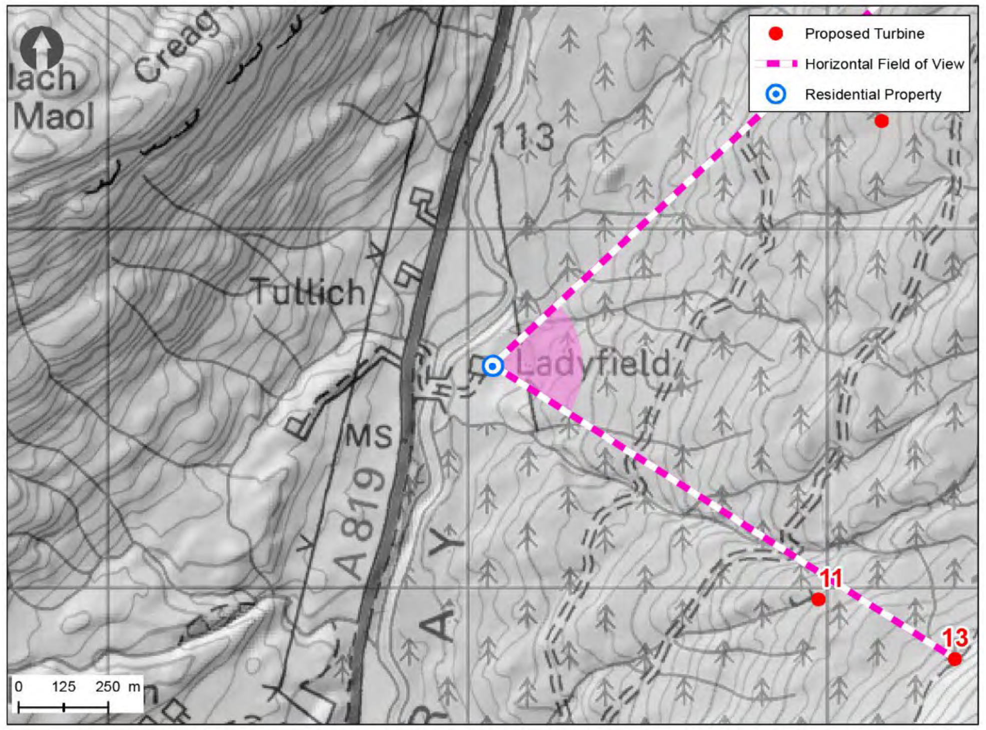
Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered to have the potential to reach the Residential Visual Amenity Threshold, for the following reasons:

- Turbines to the south of the Development would potentially be visible from the interior of the property in indirect views to the south-east;
- From the approach track and the space around the property, all the turbines would be readily visible; and
- The combination of the 180 m tall turbines, their minimum distance of 1121 m from the property and their location on elevated land above the property would make the turbines the defining feature in the sector of the view from the north-east through to the south-east.

The overall effect on residential visual amenity is moderated to some extent by the concentration of the proposed turbines in the eastern sector of the view, while the western sector would remain unaffected, and also by the principal orientation of the property being to the south, while the turbines are to the east and south-east. While there would be some containment by landform and forestry to the north of the property, and deciduous tree cover forming some containment to the south and west, the sector from the north through the west to the south would present an undeveloped and relatively open aspect. The Development would, nonetheless, present a notable influence on the views of residents towards the east.

2: Ladyfield Farm Future Baseline – Replacement Dwelling

Property : Ladyfield Farm Future Baseline – Replacement Dwelling



Property Description

OS Grid Ref:	209070 715619	Distance to Nearest Turbine:	1124 m	Elevation:	108.3 m AOD

Farmhouse		Stone-built	X	1 Storey		Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey	X	Uninhabited		Front Garden	
Semi-detached		Render		2 Storey		Garage(s)		Rear Garden	
Terraced		Timber-clad		Conservatory		Outbuildings		Side Gardens	

Step 2: Existing Residential (Visual) Amenity

This assessment considers the effects of the Development on a future scenario in which proposals granted planning consent within the property boundary for Ladyfield Farm have been built and are inhabited. This assessment relates to the construction of a new property. A notice of commencement of construction was submitted to Argyll and Bute Council in April 2023.

The new property would be located to the north-east of the derelict barn. The property would comprise a one-and-a-half storey T-shaped detached property, with principal views to the south-west and open views to the north-west, north-east and south-east. To the south-west, interior views would be available along Glen Aray. Woodland within the glen would be visible in the mid-ground of the view, with longer-distance views contained by higher ground on the western and eastern sides of the glen. From the north-western aspect, views would comprise the steeply rising moorland hills around Mullach nam Maol on the western side of Glen Aray beyond the wooded river corridor. To the north-east, the foreground of views would feature land within the property boundary. Longer-distance views would be limited by commercial forestry. From the south-eastern aspect, there would be open views over the rising landform below Creag Dhubh and Stuc Scardan. Coupes of commercial forestry at different stages are visible across these hills, as well as areas of clear felling. The renovated barn would also be visible in close-proximity views from the north-western and south-western aspects. Access would be retained from the A819. Vegetation between the A819 and the River Aray filters outward views from a section of this track, although near the properties views would be more open in all directions. There are small areas of cultivated land to the east and west of the access track. An overhead line supported on wooden poles passes over land within the property boundary.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	73º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.3 shows that all 13 of the turbines would be visible in close-proximity views to the east, with the towers, hubs and blades of each turbine seen against the skyline. The Development would be readily visible from the surroundings of the dwelling, including the access track. The Development would also be visible in interior views from the south-eastern façade of the property. It is considered unlikely that the turbines would be visible in interior principal south-western views. With the minimum distance of 1124 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, and the scale of the turbines would appear at odds with the relatively small scale of the surrounding landscape. The turbines would occupy a large proportion of the horizon to the east, considering the 73-degree horizontal field of view.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

Step 4: Residential Visual Amenity Threshold

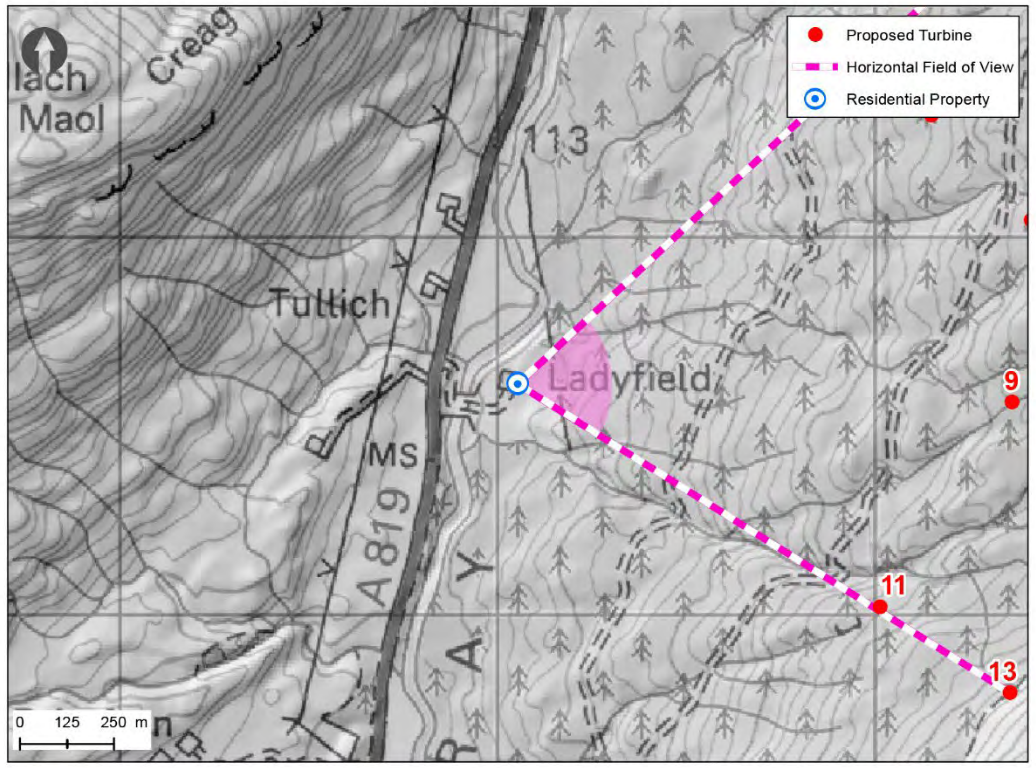
Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered to have the potential to reach the Residential Visual Amenity Threshold, for the following reasons:

- Although the principal views from the property are to the south-west, turbines within the Development would be visible from the interior of the property in views from the south-eastern aspect;
- From the approach track and the space around the property, all the turbines would be readily visible;
- The combination of the 180 m tall turbines, their minimum distance of 1124 m from the property and their location on elevated land above the property would make the turbines the defining feature in the sector of the view from the north-east through to the south-east.

The overall effect on residential visual amenity is moderated to some extent by the concentration of the proposed turbines in the eastern sector of the view, while the western sector would remain unaffected. While there would be some containment by landform and forestry to the north of the property, and deciduous tree cover forming some containment to the south and west, the sector from the north through the west to the south would present an undeveloped and relatively open aspect. The Development would, nonetheless, present a notable influence on the views of residents towards the east.

3: Ladyfield Farm Future Baseline – Barn Conversion

Property : Ladyfield Farm Future Baseline – Barn Conversion



Property Description

OS Grid Ref:	209055 715609	Distance to Nearest Turbine:	1125 m	Elevation:	181.7 m AOD	

Farmhouse		Stone-built	X	1 Storey		Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey	X	Uninhabited		Front Garden	
Semi-detached		Render		2 Storey		Garage(s)		Rear Garden	
Terraced		Timber-clad		Conservatory		Outbuildings		Side Gardens	

Step 2: Existing Residential (Visual) Amenity

This assessment considers the effects of the Development on a future scenario in which proposals granted planning consent within the property boundary for Ladyfield Farm have been built and are inhabited. This assessment relates to the renovation and conversion of a barn into a residential dwelling. The barn is located at the east of the land associated with these properties. When renovated, the barn would comprise a one-and-a-half storey detached property. It would be orientated north-west to south-east, with principal views to the north-west. The south-eastern aspect would have a lean-to extension. Views to the north-west would be over the wooded corridor of the River Aray towards the rising ground below Mullach nam Maol. The north-eastern and south-western gable end would each have a small window on the first floor, from which longer-distance views would largely be contained by the topography and surrounding vegetation. The south-eastern aspect would have one small window on the ground floor, and velux windows on the first floor, from which there would be open views over the rising landform below Creag Dhubh and Stuc Scardan. Coupes of commercial forestry at different stages would be visible across these hills, as well as areas of clear felling. The new dwelling to the north-east may be visible from the interior of the property. Access would be retained from the A819. Vegetation between the A819 and the River Aray filters outward views from a section of this track, although near the property views would be more open in all directions. There are small areas of cultivated land to the east and west of the access track. An overhead line supported on wooden poles passes over land within the property boundary.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	75º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.4 shows that all 13 of the turbines would be visible in close-proximity views to the east, with the towers, hubs and blades of each turbine seen against the skyline. The Development would be readily visible from the surroundings of the dwelling, including the access track. The Development would also be visible in interior views from the south-eastern façade of the property, although the new property to the north-east may partially screen views of turbines towards the north of the Site. The turbines would not be visible in interior principal north-western views. With the minimum distance of 1125 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180m tall turbines would present large and dynamic structures, and the scale of the turbines would appear at odds with the relatively small scale of the surrounding landscape. The turbines would occupy a large proportion of the horizon to the east, considering the 75-degree horizontal field of view.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

Step 4: Residential Visual Amenity Threshold

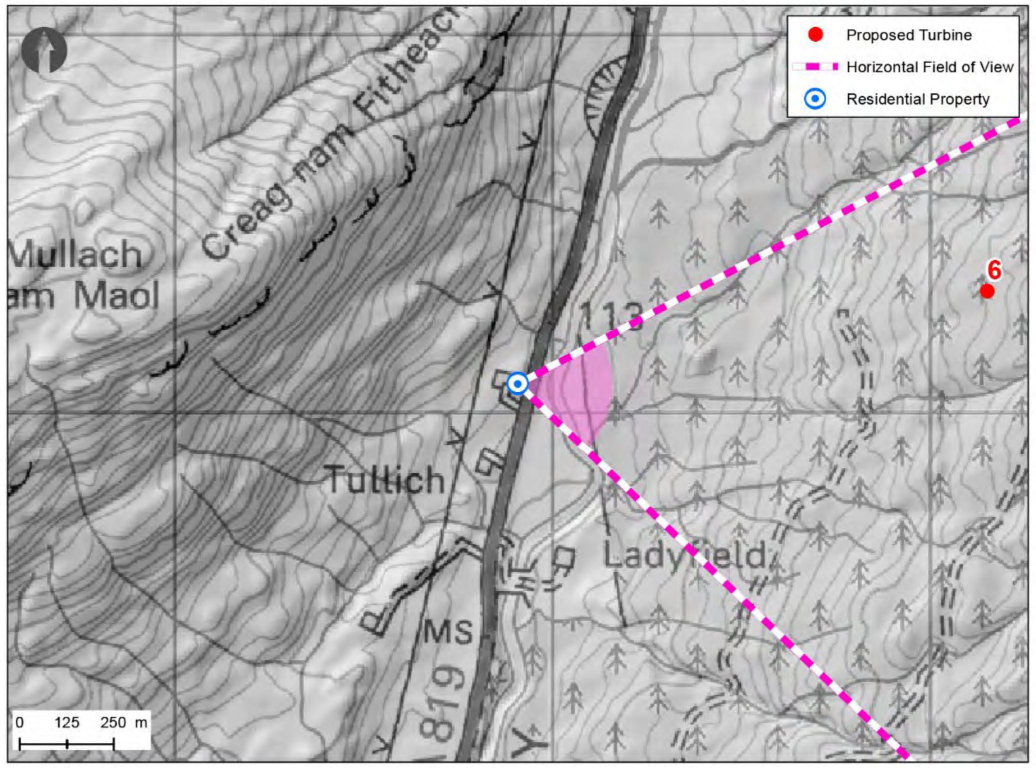
Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered to have the potential to reach the Residential Visual Amenity Threshold, for the following reasons:

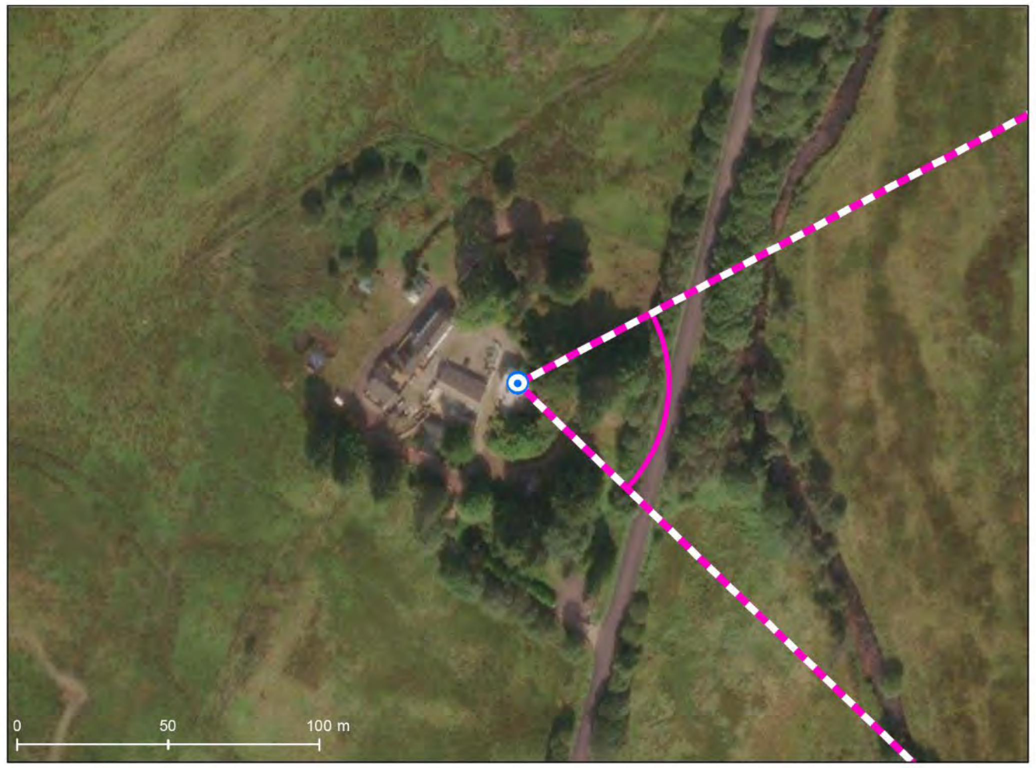
- Although the principal views from the property are to the north-west, turbines within the Development would be visible from the interior of the property in views from the south-eastern aspect;
- From the approach track and the space around the property, all the turbines would be readily visible;
- The combination of the 180 m tall turbines, their minimum distance of 1125 m from the property and their location on elevated land above the property would make the turbines the defining feature in the sector of the view from the north-east through to the south-east. make the turbines the defining feature.

The overall effect on residential visual amenity is moderated to some extent by the concentration of the proposed turbines in the eastern sector of the view, while the western sector would remain unaffected. While there would be containment by the replacement house to the north of the property, and deciduous tree cover forming some containment to the south and west, the sector from the north through the west to the south would present an undeveloped and relatively open aspect. The Development would, nonetheless, present a notable influence on the views of residents towards the east.

4: North Tullich

Property : North Tullich





Property Description

OS Grid Ref:	208909 716076	Distance to Nearest Turbine:	1264 m	Elevation:	124.3 m AOD	

Farmhouse		Stone-built		1 Storey		Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey	X	Uninhabited		Front Garden	X
Semi-detached		Render	X	2 Storey		Garage(s)		Rear Garden	
Terraced		Timber-clad		Conservatory		Outbuildings	X	Side Gardens	X

Step 2: Existing Residential (Visual) Amenity

This property is located on the lower slopes of the hills to the west of Glen Aray, situated on higher ground above the A819. North Tullich is a one-and-a-half to two storey modern detached property. It has a garden to the front and side at the east and north respectively. The property is orientated east to west, with principal views to the east over the floor of Glen Aray towards the rounded, forested hills that contain the glen to the east. Areas of clear felling are visible across the commercial forestry which covers the lower slopes of these hills. Trees along the A819 to the east of the property partially filter outward views, although in winter views are largely open in this direction. Two adjacent properties, Kennels Cottage and an unnamed property, are located to the west of North Tullich on slightly higher ground, and largely screen westward views to the wider surroundings. Access to all three properties is taken from the A819. Vegetation along this track filters views of the surrounding landscape, although there are views to the west from the section of the track nearest the house. Views in this direction comprise rough grassland in the foreground, with the horizon formed in the middle distance by steeply rising landform. There are longer-distance views to the south along Glen Aray from the access track and surroundings of the property. Views to the north are largely screened by the landform and vegetation. An overhead line supported on pylons passes from north to south in close proximity to the west of the property.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	73°	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.5 shows that all 13 of the turbines would be visible in close-proximity views to the east. The towers, hubs and blades of each turbine would be seen against the skyline. The Development would be readily visible from the surroundings of the dwelling, including parts of the access track and the gardens to the front and side of the property at the east and north. The Development would also be visible in direct interior views from the principal eastern façade of the property. With the minimum distance of 1264 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, and the scale of the turbines would appear at odds with the relatively small scale of the surrounding landscape. The turbines would occupy a large proportion of the horizon to the east, considering the 73-degree horizontal field of view. From this property, the layout will result in stacking of several turbines. Vegetation in the garden to the east of the property may provide some filtering of views when trees are in leaf.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

Step 4: Residential Visual Amenity Threshold

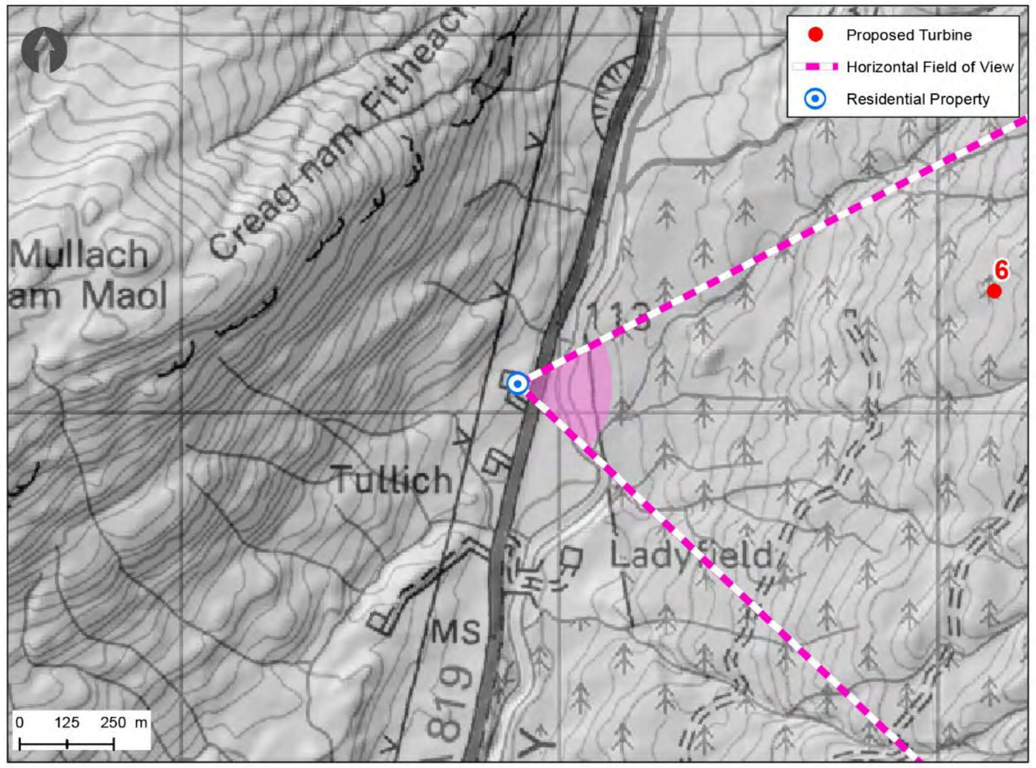
Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered to have the potential to reach the Residential Visual Amenity Threshold, for the following reasons:

- The Development would be visible from the interior of the property in direct views to the east from the principal eastern façade.
- From the garden and surroundings of the property, all the turbines would be readily visible;
- The combination of the 180 m tall turbines, their minimum distance of 1264 m from the property and their location on elevated land above the property would make the turbines the defining feature in the sector of the view to the east; and
- The containment of views to the north, west and south by intervening vegetation, landform and/or buildings creates a situation in which the eastern aspect presents the open aspect from this property.

The overall effect on residential visual amenity is moderated to some extent by the concentration of the proposed turbines in the eastern sector of the view, while the western sector would remain unaffected. There would be containment by the other properties to the west of North Tullich, and mature deciduous tree cover to the north and south, with these close range trees partially screening the full extent of the Development. The Development would, nonetheless, present a notable influence on the views of residents towards the east.

5: Kennels Cottage

Property : Kennels Cottage



Property Description

OS Grid Ref:	208890 716076	Distance to Nearest Turbine:	1283 m	Elevation:	125.6 m AOD

Farmhouse		Stone-built		1 Storey		Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey		Uninhabited		Front Garden	X
Semi-detached		Render	X	2 Storey	X	Garage(s)	X	Rear Garden	
Terraced		Timber-clad		Conservatory		Outbuildings		Side Gardens	

Step 2: Existing Residential (Visual) Amenity

This property is located on the lower slopes of the hills to the west of Glen Aray, situated on higher ground above the A819. Kennels Cottage is located to the west of North Tullich. Kennels Cottage is a two-storey modern detached property, orientated north to south with a conservatory along the southern façade. There is a garden with hard landscaping to the south of the property. Views are generally contained in close proximity by adjacent development and vegetation. There are slightly longer-distance views to the west of the steep enclosing landform below Mullach nam Maol from the conservatory and surroundings of the property. Access to this property and the adjacent properties is taken from the A819. Vegetation along this track largely filters views of the surrounding landscape. There are longer-distance views to the south along Glen Aray from the access track and surroundings of the properties. An overhead line supported on pylons passes from north to south in close proximity to the east of the property.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	72º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.6 shows that all 13 of the turbines would be theoretically visible in close-proximity views to the east. However, due to screening from the adjacent North Tullich, there is unlikely to be any visibility of the turbines from the property or its direct surroundings. If turbines were to be seen, they would be visible in glimpsed views beyond existing development in the foreground, in indirect views to the east. The Development would be visible from parts of the surroundings of the dwelling, including parts of the access track, although these views are likely to be partially filtered by vegetation along the track.

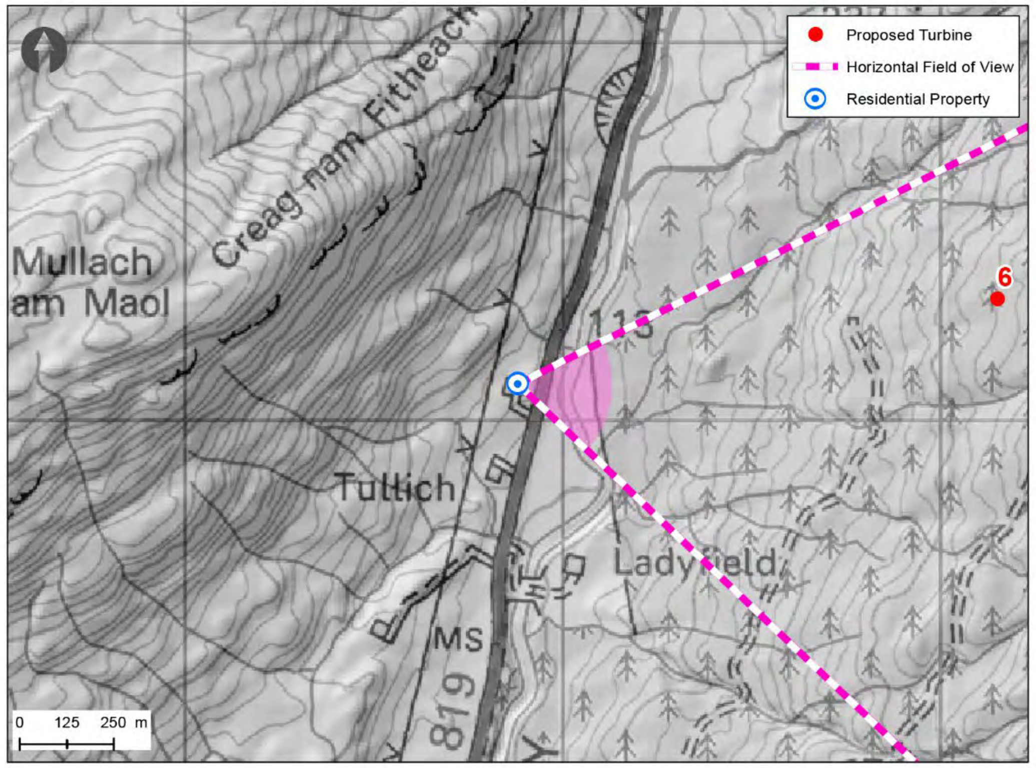
The magnitude of change is predicted to be **medium-low**, which when combined with the **high** sensitivity would result in a **moderate** and **significant** effect.

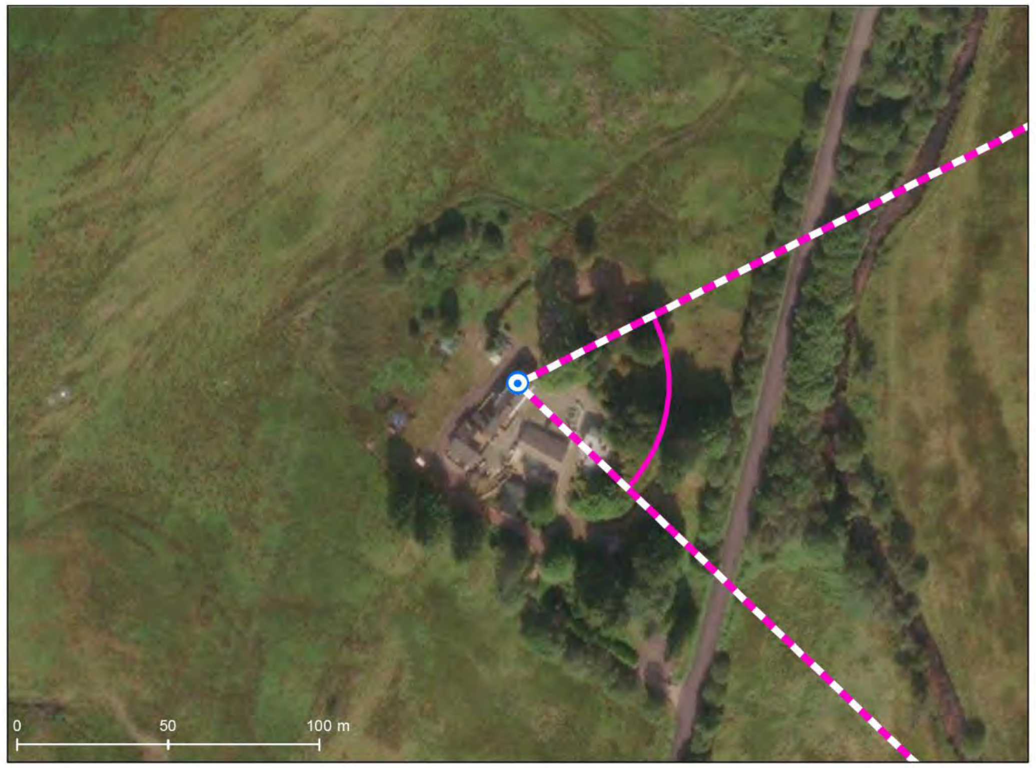
Step 4: Residential Visual Amenity Threshold

N/A

6: Unnamed property to west of North Tullich

Property : Unnamed property to west of North Tullich





Property Description

OS Grid Ref:	208882 716096	Distance to Nearest Turbine:	1287 m	Elevation:	127.3 m AOD

Farmhouse		Stone-built	X	1 Storey	X	Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey		Uninhabited		Front Garden	
Semi-detached		Render		2 Storey		Garage(s)		Rear Garden	
Terraced		Timber-clad		Conservatory		Outbuildings	X	Side Gardens	

Step 2: Existing Residential (Visual) Amenity

This property is located on the lower slopes of the hills to the west of Glen Aray, situated on higher ground above the A819. The unnamed property is a one-storey stone barn conversion. It is orientated east to west, with principal views to the east. North Tullich somewhat screens outward views to the east, although there are longer-distance views of the rounded forested hills beyond North Tullich on the eastern side of Glen Aray from parts of the property and from its surroundings. Access to this property and the adjacent properties is taken from the A819. Vegetation along this track largely filters views of the surrounding landscape. There are longer-distance views to the south along Glen Aray from the access track and surroundings of the properties. Views to the west are contained at close proximity by the steeply rising landform below Mullach nam Maol. Views to the north and south from the immediate surroundings of the property are limited by the landform and vegetation. An overhead line supported on pylons passes in close proximity to the west of the property.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	72º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.7 shows that all 13 of the turbines would be theoretically visible in views to the east. However, screening by adjacent development at North Tullich is likely to screen the southern parts of the Development in views from this property and its surroundings. Turbines within the northern part of the Site may be seen in direct views from the principal eastern façade of the property. With the minimum distance of 1287 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, and the scale of the turbines would appear at variance with the relatively small scale of the surrounding landscape. The turbines would occupy a relatively small proportion of the horizon to the east and would be seen beyond development at North Tullich, which is visible in close proximity. Vegetation in the garden to the east of the property and North Tullich may provide some filtering of views when trees are in leaf.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

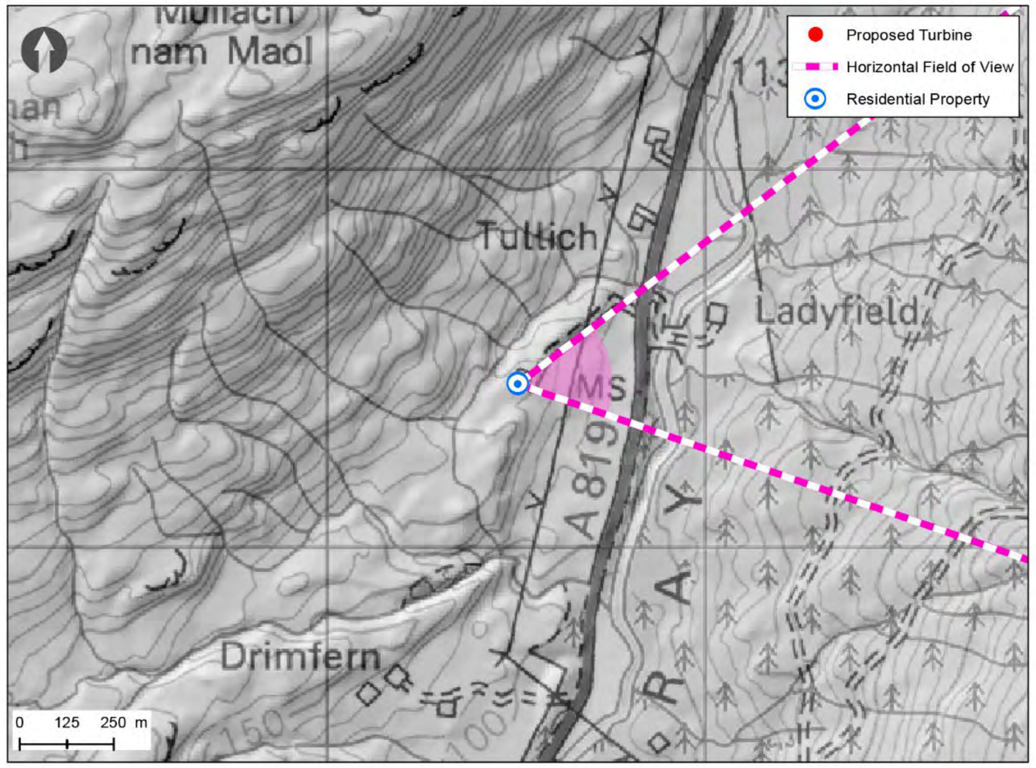
Step 4: Residential Visual Amenity Threshold

Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered not to have reached the Residential Visual Amenity Threshold, for the following reasons:

- Although principal interior views from the property occur to the east where the turbines would be located, the Development would be partially screened by adjacent development, tree cover and other garden vegetation; and
- The containment of the proposed turbines within a specific sector to the east means that there is not the potential for the effects to reach the Residential Visual Amenity Threshold.

7: South Tullich

Property : South Tullich



Property Description

OS Grid Ref:	208505 715431	Distance to Nearest Turbine:	1563 m	Elevation:	146.9 m AOD	

Farmhouse		Stone-built	X	1 Storey		Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey	X	Uninhabited		Front Garden	X
Semi-detached		Render		2 Storey		Garage(s)		Rear Garden	X
Terraced		Timber-clad		Conservatory		Outbuildings	X	Side Gardens	

Step 2: Existing Residential (Visual) Amenity

South Tullich is located on the western side of Glen Aray, on the lower slopes of Mullach nam Maol. It is a one-and-a-half storey detached property. The property is orientated north-west to south-east, with principal views to the south-east, towards the River Aray. It has a large garden at the front to the east and a smaller garden at the rear. It is accessed by a long track which leads from the A819. There is a small outbuilding to the north-west of the property. Trees within the garden partially filter views to the east from the interior of the property, although outward views from the property are generally open in all directions. To the east, the property overlooks the wooded River Aray towards rounded, forested hills which contain the glen on the opposite side. Areas of clear felling are visible across the commercial forestry which covers the slopes of these hills. To the west, views are contained by the rising landform below Mullach nam Maol. Views to the south are longer distance along Glen Aray. To the north, views along the Glen are more contained by the steep lower slopes of Mullach nam Maol. The access track has longer-distance, open views towards the forested hills to the east of Glen Aray. An overhead line supported on pylons passes from north to south in close proximity to the east of the property.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	56º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.8 shows that all of the 13 turbines would be visible above the forested hills which form the horizon to the east. The Development would be visible in direct interior views from the principal façade of the property, although trees in the garden are likely to provide some partial filtering of such views. From the surroundings of the property, including from the access track and most of the front garden, there would be open direct views of the Development. The turbines would be readily visible, and largely seen to their full extents, with the towers, hubs and tips visible against the skyline. With the minimum distance of 1563 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, and the scale of the turbines may appear at variance with the detail of the landscape elements and patterns in the surrounding landscape.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

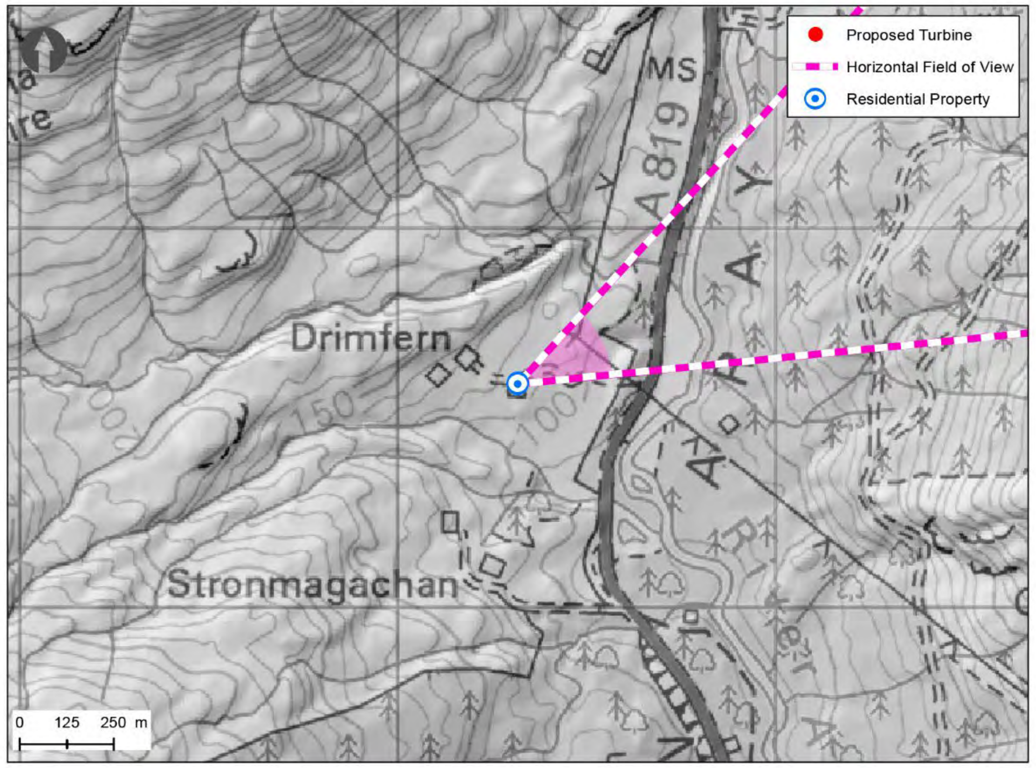
Step 4: Residential Visual Amenity Threshold

Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered not to have reached the Residential Visual Amenity Threshold, for the following reasons:

- Although interior views from the property occur to the north-east where the turbines would be located, the longer-distance interior views to the south-east would remain unaffected; and
- Despite the distance of the Development from the property, and the size of these large dynamic structures, their containment within a specific sector to the north-east means that there is not the potential for the effects to reach the Residential Visual Amenity Threshold.

8: Drimfern

Property : Drimfern



Property Description

OS Grid Ref:	208319 714588	Distance to Nearest Turbine:	1747 m	Elevation:	120.9 m AOD

Farmhouse		Stone-built	X	1 Storey		Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey	X	Uninhabited		Front Garden	X
Semi-detached		Render	X	2 Storey		Garage(s)		Rear Garden	X
Terraced		Timber-clad		Conservatory		Outbuildings		Side Gardens	X

Step 2: Existing Residential (Visual) Amenity

Drimfern is a one-and-a-half storey traditional stone-built property, located on lower ground below the ridge formed by Cruach Mhor and Mullach nam Maol to the west of the River Aray. It is located along an access track from the A819. This track continues on to West Drimfern and Druim Breac, which are located further west. The property is orientated north-west to south-east, and principal views are to the south-east towards the River Aray. An extension on the south-eastern aspect has large windows which look out to the south-east south-west and north-west. The property is surrounded to the south-east, south-west and north-west by a large garden. To the south-east, there are long-distance principal views over rounded forested and moorland hills on the eastern edge of Glen Aray towards larger hills beyond Glen Shira. Views to the north and south along Glen Aray are also open, although contained at closer proximity by the rising landform. To the west, the landform around Cruach Mhor limits long-distance views, and properties at Druim Breac and West Drimfern can be seen in the middle distance. An overhead line supported on pylons passes on lower ground to the north-east of the property.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	42º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.9 shows that all of the 13 turbines would be visible above the forested hills which form the horizon to the north-east. The Development may be visible in direct interior views from small windows on the north-eastern gable end of the property, although vegetation to the north-east of the property is likely to filter these views. The turbines may also be visible in oblique interior views from the principal façade of the property, although these views are orientated to the south-east and the Development would be seen in indirect views to the north-east. Vegetation in the front garden may also filter these views. From the access track and parts of the garden, the turbines would be readily visible, and the majority seen to their full extents. With the minimum distance of 1747 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, which may appear at variance with the relatively with the detailed landscape elements and patterns in the surrounding landscape. The Development would be contained within a sector of the view to the north-east and would occupy a 42-degree field of view.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

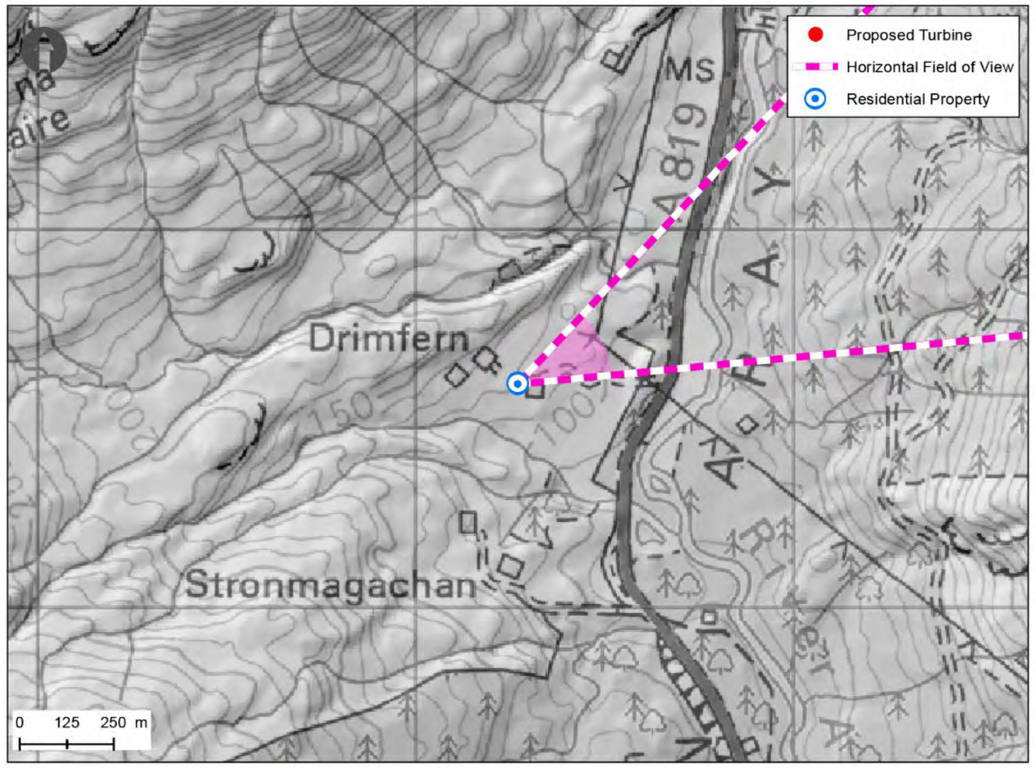
Step 4: Residential Visual Amenity Threshold

Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered not to have reached the Residential Visual Amenity Threshold, for the following reasons:

- While interior views from the house to the north-east may be affected, the filtering effect of close-range vegetation on this aspect would moderate this effect and principal interior views to the south-east and north-west would remain unaffected;
- The Development would be readily visible from the garden grounds and access track and would comprise all 13 turbines although these would be contained in the north-eastern aspect with the wider view unaffected; and
- Despite the distance of the Development from the property, and the size of these large dynamic structures, their containment within a specific sector to the northeast means that there is not the potential for the effects to reach the Residential Visual Amenity Threshold.

9: Unnamed property to south-west of Drimfern

Property : Unnamed property to south-west of Drimfern



Property Description

OS Grid Ref:	208271 714590	Distance to Nearest Turbine:	1794 m	Elevation:	123.6 m AOD		

Farmhouse		Stone-built		1 Storey	X	Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey		Uninhabited		Front Garden	X
Semi-detached		Render		2 Storey		Garage(s)		Rear Garden	X
Terraced		Timber-clad	X	Conservatory		Outbuildings		Side Gardens	X

Step 2: Existing Residential (Visual) Amenity

This property is a small one-storey cabin, located to the south-west of the main Drimfern property and accessed along the same track. The property is orientated north-west to south-east, and there are large windows on the north-eastern, south-eastern and south-western aspects. The property is surrounded to the east, south and north by a large garden. To the south-east, there are long-distance views over rounded forested and moorland hills on the eastern edge of Glen Aray towards larger hills beyond Glen Shira. Drimfern can be seen in close proximity in this direction. Views are also open to the north and south along Glen Aray, although contained at slightly closer proximity than the views to the south-east by the rising landform on the western side of Glen Aray. To the north-west, views are contained by close-proximity vegetation. An overhead line supported on pylons passes on lower ground beyond Drimfern to the north-east of the property.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	41º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.10 shows that all of the 13 turbines would be visible above the forested hills which form the horizon to the north-east. The Development may be visible in indirect interior views from the north-eastern and south-eastern aspects of the property, although vegetation in the surrounding garden and beyond Drimfern to the east may partially filter these views. From the access track and parts of the garden, the turbines would be readily visible, and the majority seen to their full extents. With the minimum distance of 1794 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180m tall turbines would present large and dynamic structures, which may appear at variance with the detailed landscape elements and patterns in the surrounding landscape. The Development would be contained within a sector of the view to the north-east and would occupy a 41-degree field of view.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

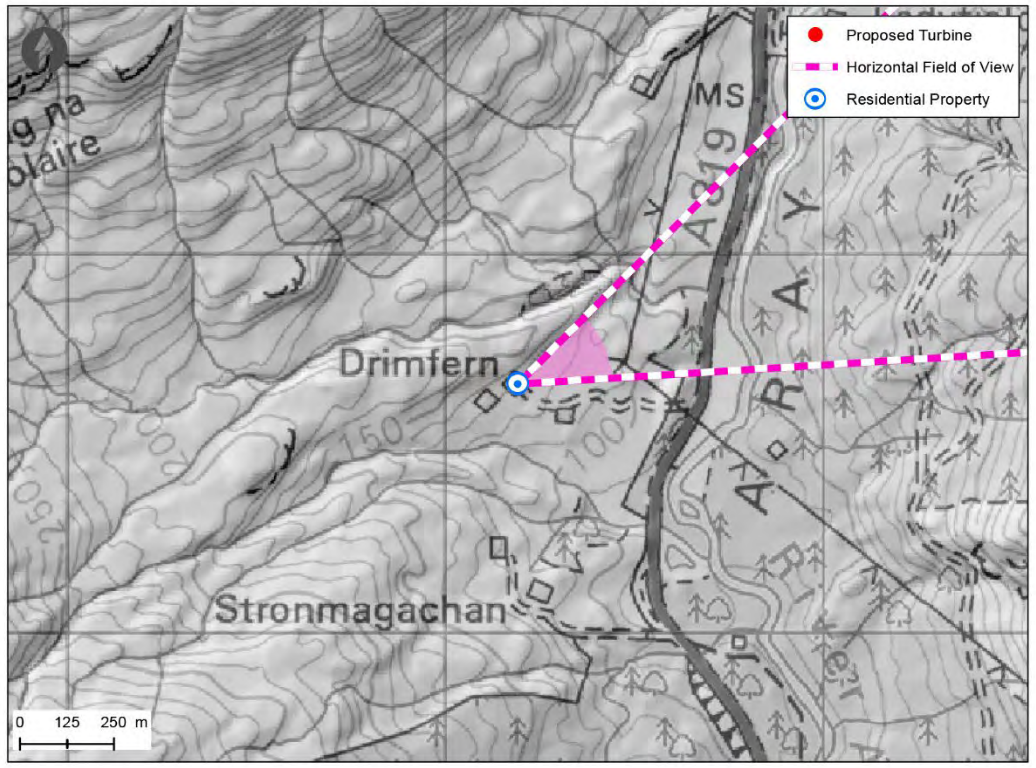
Step 4: Residential Visual Amenity Threshold

Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered not to have reached the Residential Visual Amenity Threshold, for the following reasons:

- Although interior views from the property occur to the north-east where the turbines would be located, the longer-distance interior views to the south-east towards Glen Shira would remain unaffected;
- While the Development would be readily visible from the access track, views from the property and its immediate surroundings are likely to be partially filtered by surrounding vegetation; and
- Despite the distance of the Development from the property, and the size of these large dynamic structures, their containment within a specific sector to the north-east means that there is not the potential for the effects to reach the Residential Visual Amenity Threshold.

10: West Drimfern

Property : West Drimfern



Property Description

OS Grid Ref:	208192 714656	Distance to Nearest Turbine:	1856 m	Elevation:	136.2 m AOD

Farmhouse		Stone-built	X	1 Storey		Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey	X	Uninhabited		Front Garden	X
Semi-detached		Render	X	2 Storey		Garage(s)		Rear Garden	X
Terraced		Timber-clad		Conservatory		Outbuildings	X	Side Gardens	

Step 2: Existing Residential (Visual) Amenity

West Drimfern is a one-and-a-half storey stone and rendered property. It is located on lower ground below the ridge formed by Cruach Mhor and Mullach nam Maol to the west of the River Aray. It is located along the same access track as Drimfern and Druim Breac and is situated between these two properties. The property is orientated north-west to south-east, and principal views are to the south-east towards the River Aray. There is a garden at the front to the south-east, and to the side at the north-east. A large outbuilding is located to the north-west, and there are several smaller outbuildings to the south-east. Principal views to the south-east are longer distance over rounded forested and moorland hills on the eastern edge of Glen Aray in the middle distance, towards larger hills beyond Glen Shira. There are several windows providing interior views in this direction. To the west, views are contained at close proximity by rising landform. To the north-east, trees within the garden largely limit outward views from the interior of the property, although there are open views in this direction towards the forested hills to the east of the Glen from the gardens and surroundings of the property. Views to the south along Glen Aray are largely screened by an outbuilding. An overhead line supported on pylons passes on lower ground beyond Drimfern to the east of the property.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	41º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.11 shows that all of the 13 turbines would be visible above the forested hills which form the horizon to the north-east. The Development would be visible in oblique interior views from the property, given that the principal orientation is to the south-east. Vegetation in the garden to the north-east of the property would provide some filtering of views in this direction. The majority of the turbines would be seen to their full extents, with the towers, hubs and blades visible against the skyline. Views of the turbines would also be readily available from the access track and garden to the front of the property. With the minimum distance of 1856 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, which may appear at variance with the detail of the landscape elements and patterns in the surrounding landscape. The Development would be contained within a sector of the view to the north-east and would occupy a 41-degree field of view.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

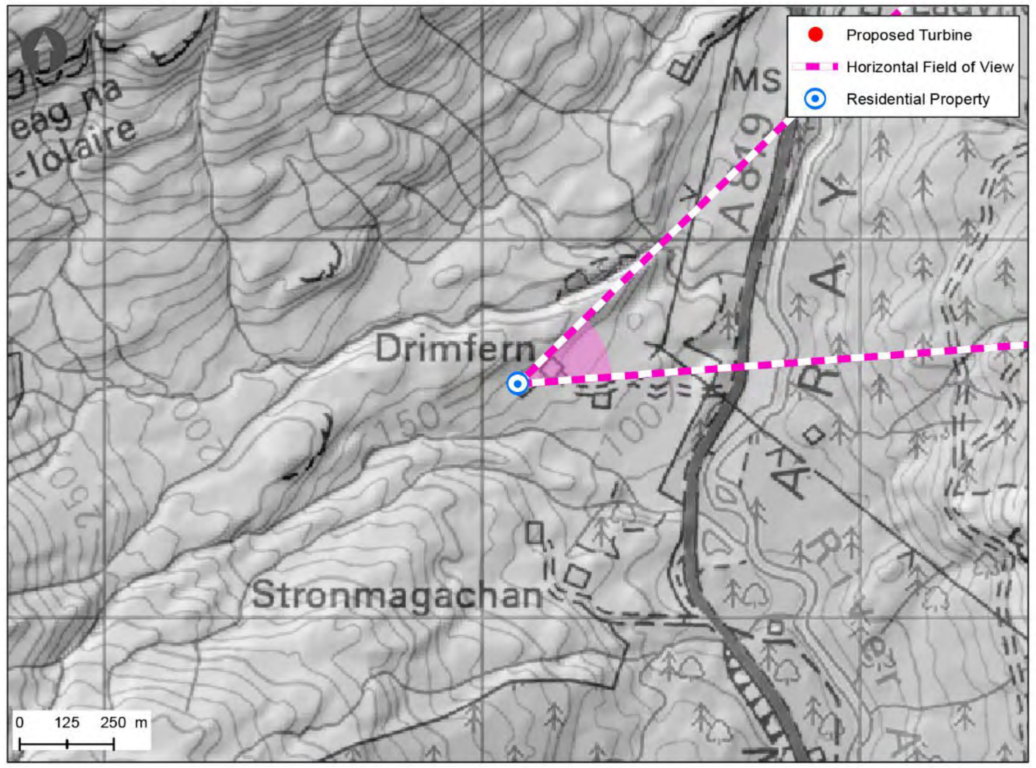
Step 4: Residential Visual Amenity Threshold

Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered not to have reached the Residential Visual Amenity Threshold, for the following reasons:

- Although interior views from the property occur to the north-east where the turbines would be located, the longer-distance interior views to the south-east towards Glen Shira would remain unaffected;
- While the Development would be readily visible from the access track, views from the property and its immediate surroundings are likely to be partially filtered by surrounding vegetation; and
- Despite the distance of the Development from the property, and the size of these large dynamic structures, their containment within a specific sector to the north-east means that there is not the potential for the effects to reach the Residential Visual Amenity Threshold.

11: Druim Breac

Property : Druim Breac



Property Description

OS Grid Ref:	208095 714617	Distance to Nearest Turbine:	1959 m	Elevation:	139.6 m AOD

Farmhouse		Stone-built		1 Storey		Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey	X	Uninhabited		Front Garden	X
Semi-detached		Render	X	2 Storey		Garage(s)		Rear Garden	
Terraced		Timber-clad		Conservatory		Outbuildings		Side Gardens	X

Step 2: Existing Residential (Visual) Amenity

Druim Breac is a one-and-a-half storey modern rendered property, located on lower ground below the ridge formed by Cruach Mhor and Mullach nam Maol to the west of the River Aray. It is located along the same access track as Drimfern and West Drimfern and is situated to the west of these two properties. It is orientated north-west to south-east. Principal views are to the south-east towards the River Aray. The property is surrounded by hard landscaping, and there is a garden at the front to the south-east and side to the south-west. An outbuilding is located beyond the property boundary to the south-west. Principal views to the south-east comprise the wooded corridor of the River Aray at lower elevation in the foreground, with rounded forested and moorland hills on the eastern edge of Glen Aray in the middle distance, and larger hills to the east of Glen Shira beyond. Areas of clear felling of commercial forestry can be seen across the hills on the eastern edge of Glen Aray to the north-east. Views from the access track are also open to the east. Views to the west are contained at close proximity by rough grassland across the rising landform of Cruach Mhor. Views to the north are also contained in the middle distance by the landform, while views to the south are slightly longer-distance, over farmland towards moorland hills with blocks of commercial forestry. An overhead line supported on pylons passes on lower ground beyond West Drimfern and Drimfern to the north-east of the property.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	39º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.12 shows that all of the 13 turbines would be visible above the forested hills which form the horizon to the north-east. The Development would be visible in oblique interior views from the property, given that the principal orientation is to the south-east. There would be no screening provided by vegetation and the turbines would be readily visible. Rising landform to the north would screen the tower of one turbine to the north-east of the Development. The majority of the turbines would be seen to their full extents, with the towers, hubs and blades visible against the skyline. Views of the turbines would also be readily available from the access track and gardens to the front and side of the property. With the minimum distance of 1959 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, which may appear at variance with the detailed scale and pattern of landscape elements in the surrounding landscape. The Development would be contained within a sector of the view to the north-east and would occupy a 39-degree field of view.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

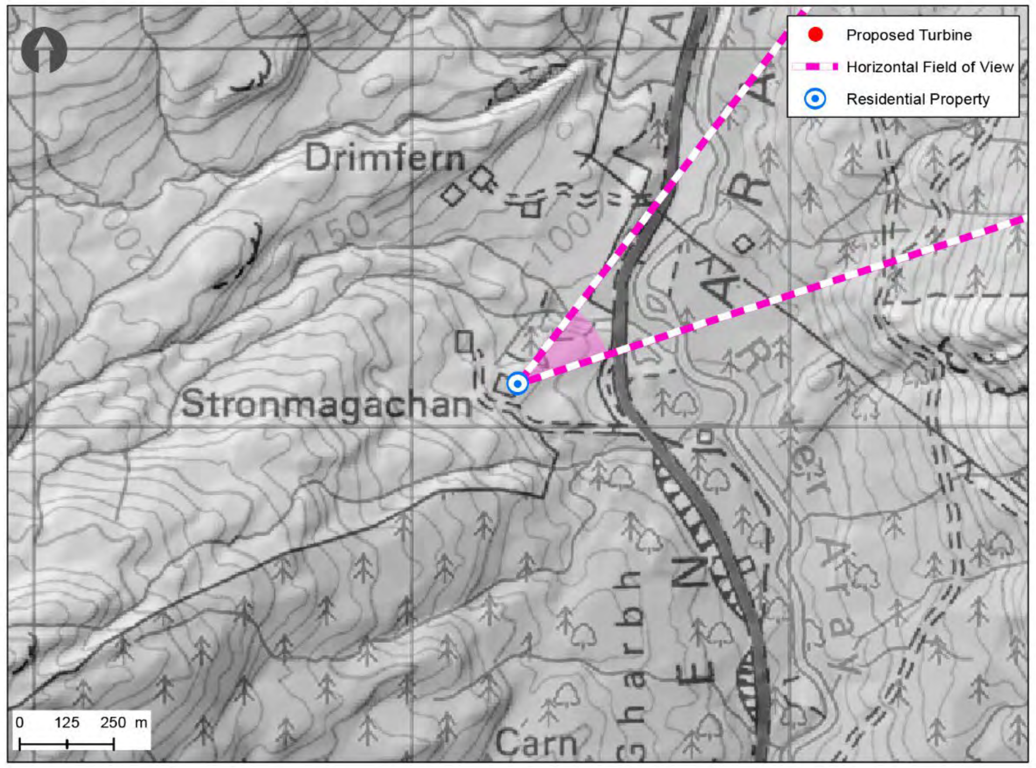
Step 4: Residential Visual Amenity Threshold

Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered not to have reached the Residential Visual Amenity Threshold, for the following reasons:

- Although interior views from the property occur to the north-east where the turbines would be located, the longer-distance interior views to the south-east would remain unaffected; and
- Despite the distance of the Development from the property, and the size of these large dynamic structures, their containment within a specific sector to the north-east means that there is not the potential for the effects to reach the Residential Visual Amenity Threshold.

12: Stronmagachan

Property : Stronmagachan



Property Description

OS Grid Ref:	208281 714112	Distance to Nearest Turbine:	1955 m	Elevation:	120.6 m AOD

Farmhouse		Stone-built	X	1 Storey	X	Derelict		Farmyard	
Detached	X	Brick-built		1.5 Storey	X	Uninhabited		Front Garden	X
Semi-detached		Render		2 Storey	X	Garage(s)	X	Rear Garden	
Terraced		Timber-clad		Conservatory		Outbuildings	X	Side Gardens	X

Step 2: Existing Residential (Visual) Amenity

Stronmagachan is located on the lower eastern slopes of Cruach Mhor, to the west of the River Aray. It is a one to two storey traditional stone property. The property is L-shaped, with a principal, two-storey façade facing east and a one-storey façade facing north. The property is accessed along a track from the A819. A large garden surrounds the property to the north, east and south-west. To the east, the garden is terraced and slopes down towards a pond. There is a small patio directly to the east of the main façade, as well as to the south of the northern façade. There is a large outbuilding to the south-west, as well as an area of hard surfacing. Outward views are largely open to the east, although there is some filtering by vegetation in the garden. These views comprise woodland within the property boundary at lower elevation, beyond which the forested hills to the east of Glen Aray are visible. Areas of clear felling of commercial forestry can be seen across these hills. Views from the access track are also open in this direction. There are views to the west from the rear of the property and from its surroundings, towards rough grassland across the rising landform of Cruach Mhor. Views to the north and south are largely screened by surrounding woodland.

Step 3: Residential (Visual) Amenity Effects

Affected Field of View:	34º	No of Blade Tips Theoretically Visible:	13	No of Turbine Hubs Theoretically Visible:	13

The wireline in Figure 6.4.13 shows that all of the 13 turbines would be theoretically visible above the forested hills which form the horizon to the north-east. The Development is likely to be visible in oblique interior views from the principal façade, although these views are likely to be filtered by vegetation within the front garden to the north-east. From the access track and parts of the garden, the turbines would also be visible, again partially filtered by vegetation within the garden. With the minimum distance of 1955 m between the property and the closest turbine, the Development would be seen as a close-range feature. The 180 m tall turbines would present large and dynamic structures, which may appear at variance with the detailed landscape elements and patterns in the surrounding landscape. The Development would be contained within a sector of the view to the north-east and would occupy a 34º degree field of view.

The magnitude of change is predicted to be **high**, which when combined with the **high** sensitivity would result in a **major** and **significant** effect.

Step 4: Residential Visual Amenity Threshold

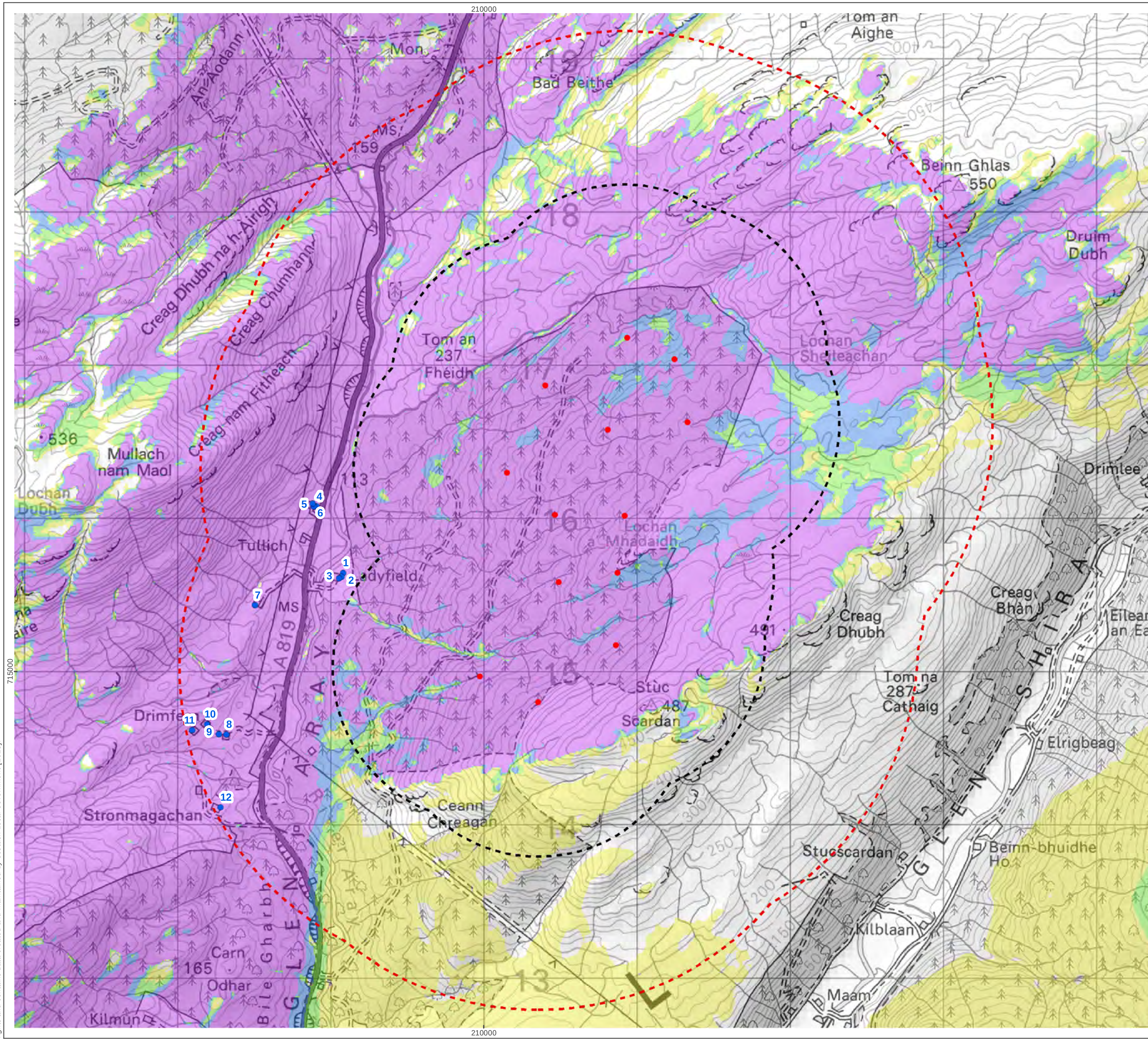
Step 4 involves making a judgement as to whether the predicted effects on visual amenity and views at a property assessed to have a high magnitude of change are such that it is approaching or has reached the Residential Visual Amenity Threshold, as defined above. This property is considered not to have reached the Residential Visual Amenity Threshold, for the following reasons:

- Although interior views from the property occur to the north-east where the turbines would be located, the longer-distance interior views to the south-east towards Glen Shira would remain unaffected;
- While the Development would be visible from parts of the surroundings of the property, including the access track, views from the property and its immediate surroundings are likely to be partially filtered by surrounding vegetation; and
- Despite the distance of the Development from the property, and the size of these large dynamic structures, their containment within a specific sector to the north-east means that there is not the potential for the effects to reach the Residential Visual Amenity Threshold.

5 REFERENCES

- Landscape Institute with the Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3).
- Landscape Institute (2019). Technical Guidance Note 2/19 Residential Visual Amenity Assessment.
- Landscape Institute (2019). Visual representation of Development Proposals: Landscape Institute Technical Guidance Note 06/19.

FIGURES



open optimised environments
PART OF SLR

ERM

- Proposed Turbines
- 1km Radius
- 2km Study Area
- Residential Properties

1. Ladyfield Farm Baseline
2. Ladyfield Farm Future Baseline – Replacement Dwelling
3. Ladyfield Farm Future Baseline – Barn Conversion
4. North Tullich
5. Kennels Cottage
6. Unnamed property to west of North Tullich
7. South Tullich
8. Drimfern
9. Unnamed property to south-west of Drimfern
10. West Drimfern
11. Druim Breac
12. Stronmagachan

Blade Tip ZTV

No. of Blade Tips Theoretically Visible

- 1 - 3
- 4 - 6
- 7 - 9
- 10 - 13

Blade tip:	180m	Observer height:	2m
DTM:	OS T5/T50 DTM	Surface features:	Excluded
DTM resolution:	10m	Earth curvature:	Included

1:24,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: NL	Ref:
Checked By: JP	Date: 29/09/2023

Figure 6.4.1:
Blade Tip ZTV with Residential Properties

Ladyfield Wind Farm
RVAA

P:\2020\201532_LadyfdWF\GIS\201532_LFDWF\RVAA\201532_LFDWF_RVAA_Resi_ZTV.mxd

OS reference:	209081 E 715643 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	110.4 mAOD	**Principal distance:**	812.5 mm
Direction of view:	58°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.12 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.2a
Viewpoint 1: Ladyfield Farm Baseline
Ladyfield

OS reference:	209081 E 715643 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	110.4 mAOD	**Principal distance:**	812.5 mm
Direction of view:	111.5°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.12 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.2b

Viewpoint 1: Ladyfield Farm Baseline

Ladyfield

OS reference: 209070 E 715619 N
Eye level: 109.2 mAOD
Direction of view: 58°
Nearest turbine: 1.12 km

Horizontal field of view: 53.5° (planar projection)
Principal distance: 812.5 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Figure 6.4.3a
Viewpoint 2: Ladyfield Farm Future Baseline – Replacement Dwelling
Ladyfield

OS reference:	209070 E 715619 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	109.2 mAOD	**Principal distance:**	812.5 mm
Direction of view:	111.5°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.12 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.3b

Viewpoint 2: Ladyfield Farm Future Baseline – Replacement Dwelling

Ladyfield

OS reference: 209055 E 715609 N
Eye level: 181.7 mAOD
Direction of view: 58°
Nearest turbine: 1.12 km

Horizontal field of view: 53.5° (planar projection)
Principal distance: 812.5 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Figure 6.4.4a
Viewpoint 3: Ladyfield Farm Future Baseline – Barn Conversion
Ladyfield

OS reference: 209055 E 715609 N
Eye level: 181.7 mAOD
Direction of view: 111.5°
Nearest turbine: 1.12 km

Horizontal field of view: 53.5° (planar projection)
Principal distance: 812.5 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Figure 6.4.4b
Viewpoint 3: Ladyfield Farm Future Baseline – Barn Conversion
Ladyfield

OS reference:	208909 E 716076 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	124.3 mAOD	**Principal distance:**	812.5 mm
Direction of view:	70°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.26 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.5a
Viewpoint 4: North Tullich
Ladyfield

OS reference:	208909 E 716076 N
Eye level:	124.3 mAOD
Direction of view:	123.5°
Nearest turbine:	1.26 km

Horizontal field of view:	53.5° (planar projection)
Principal distance:	812.5 mm
Paper size:	841 x 297 mm (half A1)
Correct printed image size:	820 x 260 mm

Figure 6.4.5b
Viewpoint 4: North Tullich
Ladyfield

OS reference: 208890 E 716076 N
Eye level: 125.6 mAOD
Direction of view: 71°
Nearest turbine: 1.28 km

Horizontal field of view: 53.5° (planar projection)
Principal distance: 812.5 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Figure 6.4.6a
Viewpoint 5: Kennels Cottage
Ladyfield

OS reference: 208890 E 716076 N
Eye level: 125.6 mAOD
Direction of view: 124.5°
Nearest turbine: 1.28 km

Horizontal field of view: 53.5° (planar projection)
Principal distance: 812.5 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Figure 6.4.6b
Viewpoint 5: Kennels Cottage
Ladyfield

OS reference:	208882 E 716096 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	127.3 mAOD	**Principal distance:**	812.5 mm
Direction of view:	71°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.29 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.7a

Viewpoint 6: Unnamed property to west of North Tullich

Ladyfield

OS reference: 208882 E 716096 N
Eye level: 127.3 mAOD
Direction of view: 124.5°
Nearest turbine: 1.29 km

Horizontal field of view: 53.5° (planar projection)
Principal distance: 812.5 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Figure 6.4.7b
Viewpoint 6: Unnamed property to west of North Tullich
Ladyfield

OS reference:	208505 E 715431 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	146.9 mAOD	**Principal distance:**	812.5 mm
Direction of view:	54°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.54 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.8a
Viewpoint 7: South Tullich
Ladyfield

OS reference:	208505 E 715431 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	146.9 mAOD	**Principal distance:**	812.5 mm
Direction of view:	107.5°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.54 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.8b
Viewpoint 7: South Tullich
Ladyfield

OS reference: 208319 E 714588 N
Eye level: 120.9 mAOD
Direction of view: 64°
Nearest turbine: 1.70 km

Horizontal field of view: 53.5° (planar projection)
Principal distance: 812.5 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Figure 6.4.9
Viewpoint 8: Drimfern
Ladyfield

OS reference:	208271 E 714590 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	123.6 mAOD	**Principal distance:**	812.5 mm
Direction of view:	64.5°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.75 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.10

Viewpoint 9: Unnamed property to south-west of Drimfern

Ladyfield

OS reference:	208192 E 714656 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	136.2 mAOD	**Principal distance:**	812.5 mm
Direction of view:	66.5°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.81 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.11
Viewpoint 10: West Drimfern
Ladyfield

OS reference:	208095 E 714617 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	139.6 mAOD	**Principal distance:**	812.5 mm
Direction of view:	66°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.91 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.12
Viewpoint 11: Druim Breac
Ladyfield

OS reference:	208281 E 714112 N	**Horizontal field of view:**	53.5° (planar projection)
Eye level:	120.6 mAOD	**Principal distance:**	812.5 mm
Direction of view:	55°	**Paper size:**	841 x 297 mm (half A1)
Nearest turbine:	1.90 km	**Correct printed image size:**	820 x 260 mm

Figure 6.4.13

Viewpoint 12: Stronmagachan

Ladyfield

Wireline drawing

View flat at a comfortable arm's length

OS reference: 208935 E 712956 N
Eye level: 69.1 mAOD
Direction of view: 31°
Nearest turbine: 2.27 km

Horizontal field of view: 53.5° (planar projection)
Principal distance: 812.5 mm
Paper size: 841 x 297 mm (half A1)
Correct printed image size: 820 x 260 mm

Figure 6.4.14
Viewpoint 13: Linneghlutten
Ladyfield

Environmental Impact Assessment – Technical Appendix 6.5: Assessment of Visible Aviation Lighting

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

ERM

TABLE OF CONTENTS

1 INTRODUCTION

This Technical Appendix has been prepared to accompany Chapter 6: LVIA in Volume 1 of the Ladyfield Renewable Energy Park (the Development) EIA Report. The Civil Aviation Authority (CAA) requires that 'en-route obstacles' at or above 150 m above ground level are lit with visible lighting to assist their detection by aircraft. As such, there is potential that the Development may need to display visible red lights at night. The effect of the Development at night would result from visible medium intensity (2,000 candela) red coloured light fittings located on the hubs and 32 candela red coloured light fittings located on the towers of all proposed turbines. It should be noted that all turbines would also include infra-red lighting on the turbine hubs which would not be visible to the human eye. The focus of this Appendix is on the visual assessment of the visible aviation lighting requirements of the Development. For the assessment of lighting effects, the visual sensitivity and magnitude criteria described in Appendix 6.1 have been applied.

This visual assessment of turbine lighting is supported by a baseline light pollution map (Figure 6.21), a Hub Lighting ZTV (Figure 6.22), a Lighting Intensity ZTV (Figure 6.23) and night-time photomontage visualisations from four viewpoints (See visualisation Figures 6.24, 6.27, 6.33 and 6.38).

2 REGULATIONS AND GUIDANCE

2.1 ICAO / Civil Aviation Authority (CAA) Regulations

ICAO (a UN body) sets international Standards; Recommendations and 'Notes' for aviation lighting in its publication 'Annex 14 to the Convention on International Civil Aviation' - Volume I Aerodrome Design and Operations (ICAO, Eighth Edition, July 2018).

ICAO Table 6.1 (page 6-4) identifies the international definitions of daylight; twilight and night based on measured background illuminance as follows:

- Daylight: Above 500 cd/m^2
- Twilight: 50-500 cd/m^2
- Night: Below 50 cd/m^2

For 2,000 candela medium intensity steady or fixed red lights, ICAO indicates a requirement for no lighting to be switched on until 'Night' has been reached, as measured at 50 cd/m^2 or darker.

ICAO Table 6.3 (page 6-5) identifies minimum requirements and recommendations for 2,000 cd aviation lights on wind turbines at 150 m and above. In summary these are:

Minimum requirements:

- 0 to +3 ° from horizontal: 2,000 cd minimum average intensity (or 1,500 cd minimum intensity); and
- -1 degree from horizontal: 750 cd minimum intensity.

The European Aviation Safety Agency (EASA) implements ICAO in European airspace. In pursuit of international standards for use around the globe, a project team has been established to provide clearer direction to lighting manufacturers, as there is scope for interpretation of ICAO in different ways by manufacturers.

Within the UK, the ICAO/ EASA requirements for lighting wind turbines are implemented through CAA publication *'CAP 764: Policy and Guidelines on Wind Turbines'*, and *'CAP393: Air Navigation Order 2016'*. The CAA have confirmed that UK policy broadly aligns with the International standards, including insofar as the point at which lights must be switched on at 'Night' rather than 'Twilight'.

The proposed turbines, at 180 m to blade tip, would require lighting under Article 222 of the Air Navigation Order (ANO, 2016). This requires a single, medium intensity, 'steady' red aviation light (emitting 2,000 candela) to be fitted at hub level to each turbine. In addition, the CAA requires 3 low intensity lights to be fitted at the intermediate level on the turbine tower (CAA, 2017), to provide 360 degree visibility around the tower. The intermediate 'tower' lights will be 32 candela.

Air Navigation Order 2016 (CAP393) Article 223 (8) states that *'If visibility in all directions from every wind turbine generator in a group is more than 5km the light intensity for any light required by this article to be fitted to any generator in the group and displayed may be reduced to not less than 10% of the minimum peak intensity specified for a light of this type.'* This reduction affords valuable mitigation of light intensity and allows the minimum intensities identified above to be dimmed to 10 % of their values if meteorological conditions permit (i.e. the 2,000 cd minimum intensity may be dimmed to 10 %, or 200 cd, if visibility is greater than 5 km, i.e. in moderate to excellent or 'clear' visibility).

2.2 Guidelines for Landscape and Visual Impact Assessment (GLVIA3)

GLVIA3 (page 103) provides the following guidance on the assessment of lighting effects: *'For some types of development the visual effects of lighting may be an issue. In these cases it may be important to carry out night-time 'darkness' surveys of the existing conditions in order to assess the potential effects of lighting and these effects need to be taken into account in generating the 3D model of the scheme. Quantitative assessment of illumination levels, and incorporation into models relevant to visual effects assessment, will require input from lighting engineers, but the visual effects assessment will also need to include qualitative assessments of the effects of the predicted light levels on night-time visibility.'*

GLVIA3 (page 60) also provides the following guidance with regards to mitigation of obtrusive light*: 'lighting for safety or security purposes may be unavoidable and may give rise to significant adverse effects; in such cases, consideration should be given to different ways of minimising light pollution and reference should be made to appropriate guidance, such as that provided by the Institution of Lighting Professionals* (ILP, 2011)'.

2.3 Institute of Lighting Professional Guidance

Guidance produced by the Institute of Lighting Professionals (ILP) (2011) (GN01:2011)[1] is useful in setting out some key lighting terminology that relates to potential visual effects.

*'**Obtrusive Light**, whether it keeps you awake through a bedroom window or impedes your view of the night sky, is a form of pollution, which may also be a nuisance in law and which can be substantially reduced without detriment to the lighting task. **Skyglow** - the brightening of the night sky; **Glare** - the uncomfortable brightness of a light source when viewed against a darker background; and **Light Intrusion** - the spilling of light beyond the boundary of the property or area being lit, are all forms of obtrusive light which may cause nuisance to others*.'

The following key guidance within the ILP GN01:2011 is noted as follows:

- *'The most sensitive/critical zones for minimising sky glow are those between 90° and 100° (note that this equates to 0-10° above the horizontal).*
- *Keep glare to a minimum by ensuring that the main beam angle of all lights directed towards any potential observer is not more than 70°.*
- *In rural areas the use of full horizontal cut off luminaires installed at 0° uplift will, in addition to reducing sky glow, also help to minimise visual intrusion within the open landscape.*
- *Upward Light Ratio (ULR) of the Installation is the maximum permitted percentage of luminaire flux that goes directly into the sky. A ULR of 0 (zero) Candela (cd) is suggested for Dark Sky Parks.'*

CPRE[2] also identifies these same broad terms as the three types of light pollution:

[1] Institute of Lighting Professionals (ILP) - Guidance Notes for the Reduction of Obtrusive Light GN01:2011
[2] CPRE – 'What is Light Pollution' found at webpage - https://www.nightblight.cpre.org.uk/what-is-light-pollution

- *'**skyglow** - the pink or orange glow we see for miles around towns and cities, spreading deep into the countryside, caused by a scattering of artificial light by airborne dust and water droplets.*
- ***glare** - the uncomfortable brightness of a light source.*
- ***light intrusion** - light spilling beyond the boundary of the property on which a light is located, sometimes shining through windows and curtains'.*

2.4 NatureScot Guidance

2.4.1 Visual Representation Guidance

In terms of how lighting is captured in visualisations, the main change in the latest version of the NatureScot guidance 'Visual Representation of Wind Farms' (Version 2.2, February 2017) is in paragraphs 174-177, which states*: 'The visualisation should use photographs taken in low light conditions, preferably when other artificial lighting (such as street lights and lights on buildings) are on, to show how the wind farm lighting will look compared to the existing baseline at night'… 'We have found that approximately 30 minutes after sunset provides a reasonable balance between visibility of the landform and the apparent brightness of artificial lights, as both should be visible in the image.'*

The night time photography has therefore been captured in low light conditions, when other artificial lighting (such as street lights and lights on buildings) is on, to show how the wind farm lighting would look compared to the existing baseline at night.

Existing lights shown in the photographs appear larger and more blurred than those seen to the naked eye in the field when the photographs were captured. The term used in photography to describe this effect is 'Bokeh' which has been defined as *'the way the lens renders out-of-focus points of light'*. This has proved difficult to avoid when taking photographs of light at varied distances across a view. The blurred nature of the lights is also exacerbated by their movement, particularly on vehicle headlights. Where the lights of the Development have been added to the night time views this effect has been emulated.

The turbine blades, when they intermittently pass in front of the aviation lights, would cause randomised flickering when the lights are switched 'on'. The turbines used in the night time visualisations have been positioned so that their blades face away from the viewpoint so that all the lights are visible and on within the visualisations, representing a worst-case impression. The flickering effect caused by the blades interacting with the lights would be most usually apparent from a south westerly direction due to the prevailing south-westerly wind.

2.4.2 Evolving NatureScot Approaches to Turbine Lighting

Recent NatureScot workshops indicate that a proportionate and pragmatic approach is required, both in terms of the need to assess likely significant effects under the EIA regulations (complying with current civil aviation standards) and also in providing mitigation (on a project and site-specific basis).

Mitigation options to eliminate or reduce the need for, and effects of, visible lighting are evolving quickly and developers are exploring these with consultees and the CAA in relation to specific sites. NatureScot has offered a perspective on the efficacy of different mitigation options, noting that the most effective appears to be radar activated, albeit accepting the considerable cost implications inherent in this potential option.

Ministers and planning authorities are using planning conditions to manage effects. It is recognised that the EIA should not necessarily specify one mitigation option, as these are evolving rapidly, and developers need flexibility to utilise the most appropriate mitigation once they are ready to start discharging conditions. Conditions provide some flexibility for developers to identify the most appropriate mitigation option(s) post consent and prior to construction, and to agree these with the relevant decision maker.

In terms of visual effects, NatureScot's view (as expressed at a seminar in November 2019) is that lengthy debate about the exact brightness of lights (including in visualisations) is potentially not helpful and that it is better to focus on where they will be visible, how many lights will be visible and the level of change from the baseline situation. This is recognised in the visual assessment in this Appendix. NatureScot has also taken a pragmatic view with night-time visualisations, requesting that decision makers, consultees and communities require visualisations from a small number of relevant viewpoints to understand these effects. NatureScot also recognises the challenges of capturing night time photography and accept that some post photographic manipulation of images to provide a good representation is acceptable.

3 ASSESSMENT PARAMATERS

3.1 Overview

A description of the proposed turbine lighting is found within Chapter 2: Development Description and Chapter 17 Other Issues: Shadow Flicker, Aviation, Telecommunications, Television Reception and Utilities, based on this, the following assumptions have been made with regards to visible lighting of the Development for the LVIA:

- the CAA requires that all obstacles at or above 150 m above ground level are fitted with visible medium intensity lighting (2,000 cd) located on the turbine hub;
- the CAA requires that a secondary light is fitted to the hub for use only when the primary light fails and would not be lit concurrently;
- there is an additional requirement for three lights to be provided at an intermediate level of half the hub height. These would need to be fitted around the towers to allow for 360 degrees horizontal visibility; and
- The 2,000 cd medium intensity lights may be dimmed to 10 %, or 200 cd, if visibility is greater than 5 km, i.e. in moderate to excellent or 'clear' visibility.

3.2 Worst Case Aviation Lighting Scheme

In relation to the Development, the worst-case scenario for night time effects includes the following parameters:

- all turbines will have red, medium intensity visible lights mounted on the hub (112 m based on the worst-case hub height candidate turbine described in Chapter 2: Development Description);
- 2,000 cd and 200 cd intensity hub lights have been assessed representing two differing worst-case situations. 2,000 cd represents the maximum intensity possible. 200 cd represents the maximum intensity that will be used when visibility extending from the wind farm exceeds 5 km;
- all turbines will also have low-intensity lights (32 candela) to be provided on the turbine towers at an intermediate level of half the hub height (56 m); and
- the steady red lighting fixed to the top of the hubs and to the turbine towers may appear to flicker on and off with the blade movement. This will occur when the turbine blades pass between the lights and the observers.

On the basis of the CAA requirements, it is evident that the effect of the visible lights of the Development will be dependent on a range of factors, including the intensity of lights used, the clarity of atmospheric visibility and the degree of negative/ positive vertical angle of view from the light to the receptor.

In compliance with EIA regulations, the likely significant effects of a 'worst-case' scenario for turbine lighting are assessed and illustrated in this visual assessment. A worst-case approach is applied which considers the effects of 2,000 cd and 200 cd scenarios during periods of clear visibility. It should be noted however, that as the required medium intensity lights are only likely to be operated at their maximum 2,000 cd during periods of poor visibility, that 2,000 cd intensity actually represents an unrealistic worst-case position, as it is unlikely to ever be experienced at that maximum illumination level.

3.3 Light Intensity

Visible aviation obstruction warning lights are designed to emit light horizontally in 360 degrees and offer a reduced light intensity above and below the horizontal. This in line with ICAO Annex 14 which requires the intensity of emitted light to be most intense at 0° (horizontal) and lower below the horizontal. Whilst aviation lighting manufacturers must meet the minimum requirements, their products may vary in relation to recommended limits set out in ICAO standards and the lighting characteristics of different light fittings may therefore vary outside the minimum requirements stipulated by ICAO.

For this assessment data from the testing of a Quantec medium intensity obstruction light has been used to provide an example of the reduction in lighting intensity above and below the horizontal. Whilst the precise model of light to be used for the Development is not known at this time it is considered that such an example provides a useful understanding of the potential visual mitigation of the intensity of the lights for receptors viewing them from areas of the Study Area that are below the horizontal. The Quantec data has therefore been used to define the amount of light emitted at particular angles above and below the horizontal for use in the assessment, see Table A6.5.1 below.

Table A6.5.1: Intensity of Turbine Light based on the Quantec medium Intensity Obstruction Light

Vertical Angle	**Turbine Lighting Intensity (Intensity of Turbine Light shown in Candelas (cd))**	
	2000cd intensity	**200cd intensity**
Above 6°	<100cd	<10cd
2° to 6°	775 to 100cd	77.5 to 10cd
0° to 2°	2100 to 775cd	210 to 77.5cd
0° to -1	2100 to 750cd	210 to 75cd
-1° to -2°	750 to 75cd	75 to 7.5cd
-2° to -3°	75 to 32cd	7.5 to 3.2cd
-3° to -4°	32 to 13cd	3.2 to 1.3cd
Below -4°	<13cd	<1.3cd

On the basis of the CAA requirements, therefore, it is evident that the intensity of the visible lights of the Development will be dependent on the clarity of atmospheric visibility and the degree of negative/ positive vertical angle of view from the light to the receptor. It should also be noted that the definitions in Table A6.5.1 do not take account of the potential for some of the emitted light spilling onto the passing blades which will be visible at all negative angles, albeit as a less intense and diffuse reflected glow. Figure 6.23 shows the intensity of visible aviation lights across the extent of visibility for the hub lights for the 'Worst Case Aviation Lighting Scheme' in which all the turbines will be lit.

3.4 Representative Night Time Viewpoints

A hub height ZTV was used to identify where there could be direct line of sight from the surrounding area to the proposed turbine lights mounted on the turbine hub (Figure 6.22). This ZTV does not take account of any intervening screening that may arise as a result of forestry or woodland cover.

Night-time visualisations have been produced for the four representative viewpoints. These were selected from the LVIA viewpoints.

- Viewpoint 1: A819 Dorchaidean Eoin Ruadh-bhuidhe;
- Viewpoint 4: Track above Inveraray;
- Viewpoint 10: St Conan's Kirk; and
- Viewpoint 15: Beinn Bhuidhe.

The precise locations of the viewpoints differ slightly from the daytime locations as they were captured on separate and specific visits.

Whilst aviation lighting manufacturers must meet the minimum requirements, their products may vary in relation to recommended limits set out in ICAO standards, which makes it difficult producing accurate visualisations as the lighting characteristics of different light fittings, of the same intensity, may vary outside the minimum requirements stipulated by ICAO. The night-time photomontages have been produced to show both 2,000 cd and 200 cd reduced intensity lighting, to inform the assessment of worst-case effects assessed. However, it should be noted that the night-time photography has been captured in periods of good visibility that is greater than 5 km. As a result, the night-time photomontage representations of the 2,000 cd lights are therefore an unrealistic over-representation of the likely visibility of visible aviation lighting. This is because visibility on the site (and likely at the viewpoint itself) is very likely to be much poorer (<5 km) when they operate at that intensity.

4 ASSESSMENT OF EFFECTS

4.1 Types of Effect

The visual assessment of turbine lighting is intended to determine the likely effects that the Development will have on the visual resource i.e. it is an assessment of the effects of visible aviation lighting on views experienced by people at night.

The assessment of turbine lighting in this Appendix does not consider effects of aviation lighting on landscape character (i.e. landscape effects). For visible medium intensity steady or fixed red aviation warning lights, ICAO indicates a requirement for no lighting to be switched on until 'night' has been reached, as measured at 50 cd/m^2 or darker. This is helpful as it does not require them to be on during 'twilight', when landscape character may be clearly discerned. It is considered that visible aviation lighting will therefore not affect the perception of landscape character, which is not readily perceived at night in darkness, particularly in rural areas. The assessment of visible lighting is solely a visual effect. While aviation lighting will be visible and result in visual effects, as assessed in this Appendix, the effects of aviation lighting on the perception of landscape character are scoped out of this assessment. This decision to scope out landscape effects reflects the Scottish Ministers' recent finding in the Crystal Rig IV Wind Farm Public Inquiry.

4.2 Baseline Lighting

The existing baseline lighting levels have been mapped for the surrounding landscape (see Figure 6.21) based on Open Source data of Light Pollution across the UK. This Open Source data has been used to help understand and illustrate the existing baseline lighting levels of the Study Area. Each pixel in the mapping shows the level of radiance (night lights) shining up into the night sky, which have been categorised into nine colour bands to distinguish between different light levels, from low level light pollution colour band one (darkest) to high level light pollution nine (brightest).

Figure 6.21 shows that the extent of baseline lighting across the Study Area is largely concentrated where settlements occur, while the majority of the Study Area remains unaffected by baseline lighting. The highest levels of baseline lighting occur in the south-east of the Study Area beyond 25 km, where the settlements of Helensburgh, Faslane, Dunoon and Greenock occur with levels in Faslane and Greenock reaching >32 NanoWatts/cm^2/sr. The extent and intensity of lighting that occurs in these areas is not replicated within the core of the Study Area.

The Site sits in an area classified as the lowest band of baseline lighting at <0.25 NanoWatts/cm^2/sr. This lowest level of baseline lighting extends across the vast majority of the Study Area, denoting the very limited presence of settlement and other lit developments. The closest source of baseline lighting to the Site occurs at Inveraray, approximately 6 km to the south. Figure 6.21 shows a gradation of lighting from 0.25 to 0.5 on the fringes to 4 to 8 NanoWatts/cm^2/sr in the centre of Inveraray. Other settlement within this first 10 km radius of the site includes Cairndow which registers as 0.5 to 1.0 NanoWatts/cm^2/sr. There are also some small patches of 0.25 to 0.5 NanoWatts/cm^2/sr denoting the presence of small clusters of properties in the glens of the rural areas. In the 10 to 20 km radius, lighting levels rise slightly to 1 to 2 or 2 to 3 NanoWatts/cm^2/sr where small settlements such as Strachur, Lochgoilhead and Taynuilt occur. Lochawe only registers as 0.25 to 0.5 NanoWatts/cm^2/sr, possibly on account of the extent of tree cover along this section of loch shore. Beyond 20 km, the larger towns of Oban and Lochgilphead present slightly higher levels of visibility albeit also within a concentrated area amidst a largely unaffected rural area.

5 DETAILED ASSESSMENT

5.1 Visibility of turbine lighting from viewpoints

Table A6.5.2 below provides a summary of the potential visibility of hub lights for each of the LVIA viewpoints. This is based on the hub light ZTV, shown on Figure 6.22 and details how many lit turbines will be theoretically visible from each of the viewpoints included in the LVIA. It should be noted that actual visibility of the aviation lighting may be reduced by the screening effect of intervening features, such as coniferous forestry, while it is likely that the lights will be visible through less dense deciduous tree cover. Table A6.5.2 also sets out the reductions in lighting intensity that would occur if directional lighting were used, as illustrated on the Lighting Intensity ZTV on Figure 6.23. While there are notable benefits of using directional lighting, these are not considered in the assessment as, at this application stage, the Applicant is unable to commit to the particular lamp that these calculations are based on.

Table A6.5.2: Viewpoint Lighting Intensity Summary

Viewpoint	Distance and direction to nearest turbine (km)	Number of hub aviation lights theoretically visible	Light intensity at each viewpoint relative to vertical angle (cd)		
			Vertical Angle in degrees	2,000 cd	200 cd
VP1: A819, Dorchaidean Eoin Ruadh-bhuidhe	1.53 km north-west	13	Below -4	Below 13 cd	Below 1.3 cd
VP2: A819, Tullich	1.32 km west	13	Below -4	Below 13 cd	Below 1.3 cd
VP3: A819, north of Inveraray	1.70 km south-west	13	Below -4	Below 13 cd	Below 1.3 cd
VP4: Access track above Inveraray	6.54 km south	2	-2 to -3	75 to 32 cd	7.5 to 3.2 cd
VP5: Inveraray Castle Grounds	5.99 km south	0	-	-	-
VP6: Forest track above St Catherine’s	8.02 km south-east	2	-1 to -2	750 to 75 cd	75 to 7.5 cd
VP7: A815, Ardnagowan	8.88 km south	0	-	-	-
VP8: A815, Strachur	9.20 km south	3	-1 to -2	750 to 75 cd	75 to 7.5 cd

Viewpoint	Distance and direction to nearest turbine (km)	Number of hub aviation lights theoretically visible	Light intensity at each viewpoint relative to vertical angle (cd)		
			Vertical Angle in degrees	2,000 cd	200 cd
VP9: Rubha nam Frangach	6.76 km south-west	1	-2 to -3	75 to 32 cd	7.5 to 3.2 cd
VP10: St. Conan's Kirk	9.57 km north	10	-1 to -2	750 to 75 cd	75 to 7.5 cd
VP11: Kilchrenan	6.46 km north-west	2	-2 to -3	75 to 32 cd	7.5 to 3.2 cd
VP12: Ben Cruachan	10.00 km north-west	13	0 to 2	750 to 75 cd	75 to 7.5 cd
VP13: Ben Lui	14.41 km north-east	10	0 to 2	2100 to 775 cd	210 to 77.5 cd
VP14: Beinn Ime	9.44 km south-east	10	0 to 2	2100 to 775 cd	210 to 77.5 cd
VP15: Beinn Bhuidhe	4.58 km east	13	2 to 6	775 to 100 cd	77.5 to 10 cd
VP16: Beinn Lochain	13.18 km south-east	8	0 to 2	2100 to 775 cd	210 to 77.5 cd
VP17: Cruachan Power Station	9.60 km north-west	9	-1 to -2	750 to 75 cd	75 to 7.5 cd
VP18: Dun na Cuaiche	4.67 km south	3	-1 to -2	750 to 75 cd	75 to 7.5 cd
VP19: Stob an Eas	6.41 km south-east	8	0 to 2	2100 to 775 cd	210 to 77.5 cd

5.2 Viewpoint Lighting Intensity

The Lighting Intensity ZTV on Figure 6.23 illustrates where the different intensities, relative to the different vertical angles from the hub mounted aviation light, will be visible within the surrounding landscape in respect of the Development. Figure 6.23 also illustrates the corresponding intensity reductions for each of the 2,000 cd and 200 cd situations. It is clear from this figure that the full intensity of the lights will only theoretically be experienced from a small proportion of the Study Area when on similar or more elevated terrain.

As described in the LVIA baseline, the ZTV is largely contained within the first 15 km radius around the Development and then occurring more patchily beyond this. The location of the Development on slightly lower hills within a predominantly upland area means that long-distance visibility is generally contained by surrounding hill summits.

Where visibility does occur, this tends to be either across surrounding low-lying areas, or on upland areas facing the Site. This leads to a pattern of general visibility across the surrounding glens, including Glen Aray and Glen Shira; along nearby lochs, including Loch Fyne to the south-west and Loch Awe to the north-west; on the immediate upland area surrounding the Site, to the west, north and east; and on nearby hill slopes facing towards the Site, including around Ben Cruachan to the north and some limited visibility across hill summits within the Loch Lomond and Trossachs National Park to the south-east.

The Lighting Intensity ZTV on Figure 6.23 shows that lighting intensity will be varied across the Site with a high intensity across the eastern part, equating to 2100 cd to 775 cd for the 2000 cd scenario and 210 cd to 77.5 cd for the 200 cd scenario, falling away to the lowest visibility across the western part, equating to less than 13 cd for the 2000 cd scenario and 1.3 cd for the 200 cd scenario. The high intensity extends to the north of the Site to cover the southern hill slopes of Beinn Ghlas (550 m AOD) and the east to cover the upper slopes of Stuc Scardan (487 m AOD), while the low intensity extends across the lower slopes and valley floor of Glen Aray. This means that the A819 and closest properties located within Glen Aray will experience the aviation lights at a low intensity. While the levels of lighting intensity rise with elevation across the western slopes, there are few visual receptors associated with these uninhabited hillsides.

To the south of first 5 km, Figure 6.23 shows that no aviation lighting will be visible in and around Inveraray Castle, and while there may be some visibility from the western side of the estate, this is shown as low intensity. From Dun na Cuaiche, three aviation lights will be visible albeit at the medium intensity of 750 to 75 cd in respect of the 2000 cd scenario, and 75 to 7.5 cd in respect of the 200 cd scenario. In and around Inveraray, theoretical visibility of aviation lighting will be very limited in extents, with only small patches of small numbers at low intensity theoretically visible and with this likely to be further reduced by close range tree cover and middle range forest cover. While patches of theoretical visibility are shown to occur on the western shore of Loch Fyne, again this will be limited in extents, limited in numbers of lights visible and low in terms of lighting intensity. The section of the eastern shore of Loch Fyne, between approximately 8 and 12 km, is shown on Figure 6.23 as experiencing lighting intensities of 75 to 32 cd in respect of the 2000 cd scenario and 7.5 to 3.2 cd in respect of the 200 cd scenario, which will be low. While lighting intensities rise gradually with elevation, there are few receptors in these afforested hill sides to the east of Loch Fyne and further south along the coast, the increase in distance will counteract the slight increase in intensity.

To the east of the first 5 km, Figure 6.23 shows a large patch of high level visibility across the western slopes and summits of Beinn Bhuidhe and Clachan Flats, reducing to medium and lower levels across the slopes of Glen Shira and Barr Mor to the south. Figure 6.22 shows that the number of aviation lights visible from these hills will be variable, with all 13 only visible from the summits and upper west-facing slopes. This patch also does not coincide with visual receptors such as residents or road-users and although there may be walkers on these hills, this is less likely during the hours of darkness.

To the north of the first 5 km, Figure 6.23 shows medium to low levels of visibility occurring across the northern end of Loch Awe. While across the Ardanaiseig peninsula lighting intensity levels are shown to be low along the coast and medium in the hinterland, actual visibility will be reduced by woodland cover. A similar pattern of lighting intensity is shown on the northern side of Loch Awe with low levels occurring along the coast, where the A85, Glasgow to Oban trainline and the majority of properties are located at a minimum of 9 km, and while intensity levels increase with elevation across the hill slopes to the north, lower to middle slopes will be screened by woodland cover, although middle to upper slopes will be exposed.

Beyond the first 10 km radius, visibility is largely reduced to summits and upper slopes facing towards the Development. The generally higher elevation of the upland landscape means that the vertical angle of the lighting is close to the horizontal and the lighting intensity levels are, therefore, typically at the higher levels. The exceptions occur through the lower-lying landscapes along the eastern shore of Loch Fyne and the north-west of Loch Awe.

Many of the representative viewpoints within the areas closest to the Development, including those in Glen Aray and around the shores of Loch Fyne and Loch Awe, will have reduced intensity as a result of the negative vertical angle in which the hub lights will be viewed. Table A6.5.2 provides a summary of the reduced intensity for the hub lights based on the ZTV on Figure 6.23.

In reality, it is extremely unlikely that 2,000 cd will ever be experienced at its full intensity as it will only operate when visibility is reduced by climatic conditions. Reduced visibility will also affect someone's perception of the intensity of the light fitting. Only five of the viewpoints lie within 5 km of the Development, with the remaining 14 located beyond 5 km. Therefore, the worst case intensity experienced at the majority of the viewpoints will likely be represented by the 200 cd scenario. This is because the 2000cd intensity lights will only be in operation when visibility is less than 5 km and, in this situation, they will appear far less intense due to the poor visibility surrounding the Development.

All residential properties assessed within the 2 km RVAA Study Area will have a vertical angle of either below -4 or at -3 to -4, resulting in an approximate range of lighting intensities of below 32 cd - when visibility <5 km and below 3.2 cd when visibility >5 km. In distant views, over 10 km, the aviation lights are still likely to be visible, based on experience of other operational wind farm aviation lights viewed in the field, however the distance and reduced intensity are mitigating factors with increasing distance.

For the purposes of this assessment, the potential reduction in lighting intensity relating to directional lighting, as described above, is not considered in this assessment. In line with NatureScot guidance, the maximum 2,000cd and reduced 200cd lighting intensity is assessed from each of the four night-time viewpoints.

6 REPRESENTATIVE VIEWPOINTS

6.1 Viewpoint 1: A819 Dorchaidean Eoin Ruadh-bhuidhe

Nearest Visible Turbine Light: 1.53 km

6.1.1 Night-Time Baseline Condition and Sensitivity

The viewpoint presents a night-time view looking south-east from the A819, towards the Development, seen set on the eastern valley side of Glen Aray. This section of the A819 lies a minimum of 1.53 km to the north-west of the Site, such that views will be close in range. The viewpoint is representative of the views of south-bound road-users on the A819, as their forward field of view will include the Site. While there are no properties along this section of the A819, there are some further south, and this viewpoint is also representative of the night-time views of residents at these properties.

The A819 runs parallel to River Aray, following its general north to south alignment towards Loch Fyne. Views from the road are generally open in the northern and central sections and generally enclosed by tree cover in the southern section and the Site is not readily visible from the northern section owing to the screening effect of the intervening landform. This means that it is the central section that has potential to be affected by both day time and night time effects. The central section extends over an approximate 3 km section from just north of the bridge over Dorchaidean Eoin Ruadh-bhuidhe to just north of the access to Stronmagachan.

The view during the day looks out across an area characterised by low hills with coniferous forestry, mainly on the eastern valley side, and open moorland, mainly on the western valley side. While there are no properties in this area, there is a small number of dispersed rural properties further south. In terms of development, there is also an electricity transmission line routed along the lower slopes of the western valley side.

At night, the individual landscape elements that create different landscape patterns during the day are difficult to discern, including the other infrastructure. The baseline night photography is captured at a time when the shape of the enclosing hills around the valley can be distinguished against the sky. There is no baseline lighting at this viewpoint other than the transitory lighting from occasional passing vehicles. From the section further south where there is rural settlement, there is some low level baseline lighting associated with these properties, with occasional use of outdoor lighting presenting a slightly brighter light than the effect of indoor lighting, although this is often screened by window coverings. There is no street lighting on the A819.

The value and visual susceptibility of receptors at night differs when compared to the assessment carried out for daytime conditions. During the night the landscape has a diminished scenic quality and receptors will not have the same appreciation of the landscape which is dark and muted compared to what is evident during the day. Taking these factors into account, the night-time sensitivity of residential receptors is considered to be **medium-high** and the night-time sensitivity of road-users is considered to be **medium**.

6.1.2 Night-Time Assessment

2,000 cd Light Intensity

All 13 of the hub lights on the proposed turbines will be theoretically visible from this location, as shown in the wireline on Figure 6.24b, albeit with four screened by intervening tree cover as shown in the night-time photomontage on Figures 6.24e and 6.24f.

In respect of the viewpoint, the aviation lights will be seen to introduce lighting into a relatively dark context, where the only baseline lighting is from the lights of passing vehicles. These medium intensity red aviation lights will be seen above the south-western horizon and in a part of the view where there are currently no other lights visible below or above the horizon as shown in the night-time photomontage on Figures 6.24g and 6.24h. The close proximity of the Development will tend to increase the visual impression that the nine visible turbine lights will have on road-users on this section of the A819 and the magnitude of change will be **medium-high**.

A similar assessment applies in respect of the A819 and residential properties occurring further to the south from the viewpoint. Baseline lighting will be limited in this area to low level domestic lighting although outdoor lighting on properties will be brighter and there will be the additional effect of lighting from passing vehicles on the A819. The aviation lights will be seen above the horizon to the east, introducing lighting within close range and in a part of the view which is currently dark. While all 13 turbine lights will theoretically be visible, there may be some screening from close range tree cover around the properties and along the road-side. The turbine lights will nonetheless form a defining feature in the night-time views along the glen and the magnitude of change will be **medium-high**.

Taking these factors into account, it is considered that these lights will form a defining feature to the existing baseline views along this section of the A819 and in respect of surrounding properties. The magnitude of change is assessed as **medium-high** and the effect on road-users will be **moderate** and **significant** and the effect on residential receptors will be **major / moderate** and **significant**.

200 cd Light Intensity

During periods of good visibility, the intensity of the hub lights will be reduced from 2,000cd to 200cd. This means the intensity will be at 10% of the 2,000cd intensity as shown in the night-time photomontage on Figures 6.24i and 6.24j. Despite the close proximity of the lights, the reduced intensity will moderate the effect and the magnitude of change will reduce to medium. While the hub lights will introduce lighting into a relatively dark aspect of the view from the A819 and associated residential properties, they will be seen in the context of vehicle and domestic lights associated with these receptors. Taking these factors into account the magnitude of change is assessed as medium resulting in a moderate and significant effect for residential receptors and moderate and significant effect for road-users.Viewpoint 4: Access Track above Inveraray

Nearest Visible Turbine Light: 6.54 km

6.1.3 Night-Time Baseline Condition and Sensitivity

This viewpoint represents the night-time views from the settlement of Inveraray, with the Development located a minimum of 6.54 km to the north of the viewpoint. It is representative of the open views of road-users and walkers on the track, while the views of residents in the local area are more enclosed by mature tree cover and surrounding built form.

Inveraray is a town situated on the north-western shoreline of Loch Fyne, near the head of the loch. The A83 passes through the historic core of the settlement, while new development has extended the settlement boundary to the south and west. The principal orientation of properties on the north-eastern and eastern aspects is across the open waters of Loch Fyne. Along Main Street the views are contained within the street, and in the areas behind Main Street, the properties are also typically inward looking. Viewpoint 4 is representative of the views experienced from the more open and elevated western part of the settlement, from where the view opens up to towards Glen Aray to the north, although this is not typical of the settlement as a whole. In the southern part of the settlement, the properties line the shoreline with a strong association eastward across the loch and no association with the view to the north.

During the day, views to the north are across a foreground of open fields, separated by the access track and with a cluster of properties marking the northern edge of the town where the A819 passes. The key feature in the view is the afforested hill named Dun na Cuaiche, where a folly, associated with Inveraray Castle, forms a hilltop landmark. Human influence in the surrounding landscape is generally rural in nature with no wind farms or electricity transmission lines readily evident. Coniferous forestry is visible across the hills to the north of the settlement, and beyond Loch Fyne to the east.

During the night, individual landscape elements that create different landscape patterns in the view are difficult to discern. The baseline night photography is captured at a time where the middle range ridgeline of hills is discernible against the skyline, however, the intervening landscape is not readily visible. There is a low level of baseline lighting visible in this view, associated with the edge of settlement in the foreground and with the settlement to the east. At the time of capturing the photography, security lighting can also be seen to the north-east associate with commercial sheds in this area.

During the night, the landscape has a diminished scenic quality and receptors will not have the same appreciation of the landscape which is dark and muted compared with the landscape scenery evident during the day and particularly in muted contrast to the closer context of lighting within the settlement itself. Taking these factors into account, the night-time sensitivity of this location is considered to be **medium-high**.

6.1.4 Night-Time Assessment

2,000 cd Light Intensity

Figure 6.27b shows that two hubs will be theoretically visible, while Figure 6.27c shows that only one hub will be actually visible, owing to the screening effect of forestry on the intervening ridgeline. This means that in the night-time view, only one of the 13 aviation lights will be visible from this viewpoint. This viewpoint represents the fullest visibility of the Development from Inveraray, owing to its relatively elevated and open aspect towards the north, compared to the lower-lying and enclosed other parts of the settlement, where built form and tree cover further reduce already low levels of visibility.

The aviation light will be seen as an introduction of lights above the northern horizon and to a part of the view where there is low level domestic lighting visible in the foreground, as shown in the night-time photomontage on Figure 6.27e. It is considered that the visible light will form a new feature in the night-time view, however, it will be experienced within a foreground context of edge of settlement lighting which will further moderate the effect. Taking this into account, it is considered that this light will form a very limited addition to the existing baseline view and the magnitude of change is assessed as **low**. The effect on residential receptors at this viewpoint is considered to be **moderate-minor** and **not significant**.

200 cd Light Intensity

The description of lights visible for 2,000 cd also applies to the 200 cd reduced intensity scenario. This means the intensity will be at 10% of the 2,000cd intensity as shown in the photomontage on Figure 6.27f. The reduced intensity will moderate the effect and the magnitude of change will reduce to **negligible**. With only one turbine light visible from a very localised part of the settlement and with it being seen in a context where there is a moderate level of baseline lighting, the effect of this additional light will be very limited, despite its location in a darker part of the view. Taking these factors into account the magnitude of change is assessed as **negligible** resulting in a **minor** and **not significant** effect.

6.2 Viewpoint 10: St. Conan's Kirk

Nearest Visible Turbine Light: 9.57 km

6.2.1 Night-Time Baseline Condition and Sensitivity

The viewpoint is located in the grounds of the historic St Conan's Kirk. The kirk is located on the north-western shore of Loch Awe, towards the southern edge of the settlement of Lochawe. The viewpoint is located to the south of the kirk itself, close to the shoreline of Loch Awe in an area with outward views to the east and south. This viewpoint represents the night-time views from the settlement of Lochawe, with the Development located a minimum of 9.57 km to the south of the viewpoint. It is representative of the views of residents and visitors in the settlement, and while open views occur in localised patches along the shoreline, much of the settlement is enclosed by mature tree cover and adjacent built form.

During the day, the view comprises an outlook across the northern part of Loch Awe, framed by close range trees. The middle ground comprises the opposite eastern shore with its low hills and predominance of commercial forestry with areas of clear felling and associated access tracks. Views to the south of Lochawe are generally restricted by the rising landform and extensive woodland cover.

During the night, individual landscape elements that create these different landscapes are difficult to discern. Baseline lighting is concentrated in Lochawe with a low glow from the street lighting, domestic lighting in surrounding properties and transitory lighting from passing cars. There is no visibility of distant lights, seen set on the opposite shore of Loch Awe and although there are light sources evident around the viewpoint, the view is of a dark landscape. The contrast between land and sky on the southern skyline can be seen beyond dusk as the setting sun maintains a low glow against the western skyline for a sustained period. The effect of this is more prolonged in summer months.

The value and visual susceptibility of residents and visitors at Loch Awe differs at night when compared to the assessment carried out for daytime conditions. During the night the landscape has a diminished scenic quality and residents / visitors will not have the same appreciation of the landscape which is dark and muted compared with the landscape scenery evident during the day. Visibility is also limited to localised parts of the settlement from where views across the loch open up without restriction from tree cover and built form. As such the sensitivity of residents and visitors is assessed as **medium-high**.

6.2.2 Night-Time Assessment

2,000 cd Light Intensity

Ten of the 13 hub lights will be theoretically visible from this location, as shown in the wireline on Figure 6.33b. They will be seen set against the open sky above the eastern skyline of Loch Awe.

The aviation lights will be seen as an introduction of lights to a part of the upland horizon to the south at a minimum distance of 9.57 km, where there is a background context of relatively high levels of darkness, as shown in the night-time photomontage on Figure 6.33e. The effect will be accentuated by the principal outlook being south across the loch to where the aviation lights will be seen. The effect will, however, be moderated by the fact that the extent to which the aviation lights will be visible across the settlement will be limited by the screening effect of tree cover and built form, and that they will be seen from a context in which there is widespread baseline lighting from street lights, properties, restaurant and hotels, and passing vehicles. Furthermore, the scenic qualities of the view are lost at night when the detail of the landscape is not evident and the aviation lights will be seen in the darkness and contained within a limited horizontal extent.

Taking all these factors into account, the magnitude of change is assessed as **medium-low** resulting in a **moderate** and **not significant** effect. This assessment does not take into account the further reduction in intensity that will be experienced owing to the separation distance of almost 10 km.

200 cd Light Intensity

The description of lights visible for 2,000 cd also applies to the 200 cd reduced intensity scenario. This means the intensity will be at 10% of the 2,000cd intensity as shown in the photomontage on Figure 6.33f. The reduced intensity will moderate the effect and the magnitude of change will reduce to low. While the turbine lights will be seen in the darker aspect of the view, they will be seen from a context which is already influenced by moderate baseline levels of artificial light. Taking these factors into account the magnitude of change is assessed as **low** resulting in a **moderate / minor** and **not significant** effect.

6.3 Viewpoint 15: Beinn Bhuidhe

Nearest Visible Turbine Light: 9.28 km

6.3.1 Night-Time Baseline Condition and Sensitivity

This viewpoint is located on the summit of Beinn Bhuidhe (948 m AOD), the only Munro within an upland area to the south and west of Glen Fyne and east of Glen Shira. The summit is generally ascended along a route from the head of Loch Fyne to the south and involves a long walk in along the glen. This viewpoint represents the night-time views from the hill walkers, with the Development located a minimum of 9.28 km to the north-east of the viewpoint. It is representative of the views of walkers on Beinn Bhuidhe and the wider Ben Lui WLA.

Beinn Bhuidhe is located within the Steep Ridgeland and Mountains LCT, which comprises steep-sided, craggy topped mountains and sharp ridges deeply cut by long narrow sea lochs. Beinn Bhuidhe forms part of a steep ridge which extends from south-west to north-east, and which is rough and rocky across parts.

During the day, the view to the north, east and south-east is over a large-scale upland landscape, while in other sectors of the view the landform is flatter and less distinctive. Loch Etive and Loch Fyne are visible, along with associated settlement across these lower-lying areas. A new track extends along Glen Fyne to the north of the river and can be followed to access Beinn Bhuidhe. Human influence on the wider landscape is also evident in the form of coniferous forestry, particularly to the west and south; overhead electricity transmission lines; and operational wind farm developments including Clachan Flats Wind Farm, located to the south-west. Other operational wind farms in the view comprise Cruach Mhor, A Cruach, An Suidhe, Carraig Gheal and Beinn Ghlas.

During the night, individual landscape elements that create these different landscapes are difficult to discern. There is no readily visible baseline lighting visible from this viewpoint. The contrast between land and sky on the western skyline can be seen beyond dusk as the setting sun maintains a low glow against the western skyline for a sustained period. The effect of this is more prolonged in summer months.

The value and visual susceptibility of walkers on Beinn Bhuidhe differs at night when compared to the assessment carried out for daytime conditions. During the night the landscape has a diminished scenic quality and walkers will not have the same appreciation of the landscape which is dark and muted compared with the landscape scenery evident during the day. The sensitivity of walkers is assessed as **medium-high**. It should also be noted that there will be extremely few walkers on this hill top or in other parts of the Ben Lui WLA during the hours of darkness. The ascent / descent lies to the east of Beinn Bhuidhe such that views of the Development will be screened by the intervening landform apart from on the summit.

6.3.2 Night-Time Assessment

2,000 cd Light Intensity

All 13 of the hub lights will be visible from this location, as shown in the wireline on Figure 6.38c. They will be seen set beyond the hills that enclose Glen Shira and backclothed by the hills to the west of Glen Aray.

The aviation lights will be seen as an introduction of lights to an area below the upland horizon to the south-west at a minimum distance of 9.28 km. There are high levels of darkness in all directions around this viewpoint and experienced from all parts of the Ben Lui WLA and in contrast to this context, the aviation lights will form a notable addition. It should be noted that an extremely small number of walkers will experience the effects of the aviation lighting as they will only be evident during the hours of darkness when typically walkers will not be on the summit from where the lights would be visible.

Taking all these factors into account, the magnitude of change is assessed as **medium-high** resulting in a **major / moderate** and **significant** effect. Despite the separation distance of 9.28 km and the limited number of walkers experiencing this view at night, the lighting will add a new feature into an otherwise dark context.

200 cd Light Intensity

The description of lights visible for 2,000 cd also applies to the 200 cd reduced intensity scenario. This means the intensity will be at 10% of the 2,000cd intensity as shown in the night-time photomontage on Figure 6.38f. The reduced intensity will moderate the effect and the magnitude of change will reduce to medium-low. While the turbine lights will be seen as a feature in the dark sky, the reduced intensity means that they will not form such a notable feature. Taking these factors into account the magnitude of change is assessed as **medium** resulting in a **moderate** and **significant** effect.

6.4 General Assessment

The assessment of the four night time viewpoints combined with site work and desk-based study utilising the Hub Lighting ZTV (Figure 6.22) and Lighting Intensity ZTV (Figure 6.23) enables the development of an overview with regard to the potential wider effects of the aviation lighting. This overview is based on the premise that the effects of the aviation lighting will relate to visual receptors and not landscape receptors and, therefore, the potential for significant effects will relate to locations where people will be experiencing the night sky.

The area with the highest potential for susceptibility is Glen Aray, owing to its close proximity to the Development. The principal visual receptors located in Glen Aray are the A819 and associated scattered rural settlement. The assessment of Viewpoint 1: A819 Dorchaidean Eoin Ruadh-bhuidhe, which included consideration of road-users and residents to the south, found that the effects will be significant, largely owing to the close proximity of these receptors to the turbine lights, the relatively full extents to which the turbine lights will be visible and the typically low levels of baseline lighting in the context of the rural glen.

In the southern part of the A819, towards Inveraray the effects of the turbine lights would be moderated by the screening effect of intervening landform and tree cover, such that effects will be not significant. Visibility of the turbine lights from Inveraray will be largely precluded by the screening effect of intervening built form and tree cover. From the very few localised parts where theoretical visibility will arise, this will comprise only a small number of hub lights as illustrated by Viewpoint 4: Track above Inveraray and these are likely to be screened by intervening forestry or other tree cover, such that only one or possibly two lights will be visible. The effects here will be not significant.

Visibility of aviation lighting from Inveraray Castle GDL will be limited by the intervening landform to the south of the Site and extensive tree cover across the policies. Figure 6.22 and Table A6.5.2 show that from Viewpoint 5: Inveraray Castle Grounds, none of the turbine lights will be visible.

Three hub lights will potentially be visible from the most elevated part of the GDL at Viewpoint 18: Dun na Cuaiche, and while this will give rise to a significant effect, it is unlikely that visitors will be experiencing this view in the dark. While the northern part of the GDL also has some potential for significant effects owing to the open nature of the farmland, similarly, only a very small number of turbine lights will be theoretically visible along the ridgeline.

Figure 6.22 and Table A6.5.2 also show that visibility of the hub lighting will be limited around Loch Fyne as intervening landform to the south of the Site reduces the number of hub lights visible from Viewpoint 6: Forest track above St Catherine's, Viewpoint 7: A815, Ardnagowan, Viewpoint 8: A815, Strachur and Viewpoint 9: Rubha nam Frangach to between 0 to 3, and these will be seen at distances of between 6.8 and 9.2km and either from or in the context of settled coastline. There will be no significant night-time effects from Loch Fyne.

The other potential area where significant night-time effects may arise is around the north of Loch Awe, as represented by Viewpoint 10: St. Conan's Kirk. The shoreline of Loch Awe is generally well-wooded such that there are few open sections from which residents and road-users can experience open views across the loch towards the Development. Where open sections do occur, the effect of the turbine lighting will not be significant owing to the baseline lighting associated with the car lights, street lights and building lights along parts of the shoreline, despite the generally dark skies that occur to the south where the Development will be located.

In summary, significant night-time effects will occur on residents and road-users in Glen Aray and on night-time walkers on Beinn Bhuidhe in the WLA.

7 CONCLUSION

The proposed turbines will not, in themselves, be conspicuous during the hours of darkness. Nevertheless, the assessment of night-time effects for the Development has assessed the effects that the aviation lighting will have on visual receptors in the local area. The assessment has found that the effects will be significant in respect of Viewpoint 1: A819 Dorchaidean Eoin Ruadh-bhuidhe and Viewpoint 15: Beinn Bhuidhe for both the 2,000 cd and 200 cd scenarios. This finding relates principally to the proximity of Viewpoint 1 to the Development and the sensitivity associated with residents in Glen Aray, which this viewpoint is representative of. In respect of Viewpoint 15, despite the separation distance and the very limited number of walkers who will be experiencing this night-time view, the significant effect relates to the sensitivity of the Ben Lui WLA and the dark skies that are experienced from this location. The effects on Viewpoint 4: Access track above Inveraray will be not significant owing to the very limited levels of visibility that will occur from this settlement, combined with the higher levels of baseline lighting associated with the settlement. While more lights will be visible from Viewpoint 10: St Conan's Kirk, the baseline lighting from the settlement of Lochawe, combined with the separation distance of almost 10km, the contained extent of the lights within the wider view, and the reduced scenic qualities of the loch perceived during the hours of darkness, will ensure the effect will be not significant.

It should be noted that this assessment has been based on a lighting intensity of 2,000 cd and 200 cd and does not take into account the notable reductions that would occur were directional hub lights implemented, as demonstrated in Table A6.5.2. This assessment, therefore, represents a pronounced worst case scenario.

The duration of the effect of the lights on receptors is likely to be over a relatively short period, more commonly experienced during evening and morning hours of darkness, around dusk and sunrise. The ICAO standard requires the lights to be switched on 30 minutes after sunset, and 30 minutes before sunrise, removing the likelihood of visible lighting during twilight. The visual effects of the Development at night will also be limited by the activity of receptors at night. Receptors that experience views at night are generally limited to residents on the closest edge or elevated parts of settlements, residents of rural properties, and road-users. Views from within properties are likely to be restricted by the use of window coverings, particularly in winter. Views from remote uplands and hills, rural farmland and footpaths are visited infrequently at night, therefore, the number of associated visual receptors affected will be low.

The assessment of night-time effects is also based on clear night time viewing conditions. At dusk and sunrise, it may be possible to identify the formation of the turbines with the lighting switched on, but only in conditions of good and excellent visibility. At sunrise it may also be possible, in views from the west, to see the turbines with lights switched on whilst backlit by the rising sun.

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Environmental Impact Assessment – Technical Appendix 7.1: Ornithology

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

ERM

MacArthur Green

Ladyfield Renewable Energy Park Ornithology Appendix 7.1

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CONTENTS

LIST OF TABLES

1 INTRODUCTION

MacArthur Green was commissioned by the Applicant to complete ornithological surveys at the proposed Ladyfield Renewable Energy Park, approximately 5 km north of the town of Inveraray in Argyll and Bute (hereafter referred to as 'the Development'). The surveys were conducted between March 2020 and March 2022 to inform an assessment of the potential ornithological effects of the Development on the species assemblage present.

This technical report summarises the methods employed and the results of the field surveys and is supported by the following Annexes.

Annex A	Ornithological Legal Protection
Annex B	Ornithological Survey Methodologies
Annex C	Ornithological Survey Effort & General Information
Annex D	Ornithological Survey Results
Annex E	Collision Risk Assessments

Confidential information relating to species listed in Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) is detailed in **Confidential Appendix 7.4**.

A range of surveys were employed to accurately record baseline conditions within the Development and appropriate survey areas (detailed in **Annex B**). In this Technical Appendix, associated **Annexes A – E**, **Confidential Technical Appendix 7.4** and **Chapter 7 (Ornithology)** of the Environmental Impact Assessment Report. Terms referred to are as follows:

- 'the Site' refers to the area within the red line boundary, e.g. **Figure 7.2**;
- 'survey area' is defined as the area covered by each survey type for the Development; and
- 'study area' is defined as the area of consideration of effects on each species at the time of assessment (**Figure 7.2**).

2 LEGAL PROTECTION

With limited exceptions, all wild birds and their eggs are protected by law. Specific levels of protection are determined by a species' inclusion on certain lists. **Annex A** to this report details the various levels of legal protection afforded to UK bird species.

3 FIELD SURVEY METHODS

The following surveys were undertaken in and around the Site between March 2020 and March 2022:

- Flight activity surveys (two breeding seasons and two non-breeding seasons), from five vantage points (VPs) (**Figure 7.1**);
- Breeding bird surveys (one breeding season), up to a 500 m survey buffer around the Site;
- Scarce breeding bird surveys (two breeding seasons), up to a 2 km survey buffer around the Site;
- Black grouse surveys (two breeding seasons), up to a 1.5 km survey buffer around the Site; and

- Winter walkover surveys (two non-breeding seasons), up to a 500 m survey buffer around the Site.

Survey methods followed the recommended NatureScot guidance (SNH 2017[i]) and methods are described in detail within **Annex B**.

The relative importance of the data collected was determined by the specific level of protection assigned to those species recorded, coupled with their perceived susceptibility to potential effects resulting from the Development. The resulting 'target species' and 'secondary species' lists are a standard assessment tool for wind farm ornithological studies (see **Annex B**).

4 FIELD SURVEY RESULTS

All valid surveys were undertaken during suitable weather conditions (as described within **Annex B**). Where weather conditions deteriorated below acceptable conditions (see definitions in **Annex B**), surveys were either suspended or additional surveys were undertaken. In the case of flight activity surveys, any time where the visibility was <1 km was excluded from total survey effort and subsequent analysis (further detail in **section 4.1**). Schedule 1 breeding bird surveys were carried out by appropriately licensed surveyors. All survey data were reviewed, inputted, and analysed by MacArthur Green.

A total 73 bird species were recorded within, or adjacent to, the Site during the various ornithological surveys conducted. Survey effort and results of the field surveys are detailed within **Annexes C and D**. The following sections summarise the results from each survey undertaken.

4.1 Flight Activity

The flight activity surveys recorded all target species' flight activity within the Site and beyond. These data have been used in the collision risk modelling. The flights used included those within the 'Collision Risk Analysis Area' (CRAA) (i.e. the area to be occupied by operational turbines, together with a 500 m buffer).

Flight activity surveys across the 2020 and 2021 breeding seasons and 2020/2021 and 2021/2022 non-breeding seasons were undertaken across up to five VPs. Valid survey effort[1] is detailed in **Table 7-1** and full details of flight activity surveys are contained in **Annex C** with methodology in **Annex B**.

Table 7-1 Summary of total hours of valid survey per VP in each season

Period	VP1	VP2	VP3	VP4	VP5
2020 breeding season	36	36	36	36	n/a
2020/2021 non-breeding season	38	38.85	42	42	n/a
2021 breeding season	36.34	36	n/a	36	36
2021/2022 non-breeding season	36.013	36	n/a	36	36

A total of 13 target species were recorded during the flight activity surveys (further details are provided in **Annex D**). For each species across the whole flight activity survey period, **Table 7-2** shows the total number of flights recorded and the total number of birds recorded[2]. The bird

[1] Hours where visibility was >1 km are not considered valid for use in collision risk modelling as less than half the 2 km viewshed can be seen.
[2] This includes flights that would not technically be 'at-risk' of collision (e.g. recorded outwith the CRAA and/or not at rotor height).

seconds are calculated for each observation as the product of flight duration and number of individuals. This is then summed per species to give the total bird seconds recorded across the entire surveyed period.

Table 7-2 Target species recorded and total number of flights recorded during flight activity surveys, 2020-2022

Species	Total number of flightlines recorded	Total number of birds recorded	Total bird seconds recorded
Black grouse	1	1	2
Golden eagle	138	154	25128
Golden plover	28	33	571
Greenshank	5	5	68
Greylag goose	18	56	5041
Hen harrier	28	28	2068
Herring gull	2	5	520
Merlin	9	10	375
Peregrine falcon	7	7	314
Pink-footed goose	9	553	93495
Short-eared owl	2	2	15
White-tailed eagle	8	8	1165
Whooper swan	4	6	1054

4.1.1 Flightlines Used in Collision Risk Modelling

Only flightlines identified to be within the CRAA and recorded within the 2 km viewshed of the associated VP were considered in the collision risk modelling and **Annex E** provides details of the bird seconds from flights identified to be ‘at- risk’.

- ‘At-risk’ is defined as – a flight having at least part of its duration (i) at Potential Collision Height (PCH)[3]; (ii) within the CRAA; and (iii) recorded within the 2 km viewshed of the associated VP.
- PCH is defined as – the altitude between the minimum and maximum blade height[4] (taken to be from 44 m to 180 m for the Development).

Black grouse, greenshank, greylag goose, herring gull, merlin, short-eared owl and whooper swan were recorded during flight activity surveys, but no flights were considered to be ‘at-risk’[5]. Full survey results detailing the findings from each survey visit (including target species’ flightlines considered not ‘at-risk’ and secondary species information) can be found within **Annex D**. Only bird seconds for observations identified as within the CRAA and associated viewshed are considered in the following discussions. Full target species results are detailed within **Annex D** and the collision risk calculations are detailed in **Annex E**.

[3] In some cases, only part of a total flight duration was recorded at PCH, and it is assumed that this proportion is applicable for that part of the flight within the CRAA and 2 km viewshed area.
[4] Where the actual rotor blade altitude differs from the pre-defined survey height bands, the collision risk model accounts for this difference on the assumption of an even flight distribution within each particular survey height band, and an adjustment can be made to estimate total flight duration at actual rotor blade altitude.
[5] i.e. the flights were either not within the CRAA and associated viewshed or were only recorded flying above 150m.

4.1.2 Collision Risk Model Outputs

The bird seconds for target species flights within the CRAA at PCH were then input into a Collision Risk Model (CRM) to calculate the predicted collision rates per season. The CRM calculations for each species can be found in **Annex E**. **Table 7-3** and **Table 7-4** provide the estimated collision rates and number of seasons per collision for each species.

Table 7-3 Estimated collision rates.

Species	2020 breeding season	2020/2021 non-breeding season	2021 breeding season	2021/2022 non-breeding season	Mean breeding season	Mean non-breeding season	Mean annual
Golden eagle	-	0.0134	0.1002	0.0306	0.0501	0.0220	0.0721
Golden plover	-	0.0015	-	-	-	0.0008	0.0008
Hen harrier	0.0071	-	-	0.0020	0.0035	0.0010	0.0045
Peregrine falcon	-	-	-	0.0003	-	0.0002	0.0002
Pink-footed goose	-	0.1578	-	-	-	0.0789	0.0789
White-tailed eagle	0.0340	-	-	-	0.0170	-	0.0170

Table 7-4 Estimated number of seasons per collision.

Species	2020 breeding season	2020/2021 non-breeding season	2021 breeding season	2021/2022 non-breeding season	Mean breeding season	Mean non-breeding season	Mean annual
Golden eagle	-	75	10	33	19.95	45	13.86
Golden plover	-	663	-	-	-	1325	1325
Hen harrier	142	-	-	504	283	1008	221
Peregrine falcon	-	-	-	2927	-	5853	5853
Pink-footed goose	-	6	-	-	-	12.68	12.68
White-tailed eagle	29	-	-	-	59	-	59

4.2 Breeding Birds

One complete breeding bird season (comprising of four visits each) was surveyed in 2021 (April to July). These surveys focused on areas of open moorland (in particular an area where an access track was planned in a previous Development iteration), as most of the Site comprises forestry habitat which is unsuitable for breeding waders. Surveys recorded four wader species likely to be breeding (**Table 7-5**). The same four species were also recorded on scarce breeding bird surveys within 1 km of the Site during 2020 and 2021. Full details of the breeding bird surveys are provided within **Annexes C and D** and survey methodology is provided within **Annex B**.

Table 7-5 Breeding wader territories, 2021 (number of territories within 500 m study area)

Species	Number of territories 2021
Common sandpiper	0-1
Golden plover	1-3
Greenshank	1-2
Snipe	12-15

4.3 Winter Walkovers

Winter walkover surveys were conducted during the 2020/2021 and 2021/2022 non-breeding seasons. Surveys recorded 36 species of which 10 are considered to be target species (**Table 7-6**). Full details of the winter walkover surveys are provided within **Annexes C and D** and survey methodology is provided within **Annex B**.

Table 7-6 Winter walkover: target species records (number of birds recorded per visit), 2020 / 2021 and 2021 / 2022.

Species	2020/2021 non-breeding season		2021/2022 non-breeding season	
	Number of records	Total number of birds	Number of records	Total number of birds
Black grouse	1	1	0	0
Golden eagle	7	7	1	1
Golden plover	2	3	0	0
Greylag goose	1	7	0	0
Hen harrier	0	0	1	1
Slavonian grebe	1	1	0	0
Snipe	0	0	1	1
White-tailed eagle	0	0	1	2
Whooper swan	1	8	6	6
Woodcock	1	1	3	3

4.4 Scarce Breeding Birds

Scarce breeding bird surveys were conducted during the 2020 and 2021 (March to August) breeding seasons.

Merlin was confirmed to be breeding within the survey area and breeding activity is summarised in **Table 7-7**. **Confidential Technical Appendix 7.4** contains the full details of all breeding activity.

Table 7-7 Scarce breeding bird summary

Species	2020	2021
Barn owl	Three potential nest and/or roost locations identified outside of the Site within 500 m of the Site boundary.	One confirmed nest and/or roost location identified within the Site.
Golden eagle	Two occupied territories within 6 km of the Site. Additional breeding data obtained from Argyll Raptor Study Group.	Confirmed breeding at one territory within 6 km of Site. Additional breeding data obtained from Argyll Raptor Study Group.
Hen harrier	One confirmed nest approximately 1 km from Site boundary. Success unknown.	One potential nest in a similar location to 2020. Adults sighted regularly and juvenile present in August.
Merlin	One confirmed nest within the Site. Success unknown.	One potential territory approximately 1 km outside the Site boundary.

Peregrine falcon, short-eared owl and white-tailed eagle (target species) were also recorded during surveys but were not considered to be breeding/no breeding attempts were located within the survey area.

Buzzard, kestrel, sparrowhawk and tawny owl (secondary species) were also recorded across the survey area and are likely to have bred within the wider area.

Full details of the scarce breeding bird surveys are provided within **Annexes C and D** and **Confidential Technical Appendix 7.4** and survey methodology is provided within **Annex B**.

4.5 Black Grouse

Surveys to identify areas of black grouse activity, locate lek locations and establish lek size were conducted in the 2020 and 2021 breeding seasons during April and May. Surveys identified six individual lek sites with lek 4 recording the largest numbers in both years (**Table 7-8**). Full details of the black grouse surveys are provided within **Annexes C and D** and survey methodology is provided within **Annex B**.

Table 7-8 Black grouse lek activity: 2020 to 2021

Lek	Location	2020 Maximum number of males recorded	Maximum number of females recorded	2021 Maximum number of males recorded	Maximum number of females recorded
1	Allt Sheileachan	1	0	0	0
2	Bad Beithe	1	0	0	0
3	Tom an Fheidh (north)	1	0	0	0
4	Tom an Fheidh (south)	2	0	4	5
5	Stuc Scardan	0	0	2	0
6	Cachlaidh Bhain	0	0	4	0

[i] Scottish Natural Heritage (2017) Recommended Bird Survey Methods to inform impact assessment of Onshore Windfarms.

APPENDIX A ORNITHOLOGICAL LEGAL PROTECTION

ANNEX A. ORNITHOLOGICAL LEGAL PROTECTION

In Scotland, all wild birds are protected under the Wildlife and Countryside Act 1981 (the 'Act'), as amended by the Nature Conservation (Scotland) Act 2004. This protection also extends to their eggs and nests, with it being an offence to intentionally or recklessly[6]:

- Kill, injure or take any wild bird[7];
- Take, damage, destroy or otherwise interfere with the nest of any wild bird while it is being built or is in use[8];
- At any other time take, damage, destroy or otherwise interfere with any nest habitually used by any wild bird included in Schedule A1 (Protected Nests and Nest Sites for Birds: white-tailed eagle and golden eagle)[9];
- Obstruct or prevent any wild bird from using its nest[10]; or
- Take or destroy an egg of any wild bird[11].

It is also an offence to have in possession or control any live or dead wild bird or any part thereof; or any egg or part of an egg of any wild bird[12].

Further special protection under this legislation is afforded to those species listed on Schedule 1 of the Act. For these species, it is an offence to:

- Intentionally or recklessly disturb any wild bird listed on Schedule 1 while it is nest building, or is in, on or near a nest containing eggs or young, or disturb the dependent young of such a bird[13];
- Intentionally or recklessly disturb any wild birds included on Schedule 1 which leks, while it is doing so[14] (capercaillie is the only bird this offence applies to in Scotland);
- Intentionally or recklessly harass any wild bird included in Schedule 1A[15]. Section 1, subsection 5B states, '*Subject to the provisions of this Part, any person who intentionally or recklessly harasses any wild bird included in Schedule 1A shall be guilty of an offence*'. At this time, Schedule 1A includes golden eagle, hen harrier, red kite and white-tailed eagle. This updated legislation was introduced on 16 March 2013; or

[6] Exceptions to these offences exist under various circumstances (e.g. controlling pest species; taking birds during specific season; and killing sick or injured birds etc.).
[7] Wildlife and Countryside Act 1981, Section 1(1)(a)
[8] Wildlife and Countryside Act 1981, Section 1(1)(b)
[9] Wildlife and Countryside Act 1981, Section 1(1)(ba)
[10] Wildlife and Countryside Act 1981, Section 1(1)(bb)
[11] Wildlife and Countryside Act 1981, Section 1(1)(c)
[12] Wildlife and Countryside Act 1981, Section 1(2)
[13] Wildlife and Countryside Act 1981, Section 1(5)
[14] Wildlife and Countryside Act 1981, Section 1(5A)
[15] Wildlife and Countryside Act 1981, Section 1(5B)

- Intentionally or recklessly take, damage, destroy or otherwise interfere with any nest and/or nest site habitually used by any bird on Schedule A1 at any time. At this time, Schedule 1A includes golden eagle and white-tailed eagle[16];

It is also an offence to knowingly cause or permit to be done an act which is made unlawful by any of the above provisions.

Further protection is described under the EU Birds Directive which requires member states to maintain wild bird species in favourable conservation status[17] and promote the conservation of bird species listed within Annex 1 of the Birds Directive through the protection of their habitat. This is achieved via the designation of Special Protection Areas (SPAs).

Red List bird species are those deemed to be globally threatened and to be suffering population declines within the UK. Although not legally enforceable, the conservation of Red List bird species represents a material consideration, in planning terms.

[16] This reflects the changes introduced by the Wildlife and Countryside Act 1981 (as amended by: Variation of Schedules A1 and 1A (Scotland) Order 2013.

[17] While the term 'favourable conservation status' is not used in the Birds Directive, EU court cases over recent years have progressively interpreted the concept as meaningful in a Birds Directive context (SNH, 2006).

APPENDIX B ORNITHOLOGICAL SURVEY METHODOLOGY

ANNEX B. ORNITHOLOGICAL SURVEY METHODOLOGY

A range of ornithological surveys have been conducted at the proposed Ladyfield Renewable Energy Park ('the Development'). The methodologies used in these surveys are summarised in the sections below; more detailed descriptions are provided in the NatureScot guidance (2017[i]) on which these surveys are based.

Survey Areas

Surveys were undertaken during the 2020 and 2021 breeding and 2020/2021 and 2021/2022 non-breeding seasons. All surveys were buffered from a Site boundary provided by the Applicant.

B.1 Flight Activity Surveys

The aims of the flight activity (vantage point) surveys are: (1) to record flight activity within the vicinity of the site in order to identify areas of importance to birds; and (2) to quantify flight activity within 500 m of proposed turbine locations in order to estimate the likelihood of collision (SNH, 2017[i] P.14-19).

Timing

- A survey period of 36 hours is recommended as the minimum level of sampling intensity at each VP for each season (breeding, non-breeding, migratory) (SNH, 2017[i] P.17);
- Watches were spread as evenly throughout the year as possible to ensure that temporally representative data are collected (see **Annex C**). Specific consideration was given to the period around dawn and twilight for breeding waders and to changing raptor behaviour across seasons (SNH, 2017[i] P.17);
- Watches were suspended and resumed to take account of changes in visibility (e.g. fluctuations in cloud base). Watches were undertaken in conditions of good ground visibility when the cloud base was higher than the most elevated ground being observed; and
- Watches were conducted in a range of weather conditions and were spread throughout the day (see **Annex C** and **Annex D**).

Field Methods

- Viewshed analysis was conducted using Arc GIS to confirm suitable Vantage Point (VP) locations and their associated visible areas at 50 m above ground level[18];
- Reconnaissance surveys were undertaken to refine VP locations;
- The VP locations and associated viewsheds are shown in **Figure 7.1**;
- Care was taken to maximize the area visible whilst minimising disturbance to birds;
- The final five VP locations were selected with the aim of achieving coverage of all the proposed turbine locations such that no turbine was more than 2 km from a VP. This objective was achieved for all turbines.

[18] The viewsheds are based on a 5m DTM to provide a representation of visibility from the observer locations; this is confirmed and refined through field site visits.

- A maximum 180° view arc was scanned by surveyors. This rule did not however apply when tracking migratory waterfowl or raptors across the site;
- Each watch lasted a maximum of three hours but was suspended and then resumed to take account of changes in visibility (e.g. fluctuations in the cloud base).

For each target and secondary species the following data were recorded (SNH, 2017[i] P.17-18):

- The flightlines by individuals or flocks of birds;
- The time the target bird was detected and the duration (seconds) spent flying over a defined survey area (the viewshed);
- The birds' flight heights, defined into five prescribed height bands (0-20 m, 21-40 m, 41-100 m, 101-150 m and >151 m[21]) were recorded at the point of detection and at 15 second intervals thereafter. From this the proportion of time spent flying below, within (referred to as Potential Collision Height (PCH)) and above approximate rotor height could be estimated. The actual planned rotor height is 44 – 180 m above ground level. This difference is accounted for within the collision risk models on the assumption of even flight distribution within each height band;
- The route followed was plotted in the field onto 1:25,000 scale maps;
- Observations of target species took priority over recording secondary species if both species were present simultaneously;
- The number of birds recorded were the minimum number of individuals that could account for the activity observed; and
- Observers only recorded perched birds and birds on waterbodies once only on arrival at the VP. Thereafter only flying birds and newly noticed perched/swimming birds were included in the activity summaries.

B.2 Moorland Breeding Bird Survey

Upland breeding bird survey methodology was employed as detailed within NatureScot guidance (SNH, 2017[i] P.11). In summary, surveys involved the following:

- Open upland (including hedgerows, scrub, isolated trees and copses) was surveyed using an intensive version of the Brown and Shepherd (1993[ii]) method for upland bird survey;
- The objectives were to map the distribution of breeding bird territories within 500 m of the site and estimate the approximate size of breeding bird populations;
- After each survey visit one overview map was then produced showing all target species. The maps from all four survey visits from that year were then compared, enabling the estimation of numbers of breeding territories. This was done by grouping the observations into territories using the methodology described by Bibby *et al*. (2000[iii]). Due to the cryptic nature of many breeding birds and the necessary assumptions made when plotting territories, a minimum and maximum number of territories was identified for each target species;
- The survey covered all areas within 500 m of the Site; and

- All upland wader species were recorded during the breeding bird survey.

Timing

- As recommended in Calladine *et al.* (2009[iv]), four survey visits were undertaken between April and July;
- Fieldwork was undertaken between sunrise and 1800hrs; and
- Fieldwork was not undertaken in conditions considered likely to affect bird detection rates, for example in winds greater than Beaufort Scale Force 4, persistent precipitation, poor visibility (less than 300 m), or in unusually hot weather.

Field Methods

- Walk-routes which optimised ground visibility were used;
- Surveyors paused at appropriate vantage and listening points;
- Isolated trees, copses and patches of scrub were approached and examined;
- Streams, ditches and hedgerows were walked;
- All other areas were approached to within 100 m; and
- Registrations were mapped at the first location that behaviour indicative of breeding was observed; and
- Standard British Trust for Ornithology (BTO) activity codes were used.

B.3 Winter Walkover

Winter walkovers were performed in the non-breeding seasons to map wintering populations of birds within 500 m of the Site.

- The area was surveyed three times during each non-breeding season;
- These surveys involved following a route that optimised ground coverage, such that observers walked within 250 m of every point; and
- Observers periodically stopped at appropriate viewing and listening points along the route and longer vantage point watches were included within the walkover to allow potentially important areas to be monitored in greater detail.

B.4 Scarce Breeding Bird Survey

The aim of the scarce breeding bird surveys was to determine the distribution of occupied nests/territories for target raptor, owl and diver species within 2 km of the Site and record breeding success. Secondary species such as buzzard, sparrowhawk and kestrel were also noted but location of their nests was not the key focus of the surveys. Surveys were undertaken by experienced and licensed[19] field ornithologists. Extreme care was taken to avoid unnecessary disturbance to breeding birds.

[19] All surveyors hold SNH Schedule 1 Licences.

Guidance from NatureScot (SNH, 2017[i] P.11-14), '*Bird Monitoring Methods*' (Gilbert *et al.* 1998[v]) and '*Raptors: a field guide to survey and monitoring*' (Hardey *et al.* 2013[vi]) were all consulted to inform survey methodology and are referenced where appropriate in the species methodologies below.

Barn Owl

- The surveys followed methodology outlined in Gilbert *et al.* (1998[v]), as mentioned in NatureScot (SNH, 2017[i] P12-13);
- Surveys were undertaken within 1 km of the Site; and
- Surveyors checked for signs of occupation (moulted feathers, pellets) in all suitable buildings within this 1 km buffer.

Goshawk

Methodology outlined in Hardey *et al.* (2013[vi]) was used as guidance for the surveying of areas for potential goshawk breeding. Extreme care was taken not to disturb potential nests especially around the time of year when females were likely to be laying or incubating.

- Areas of suitable woodland were observed for the presence of nests. Searches for goshawk nests were focused on mature forestry blocks, although their presence was not ruled out of other wooded areas;
- Searches carried out between March and April focussed on observing territorial and nest building behaviours;
- Where nests were known to be present, scans were carried out between mid-March and May to confirm breeding. Scans were kept brief – carried out for between 5-10 minutes and from a distance; and
- When breeding was confirmed, searches for further nests were deferred until such a time as the young had hatched. Searches were then undertaken between late May and late June for evidence of provisioning young and then between late July and early August to watch for fledgling activity, this included listening for the begging calls of newly fledged young.

Hen Harrier

Methodology outlined in Hardey *et al.* (2013[vi]) was used as guidance for the surveying of areas for potential hen harrier breeding. Extreme care was taken not to disturb potential nests especially around the time of year when females were likely to be laying or in cold/wet weather when females were likely to be incubating or brooding. Areas of suitable habitat[20] were visited during four time periods across the breeding season to:

- Check for territory occupancy (between March and mid-April) – this consisted of watching over suitable habitat from a good vantage point for displaying males (and females) and checking all areas of suitable habitat to within 250 m (watching out for signs of kills);
- Locate incubating females (between mid-April and late May) by listening for female begging calls and watching for food passes between the male and female – surveyors

[20] Unsuitable habitat areas include: land above 600 m; improved pasture and arable land; extensive areas of degraded land with no heather cover and low vegetation; the vicinity of cliffs, rocky outcrops, boulder fields and scree; areas within 100 m of hill farms and occupied dwellings.

watched for at least four hours as Hardey *et al.* (2013[vi]) notes that when the female is incubating it can be up to six hours between feeding visits from the male, but on average it is less than every four hours. Surveys were undertaken between 06:00 to 12:00 or 16:00 to 20:00;

- Check for young or breeding evidence (between late May and late June) again by listening for female begging calls and watching for food passes between male and female when the female is brooding and watching for the male and female provisioning the nest with food once brooding has ended– surveyors should watch for at least two hours as Hardey *et al.* (2013[vi]) notes that an adult bird will visit the nest every 1-2 hours. Surveyors should also watch for display behaviour which could indicate a failed breeding attempt; and
- Check for fledged young (between late June and late August).

Merlin

Methodology outlined in Hardey *et al.* (2013[vi]) was used as guidance for the surveying of areas for potential merlin breeding.

- Areas of suitable nesting habitat (including forest edge where trees are >5 m high) were closely observed between 20th March and 30th April;
- Boulders, fence lines, isolated posts, stone dykes, grouse butts, hummocks, stream banks, crags, trees and recently burnt areas of heather were checked for signs of occupation (e.g. plucked prey, moulted feathers, pellets and faeces);
- If merlin were observed, or signs found, areas were visited at least twice to verify occupation of the territory; and
- Potential nest areas were watched for 4-6 hours if necessary.

Osprey

Methodology outlined in Hardey *et al.* (2013[vi]) and Gilbert *et al.* (1998[v]) was used as guidance for the surveying of areas for potential osprey breeding. Care was taken when carrying out the searches so as not to disturb any displaying or nesting birds, with nests checked from a distance.

- All wooded areas within the study area were searched for the possible presence of nests, especially those located close to freshwater lochs and rivers that could provide feeding sites. Artificial platforms were also checked;
- If breeding was suspected within the study area, the location was visited between April and May until nesting was confirmed. In line with the methods suggested by Gilbert *et al.* (1998[v]) and Hardey *et al.* (2013[vi]), proof of occupancy was determined by: two ospreys seen on the same eyrie on more than one occasion (with a week separating observations); incubation; or feeding of chicks.
- Further scans were undertaken between late May and early July to try and observe any young in the nests.

Peregrine Falcon

- Potential nest sites were visited and checked for evidence of occupation between March and April;

- Sites checked included crags and steep banks identified from OS maps and searches of the survey area;
- Surveyors checked for signs of occupation (e.g. faecal splash, fresh plucked prey);
- If occupied sites were found they were re-visited to verify incubation; and
- Searches were made for eyries. Where this was not possible sites were watched from a suitable vantage point for 3-4 hours or until a nest was located.

Red Kite

Care was taken not to disturb any birds, especially between mid-March and mid-April when disturbance to displaying red kites can cause them to move to another area (Hardey *et al.* 2013[vi]).

- Wooded areas were scanned from outside for the presence of nests, with signs occupation searched for between February and March;
- Potential territories were watched for 1-2 hours between March and April to observe any breeding or nest-building behaviour; and
- Where breeding was confirmed, nests were scanned to determine the breeding success between late April and late June/early July.

Short-Eared Owl

- At least two visits between early April and the end of May were carried out;
- Suitable habitat was visited and checked for evidence of hunting males, territorial activity and other signs of presence; and
- If breeding was confirmed, a further visit was be made in June to watch birds, locate nest-sites and confirm breeding behaviour wherever possible.

B.5 Black Grouse Survey

The survey methodology used is detailed in NatureScot guidance (SNH, 2017[i] P.12). A summary is provided below.

- Breeding black grouse were surveyed within 1.5 km of the Site by counting total numbers of males and females at leks, most lekking activity taking place at or soon after dawn in spring.
- Known lek sites and other areas of suitable habitat which can host leks were identified and visited during April and May within 2 hours of dawn on calm dry days with good visibility;
- Visits involved listening and scanning for lekking black grouse from strategic locations (avoiding disturbance of leks) and during walks between these locations ensuring that all potential habitat was covered;
- The maximum count of males in the 2 hours around dawn gives the standard count estimate but the maximum number of females seen was also presented; and
- Leks that were at least 200 m apart within the same year were treated as separate leks.

[i] Scottish Natural Heritage (2017) Recommended bird survey methods to inform impact assessment of onshore windfarms.
[ii] Brown, A. F. and Shepherd, K. B. (1993) A method for censusing upland breeding waders. Bird Study, 40: 189-195.
[iii] Bibby, C. J., Neil D. Burgess, David A. Hill and Simon H. Mustoe (2000) Bird Census Techniques, 2nd Edition, London, Academic Press.
[iv] Calladine. J., Garner, G., Wernham, C., & Thiel, A. (2009) The influence of survey frequency on population estimates of moorland breeding birds. Bird Study, 56: 3, 381-388.
[v] Gilbert, G., Gibbons, D. W. and Evans, J. (1998) Bird Monitoring Methods. RSPB, Sandy.
[vi] Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. and Thompson, D. (2013) Raptors: a field guide for surveys and monitoring (3rd edition). The Stationery Office, Edinburgh.

APPENDIX C ORNITHOLOGICAL SURVEY EFFORT & GENERAL INFORMATION

C.1 Ornithological Survey Effort & General Information

Table C-1 shows the system used for recording weather conditions on all the surveys (sections **C.2** to **C.6** below).

Table C-1 Key to meteorological conditions recorded during all surveys

Wind speed				Rain		Cloud cover		Cloud height	
Calm	0	Moderate gale	7	None	0	In eighths		<150m	0
Light air	1	Fresh gale	8	Drizzle/Mist	1	*e.g.*	3/8	150-500m	1
Light breeze	2	Strong gale	9	Light showers	2			>500m	2
Gentle breeze	3	Whole gale	10	Heavy showers	3				
Moderate breeze	4	Storm	11	Heavy rain	4				
Fresh breeze	5	Hurricane	12	**Snow**		**Frost**		**Visibility**	
Strong breeze	6			None	0	None	0	Poor (<1km)	0
				On site	1	Ground	1	Moderate (1-2km)	1
				High ground	2	All day	2	Good (>2km)	2

C.2 Flight Activity Surveys

Flight activity surveys were undertaken during the 2020 and 2021 breeding seasons and 2020/2021 and 2021/2022 non-breeding seasons. Details of the flight activity surveys undertaken across each Vantage Point (VP) location are supplied in **Table C-2** (survey hours per VP per season are summarised in **Technical Appendix 7.1**) and the associated weather data recorded is detailed in **Table C-3**. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-2 Summary of flight activity surveys undertaken at Ladyfield Renewable Energy Park (sorted chronologically)

Date	Season	VP	Observer	Survey start time	Survey finish time	No. hours[1] surveyed
24/03/2020	2020 BR	4	WS	1005	1305	3
24/03/2020	2020 BR	4	WS	1335	1635	3
26/03/2020	2020 BR	1	WS	0845	1145	3
26/03/2020	2020 BR	1	WS	1215	1515	3
28/03/2020	2020 BR	2	WS	0930	1230	3
28/03/2020	2020 BR	2	WS	1300	1600	3
29/03/2020	2020 BR	3	WS	0935	1235	3
29/03/2020	2020 BR	3	WS	1305	1605	3
06/04/2020	2020 BR	4	WS	0900	1200	3
06/04/2020	2020 BR	4	WS	1230	1530	3
09/04/2020	2020 BR	1	WS	0840	1140	3
09/04/2020	2020 BR	1	WS	1210	1510	3
11/04/2020	2020 BR	2	WS	0820	1120	3
11/04/2020	2020 BR	2	WS	1335	1635	3
14/04/2020	2020 BR	3	WS	0730	1030	3
14/04/2020	2020 BR	3	WS	1100	1400	3

[1] Note: only valid hours (i.e. where visibility was at least 1 km) are presented in this column.

Date	Season	VP	Observer	Survey start time	Survey finish time	No. hours[1] surveyed
06/05/2020	2020 BR	2	WS	0850	1150	3
07/05/2020	2020 BR	3	WS	1005	1305	3
07/05/2020	2020 BR	3	WS	1335	1635	3
12/05/2020	2020 BR	2	WS	1025	1325	3
13/05/2020	2020 BR	1	WS	0820	1120	3
13/05/2020	2020 BR	1	WS	1150	1450	3
19/05/2020	2020 BR	4	WS	0830	1130	3
19/05/2020	2020 BR	4	WS	1200	1500	3
01/06/2020	2020 BR	1	WS	0825	1125	3
01/06/2020	2020 BR	1	WS	1155	1455	3
06/06/2020	2020 BR	2	WS	0910	1210	3
06/06/2020	2020 BR	2	WS	1240	1540	3
08/06/2020	2020 BR	3	WS	0845	1145	3
08/06/2020	2020 BR	3	WS	1355	1655	3
12/06/2020	2020 BR	4	WS	0745	1045	3
12/06/2020	2020 BR	4	WS	1210	1510	3
06/07/2020	2020 BR	2	WS	0820	1120	3
06/07/2020	2020 BR	2	WS	1150	1450	3
08/07/2020	2020 BR	1	WS	0920	1220	3
08/07/2020	2020 BR	1	WS	1250	1550	3
09/07/2020	2020 BR	3	WS	0820	1120	3
09/07/2020	2020 BR	3	WS	1150	1450	3
11/07/2020	2020 BR	4	WS	0515	0815	3
11/07/2020	2020 BR	4	WS	0845	1145	3
01/08/2020	2020 BR	3	WS	1000	1300	3
01/08/2020	2020 BR	3	WS	1330	1630	3
10/08/2020	2020 BR	1	WS	0745	1045	3
10/08/2020	2020 BR	1	WS	1115	1415	3
12/08/2020	2020 BR	2	WS	0740	1040	3
12/08/2020	2020 BR	2	WS	1110	1410	3
16/08/2020	2020 BR	4	WS	0750	1050	3
16/08/2020	2020 BR	4	WS	1120	1420	3
01/09/2020	2020/2021 NBR	1	WS	0935	1235	3
01/09/2020	2020/2021 NBR	1	WS	1305	1505	2
09/09/2020	2020/2021 NBR	4	WS	0705	1005	3
09/09/2020	2020/2021 NBR	4	WS	1035	1335	3
10/09/2020	2020/2021 NBR	3	WS	0830	1130	3
10/09/2020	2020/2021 NBR	3	WS	1200	1500	3
16/09/2020	2020/2021 NBR	2	WS	0950	1250	3
16/09/2020	2020/2021 NBR	2	WS	1320	1620	3
22/10/2020	2020/2021 NBR	2	WS	1000	1300	3
22/10/2020	2020/2021 NBR	2	WS	1330	1630	3
25/10/2020	2020/2021 NBR	1	WS	0850	1150	3
25/10/2020	2020/2021 NBR	1	WS	1220	1420	2
28/10/2020	2020/2021 NBR	4	WS	0740	1040	3
28/10/2020	2020/2021 NBR	4	WS	1110	1410	3
30/10/2020	2020/2021 NBR	3	WS	0750	1050	3
30/10/2020	2020/2021 NBR	3	WS	1120	1420	3
04/11/2020	2020/2021 NBR	2	WS	0810	1110	3
04/11/2020	2020/2021 NBR	2	WS	1140	1440	3
07/11/2020	2020/2021 NBR	1	WS	0750	1050	3
07/11/2020	2020/2021 NBR	1	WS	1120	1420	3
16/11/2020	2020/2021 NBR	4	WS	0830	1130	3
16/11/2020	2020/2021 NBR	4	WS	1200	1500	3

Date	Season	VP	Observer	Survey start time	Survey finish time	No. hours[1] surveyed
19/11/2020	2020/2021 NBR	1	WS	1120	1220	1
25/11/2020	2020/2021 NBR	3	WS	0905	1205	3
25/11/2020	2020/2021 NBR	3	WS	1255	1555	3
07/12/2020	2020/2021 NBR	4	WS	0835	1135	3
07/12/2020	2020/2021 NBR	4	WS	1205	1505	3
15/12/2020	2020/2021 NBR	1	WS	0850	1150	3
15/12/2020	2020/2021 NBR	1	WS	1220	1520	3
17/12/2020	2020/2021 NBR	3	WS	0840	1140	3
17/12/2020	2020/2021 NBR	3	WS	1210	1510	3
22/12/2020	2020/2021 NBR	2	WS	0855	1155	3
22/12/2020	2020/2021 NBR	2	WS	1225	1525	3
03/01/2021	2020/2021 NBR	4	WS	0845	1145	3
03/01/2021	2020/2021 NBR	4	WS	1215	1515	3
18/01/2021	2020/2021 NBR	3	WS	0825	1125	3
18/01/2021	2020/2021 NBR	3	WS	1155	1455	3
20/01/2021	2020/2021 NBR	2	WS	0900	1200	2.35
20/01/2021	2020/2021 NBR	2	WS	1230	1500	0.5
27/01/2021	2020/2021 NBR	1	WS	0900	1200	1
27/01/2021	2020/2021 NBR	1	WS	1230	1530	2
10/02/2021	2020/2021 NBR	4	WS	0820	1120	3
10/02/2021	2020/2021 NBR	4	WS	1150	1450	3
21/02/2021	2020/2021 NBR	1	WS	0920	1220	3
21/02/2021	2020/2021 NBR	1	WS	1250	1550	3
22/02/2021	2020/2021 NBR	2	WS	0730	1030	3
22/02/2021	2020/2021 NBR	2	WS	1100	1400	3
25/02/2021	2020/2021 NBR	3	WS	0740	1040	3
25/02/2021	2020/2021 NBR	3	WS	1110	1410	3
02/03/2021	2020/2021 NBR	1	WS	0920	1220	3
02/03/2021	2020/2021 NBR	1	WS	1250	1550	3
05/03/2021	2020/2021 NBR	2	WS	1020	1320	3
05/03/2021	2020/2021 NBR	2	WS	1350	1650	3
06/03/2021	2020/2021 NBR	3	WS	0920	1220	3
06/03/2021	2020/2021 NBR	3	WS	1250	1550	3
08/03/2021	2020/2021 NBR	4	WS	0830	1130	3
08/03/2021	2020/2021 NBR	4	WS	1200	1500	3
15/03/2021	2021 BR	5	WS	0930	1230	3
15/03/2021	2021 BR	5	WS	1300	1500	2
18/03/2021	2021 BR	2	WS	0830	1130	3
18/03/2021	2021 BR	2	WS	1200	1500	3
19/03/2021	2021 BR	1	WS	0830	1130	3
19/03/2021	2021 BR	1	WS	1200	1500	3
26/03/2021	2021 BR	4	WS	0810	1110	3
26/03/2021	2021 BR	4	WS	1150	1450	3
06/04/2021	2021 BR	2	WS	0735	1035	3
06/04/2021	2021 BR	2	WS	1105	1405	3
07/04/2021	2021 BR	5	WS	0850	1150	3
07/04/2021	2021 BR	5	WS	1320	1620	3
16/04/2021	2021 BR	5	WS	0900	1000	1
17/04/2021	2021 BR	1	WS	0740	1040	3
17/04/2021	2021 BR	1	WS	1110	1410	3
20/04/2021	2021 BR	4	WS	0805	1105	3
20/04/2021	2021 BR	4	WS	1135	1435	3
02/05/2021	2021 BR	2	WS	0700	1000	3
02/05/2021	2021 BR	2	WS	1030	1330	3

Date	Season	VP	Observer	Survey start time	Survey finish time	No. hours[1] surveyed
12/05/2021	2021 BR	5	WS	1430	1730	3
12/05/2021	2021 BR	5	WS	1820	2120	3
24/05/2021	2021 BR	4	WS	1010	1310	3
24/05/2021	2021 BR	4	WS	1340	1640	3
26/05/2021	2021 BR	1	WS	0800	1100	3
26/05/2021	2021 BR	1	WS	1130	1430	3
07/06/2021	2021 BR	5	WS	0800	1100	3
07/06/2021	2021 BR	5	WS	1130	1430	3
08/06/2021	2021 BR	1	WS	0850	1150	3
08/06/2021	2021 BR	1	WS	1220	1520	3
17/06/2021	2021 BR	2	WS	0715	1015	3
17/06/2021	2021 BR	2	WS	1045	1345	3
24/06/2021	2021 BR	4	WS	0735	1035	3
24/06/2021	2021 BR	4	WS	1105	1405	3
08/07/2021	2021 BR	1	WS	1445	1745	1.34
08/07/2021	2021 BR	1	WS	1815	2115	3
13/07/2021	2021 BR	5	WS	1050	1350	2.83
13/07/2021	2021 BR	5	WS	1420	1600	1.67
14/07/2021	2021 BR	2	WS	0935	1235	3
14/07/2021	2021 BR	2	WS	1305	1605	3
19/07/2021	2021 BR	4	WS	1120	1420	3
19/07/2021	2021 BR	4	WS	1450	1750	3
02/08/2021	2021 BR	1	WS	1230	1530	3
02/08/2021	2021 BR	1	WS	1600	1900	3
06/08/2021	2021 BR	4	WS	0845	1145	3
06/08/2021	2021 BR	4	WS	1215	1515	3
12/08/2021	2021 BR	2	WS	1000	1300	3
12/08/2021	2021 BR	2	WS	1330	1630	3
16/08/2021	2021 BR	5	WS	1100	1400	3
16/08/2021	2021 BR	5	WS	1430	1730	3
18/08/2021	2021 BR	1	WS	1105	1305	2
18/08/2021	2021 BR	5	WS	1325	1455	1.5
14/09/2021	2021/2022 NBR	4	WS	0935	1235	3
14/09/2021	2021/2022 NBR	4	WS	1205	1605	3
16/09/2021	2021/2022 NBR	1	WS	1140	1440	3
16/09/2021	2021/2022 NBR	1	WS	1510	1745	2.58
18/09/2021	2021/2022 NBR	5	WS	0945	1245	3
18/09/2021	2021/2022 NBR	5	WS	1315	1615	3
29/09/2021	2021/2022 NBR	2	WS	0900	1200	3
29/09/2021	2021/2022 NBR	2	WS	1230	1530	3
05/10/2021	2021/2022 NBR	5	WS	1045	1355	3
05/10/2021	2021/2022 NBR	5	WS	1425	1715	3
20/10/2021	2021/2022 NBR	4	WS	0745	1045	3
20/10/2021	2021/2022 NBR	4	WS	1115	1415	3
22/10/2021	2021/2022 NBR	2	WS	0750	1050	3
22/10/2021	2021/2022 NBR	2	WS	1120	1420	3
02/11/2021	2021/2022 NBR	4	WS	0945	1245	3
02/11/2021	2021/2022 NBR	4	WS	1315	1615	3
07/11/2021	2021/2022 NBR	2	WS	1000	1300	3
07/11/2021	2021/2022 NBR	2	WS	1330	1630	3
10/11/2021	2021/2022 NBR	1	WS	0925	1225	0.83
10/11/2021	2021/2022 NBR	1	WS	1240	1255	0
13/11/2021	2021/2022 NBR	1	WS	0915	1215	3
13/11/2021	2021/2022 NBR	1	WS	1245	1500	2.25

Date	Season	VP	Observer	Survey start time	Survey finish time	No. hours[1] surveyed
24/11/2021	2021/2022 NBR	1	WS	0940	1240	3
24/11/2021	2021/2022 NBR	1	WS	1310	1525	2.25
26/11/2021	2021/2022 NBR	5	WS	0915	1215	3
26/11/2021	2021/2022 NBR	5	WS	1245	1525	3
01/12/2021	2021/2022 NBR	5	WS	0920	1220	3
01/12/2021	2021/2022 NBR	5	WS	1250	1550	3
05/12/2021	2021/2022 NBR	1	WS	0925	1225	3
05/12/2021	2021/2022 NBR	1	WS	1255	1555	3
10/12/2021	2021/2022 NBR	2	WS	0905	1205	3
10/12/2021	2021/2022 NBR	2	WS	1235	1535	3
16/12/2021	2021/2022 NBR	4	WS	0915	1215	3
16/12/2021	2021/2022 NBR	4	WS	1245	1545	3
11/01/2022	2021/2022 NBR	2	WS	0955	1255	3
11/01/2022	2021/2022 NBR	2	WS	1325	1625	3
23/01/2022	2021/2022 NBR	4	WS	1015	1315	3
23/01/2022	2021/2022 NBR	4	WS	1345	1645	3
27/01/2022	2021/2022 NBR	5	WS	0920	1220	3
27/01/2022	2021/2022 NBR	5	WS	1250	1550	3
31/01/2022	2021/2022 NBR	5	WS	0925	1225	3
31/01/2022	2021/2022 NBR	5	WS	1255	1555	3
07/02/2022	2021/2022 NBR	4	WS	0920	1220	3
07/02/2022	2021/2022 NBR	4	WS	1250	1550	3
11/02/2022	2021/2022 NBR	1	WS	0940	1240	3
11/02/2022	2021/2022 NBR	1	WS	1310	1610	3
22/02/2022	2021/2022 NBR	2	WS	0950	1250	3
22/02/2022	2021/2022 NBR	2	WS	1320	1650	3
01/03/2022	2021/2022 NBR	1	WS	0845	1145	3
01/03/2022	2021/2022 NBR	1	WS	1215	1515	3
07/03/2022	2021/2022 NBR	1	WS	1245	1400	1.25

Table C-3 Meteorological conditions during flight activity surveys at Ladyfield Renewable Energy Park (sorted chronologically)

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
24/03/2020	4	WS	1005	1305	1	3	S	3	8	1	2	0	0
24/03/2020	4	WS	1005	1305	2	2	S	3	8	1	1	0	0
24/03/2020	4	WS	1005	1305	3	3	S	1	8	1	2	0	0
24/03/2020	4	WS	1335	1635	1	3	S	0	8	1	2	0	0
24/03/2020	4	WS	1335	1635	2	3	S	0	8	1	2	0	0
24/03/2020	4	WS	1335	1635	3	3	S	1	8	1	2	0	0
26/03/2020	1	WS	0845	1145	1	1	NW	0	8	1	2	0	2
26/03/2020	1	WS	0845	1145	2	2	NW	0	8	1	1	0	2
26/03/2020	1	WS	0845	1145	3	1	VAR	0	8	0	1	0	2
26/03/2020	1	WS	1215	1515	1	2	E	0	8	1	2	0	2
26/03/2020	1	WS	1215	1515	2	2	S	0	8	1	2	0	2
26/03/2020	1	WS	1215	1515	3	1	S	0	8	1	2	0	2
28/03/2020	2	WS	0930	1230	1	4	NNE	0	3	2	2	0	2
28/03/2020	2	WS	0930	1230	2	4	NNE	0	7	2	2	0	2
28/03/2020	2	WS	0930	1230	3	4	NNE	0	7	2	2	0	2
28/03/2020	2	WS	1300	1600	1	4	NE	0	6	2	2	0	2
28/03/2020	2	WS	1300	1600	2	4	NE	0	6	2	2	0	2
28/03/2020	2	WS	1300	1600	3	4	NE	0	7	2	2	0	2
29/03/2020	3	WS	0935	1235	1	1	N	0	4	2	2	2	2
29/03/2020	3	WS	0935	1235	2	1	N	0	8	2	2	2	2
29/03/2020	3	WS	0935	1235	3	2	N	0	7	2	2	2	2
29/03/2020	3	WS	1305	1605	1	3	NNW	0	6	2	2	2	2
29/03/2020	3	WS	1305	1605	2	2	N	0	5	2	2	2	2
29/03/2020	3	WS	1305	1605	3	2	N	0	6	2	2	2	2
06/04/2020	3	WS	0900	1200	1	3	SW	1	8	1	2	0	0
06/04/2020	3	WS	0900	1200	2	4	SW	2	7	1	2	0	0
06/04/2020	3	WS	0900	1200	3	3	SW	2	7	1	2	0	0
06/04/2020	3	WS	1230	1530	1	4	WSW	0	5	2	2	0	0
06/04/2020	3	WS	1230	1530	2	4	WSW	0	6	2	2	0	0
06/04/2020	3	WS	1230	1530	3	4	WSW	0	5	2	2	0	0
09/04/2020	1	WS	0840	1140	1	2	E	1	8	1	2	0	2
09/04/2020	1	WS	0840	1140	2	3	E	0	8	1	2	0	2
09/04/2020	1	WS	0840	1140	3	3	E	0	8	1	2	0	2
09/04/2020	1	WS	1210	1510	1	3	SE	0	8	1	2	0	2
09/04/2020	1	WS	1210	1510	2	2	SE	0	8	1	2	0	2
09/04/2020	1	WS	1210	1510	3	2	SE	0	8	1	2	0	2
11/04/2020	2	WS	0820	1120	1	3	SW	1	8	1	1	0	0
11/04/2020	2	WS	0820	1120	2	3	SW	2	8	1	2	0	0
11/04/2020	2	WS	0820	1120	3	3	WSW	2	8	1	2	0	0
11/04/2020	2	WS	1335	1635	1	2	W	2	8	1	2	0	0
11/04/2020	2	WS	1335	1635	2	2	W	0	7	1	2	0	0
11/04/2020	2	WS	1335	1635	3	2	W	0	8	1	2	0	0
14/04/2020	3	WS	0730	1030	1	2	W	0	2	1	2	1	2
14/04/2020	3	WS	0730	1030	2	2	W	0	4	1	2	1	2
14/04/2020	3	WS	0730	1030	3	2	W	0	7	1	2	1	2
14/04/2020	3	WS	1100	1400	1	2	W	0	7	2	2	0	2
14/04/2020	3	WS	1100	1400	2	2	W	0	6	2	2	0	2
14/04/2020	3	WS	1100	1400	3	3	W	0	5	2	2	0	2
06/05/2020	2	WS	0850	1150	1	1	VAR	0	0	2	2	0	0
06/05/2020	2	WS	0850	1150	2	1	SW	0	0	2	2	0	0
06/05/2020	2	WS	0850	1150	3	1	SW	0	1	2	2	0	0
07/05/2020	3	WS	1005	1305	1	2	SSW	1	8	1	2	0	0

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
07/05/2020	3	WS	1005	1305	2	2	S	1	8	0	1	0	0
07/05/2020	3	WS	1005	1305	3	2	S	0	8	0	2	0	0
07/05/2020	3	WS	1335	1635	1	3	S	0	8	1	2	0	0
07/05/2020	3	WS	1335	1635	2	3	S	0	8	1	2	0	0
07/05/2020	3	WS	1335	1635	3	3	S	0	7	1	2	0	0
12/05/2020	2	WS	1025	1325	1	4	NW	0	7	2	2	0	0
12/05/2020	2	WS	1025	1325	2	3	NW	0	8	2	2	0	0
12/05/2020	2	WS	1025	1325	3	4	NW	0	8	1	2	0	0
13/05/2020	1	WS	0820	1120	1	4	N	0	1	2	2	1	2
13/05/2020	1	WS	0820	1120	2	2	N	0	4	2	2	1	2
13/05/2020	1	WS	0820	1120	3	3	N	0	6	2	2	0	2
13/05/2020	1	WS	1150	1450	1	2	N	0	7	2	2	0	0
13/05/2020	1	WS	1150	1450	2	2	N	0	6	2	2	0	0
13/05/2020	1	WS	1150	1450	3	2	N	0	6	2	2	0	0
19/05/2020	4	WS	0830	1130	1	1	VAR	1	8	1	1	0	0
19/05/2020	4	WS	0830	1130	2	2	VAR	1	8	1	2	0	0
19/05/2020	4	WS	0830	1130	3	2	SW	0	8	1	2	0	0
19/05/2020	4	WS	1200	1500	1	2	SW	0	8	1	2	0	0
19/05/2020	4	WS	1200	1500	2	2	VAR	0	8	1	2	0	0
19/05/2020	4	WS	1200	1500	3	1	VAR	1	8	1	2	0	0
01/06/2020	1	WS	0825	1125	1	1	SE	0	1	2	2	0	0
01/06/2020	1	WS	0825	1125	2	1	SE	0	1	2	2	0	0
01/06/2020	1	WS	0825	1125	3	1	SE	0	0	2	2	0	0
01/06/2020	1	WS	1155	1455	1	1	SE	0	1	2	2	0	0
01/06/2020	1	WS	1155	1455	2	1	SE	0	2	2	2	0	0
01/06/2020	1	WS	1155	1455	3	1	SE	0	4	2	2	0	0
06/06/2020	2	WS	0910	1210	1	3	NW	0	8	1	2	0	0
06/06/2020	2	WS	0910	1210	2	2	NW	2	8	1	2	0	0
06/06/2020	2	WS	0910	1210	3	3	NNW	0	8	1	2	0	0
06/06/2020	2	WS	1240	1540	1	2	NNW	0	8	1	2	0	0
06/06/2020	2	WS	1240	1540	2	2	NNW	0	8	1	2	0	0
06/06/2020	2	WS	1240	1540	3	2	NNW	0	8	1	2	0	0
08/06/2020	3	WS	0845	1145	1	1	ESE	0	8	2	2	0	0
08/06/2020	3	WS	0845	1145	2	1	SE	0	7	2	2	0	0
08/06/2020	3	WS	0845	1145	3	1	VAR	0	7	2	2	0	0
08/06/2020	3	WS	1355	1655	1	1	W	0	8	2	2	0	0
08/06/2020	3	WS	1355	1655	2	1	W	0	8	2	2	0	0
08/06/2020	3	WS	1355	1655	3	1	W	0	8	2	2	0	0
12/06/2020	4	WS	0745	1045	1	2	N	0	8	2	2	0	0
12/06/2020	4	WS	0745	1045	2	2	N	0	8	2	2	0	0
12/06/2020	4	WS	0745	1045	3	1	N	0	8	2	2	0	0
12/06/2020	4	WS	1210	1510	1	2	NE	0	7	2	2	0	0
12/06/2020	4	WS	1210	1510	2	2	NE	0	5	2	2	0	0
12/06/2020	4	WS	1210	1510	3	2	ENE	0	6	2	2	0	0
06/07/2020	2	WS	0820	1120	1	3	NW	0	7	1	2	0	0
06/07/2020	2	WS	0820	1120	2	3	NW	0	8	1	2	0	0
06/07/2020	2	WS	0820	1120	3	4	NW	0	7	1	2	0	0
06/07/2020	2	WS	1150	1450	1	4	NW	0	8	1	2	0	0
06/07/2020	2	WS	1150	1450	2	4	NW	0	8	2	2	0	0
06/07/2020	2	WS	1150	1450	3	4	NW	0	7	1	2	0	0
08/07/2020	1	WS	0920	1220	1	2	S	0	8	1	2	0	0
08/07/2020	1	WS	0920	1220	2	2	S	0	8	2	2	0	0
08/07/2020	1	WS	0920	1220	3	2	S	0	8	2	2	0	0

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
08/07/2020	1	WS	1250	1550	1	2	S	0	7	2	2	0	0
08/07/2020	1	WS	1250	1550	2	2	S	0	8	2	2	0	0
08/07/2020	1	WS	1250	1550	3	2	S	0	8	2	2	0	0
09/07/2020	3	WS	0820	1120	1	2	NW	0	7	1	2	0	0
09/07/2020	3	WS	0820	1120	2	2	NNW	0	7	1	2	0	0
09/07/2020	3	WS	0820	1120	3	3	NNW	0	7	1	2	0	0
09/07/2020	3	WS	1150	1450	1	3	NW	0	7	2	2	0	0
09/07/2020	3	WS	1150	1450	2	3	NW	0	7	2	2	0	0
09/07/2020	3	WS	1150	1450	3	3	NW	0	7	2	2	0	0
11/07/2020	4	WS	0515	0815	1	0	-	0	8	0	2	0	0
11/07/2020	4	WS	0515	0815	2	1	NW	2	8	1	1	0	0
11/07/2020	4	WS	0515	0815	3	1	NW	0	8	1	2	0	0
11/07/2020	4	WS	0845	1145	1	2	NW	3	8	1	2	0	0
11/07/2020	4	WS	0845	1145	2	2	NW	0	7	1	2	0	0
11/07/2020	4	WS	0845	1145	3	2	NW	0	8	1	2	0	0
01/08/2020	3	WS	1000	1300	1	2	W	0	8	1	2	0	0
01/08/2020	3	WS	1000	1300	2	3	W	2	8	1	2	0	0
01/08/2020	3	WS	1000	1300	3	2	W	0	8	1	2	0	0
01/08/2020	3	WS	1330	1630	1	2	W	0	8	2	2	0	0
01/08/2020	3	WS	1330	1630	2	3	W	0	8	2	2	0	0
01/08/2020	3	WS	1330	1630	3	2	W	0	8	2	2	0	0
10/08/2020	1	WS	0745	1045	1	3	E	0	1	1	2	0	0
10/08/2020	1	WS	0745	1045	2	3	E	0	3	1	2	0	0
10/08/2020	1	WS	0745	1045	3	3	E	0	6	1	2	0	0
10/08/2020	1	WS	1115	1415	1	3	E	0	8	1	2	0	0
10/08/2020	1	WS	1115	1415	2	3	E	0	7	1	2	0	0
10/08/2020	1	WS	1115	1415	3	3	E	0	4	1	2	0	0
12/08/2020	2	WS	0740	1040	1	1	NW	0	8	1	2	0	0
12/08/2020	2	WS	0740	1040	2	1	NW	0	8	1	2	0	0
12/08/2020	2	WS	0740	1040	3	1	NW	0	8	1	2	0	0
12/08/2020	2	WS	1110	1410	1	1	NNW	0	8	1	2	0	0
12/08/2020	2	WS	1110	1410	2	1	NNW	0	7	1	2	0	0
12/08/2020	2	WS	1110	1410	3	1	NNW	0	4	1	2	0	0
16/08/2020	4	WS	0750	1050	1	1	E	0	8	1	2	0	0
16/08/2020	4	WS	0750	1050	2	2	ENE	0	7	1	2	0	0
16/08/2020	4	WS	0750	1050	3	3	ESE	0	7	1	2	0	0
16/08/2020	4	WS	1120	1420	1	3	SE	0	6	1	2	0	0
16/08/2020	4	WS	1120	1420	2	3	SE	0	6	1	2	0	0
16/08/2020	4	WS	1120	1420	3	2	SE	0	7	1	2	0	0
01/09/2020	1	WS	0935	1235	1	2	SE	0	8	1	2	0	0
01/09/2020	1	WS	0935	1235	2	2	SE	0	8	1	2	0	0
01/09/2020	1	WS	0935	1235	3	2	SE	0	8	1	2	0	0
01/09/2020	1	WS	1305	1505	1	2	SE	2	8	1	2	0	0
01/09/2020	1	WS	1305	1505	2	2	SE	1	8	0	1	0	0
09/09/2020	4	WS	0705	1005	1	3	W	2	8	1	2	0	0
09/09/2020	4	WS	0705	1005	2	3	NW	3	7	1	2	0	0
09/09/2020	4	WS	0705	1005	3	3	W	0	8	1	2	0	0
09/09/2020	4	WS	1035	1335	1	3	WNW	3	8	1	2	0	0
09/09/2020	4	WS	1035	1335	2	3	W	2	8	1	2	0	0
09/09/2020	4	WS	1035	1335	3	3	W	0	8	1	2	0	0
10/09/2020	3	WS	0830	1130	1	2	SW	0	8	1	2	0	0
10/09/2020	3	WS	0830	1130	2	3	SSW	0	8	0	2	0	0
10/09/2020	3	WS	0830	1130	3	3	S	0	8	1	2	0	0

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
10/09/2020	3	WS	1200	1500	1	3	SSW	0	8	1	2	0	0
10/09/2020	3	WS	1200	1500	2	3	SW	3	8	1	2	0	0
10/09/2020	3	WS	1200	1500	3	3	SW	1	8	1	2	0	0
16/09/2020	2	WS	0950	1250	1	4	ESE	1	8	1	2	0	0
16/09/2020	2	WS	0950	1250	2	4	ESE	0	8	1	2	0	0
16/09/2020	2	WS	0950	1250	3	5	SE	0	8	1	2	0	0
16/09/2020	2	WS	1320	1620	1	5	SE	0	8	1	2	0	0
16/09/2020	2	WS	1320	1620	2	5	SE	0	8	1	2	0	0
16/09/2020	2	WS	1320	1620	3	5	SE	0	8	1	2	0	0
22/10/2020	2	WS	1000	1300	1	2	NNW	2	8	1	2	0	0
22/10/2020	2	WS	1000	1300	2	2	NNW	0	8	1	2	0	0
22/10/2020	2	WS	1000	1300	3	2	N	0	8	1	2	0	0
22/10/2020	2	WS	1330	1630	1	2	NW	0	8	1	2	0	0
22/10/2020	2	WS	1330	1630	2	2	SW	1	8	1	2	0	0
22/10/2020	2	WS	1330	1630	3	2	SW	1	8	1	1	0	0
25/10/2020	1	WS	0850	1150	1	3	S	3	8	1	2	0	0
25/10/2020	1	WS	0850	1150	2	3	S	3	8	1	1	0	0
25/10/2020	1	WS	0850	1150	3	3	S	3	8	1	2	0	0
25/10/2020	1	WS	1220	1420	1	4	SSW	4	8	1	2	0	0
25/10/2020	1	WS	1220	1420	2	4	SSW	4	8	1	1	0	0
28/10/2020	4	WS	0740	1040	1	3	SSW	0	8	1	2	0	0
28/10/2020	4	WS	0740	1040	2	3	SSW	2	8	1	2	0	0
28/10/2020	4	WS	0740	1040	3	3	SSW	3	8	1	2	0	0
28/10/2020	4	WS	1110	1410	1	3	S	3	8	1	2	0	0
28/10/2020	4	WS	1110	1410	2	3	S	2	8	1	2	0	0
28/10/2020	4	WS	1110	1410	3	2	S	3	8	1	2	0	0
30/10/2020	3	WS	0750	1050	1	3	W	0	7	1	2	0	0
30/10/2020	3	WS	0750	1050	2	3	W	2	8	1	2	0	0
30/10/2020	3	WS	0750	1050	3	3	W	0	6	1	2	0	0
30/10/2020	3	WS	1120	1420	1	4	W	3	7	1	2	0	0
30/10/2020	3	WS	1120	1420	2	4	W	0	5	2	2	0	0
30/10/2020	3	WS	1120	1420	3	4	W	0	7	2	2	0	0
04/11/2020	2	WS	0810	1110	1	4	NW	1	8	1	1	0	0
04/11/2020	2	WS	0810	1110	2	3	NW	1	8	1	1	0	0
04/11/2020	2	WS	0810	1110	3	3	NW	3	8	1	1	0	0
04/11/2020	2	WS	1140	1440	1	3	NW	2	8	1	2	0	0
04/11/2020	2	WS	1140	1440	2	3	NW	0	7	1	2	0	0
04/11/2020	2	WS	1140	1440	3	3	NW	0	8	1	2	0	0
07/11/2020	1	WS	0750	1050	1	1	ENE	0	2	2	2	1	0
07/11/2020	1	WS	0750	1050	2	0	-	0	2	2	2	1	0
07/11/2020	1	WS	0750	1050	3	1	E	0	2	2	2	1	0
07/11/2020	1	WS	1120	1420	1	1	SE	0	3	2	2	0	0
07/11/2020	1	WS	1120	1420	2	2	SE	0	3	2	2	0	0
07/11/2020	1	WS	1120	1420	3	2	SE	0	3	2	2	0	0
16/11/2020	4	WS	0830	1130	1	2	SW	3	8	1	2	0	0
16/11/2020	4	WS	0830	1130	2	2	SW	3	7	1	2	0	0
16/11/2020	4	WS	0830	1130	3	2	SSW	2	8	1	2	0	0
16/11/2020	4	WS	1200	1500	1	3	SW	2	7	1	2	0	0
16/11/2020	4	WS	1200	1500	2	3	SSW	2	8	1	2	0	0
16/11/2020	4	WS	1200	1500	3	3	SSW	1	8	0	2	0	0
19/11/2020	1	WS	1120	1220	1	4	NW	0	8	2	2	2	2
25/11/2020	3	WS	0905	1205	1	3	SSW	2	8	1	1	0	0
25/11/2020	3	WS	0905	1205	2	3	SW	3	8	0	1	0	0

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
25/11/2020	3	WS	0905	1205	3	3	SW	4	8	0	1	0	0
25/11/2020	3	WS	1255	1555	1	2	SW	2	8	1	2	0	0
25/11/2020	3	WS	1255	1555	2	2	SW	0	7	1	2	0	0
25/11/2020	3	WS	1255	1555	3	2	SW	0	8	0	1	0	0
07/12/2020	4	WS	0835	1135	1	1	NW	0	7	1	2	2	2
07/12/2020	4	WS	0835	1135	2	2	NW	0	6	2	2	2	2
07/12/2020	4	WS	0835	1135	3	1	NW	0	6	2	2	2	2
07/12/2020	4	WS	1205	1505	1	3	NNW	0	2	2	2	2	2
07/12/2020	4	WS	1205	1505	2	2	NNW	0	2	2	2	2	2
07/12/2020	4	WS	1205	1505	3	2	N	0	1	2	2	2	2
15/12/2020	1	WS	0850	1150	1	1	SE	0	8	0	2	0	2
15/12/2020	1	WS	0850	1150	2	2	SE	0	8	1	2	0	2
15/12/2020	1	WS	0850	1150	3	2	SE	0	8	1	2	0	2
15/12/2020	1	WS	1220	1520	1	2	SE	2	8	1	2	0	2
15/12/2020	1	WS	1220	1520	2	2	SE	0	7	1	2	0	2
15/12/2020	1	WS	1220	1520	3	3	SE	0	8	1	2	0	2
17/12/2020	3	WS	0840	1140	1	3	SW	1	8	0	1	0	2
17/12/2020	3	WS	0840	1140	2	3	SW	2	8	0	1	0	2
17/12/2020	3	WS	0840	1140	3	3	SW	3	8	0	1	0	2
17/12/2020	3	WS	1210	1510	1	4	SW	3	8	1	2	0	2
17/12/2020	3	WS	1210	1510	2	3	SSW	0	8	1	2	0	2
17/12/2020	3	WS	1210	1510	3	3	S	0	8	1	2	0	2
22/12/2020	2	WS	0855	1155	1	1	SW	0	7	1	2	1	2
22/12/2020	2	WS	0855	1155	2	1	SW	0	7	1	2	0	2
22/12/2020	2	WS	0855	1155	3	2	SW	0	7	1	2	0	2
22/12/2020	2	WS	1225	1525	1	2	SW	2	8	1	1	0	2
22/12/2020	2	WS	1225	1525	2	2	SW	2	7	1	2	0	2
22/12/2020	2	WS	1225	1525	3	1	SW	1	7	1	1	0	2
03/01/2021	4	WS	0845	1145	1	1	N	0	2	2	2	2	1
03/01/2021	4	WS	0845	1145	2	2	N	0	2	2	2	2	1
03/01/2021	4	WS	0845	1145	3	2	NNW	0	2	2	2	2	1
03/01/2021	4	WS	1215	1515	1	2	NNW	0	3	2	2	2	1
03/01/2021	4	WS	1215	1515	2	2	NNW	0	5	2	2	2	1
03/01/2021	4	WS	1215	1515	3	2	NNW	0	6	2	2	2	1
18/01/2021	3	WS	0825	1125	1	3	W	2	7	1	2	0	2
18/01/2021	3	WS	0825	1125	2	4	W	0	6	1	2	0	2
18/01/2021	3	WS	0825	1125	3	3	W	0	8	1	2	0	2
18/01/2021	3	WS	1155	1455	1	4	W	2	8	1	2	0	2
18/01/2021	3	WS	1155	1455	2	3	W	2	8	1	1	0	2
18/01/2021	3	WS	1155	1455	3	4	W	3	8	0	1	0	2
20/01/2021	2	WS	0900	1200	1	1	N	0	8	0	1	2	1
20/01/2021	2	WS	0900	1200	2	2	N	0	8	0	0	2	1
20/01/2021	2	WS	0900	1200	3	3	N	0	8	0	1	2	1
20/01/2021	2	WS	1230	1500	1	3	N	0	8	0	1	2	1
20/01/2021	2	WS	1230	1500	2	2	N	0	8	0	0	2	1
20/01/2021	2	WS	1230	1500	3	2	N	0	8	0	0	2	1
27/01/2021	1	WS	0900	1200	1	1	NE	1	8	0	1	1	1
27/01/2021	1	WS	0900	1200	2	1	-	1	8	0	0	0	1
27/01/2021	1	WS	0900	1200	3	2	NW	1	8	0	0	0	1
27/01/2021	1	WS	1230	1530	1	2	NW	1	8	0	0	0	1
27/01/2021	1	WS	1230	1530	2	1	N	0	8	0	1	0	1
27/01/2021	1	WS	1230	1530	3	2	NE	1	8	0	1	0	1
10/02/2021	4	WS	0820	1120	1	1	VAR	0	1	1	2	2	1

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
10/02/2021	4	WS	0820	1120	2	2	N	0	2	2	2	2	1
10/02/2021	4	WS	0820	1120	3	2	N	0	3	2	2	2	1
10/02/2021	4	WS	1150	1450	1	2	N	0	4	2	2	2	1
10/02/2021	4	WS	1150	1450	2	3	N	0	5	2	2	2	1
10/02/2021	4	WS	1150	1450	3	2	N	0	6	2	2	2	1
21/02/2021	1	WS	0920	1220	1	3	S	0	8	1	2	0	2
21/02/2021	1	WS	0920	1220	2	3	S	0	8	1	2	0	2
21/02/2021	1	WS	0920	1220	3	3	S	0	8	1	2	0	2
21/02/2021	1	WS	1250	1550	1	3	S	0	0	2	2	0	2
21/02/2021	1	WS	1250	1550	2	3	S	0	8	1	2	0	2
21/02/2021	1	WS	1250	1550	3	3	S	0	8	1	2	0	2
22/02/2021	2	WS	0730	1030	1	3	SSE	0	4	0	2	0	2
22/02/2021	2	WS	0730	1030	2	4	SSE	0	5	0	1	0	2
22/02/2021	2	WS	0730	1030	3	3	SSE	0	6	1	2	0	2
22/02/2021	2	WS	1100	1400	1	4	SSE	0	7	1	2	0	2
22/02/2021	2	WS	1100	1400	2	4	S	0	8	1	2	0	2
22/02/2021	2	WS	1100	1400	3	4	S	0	8	1	2	0	2
25/02/2021	3	WS	0740	1040	1	4	W	2	8	1	2	0	2
25/02/2021	3	WS	0740	1040	2	4	W	3	8	1	2	0	2
25/02/2021	3	WS	0740	1040	3	4	W	0	8	1	2	0	2
25/02/2021	3	WS	1110	1410	1	4	W	0	8	1	2	0	2
25/02/2021	3	WS	1110	1410	2	4	W	3	8	1	2	0	2
25/02/2021	3	WS	1110	1410	3	5	W	0	8	1	2	0	2
02/03/2021	1	WS	0920	1120	1	0	-	0	3	0	2	1	2
02/03/2021	1	WS	0920	1120	2	2	S	0	2	1	2	1	2
02/03/2021	1	WS	0920	1120	3	3	S	0	1	1	2	1	2
02/03/2021	1	WS	1250	1550	1	1	SSE	0	1	1	2	0	2
02/03/2021	1	WS	1250	1550	2	1	SSE	0	0	2	2	0	2
02/03/2021	1	WS	1250	1550	3	2	SSE	0	0	2	2	0	2
05/03/2021	2	WS	1020	1320	1	2	SSW	0	8	1	2	1	2
05/03/2021	2	WS	1020	1320	2	2	SSW	0	8	1	2	1	2
05/03/2021	2	WS	1020	1320	3	2	SSW	0	8	1	2	1	2
05/03/2021	2	WS	1350	1650	1	3	SSW	0	7	2	2	0	2
05/03/2021	2	WS	1350	1650	2	2	SSW	0	8	2	2	0	2
05/03/2021	2	WS	1350	1650	3	2	SSW	0	8	2	2	0	2
06/03/2021	3	WS	0920	1220	1	3	S	0	8	1	2	0	2
06/03/2021	3	WS	0920	1220	2	3	S	0	8	1	2	0	2
06/03/2021	3	WS	0920	1220	3	3	S	0	8	2	2	0	2
06/03/2021	3	WS	1250	1550	1	3	S	0	8	2	2	0	2
06/03/2021	3	WS	1250	1550	2	2	S	0	8	2	2	0	2
06/03/2021	3	WS	1250	1550	3	2	S	0	8	2	2	0	2
08/03/2021	4	WS	0830	1130	1	2	SW	3	8	1	1	0	0
08/03/2021	4	WS	0830	1130	2	2	SW	3	8	0	1	0	0
08/03/2021	4	WS	0830	1130	3	1	SW	4	8	0	1	0	0
08/03/2021	4	WS	1200	1500	1	2	SW	1	8	1	1	0	0
08/03/2021	4	WS	1200	1500	2	3	W	2	8	0	1	0	0
08/03/2021	4	WS	1200	1500	3	2	W	0	8	0	1	0	0
15/03/2021	5	WS	0930	1230	1	3	NW	0	7	1	2	0	2
15/03/2021	5	WS	0930	1230	2	3	NW	0	8	1	2	0	2
15/03/2021	5	WS	0930	1230	3	2	NW	0	8	1	2	0	2
15/03/2021	5	WS	1300	1500	1	3	NW	0	8	1	2	0	2
15/03/2021	5	WS	1300	1500	2	3	NW	0	8	1	2	0	2
18/03/2021	2	WS	0830	1130	1	2	NW	0	8	0	1	0	

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
18/03/2021	2	WS	0830	1130	2	2	NW	0	8	0	1	0	2
18/03/2021	2	WS	0830	1130	3	2	NW	0	8	0	1	0	2
18/03/2021	2	WS	1200	1500	1	2	NW	0	8	0	1	0	2
18/03/2021	2	WS	1200	1500	2	3	NW	0	8	0	2	0	2
18/03/2021	2	WS	1200	1500	3	2	NW	0	7	0	2	0	2
19/03/2021	1	WS	0830	1130	1	4	NNE	0	2	0	2	0	2
19/03/2021	1	WS	0830	1130	2	4	NNE	0	3	0	2	0	2
19/03/2021	1	WS	0830	1130	3	4	NNE	0	3	1	2	0	2
19/03/2021	1	WS	1200	1500	1	4	NNE	0	3	2	2	0	2
19/03/2021	1	WS	1200	1500	2	3	NNW	0	3	2	2	0	2
19/03/2021	1	WS	1200	1500	3	3	NNW	0	3	2	2	0	2
26/03/2021	4	WS	0810	1110	1	2	SW	4	8	1	2	0	2
26/03/2021	4	WS	0810	1110	2	2	SW	3	8	0	2	0	2
26/03/2021	4	WS	0810	1110	3	3	W	3	8	1	2	0	2
26/03/2021	4	WS	1150	1450	1	3	W	3	7	1	2	0	2
26/03/2021	4	WS	1150	1450	2	4	W	2	6	1	2	0	2
26/03/2021	4	WS	1150	1450	3	4	W	2	7	1	2	0	2
06/04/2021	2	WS	0735	1035	1	3	NW	2	7	1	2	1	2
06/04/2021	2	WS	0735	1035	2	3	NW	0	8	1	2	1	2
06/04/2021	2	WS	0735	1035	3	3	NW	0	7	1	2	1	2
06/04/2021	2	WS	1105	1405	1	4	NW	0	6	1	2	1	2
06/04/2021	2	WS	1105	1405	2	4	NW	2	7	1	2	1	2
06/04/2021	2	WS	1105	1405	3	4	NW	2	8	1	2	1	2
07/04/2021	5	WS	0850	1150	1	4	NW	0	3	2	2	2	2
07/04/2021	5	WS	0850	1150	2	4	NNW	0	8	2	2	2	2
07/04/2021	5	WS	0850	1150	3	4	NNW	0	7	2	2	2	2
07/04/2021	5	WS	1320	1620	1	4	NW	0	8	2	2	2	2
07/04/2021	5	WS	1320	1620	2	3	NW	0	8	2	2	2	2
07/04/2021	5	WS	1320	1620	3	3	NW	0	8	2	2	2	2
16/04/2021	5	WS	0900	1000	1	4	S	0	5	1	2	0	0
17/04/2021	1	WS	0740	1040	1	2	SSE	0	7	2	2	0	0
17/04/2021	1	WS	0740	1040	2	2	SSE	0	3	2	2	0	0
17/04/2021	1	WS	0740	1040	3	2	SSE	0	3	2	2	0	0
17/04/2021	1	WS	1110	1410	1	2	SSE	0	4	2	2	0	0
17/04/2021	1	WS	1110	1410	2	3	S	0	3	2	2	0	0
17/04/2021	1	WS	1110	1410	3	2	S	0	3	2	2	0	0
20/04/2021	4	WS	0805	1105	1	1	SW	1	8	0	1	0	0
20/04/2021	4	WS	0805	1105	2	2	SW	2	8	0	1	0	0
20/04/2021	4	WS	0805	1105	3	2	SW	1	8	0	1	0	0
20/04/2021	4	WS	1135	1435	1	1	SW	1	8	0	1	0	0
20/04/2021	4	WS	1135	1435	2	2	SW	1	8	0	1	0	0
20/04/2021	4	WS	1135	1435	3	2	SW	0	8	0	1	0	0
02/05/2021	2	WS	0700	1000	1	1	W	0	7	1	2	1	0
02/05/2021	2	WS	0700	1000	2	2	NW	0	6	0	2	0	0
02/05/2021	2	WS	0700	1000	3	3	NW	0	6	1	2	0	0
02/05/2021	2	WS	1030	1330	1	2	NW	0	5	1	2	0	0
02/05/2021	2	WS	1030	1330	2	3	NW	2	8	2	2	0	0
02/05/2021	2	WS	1030	1330	3	3	NW	0	7	2	2	0	0
12/05/2021	5	WS	1430	1730	1	2	SSE	2	8	1	2	0	0
12/05/2021	5	WS	1430	1730	2	2	SSE	2	8	1	2	0	0
12/05/2021	5	WS	1430	1730	3	3	SSE	3	8	1	2	0	0
12/05/2021	5	WS	1820	2120	1	1	VAR	0	6	1	2	0	0
12/05/2021	5	WS	1820	2120	2	1	N	0	4	1	2	0	0

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
12/05/2021	5	WS	1820	2120	3	1	NE	0	2	2	2	0	0
24/05/2021	4	WS	1010	1310	1	3	NW	3	8	1	2	0	0
24/05/2021	4	WS	1010	1310	2	3	NW	2	8	1	2	0	0
24/05/2021	4	WS	1010	1310	3	3	W	3	8	1	2	0	0
24/05/2021	4	WS	1340	1640	1	3	NW	4	8	1	2	0	0
24/05/2021	4	WS	1340	1640	2	3	W	4	8	0	2	0	0
24/05/2021	4	WS	1340	1640	3	3	W	4	8	0	2	0	0
26/05/2021	1	WS	0800	1100	1	3	N	0	6	1	2	0	0
26/05/2021	1	WS	0800	1100	2	3	N	0	8	1	2	0	0
26/05/2021	1	WS	0800	1100	3	3	N	0	8	1	2	0	0
26/05/2021	1	WS	1130	1430	1	2	N	0	8	1	2	0	0
26/05/2021	1	WS	1130	1430	2	2	N	0	8	1	2	0	0
26/05/2021	1	WS	1130	1430	3	2	N	0	8	1	2	0	0
07/06/2021	5	WS	0800	1100	1	2	S	0	8	2	2	0	0
07/06/2021	5	WS	0800	1100	2	2	S	0	8	2	2	0	0
07/06/2021	5	WS	0800	1100	3	3	SSE	0	8	2	2	0	0
07/06/2021	5	WS	1130	1430	1	4	SSE	0	7	2	2	0	0
07/06/2021	5	WS	1130	1430	2	4	SSW	0	6	2	2	0	0
07/06/2021	5	WS	1130	1430	3	4	SSW	0	6	2	2	0	0
08/06/2021	1	WS	0850	1150	1	1	S	1	8	0	1	0	0
08/06/2021	1	WS	0850	1150	2	2	S	0	8	1	2	0	0
08/06/2021	1	WS	0850	1150	3	2	S	0	8	1	2	0	0
08/06/2021	1	WS	1220	1520	1	3	S	2	8	1	2	0	0
08/06/2021	1	WS	1220	1520	2	2	S	0	8	1	2	0	0
08/06/2021	1	WS	1220	1520	3	3	S	2	8	1	2	0	0
17/06/2021	2	WS	0715	1015	1	0	-	1	8	1	2	0	0
17/06/2021	2	WS	0715	1015	2	1	WSW	0	7	1	2	0	0
17/06/2021	2	WS	0715	1015	3	2	WSW	0	8	1	2	0	0
17/06/2021	2	WS	1045	1345	1	1	WNW	2	8	1	2	0	0
17/06/2021	2	WS	1045	1345	2	2	W	0	8	1	2	0	0
17/06/2021	2	WS	1045	1345	3	2	W	0	8	1	2	0	0
24/06/2021	4	WS	0735	1035	1	1	VAR	1	8	0	1	0	0
24/06/2021	4	WS	0735	1035	2	1	SW	0	8	1	2	0	0
24/06/2021	4	WS	0735	1035	3	2	SW	1	8	0	1	0	0
24/06/2021	4	WS	1105	1405	1	2	SW	2	8	0	1	0	0
24/06/2021	4	WS	1105	1405	2	2	SW	1	8	0	1	0	0
24/06/2021	4	WS	1105	1405	3	2	SW	3	8	0	1	0	0
08/07/2021	1	WS	1445	1745	1	2	W	1	8	0	0	0	0
08/07/2021	1	WS	1445	1745	2	2	W	1	8	0	0	0	0
08/07/2021	1	WS	1445	1745	3	1	W	0	8	0	1	0	0
08/07/2021	1	WS	1815	2115	1	1	WNW	0	8	0	2	0	0
08/07/2021	1	WS	1815	2115	2	1	WNW	0	8	0	2	0	0
08/07/2021	1	WS	1815	2115	3	2	NNW	0	8	0	1	0	0
13/07/2021	5	WS	1050	1350	1	2	SW	0	8	0	1	0	0
13/07/2021	5	WS	1050	1350	2	2	SW	0	8	0	1	0	0
13/07/2021	5	WS	1050	1350	3	2	WSW	0	8	0	1	0	0
13/07/2021	5	WS	1420	1600	1	2	W	0	7	0	2	0	0
13/07/2021	5	WS	1420	1600	2	2	WNW	0	8	0	2	0	0
14/07/2021	2	WS	0935	1235	1	2	NW	0	8	1	2	0	0
14/07/2021	2	WS	0935	1235	2	2	WNW	0	8	1	2	0	0
14/07/2021	2	WS	0935	1235	3	2	W	0	8	1	2	0	0
14/07/2021	2	WS	1305	1605	1	2	W	0	8	1	2	0	0
14/07/2021	2	WS	1305	1605	2	2	W	0	8	1	2	0	0

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
14/07/2021	2	WS	1305	1605	3	2	WSW	1	8	0	1	0	0
19/07/2021	4	WS	1120	1420	1	1	NW	0	2	2	2	0	0
19/07/2021	4	WS	1120	1420	2	1	W	0	3	2	2	0	0
19/07/2021	4	WS	1120	1420	3	2	W	0	4	2	2	0	0
19/07/2021	4	WS	1450	1750	1	2	W	0	3	2	2	0	0
19/07/2021	4	WS	1450	1750	2	1	W	0	4	2	2	0	0
19/07/2021	4	WS	1450	1750	3	2	W	0	4	2	2	0	0
02/08/2021	1	WS	1230	1530	1	1	W	0	3	2	2	0	0
02/08/2021	1	WS	1230	1530	2	1	SW	0	5	2	2	0	0
02/08/2021	1	WS	1230	1530	3	1	SW	0	5	2	2	0	0
02/08/2021	1	WS	1600	1900	1	2	S	0	5	2	2	0	0
02/08/2021	1	WS	1600	1900	2	3	WSW	0	3	2	2	0	0
02/08/2021	1	WS	1600	1900	3	3	WNW	0	2	2	2	0	0
06/08/2021	4	WS	0845	1145	1	1	VAR	2	8	1	1	0	0
06/08/2021	4	WS	0845	1145	2	2	WNW	3	8	0	1	0	0
06/08/2021	4	WS	0845	1145	3	1	WNW	2	8	1	1	0	0
06/08/2021	4	WS	1215	1515	1	1	W	2	8	1	1	0	0
06/08/2021	4	WS	1215	1515	2	2	NW	3	8	0	1	0	0
06/08/2021	4	WS	1215	1515	3	1	W	4	8	1	1	0	0
12/08/2021	2	WS	1000	1300	1	4	S	0	7	1	2	0	0
12/08/2021	2	WS	1000	1300	2	5	SSE	0	8	2	2	0	0
12/08/2021	2	WS	1000	1300	3	4	S	0	8	2	2	0	0
12/08/2021	2	WS	1330	1630	1	5	S	2	8	1	2	0	0
12/08/2021	2	WS	1330	1630	2	4	SSE	3	8	1	1	0	0
12/08/2021	2	WS	1330	1630	3	4	SSE	2	8	1	2	0	0
16/08/2021	5	WS	1100	1400	1	3	WNW	1	8	0	1	0	0
16/08/2021	5	WS	1100	1400	2	3	NW	2	8	0	1	0	0
16/08/2021	5	WS	1100	1400	3	3	NW	2	8	1	1	0	0
16/08/2021	5	WS	1430	1730	1	3	NW	2	8	1	1	0	0
16/08/2021	5	WS	1430	1730	2	3	WNW	2	8	0	2	0	0
16/08/2021	5	WS	1430	1730	3	3	W	1	8	0	1	0	0
18/08/2021	1	WS	1105	1305	1	3	W	1	8	0	1	0	0
18/08/2021	1	WS	1105	1305	2	4	W	1	8	0	1	0	0
18/08/2021	1	WS	1325	1455	1	3	WNW	3	8	0	1	0	0
18/08/2021	1	WS	1325	1455	2	3	NW	2	8	0	1	0	0
14/09/2021	4	WS	0935	1235	1	0	-	2	8	0	1	0	0
14/09/2021	4	WS	0935	1235	2	0	-	2	8	0	1	0	0
14/09/2021	4	WS	0935	1235	3	0	-	2	8	0	1	0	0
14/09/2021	4	WS	1305	1605	1	0	-	1	8	0	1	0	0
14/09/2021	4	WS	1305	1605	2	1	SSW	0	8	0	1	0	0
14/09/2021	4	WS	1305	1605	3	1	SSW	0	8	1	2	0	0
16/09/2021	1	WS	1140	1440	1	2	S	0	6	1	2	0	0
16/09/2021	1	WS	1140	1440	2	2	S	0	8	2	2	0	0
16/09/2021	1	WS	1140	1440	3	1	S	0	8	2	2	0	0
16/09/2021	1	WS	1510	1745	1	1	SSE	0	8	1	2	0	0
16/09/2021	1	WS	1510	1745	2	2	SSE	0	8	1	2	0	0
16/09/2021	1	WS	1510	1745	3	3	SE	1	8	0	1	0	0
18/09/2021	5	WS	0945	1245	1	0	-	0	8	0	1	0	0
18/09/2021	5	WS	0945	1245	2	2	S	0	8	0	1	0	0
18/09/2021	5	WS	0945	1245	3	2	S	0	8	0	2	0	0
18/09/2021	5	WS	1315	1615	1	3	S	0	7	0	2	0	0
18/09/2021	5	WS	1315	1615	2	2	S	0	6	1	2	0	0
18/09/2021	5	WS	1315	1615	3	3	S	0	7	2	2	0	0

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
29/09/2021	2	WS	0900	1200	1	2	WNW	0	4	1	2	0	0
29/09/2021	2	WS	0900	1200	2	2	NW	2	6	1	2	0	0
29/09/2021	2	WS	0900	1200	3	3	NW	2	5	2	2	0	0
29/09/2021	2	WS	1230	1530	1	3	WNW	3	8	1	2	0	0
29/09/2021	2	WS	1230	1530	2	3	WNW	2	7	1	2	0	0
29/09/2021	2	WS	1230	1530	3	4	NW	0	6	1	2	0	0
05/10/2021	5	WS	1045	1355	1	3	N	0	7	1	2	0	0
05/10/2021	5	WS	1045	1355	2	4	N	0	5	2	2	0	0
05/10/2021	5	WS	1045	1355	3	3	N	0	7	2	2	0	0
05/10/2021	5	WS	1425	1715	1	3	N	0	7	2	2	0	0
05/10/2021	5	WS	1425	1715	2	4	N	0	7	2	2	0	0
05/10/2021	5	WS	1425	1715	3	4	NNW	2	7	1	2	0	0
20/10/2021	4	WS	0745	1045	1	1	VAR	1	8	0	1	0	0
20/10/2021	4	WS	0745	1045	2	2	SW	2	7	1	2	0	0
20/10/2021	4	WS	0745	1045	3	2	VAR	3	6	1	2	0	0
20/10/2021	4	WS	1115	1415	1	3	W	2	7	1	2	0	0
20/10/2021	4	WS	1115	1415	2	3	W	0	6	1	2	0	0
20/10/2021	4	WS	1115	1415	3	3	W	2	6	1	2	0	0
22/10/2021	2	WS	0750	1050	1	2	NW	0	8	0	2	0	0
22/10/2021	2	WS	0750	1050	2	3	NW	0	8	1	2	0	0
22/10/2021	2	WS	0750	1050	3	3	NW	0	4	1	2	0	0
22/10/2021	2	WS	1120	1420	1	2	NW	0	6	2	2	0	0
22/10/2021	2	WS	1120	1420	2	2	NW	0	7	2	2	0	0
22/10/2021	2	WS	1120	1420	3	2	NW	0	7	2	2	0	0
02/11/2021	4	WS	0945	1245	1	0	-	0	5	0	2	0	0
02/11/2021	4	WS	0945	1245	2	1	NW	0	6	1	2	0	0
02/11/2021	4	WS	0945	1245	3	1	NW	0	5	1	2	0	0
02/11/2021	4	WS	1315	1615	1	1	NW	0	4	1	2	0	0
02/11/2021	4	WS	1315	1615	2	2	NW	0	6	1	2	0	0
02/11/2021	4	WS	1315	1615	3	2	NW	0	4	1	2	0	0
07/11/2021	2	WS	1000	1300	1	6	NW	3	8	1	1	0	0
07/11/2021	2	WS	1000	1300	2	6	NW	2	8	1	2	0	0
07/11/2021	2	WS	1000	1300	3	5	NW	0	7	1	2	0	0
07/11/2021	2	WS	1330	1630	1	5	NW	0	7	1	2	0	0
07/11/2021	2	WS	1330	1630	2	5	NW	0	7	1	2	0	0
07/11/2021	2	WS	1330	1630	3	3	WNW	0	8	1	2	0	0
10/11/2021	1	WS	0925	1225	1	2	SW	3	8	0	1	0	0
10/11/2021	1	WS	0925	1225	2	3	SSW	0	8	0	0	0	0
10/11/2021	1	WS	0925	1225	3	3	S	2	8	0	0	0	0
10/11/2021	1	WS	1240	1255	1	3	S	0	8	0	1	0	0
13/11/2021	1	WS	0915	1215	1	1	NW	1	8	0	1	0	0
13/11/2021	1	WS	0915	1215	2	1	NW	0	8	0	2	0	0
13/11/2021	1	WS	0915	1215	3	1	NW	0	8	0	2	0	0
13/11/2021	1	WS	1245	1500	1	0	-	0	8	0	2	0	0
13/11/2021	1	WS	1245	1500	2	1	VAR	0	8	1	2	0	0
13/11/2021	1	WS	1245	1500	3	1	N	0	8	1	2	0	0
24/11/2021	1	WS	0940	1240	1	3	NW	0	6	0	2	0	0
24/11/2021	1	WS	0940	1240	2	4	NW	2	7	1	2	0	0
24/11/2021	1	WS	0940	1240	3	4	NW	2	6	0	2	0	2
24/11/2021	1	WS	1310	1525	1	4	NNW	0	5	1	2	0	2
24/11/2021	1	WS	1310	1525	2	3	NNW	3	7	1	1	0	2
24/11/2021	1	WS	1310	1525	3	3	NNW	4	8	0	1	0	2
26/11/2021	5	WS	0915	1215	1	5	NNW	2	6	1	1	1	2

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
26/11/2021	5	WS	0915	1215	2	7	NNW	0	6	1	2	0	2
26/11/2021	5	WS	0915	1215	3	6	NNW	2	5	2	2	0	2
26/11/2021	5	WS	1245	1545	1	7	NNW	2	6	2	2	0	2
26/11/2021	5	WS	1245	1545	2	6	NNW	2	8	1	2	0	2
26/11/2021	5	WS	1245	1545	3	5	NNW	0	7	2	2	0	2
01/12/2021	5	WS	0920	1220	1	4	N	0	8	1	2	0	2
01/12/2021	5	WS	0920	1220	2	4	N	0	3	2	2	0	2
01/12/2021	5	WS	0920	1220	3	4	N	0	2	2	2	0	2
01/12/2021	5	WS	1250	1550	1	4	N	0	4	2	2	0	2
01/12/2021	5	WS	1250	1550	2	4	NNE	0	6	2	2	0	2
01/12/2021	5	WS	1250	1550	3	3	NE	0	8	2	2	1	2
05/12/2021	1	WS	0925	1225	1	2	N	0	1	2	2	2	2
05/12/2021	1	WS	0925	1225	2	3	N	0	2	2	2	2	2
05/12/2021	1	WS	0925	1225	3	3	N	0	1	2	2	2	2
05/12/2021	1	WS	1255	1555	1	3	NNE	0	0	2	2	2	2
05/12/2021	1	WS	1255	1555	2	3	NNE	0	0	2	2	2	2
05/12/2021	1	WS	1255	1555	3	2	NNE	0	0	2	2	2	2
10/12/2021	2	WS	0905	1205	1	3	NW	2	8	1	1	1	1
10/12/2021	2	WS	0905	1205	2	2	NW	0	6	1	2	1	1
10/12/2021	2	WS	0905	1205	3	3	NW	3	8	1	2	0	1
10/12/2021	2	WS	1235	1535	1	2	WNW	3	8	1	1	0	1
10/12/2021	2	WS	1235	1535	2	2	WNW	0	8	1	2	0	1
10/12/2021	2	WS	1235	1535	3	1	WNW	3	8	0	1	0	1
16/12/2021	4	WS	0915	1215	1	1	S	1	8	0	1	0	0
16/12/2021	4	WS	0915	1215	2	2	S	1	8	0	1	0	0
16/12/2021	4	WS	0915	1215	3	2	S	0	8	0	2	0	0
16/12/2021	4	WS	1245	1545	1	1	S	0	8	0	2	0	0
16/12/2021	4	WS	1245	1545	2	2	SSE	0	8	0	2	0	0
16/12/2021	4	WS	1245	1545	3	1	SSE	0	8	0	2	0	0
11/01/2022	2	WS	0955	1255	1	3	SW	0	7	0	2	1	2
11/01/2022	2	WS	0955	1255	2	3	SSW	0	8	1	2	0	2
11/01/2022	2	WS	0955	1255	3	4	SSW	1	8	0	2	0	2
11/01/2022	2	WS	1325	1625	1	4	SW	3	8	0	1	0	2
11/01/2022	2	WS	1325	1625	2	3	SW	3	8	1	1	0	2
11/01/2022	2	WS	1325	1625	3	4	SW	2	8	0	1	0	2
23/01/2022	4	WS	1015	1315	1	2	SSW	1	8	0	2	0	0
23/01/2022	4	WS	1015	1315	2	3	SSW	0	8	0	2	0	0
23/01/2022	4	WS	1015	1315	3	3	SSW	0	8	0	2	0	0
23/01/2022	4	WS	1345	1645	1	3	SSW	1	8	0	2	0	0
23/01/2022	4	WS	1345	1645	2	3	SW	1	8	0	2	0	0
23/01/2022	4	WS	1345	1645	3	3	SW	1	8	0	2	0	0
27/01/2022	5	WS	0920	1220	1	5	NW	3	8	1	1	0	0
27/01/2022	5	WS	0920	1220	2	5	NW	2	7	1	2	0	0
27/01/2022	5	WS	0920	1220	3	5	NW	0	5	1	2	0	0
27/01/2022	5	WS	1250	1550	1	5	NW	2	6	0	2	0	0
27/01/2022	5	WS	1250	1550	2	4	NW	0	7	1	2	0	0
27/01/2022	5	WS	1250	1550	3	5	NW	2	8	1	1	0	0
31/01/2022	5	WS	0925	1225	1	5	NW	3	8	0	1	1	1
31/01/2022	5	WS	0925	1225	2	5	NW	2	7	1	2	0	1
31/01/2022	5	WS	0925	1225	3	6	NW	0	7	2	2	0	1
31/01/2022	5	WS	1255	1555	1	5	NW	2	8	2	2	0	2
31/01/2022	5	WS	1255	1555	2	4	WNW	3	8	1	1	0	2
31/01/2022	5	WS	1255	1555	3	4	WNW	2	8	2	2	0	2

Date	VP	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
07/02/2022	4	WS	0920	1220	1	1	S	3	8	0	1	1	1
07/02/2022	4	WS	0920	1220	2	1	S	1	8	0	1	1	1
07/02/2022	4	WS	0920	1220	3	2	SSW	2	8	0	1	0	1
07/02/2022	4	WS	1250	1550	1	3	SW	3	8	0	1	0	1
07/02/2022	4	WS	1250	1550	2	4	WSW	0	8	1	2	0	2
07/02/2022	4	WS	1250	1550	3	4	WSW	1	8	0	1	0	2
11/02/2022	1	WS	0940	1240	1	2	S	0	8	0	1	2	1
11/02/2022	1	WS	0940	1240	2	2	SE	0	8	0	1	2	1
11/02/2022	1	WS	0940	1240	3	3	S	0	8	0	2	2	1
11/02/2022	1	WS	1310	1610	1	4	S	0	8	1	2	2	1
11/02/2022	1	WS	1310	1610	2	4	S	0	8	2	2	2	1
11/02/2022	1	WS	1310	1610	3	5	S	0	8	2	2	2	1
22/02/2022	2	WS	0950	1250	1	5	WNW	3	8	1	1	0	2
22/02/2022	2	WS	0950	1250	2	4	WNW	3	8	1	1	0	2
22/02/2022	2	WS	0950	1250	3	4	W	3	8	1	2	0	2
22/02/2022	2	WS	1320	1620	1	4	WNW	2	8	1	2	0	2
22/02/2022	2	WS	1320	1620	2	4	NW	2	8	2	2	0	2
22/02/2022	2	WS	1320	1620	3	5	W	3	8	1	1	0	2
01/03/2022	1	WS	0845	1145	1	2	S	0	8	0	1	1	2
01/03/2022	1	WS	0845	1145	2	2	S	0	6	0	1	1	2
01/03/2022	1	WS	0845	1145	3	3	SSW	0	8	0	2	1	2
01/03/2022	1	WS	1215	1515	1	2	SSW	0	7	1	2	0	2
01/03/2022	1	WS	1215	1515	2	2	SSW	1	8	2	2	0	2
01/03/2022	1	WS	1215	1515	3	2	SW	2	8	2	2	0	2
07/03/2022	1	WS	1245	1400	1	4	ESE	0	5	2	2	2	2
07/03/2022	1	WS	1245	1400	2	4	ESE	0	4	2	2	2	2

C.3 Moorland Breeding Bird Surveys

Moorland breeding bird surveys were undertaken during the 2021 breeding season. **Table C-4** details survey dates and weather data recorded. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-4 Meteorological conditions during breeding bird surveys at Ladyfield Renewable Energy Park (sorted chronologically)

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
01/04/2021	1	WS	1000	1230	1	4	NE	0	1	1	2	0	0
01/04/2021	1	WS	1000	1230	2	3	NE	0	2	1	2	0	0
01/04/2021	1	WS	1000	1230	3	3	NE	0	3	1	2	0	0
02/04/2021	1	WS	0830	1530	1	2	NNE	0	1	1	2	1	0
02/04/2021	1	WS	0830	1530	2	2	NNE	0	0	2	2	0	0
02/04/2021	1	WS	0830	1530	3	3	NNE	0	0	2	2	0	0
02/04/2021	1	WS	0830	1530	4	3	NE	0	0	2	2	0	0
02/04/2021	1	WS	0830	1530	5	3	NE	0	1	2	2	0	0
02/04/2021	1	WS	0830	1530	6	3	NE	0	2	2	2	0	0
02/04/2021	1	WS	0830	1530	7	3	NE	0	3	2	2	0	0
07/04/2021	1	WS	1155	1315	1	4	NNW	0	8	2	2	2	2
07/04/2021	1	WS	1155	1315	2	3	NNW	0	8	2	2	2	2
09/05/2021	2	WS	0830	1500	1	2	E	2	8	0	1	0	0
09/05/2021	2	WS	0830	1500	2	2	E	0	8	0	1	0	0
09/05/2021	2	WS	0830	1500	3	2	E	0	8	0	1	0	0
09/05/2021	2	WS	0830	1500	4	2	ESE	2	8	0	1	0	0
09/05/2021	2	WS	0830	1500	5	3	SE	0	8	0	1	0	0
09/05/2021	2	WS	0830	1500	6	3	SE	0	8	0	1	0	0
09/05/2021	2	WS	0830	1500	7	3	SE	0	8	0	1	0	0
12/05/2021	2	WS	1330	1420	1	1	VAR	0	8	1	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
12/05/2021	2	WS	1735	1815	1	1	S	0	7	1	2	0	0
13/05/2021	2	WS	0730	1130	1	2	NE	0	7	1	2	0	0
13/05/2021	2	WS	0730	1130	2	2	NE	0	8	1	2	0	0
13/05/2021	2	WS	0730	1130	3	2	E	0	8	1	2	0	0
07/06/2021	3	WS	1435	1605	1	3	SSW	0	8	2	2	0	0
07/06/2021	3	WS	1435	1605	2	2	SSW	0	7	2	2	0	0
10/06/2021	3	WS	0830	1500	1	2	SSE	0	8	0	1	0	0
10/06/2021	3	WS	0830	1500	2	2	SSE	0	8	0	1	0	0
10/06/2021	3	WS	0830	1500	3	3	SSE	0	8	0	1	0	0
10/06/2021	3	WS	0830	1500	4	3	S	0	8	0	2	0	0
10/06/2021	3	WS	0830	1500	5	3	SSE	0	8	0	1	0	0
10/06/2021	3	WS	0830	1500	6	2	SSE	0	8	0	2	0	0
10/06/2021	3	WS	0830	1500	7	2	SSE	0	8	0	2	0	0
11/06/2021	3	WS	1345	1600	1	4	W	0	8	0	2	0	0
11/06/2021	3	WS	1345	1600	2	4	W	0	8	0	2	0	0
11/06/2021	3	WS	1345	1600	3	3	W	0	8	0	2	0	0
06/07/2021	4	WS	0830	1430	1	1	ENE	0	3	1	2	0	0
06/07/2021	4	WS	0830	1430	2	2	ENE	0	3	1	2	0	0
06/07/2021	4	WS	0830	1430	3	2	ENE	0	3	2	2	0	0
06/07/2021	4	WS	0830	1430	4	1	E	0	5	2	2	0	0
06/07/2021	4	WS	0830	1430	5	1	SE	0	5	2	2	0	0
06/07/2021	4	WS	0830	1430	6	2	SSE	0	5	2	2	0	0
07/07/2021	4	WS	0905	1135	1	1	SW	0	8	0	2	0	0
07/07/2021	4	WS	0905	1135	2	2	SW	0	8	0	2	0	0
07/07/2021	4	WS	0905	1135	3	2	W	0	8	1	2	0	0
13/07/2021	4	WS	0840	1045	1	1	W	0	8	0	1	0	0
13/07/2021	4	WS	0840	1045	2	1	SW	0	8	0	0	0	0

C.4 Winter Walkover Surveys

Winter walkover surveys were undertaken during the 2020/2021 and 2021/2022 non-breeding seasons. **Table C-5** details survey dates and weather data recorded. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-5 Meteorological conditions during winter walkover surveys at Ladyfield Renewable Energy Park (sorted chronologically)

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
06/11/2020	1	WS	0900	1500	1	1	E	1	8	0	1	0	0
06/11/2020	1	WS	0900	1500	2	1	SE	1	8	0	2	0	0
06/11/2020	1	WS	0900	1500	3	1	ESE	1	8	0	1	0	0
06/11/2020	1	WS	0900	1500	4	1	E	1	8	0	1	0	0
06/11/2020	1	WS	0900	1500	5	1	SE	1	8	0	2	0	0
06/11/2020	1	WS	0900	1500	6	1	ESE	1	8	0	2	0	0
12/11/2020	1	WS	0820	1420	1	1	S	1	8	1	2	0	0
12/11/2020	1	WS	0820	1420	2	1	S	1	8	0	2	0	0
12/11/2020	1	WS	0820	1420	3	2	S	1	8	1	2	0	0
12/11/2020	1	WS	0820	1420	4	2	S	0	8	1	2	0	0
12/11/2020	1	WS	0820	1420	5	3	S	0	8	1	2	0	0
12/11/2020	1	WS	0820	1420	6	3	S	0	8	1	2	0	0
19/11/2020	1	WS	0910	1115	1	2	NW	0	7	2	2	0	2
19/11/2020	1	WS	0910	1115	2	2	NW	0	4	2	2	0	2
19/11/2020	1	WS	0910	1115	3	4	NW	2	7	1	2	2	2
19/11/2020	1	WS	1220	1530	1	3	NW	0	3	2	2	0	2
19/11/2020	1	WS	1220	1530	2	2	NW	0	6	2	2	0	2
19/11/2020	1	WS	1220	1530	2	2	NW	0	6	2	2	0	2

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
25/11/2020	1	WS	1205	1250	1	3	SW	0	7	1	2	0	0
09/02/2021	2	WS	0830	1430	1	2	NE	0	6	2	2	2	1
09/02/2021	2	WS	0830	1430	2	4	NE	0	4	2	2	2	1
09/02/2021	2	WS	0830	1430	3	5	NE	0	2	2	2	2	1
09/02/2021	2	WS	0830	1430	4	4	NE	0	1	2	2	2	1
09/02/2021	2	WS	0830	1430	5	3	NE	0	1	2	2	2	1
09/02/2021	2	WS	0830	1430	6	3	NE	0	1	2	2	2	1
11/02/2021	2	WS	0845	1445	1	1	VAR	0	2	2	2	2	1
11/02/2021	2	WS	0845	1445	2	4	E	0	1	2	2	2	1
11/02/2021	2	WS	0845	1445	3	5	E	0	2	2	2	2	1
11/02/2021	2	WS	0845	1445	4	5	E	0	1	2	2	2	1
11/02/2021	2	WS	0845	1445	5	4	E	0	2	2	2	2	1
11/02/2021	2	WS	0845	1445	6	4	E	0	1	2	2	2	1
24/02/2021	2	WS	0735	1335	1	3	S	0	8	1	2	0	2
24/02/2021	2	WS	0735	1335	2	2	S	2	8	1	2	0	2
24/02/2021	2	WS	0735	1335	3	3	S	2	8	1	2	0	2
24/02/2021	2	WS	0735	1335	4	4	S	0	8	1	2	0	2
24/02/2021	2	WS	0735	1335	5	4	SSW	2	8	1	2	0	2
24/02/2021	2	WS	0735	1335	6	3	SSW	2	8	1	2	0	2
04/03/2021	3	WS	0910	1510	1	2	NE	0	8	1	2	1	2
04/03/2021	3	WS	0910	1510	2	3	NE	1	8	1	2	0	2
04/03/2021	3	WS	0910	1510	3	2	NE	2	8	0	1	0	2
04/03/2021	3	WS	0910	1510	4	3	NE	0	7	0	2	0	2
04/03/2021	3	WS	0910	1510	5	2	NE	0	8	1	2	0	2
04/03/2021	3	WS	0910	1510	6	2	NE	0	8	1	2	0	2
07/03/2021	3	WS	0900	1500	1	1	VAR	0	8	1	2	1	2
07/03/2021	3	WS	0900	1500	2	2	VAR	0	7	1	2	0	2
07/03/2021	3	WS	0900	1500	3	2	SSW	1	8	0	1	0	2
07/03/2021	3	WS	0900	1500	4	2	SW	0	8	0	2	0	2
07/03/2021	3	WS	0900	1500	5	3	SW	0	8	1	2	0	2
07/03/2021	3	WS	0900	1500	6	2	SW	0	8	1	2	0	2
10/03/2021	3	WS	0750	1350	1	2	SW	0	8	1	2	0	2
10/03/2021	3	WS	0750	1350	2	4	SW	0	8	1	2	0	2
10/03/2021	3	WS	0750	1350	3	5	SSW	0	8	1	2	0	2
10/03/2021	3	WS	0750	1350	4	5	SSW	3	8	1	2	0	2
10/03/2021	3	WS	0750	1350	5	4	SSW	3	8	1	2	0	2
10/03/2021	3	WS	0750	1350	6	3	S	1	8	1	1	0	2
10/11/2021	4	WS	1300	1400	1	2	S	1	8	0	1	0	0
11/11/2021	4	WS	0915	1345	1	1	SW	0	8	0	2	0	0
11/11/2021	4	WS	0915	1345	2	2	SW	0	8	0	2	0	0
11/11/2021	4	WS	0915	1345	3	2	SE	0	8	0	2	0	0
11/11/2021	4	WS	0915	1345	4	2	SE	0	8	0	2	0	0
11/11/2021	4	WS	0915	1345	5	2	SE	0	8	0	2	0	0
23/11/2021	4	WS	1100	1600	1	1	SW	1	8	0	1	0	0
23/11/2021	4	WS	1100	1600	2	3	W	2	8	0	1	0	0
23/11/2021	4	WS	1100	1600	3	3	W	1	8	0	1	0	0
23/11/2021	4	WS	1100	1600	4	2	W	1	8	0	1	0	0
23/11/2021	4	WS	1100	1600	5	2	W	1	8	0	1	0	0
04/12/2021	5	WS	0840	1400	1	2	NNW	2	8	0	1	0	0
04/12/2021	5	WS	0840	1400	2	2	NW	2	8	0	2	0	0
04/12/2021	5	WS	0840	1400	3	3	NW	2	8	0	2	0	0
04/12/2021	5	WS	0840	1400	4	4	NW	0	8	0	2	0	0
04/12/2021	5	WS	0840	1400	5	3	NNW	0	8	1	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
04/12/2021	5	WS	0840	1400	6	4	NNW	0	8	1	2	0	0
28/12/2021	5	WS	0850	1510	1	1	NNE	1	8	0	1	1	2
28/12/2021	5	WS	0850	1510	2	2	NNE	0	7	1	2	2	2
28/12/2021	5	WS	0850	1510	3	1	N	0	8	1	2	2	2
28/12/2021	5	WS	0850	1510	4	1	NNW	1	8	1	1	2	2
28/12/2021	5	WS	0850	1510	5	1	N	2	7	1	2	2	2
28/12/2021	5	WS	0850	1510	6	1	N	0	5	1	2	0	2
28/12/2021	5	WS	0850	1510	7	1	N	0	2	1	2	0	2
24/01/2022	6	WS	0835	1505	1	1	S	0	8	0	1	0	0
24/01/2022	6	WS	0835	1505	2	3	S	2	8	0	1	0	0
24/01/2022	6	WS	0835	1505	3	2	S	2	8	0	1	0	0
24/01/2022	6	WS	0835	1505	4	2	S	3	8	0	1	0	0
24/01/2022	6	WS	0835	1505	5	1	S	0	8	0	1	0	0
24/01/2022	6	WS	0835	1505	6	2	S	2	8	0	1	0	0
24/01/2022	6	WS	0835	1505	7	1	S	2	8	0	1	0	0
28/01/2022	6	WS	0840	1410	1	2	S	0	8	0	2	0	0
28/01/2022	6	WS	0840	1410	2	2	S	1	8	0	1	0	0
28/01/2022	6	WS	0840	1410	3	2	SSW	2	8	0	1	0	0
28/01/2022	6	WS	0840	1410	4	3	SSW	1	8	0	1	0	0
28/01/2022	6	WS	0840	1410	5	3	SW	2	8	0	1	0	0
28/01/2022	6	WS	0840	1410	6	3	SW	1	8	0	1	0	0
01/02/2022	7	WS	1010	1540	1	3	SW	3	8	1	2	0	0
01/02/2022	7	WS	1010	1540	2	4	W	0	8	1	2	0	0
01/02/2022	7	WS	1010	1540	3	4	W	0	8	1	2	0	0
01/02/2022	7	WS	1010	1540	4	5	WNW	2	8	1	2	0	0
01/02/2022	7	WS	1010	1540	5	5	WSW	2	8	1	2	0	0
01/02/2022	7	WS	1010	1540	6	4	VAR	0	8	1	2	0	0
12/02/2022	7	WS	0840	1440	1	3	SSW	3	8	0	1	0	0
12/02/2022	7	WS	0840	1440	2	3	SSW	3	8	0	1	0	0
12/02/2022	7	WS	0840	1440	3	4	SW	2	8	0	2	0	0
12/02/2022	7	WS	0840	1440	4	4	SW	3	8	0	1	0	0
12/02/2022	7	WS	0840	1440	5	4	WSW	3	8	0	1	0	0
12/02/2022	7	WS	0840	1440	6	4	SW	2	8	0	2	0	0
07/03/2022	8	WS	1040	1235	1	3	SE	0	8	1	2	0	2
07/03/2022	8	WS	1040	1235	2	3	SE	0	7	2	2	2	2
07/03/2022	8	WS	1405	1810	3	5	SSE	0	5	2	2	2	2
07/03/2022	8	WS	1405	1810	4	4	SSE	0	6	2	2	2	2
07/03/2022	8	WS	1405	1810	5	4	S	0	6	2	2	2	2
07/03/2022	8	WS	1405	1810	6	3	S	0	6	2	2	0	2

C.5 Scarce Breeding Bird Surveys

Scarce breeding bird surveys were undertaken during the 2020 and 2021 breeding seasons. **Table C-6** details survey dates and weather data recorded. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-6 Meteorological conditions during scarce breeding bird surveys at Ladyfield Renewable Energy Park (sorted chronologically)

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
31/03/2020	1	WS	0745	1345	1	1	NW	0	7	1	2	0	2
31/03/2020	1	WS	0745	1345	2	2	NW	0	6	1	2	0	2
31/03/2020	1	WS	0745	1345	3	2	NW	0	5	1	2	0	2
31/03/2020	1	WS	0745	1345	4	3	NW	1	7	1	2	0	2
31/03/2020	1	WS	0745	1345	5	2	NW	2	8	1	2	0	2
31/03/2020	1	WS	0745	1345	6	2	NW	0	6	1	2	0	2
10/04/2020	2	WS	1030	1330	1	2	VAR	0	8	2	2	0	2

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
10/04/2020	2	WS	1030	1330	2	2	S	0	8	2	2	0	2
10/04/2020	2	WS	1030	1330	3	2	S	0	8	2	2	0	2
11/04/2020	2	WS	1125	1325	1	3	W	1	8	0	2	0	0
11/04/2020	2	WS	1125	1325	2	3	W	0	8	0	2	0	0
13/04/2020	2	WS	0815	1515	1	3	NE	0	0	2	2	1	2
13/04/2020	2	WS	0815	1515	2	3	NE	0	0	2	2	0	2
13/04/2020	2	WS	0815	1515	3	2	VAR	0	0	2	2	0	2
13/04/2020	2	WS	0815	1515	4	2	VAR	0	0	2	2	0	2
13/04/2020	2	WS	0815	1515	5	2	S	0	0	2	2	0	2
13/04/2020	2	WS	0815	1515	6	2	W	0	1	2	2	0	2
13/04/2020	2	WS	0815	1515	7	2	W	0	2	2	2	0	2
19/04/2020	2	WS	0740	1340	1	3	E	0	2	2	2	1	2
19/04/2020	2	WS	0740	1340	2	4	E	0	2	2	2	0	2
19/04/2020	2	WS	0740	1340	3	4	E	0	1	2	2	0	2
19/04/2020	2	WS	0740	1340	4	3	E	0	1	2	2	0	2
19/04/2020	2	WS	0740	1340	5	4	E	0	1	2	2	0	2
19/04/2020	2	WS	0740	1340	6	4	E	0	2	2	2	0	2
20/04/2020	2	WS	0840	1440	1	3	E	0	0	0	2	0	2
20/04/2020	2	WS	0840	1440	2	3	E	0	0	0	2	0	2
20/04/2020	2	WS	0840	1440	3	4	E	0	1	2	2	0	2
20/04/2020	2	WS	0840	1440	4	3	E	0	2	2	2	0	2
20/04/2020	2	WS	0840	1440	5	4	E	0	3	2	2	0	2
20/04/2020	2	WS	0840	1440	6	4	E	0	2	2	2	0	2
08/05/2020	3	WS	0730	1330	1	1	SW	1	8	0	1	0	0
08/05/2020	3	WS	0730	1330	2	2	SW	0	8	0	2	0	0
08/05/2020	3	WS	0730	1330	3	2	SW	2	8	0	1	0	0
08/05/2020	3	WS	0730	1330	4	2	SSW	0	8	1	2	0	0
08/05/2020	3	WS	0730	1330	5	3	SW	0	8	1	2	0	0
08/05/2020	3	WS	0730	1330	6	3	SW	2	8	1	2	0	0
15/05/2020	3	WS	0700	1300	1	2	WNW	2	7	1	2	0	0
15/05/2020	3	WS	0700	1300	2	3	W	2	8	1	2	0	0
15/05/2020	3	WS	0700	1300	3	4	W	0	8	1	2	0	0
15/05/2020	3	WS	0700	1300	4	4	W	2	8	1	2	0	0
15/05/2020	3	WS	0700	1300	5	4	W	0	8	1	2	0	0
15/05/2020	3	WS	0700	1300	6	4	W	0	8	1	2	0	0
16/05/2020	3	WS	0740	1340	1	2	W	2	8	1	2	0	0
16/05/2020	3	WS	0740	1340	2	3	W	2	8	0	1	0	0
16/05/2020	3	WS	0740	1340	3	3	W	0	8	0	2	0	0
16/05/2020	3	WS	0740	1340	4	4	W	0	7	1	2	0	0
16/05/2020	3	WS	0740	1340	5	4	W	0	6	1	2	0	0
16/05/2020	3	WS	0740	1340	6	4	W	2	8	1	2	0	0
02/06/2020	4	WS	0735	1335	1	1	W	0	7	1	2	0	0
02/06/2020	4	WS	0735	1335	2	1	W	0	8	2	2	0	0
02/06/2020	4	WS	0735	1335	3	1	W	0	7	2	2	0	0
02/06/2020	4	WS	0735	1335	4	1	W	0	8	2	2	0	0
02/06/2020	4	WS	0735	1335	5	2	W	0	8	2	2	0	0
02/06/2020	4	WS	0735	1335	6	1	W	0	8	2	2	0	0
07/06/2020	4	WS	0835	1435	1	2	NW	0	3	1	2	0	0
07/06/2020	4	WS	0835	1435	2	2	NNW	0	2	1	2	0	0
07/06/2020	4	WS	0835	1435	3	3	NNW	0	3	1	2	0	0
07/06/2020	4	WS	0835	1435	4	2	N	0	6	2	2	0	0
07/06/2020	4	WS	0835	1435	5	2	N	0	8	2	2	0	0
07/06/2020	4	WS	0835	1435	6	2	N	0	8	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
08/06/2020	4	WS	0825	0840	1	1	E	0	8	2	2	0	0
08/06/2020	4	WS	1150	1350	1	1	VAR	0	7	2	2	0	0
08/06/2020	4	WS	1150	1350	2	1	VAR	0	8	2	2	0	0
11/06/2020	4	WS	0805	1215	1	2	NE	0	8	2	2	0	0
11/06/2020	4	WS	0805	1215	2	4	NE	0	8	2	2	0	0
11/06/2020	4	WS	0805	1215	3	3	NE	0	8	2	2	0	0
11/06/2020	4	WS	0805	1215	4	2	NE	0	7	2	2	0	0
11/06/2020	4	WS	0805	1215	5	2	NE	0	7	2	2	0	0
12/06/2020	4	WS	1045	1205	1	1	N	0	8	2	2	0	0
12/06/2020	4	WS	1045	1205	2	1	N	0	8	2	2	0	0
07/07/2020	5	WS	0800	1400	1	2	SSW	1	8	0	1	0	0
07/07/2020	5	WS	0800	1400	2	2	SSW	0	8	1	2	0	0
07/07/2020	5	WS	0800	1400	3	2	SW	0	8	1	2	0	0
07/07/2020	5	WS	0800	1400	4	2	SW	0	8	1	2	0	0
07/07/2020	5	WS	0800	1400	5	2	S	0	8	1	2	0	0
07/07/2020	5	WS	0800	1400	6	2	S	0	8	1	2	0	0
10/07/2020	5	WS	0745	1345	1	2	NW	0	8	1	2	0	0
10/07/2020	5	WS	0745	1345	2	2	NW	0	7	1	2	0	0
10/07/2020	5	WS	0745	1345	3	2	NW	0	6	1	2	0	0
10/07/2020	5	WS	0745	1345	4	3	NW	2	8	1	2	0	0
10/07/2020	5	WS	0745	1345	5	3	NW	0	8	1	2	0	0
10/07/2020	5	WS	0745	1345	6	3	NW	0	8	1	2	0	0
14/08/2020	6	WS	0715	1315	1	1	VAR	0	7	0	2	0	0
14/08/2020	6	WS	0715	1315	2	1	VAR	0	8	0	2	0	0
14/08/2020	6	WS	0715	1315	3	1	E	0	8	0	2	0	0
14/08/2020	6	WS	0715	1315	4	1	E	0	8	1	2	0	0
14/08/2020	6	WS	0715	1315	5	1	E	0	6	1	2	0	0
14/08/2020	6	WS	0715	1315	6	1	E	0	7	1	2	0	0
15/03/2021	7	WS	0750	0920	1	3	WNW	0	3	1	2	0	2
15/03/2021	7	WS	0750	0920	2	3	WNW	0	5	1	2	0	2
17/03/2021	7	WS	0835	1435	1	2	SW	0	6	1	2	0	2
17/03/2021	7	WS	0835	1435	2	3	W	0	5	1	2	0	2
17/03/2021	7	WS	0835	1435	3	4	NW	0	4	1	2	0	2
17/03/2021	7	WS	0835	1435	4	4	NW	0	4	1	2	0	2
17/03/2021	7	WS	0835	1435	5	4	NW	0	5	1	2	0	2
17/03/2021	7	WS	0835	1435	6	3	NW	0	5	1	2	0	2
21/03/2021	7	WS	0820	1250	1	1	WNW	0	8	0	2	0	2
21/03/2021	7	WS	0820	1250	2	2	W	0	8	0	2	0	2
21/03/2021	7	WS	0820	1250	3	3	W	0	7	1	2	0	2
21/03/2021	7	WS	0820	1250	4	3	W	0	7	1	2	0	2
21/03/2021	7	WS	0820	1250	5	3	W	0	6	1	2	0	2
04/04/2021	8	WS	0815	1415	1	2	WSW	0	8	0	2	1	0
04/04/2021	8	WS	0815	1415	2	3	WSW	0	8	1	2	0	0
04/04/2021	8	WS	0815	1415	3	3	WSW	0	8	1	2	0	0
04/04/2021	8	WS	0815	1415	4	4	W	0	8	1	2	0	0
04/04/2021	8	WS	0815	1415	5	4	W	0	8	1	2	0	0
04/04/2021	8	WS	0815	1415	6	4	W	1	8	1	2	0	0
09/04/2021	8	WS	0830	1430	1	2	NW	0	1	2	2	1	2
09/04/2021	8	WS	0830	1430	2	3	NW	0	2	2	2	1	2
09/04/2021	8	WS	0830	1430	3	3	NW	0	3	2	2	1	2
09/04/2021	8	WS	0830	1430	4	3	NW	2	7	2	2	0	2
09/04/2021	8	WS	0830	1430	5	3	NW	0	7	2	2	0	2
09/04/2021	8	WS	0830	1430	6	3	NW	0	5	2	2	0	2

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
10/04/2021	8	WS	0730	1330	1	1	NNW	0	1	2	2	1	2
10/04/2021	8	WS	0730	1330	2	1	NNW	0	1	2	2	1	2
10/04/2021	8	WS	0730	1330	3	2	NNW	0	3	2	2	1	2
10/04/2021	8	WS	0730	1330	4	2	NNW	0	4	2	2	1	2
10/04/2021	8	WS	0730	1330	5	3	NNW	0	6	2	2	0	2
10/04/2021	8	WS	0730	1330	6	3	NNW	0	7	2	2	0	2
18/04/2021	8	WS	0735	1335	1	1	ESE	2	8	0	1	0	0
18/04/2021	8	WS	0735	1335	2	2	ESE	1	8	0	0	0	0
18/04/2021	8	WS	0735	1335	3	3	SE	0	8	0	1	0	0
18/04/2021	8	WS	0735	1335	4	3	ESE	0	8	0	2	0	0
18/04/2021	8	WS	0735	1335	5	3	ESE	0	8	0	2	0	0
18/04/2021	8	WS	0735	1335	6	2	ESE	0	8	0	2	0	0
01/05/2021	9	WS	0835	1135	1	1	SSE	0	7	1	2	0	0
01/05/2021	9	WS	0835	1135	2	2	S	0	8	1	2	0	0
01/05/2021	9	WS	0835	1135	3	2	S	2	8	1	2	0	0
11/05/2021	9	WS	1125	1725	1	2	S	0	7	2	2	0	0
11/05/2021	9	WS	1125	1725	2	2	S	0	7	2	2	0	0
11/05/2021	9	WS	1125	1725	3	3	S	0	7	2	2	0	0
11/05/2021	9	WS	1125	1725	4	3	S	0	7	2	2	0	0
11/05/2021	9	WS	1125	1725	5	2	S	0	7	2	2	0	0
11/05/2021	9	WS	1125	1725	6	3	S	0	7	2	2	0	0
26/05/2021	9	WS	0610	0750	1	1	VAR	0	7	1	2	0	0
26/05/2021	9	WS	0610	0750	2	2	VAR	0	4	1	2	0	0
26/05/2021	9	WS	1435	1555	1	2	N	2	8	1	2	0	0
26/05/2021	9	WS	1435	1555	2	2	N	0	8	1	2	0	0
11/06/2021	10	WS	0735	1335	1	3	W	1	8	0	1	0	0
11/06/2021	10	WS	0735	1335	2	3	W	0	8	0	2	0	0
11/06/2021	10	WS	0735	1335	3	4	SW	0	8	0	2	0	0
11/06/2021	10	WS	0735	1335	4	4	SW	0	8	0	2	0	0
11/06/2021	10	WS	0735	1335	5	4	WSW	1	8	0	1	0	0
11/06/2021	10	WS	0735	1335	6	3	WSW	1	8	0	1	0	0
12/06/2021	10	WS	0915	1645	1	3	WSW	1	8	0	1	0	0
12/06/2021	10	WS	0915	1645	2	3	WSW	0	8	1	2	0	0
12/06/2021	10	WS	0915	1645	3	4	WSW	0	8	1	2	0	0
12/06/2021	10	WS	0915	1645	4	4	SW	0	8	1	2	0	0
12/06/2021	10	WS	0915	1645	5	4	SW	2	8	1	2	0	0
12/06/2021	10	WS	0915	1645	6	3	WSW	0	8	1	2	0	0
12/06/2021	10	WS	0915	1645	7	3	WSW	0	8	1	2	0	0
12/06/2021	10	WS	0915	1645	8	3	WSW	0	8	1	2	0	0
18/06/2021	10	WS	0740	1210	1	1	NW	0	7	1	2	0	0
18/06/2021	10	WS	0740	1210	2	1	NW	0	8	1	2	0	0
18/06/2021	10	WS	0740	1210	3	2	NW	0	6	2	2	0	0
18/06/2021	10	WS	0740	1210	4	2	WNW	0	5	2	2	0	0
18/06/2021	10	WS	0740	1210	5	2	W	0	4	2	2	0	0
07/07/2021	11	WS	0510	0900	1	1	W	0	8	0	2	0	0
07/07/2021	11	WS	0510	0900	2	2	W	0	8	0	2	0	0
07/07/2021	11	WS	0510	0900	3	1	SW	0	8	0	2	0	0
07/07/2021	11	WS	0510	0900	4	2	NW	0	8	1	2	0	0
07/07/2021	11	WS	1140	1350	1	2	NW	0	7	1	2	0	0
07/07/2021	11	WS	1140	1350	2	3	NW	0	7	1	2	0	0
15/07/2021	11	WS	0825	1425	1	1	W	0	8	1	2	0	0
15/07/2021	11	WS	0825	1425	2	1	W	0	8	1	2	0	0
15/07/2021	11	WS	0825	1425	3	2	W	0	7	2	2	0	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
15/07/2021	11	WS	0825	1425	4	2	W	0	6	2	2	0	0
15/07/2021	11	WS	0825	1425	5	2	W	0	5	2	2	0	0
15/07/2021	11	WS	0825	1425	6	2	WNW	0	3	2	2	0	0
13/08/2021	12	WS	0910	1510	1	3	SSW	1	1	2	2	0	0
13/08/2021	12	WS	0910	1510	2	3	SSW	0	0	2	2	0	0
13/08/2021	12	WS	0910	1510	3	3	SSW	3	3	2	1	0	0
13/08/2021	12	WS	0910	1510	4	3	SSW	2	2	2	1	0	0
13/08/2021	12	WS	0910	1510	5	3	SW	3	3	2	2	0	0
13/08/2021	12	WS	0910	1510	6	4	WSW	2	2	2	2	0	0

C.6 Black Grouse Surveys

Black grouse surveys were undertaken during the 2020 and 2021 breeding seasons. **Table C-7** details survey dates and weather data recorded. Refer to **Annex B** for survey methodology and **Annex D** for survey results.

Table C-7 Meteorological conditions during black grouse surveys at Ladyfield Renewable Energy Park (sorted chronologically)

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
10/04/2020	1	WS	0550	1000	1	2	ESE	0	8	1	2	0	2
10/04/2020	1	WS	0550	1000	2	1	ESE	0	8	1	2	0	2
10/04/2020	1	WS	0550	1000	3	2	ESE	0	8	1	2	0	2
10/04/2020	1	WS	0550	1000	4	2	ESE	0	8	1	2	0	2
10/04/2020	1	WS	0550	1000	5	2	ESE	0	8	1	2	0	2
12/04/2020	1	WS	0520	0920	1	1	NNW	0	8	1	2	0	0
12/04/2020	1	WS	0520	0920	2	2	NNW	0	8	1	2	0	0
12/04/2020	1	WS	0520	0920	3	2	N	0	8	1	2	0	0
12/04/2020	1	WS	0520	0920	4	2	N	0	8	1	2	0	0
06/05/2020	2	WS	0415	0835	1	1	E	0	1	2	2	1	0
06/05/2020	2	WS	0415	0835	2	2	E	0	1	2	2	0	0
06/05/2020	2	WS	0415	0835	3	1	E	0	1	2	2	0	0
06/05/2020	2	WS	0415	0835	4	1	E	0	1	2	2	0	0
06/05/2020	2	WS	0415	0835	5	1	E	0	1	2	2	0	0
14/05/2020	2	WS	0405	0815	1	2	N	0	4	1	2	1	0
14/05/2020	2	WS	0405	0815	2	2	NNW	0	6	1	2	1	0
14/05/2020	2	WS	0405	0815	3	2	VAR	0	8	1	2	1	0
14/05/2020	2	WS	0405	0815	4	2	W	0	8	1	2	1	0
14/05/2020	2	WS	0405	0815	5	2	W	0	8	1	2	1	0
01/04/2021	3	WS	0540	0940	1	2	NE	0	1	1	2	0	0
01/04/2021	3	WS	0540	0940	2	3	NE	0	1	1	2	1	0
01/04/2021	3	WS	0540	0940	3	2	NE	0	1	1	2	0	0
01/04/2021	3	WS	0540	0940	4	3	NE	0	1	1	2	0	0
05/04/2021	3	WS	0530	0900	1	4	NW	0	3	1	2	1	0
05/04/2021	3	WS	0530	0900	2	3	NW	0	5	1	2	1	0
05/04/2021	3	WS	0530	0900	3	3	NW	2	7	1	2	1	0
05/04/2021	3	WS	0530	0900	4	4	NW	2	8	1	2	1	0
16/04/2021	3	WS	0510	0855	1	2	SE	0	1	1	2	1	0
16/04/2021	3	WS	0510	0855	2	4	SE	0	1	2	2	1	0
16/04/2021	3	WS	0510	0855	3	2	SE	0	2	2	2	1	0
16/04/2021	3	WS	0510	0855	4	2	SE	0	3	2	2	0	0
01/05/2021	4	WS	0425	0825	1	1	E	1	8	0	1	1	0
01/05/2021	4	WS	0425	0825	2	1	E	0	8	0	1	1	0
01/05/2021	4	WS	0425	0825	3	1	E	1	8	0	1	1	0
01/05/2021	4	WS	0425	0825	4	1	ESE	0	8	0	2	1	0
13/05/2021	4	WS	0400	0810	1	1	NE	0	7	1	2	1	0
13/05/2021	4	WS	0400	0810	2	1	NE	0	7	1	2	1	0

Date	Survey visit	Observer	Survey start time	Survey finish time	Survey hour	Wind speed	Wind direction	Rain	Cloud cover	Cloud height	Visibility	Frost	Snow
13/05/2021	4	WS	0400	0810	3	2	NE	0	8	1	2	1	0
13/05/2021	4	WS	0400	0810	4	2	NE	0	8	1	2	1	0
14/05/2021	4	WS	0405	0720	1	1	E	0	7	1	2	0	0
14/05/2021	4	WS	0405	0720	2	2	E	0	7	1	2	0	0
14/05/2021	4	WS	0405	0720	3	2	E	0	8	1	2	0	0
14/05/2021	4	WS	0405	0720	4	2	E	0	8	1	2	0	0

APPENDIX D ORNITHOLOGICAL SURVEY RESULTS

ANNEX D. ORNITHOLOGICAL SURVEY RESULTS

D.1 Flight Activity Records: Target Species

In accordance with NatureScot guidance (2017), target species are those which may be considered to be at risk from the potential effects of wind farms. All flights of target species within the turbine area and the surrounding area were mapped and are detailed in **Table D-1**.

Table D-1 Details of target species recorded during flight activity surveys (sorted by species)

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20 m	21-40 m	41-100 m	101-150 m	>150 m	0-20 m	21-40 m	41-100 m	101-150 m	>150 m
02/05/2021	WS	2	0721	Black grouse	1	2	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	1350	Common sandpiper	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
24/06/2021	WS	4	0828	Common sandpiper	1	4	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00
29/03/2020	WS	3	1145	Golden eagle	1	80	0.00	0.00	0.00	0.00	0.00	80.00	0.00	0.00	0.00	0.00
29/03/2020	WS	3	1148	Golden eagle	1	17	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	0.00	0.00
06/05/2020	WS	2	1032	Golden eagle	1	20	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
06/06/2020	WS	2	1304	Golden eagle	1	130	0.00	0.00	0.00	0.00	0.00	100.00	30.00	0.00	0.00	0.00
08/06/2020	WS	3	1114	Golden eagle	1	100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.00	55.00	0.00
08/06/2020	WS	3	1143	Golden eagle	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
06/07/2020	WS	2	0935	Golden eagle	1	30	0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00
06/07/2020	WS	2	0935	Golden eagle	1	40	0.00	0.00	0.00	0.00	0.00	0.00	25.00	15.00	0.00	0.00
06/07/2020	WS	2	0936	Golden eagle	1	125	0.00	0.00	0.00	0.00	0.00	0.00	20.00	75.00	30.00	0.00
06/07/2020	WS	2	1108	Golden eagle	1	10	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
06/07/2020	WS	2	1111	Golden eagle	1	210	0.00	0.00	0.00	0.00	0.00	45.00	90.00	60.00	15.00	0.00
06/07/2020	WS	2	1113	Golden eagle	1	60	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	0.00	0.00
06/07/2020	WS	2	1116	Golden eagle	1	45	0.00	0.00	0.00	0.00	0.00	0.00	30.00	15.00	0.00	0.00
09/07/2020	WS	3	1037	Golden eagle	1	48	0.00	0.00	0.00	0.00	0.00	48.00	0.00	0.00	0.00	0.00
09/07/2020	WS	3	1040	Golden eagle	1	25	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00
09/07/2020	WS	3	1359	Golden eagle	1	168	0.00	0.00	0.00	0.00	0.00	108.00	45.00	15.00	0.00	0.00
09/07/2020	WS	3	1410	Golden eagle	1	245	0.00	0.00	0.00	0.00	0.00	0.00	30.00	45.00	45.00	125.00
01/08/2020	WS	3	1500	Golden eagle	1	213	0.00	0.00	0.00	0.00	0.00	30.00	78.00	105.00	0.00	0.00
12/08/2020	WS	2	1140	Golden eagle	1	80	19.69	0.00	0.00	0.00	0.00	60.31	0.00	0.00	0.00	0.00
09/09/2020	WS	4	0845	Golden eagle	1	95	0.00	0.00	0.00	0.00	0.00	35.00	30.00	30.00	0.00	0.00
16/09/2020	WS	2	1142	Golden eagle	1	16	11.96	0.00	0.00	0.00	0.00	4.04	0.00	0.00	0.00	0.00
16/09/2020	WS	2	1156	Golden eagle	1	12	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00
30/10/2020	WS	3	0910	Golden eagle	1	3	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
30/10/2020	WS	3	0919	Golden eagle	1	125	0.00	0.00	0.00	0.00	0.00	110.00	15.00	0.00	0.00	0.00
30/10/2020	WS	3	0937	Golden eagle	1	2	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
30/10/2020	WS	3	0938	Golden eagle	1	10	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
30/10/2020	WS	3	0945	Golden eagle	1	120	0.00	0.00	0.00	0.00	0.00	75.00	45.00	0.00	0.00	0.00
30/10/2020	WS	3	0954	Golden eagle	1	67	0.00	0.00	0.00	0.00	0.00	52.00	15.00	0.00	0.00	0.00
30/10/2020	WS	3	0956	Golden eagle	1	15	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00
30/10/2020	WS	3	0959	Golden eagle	1	2	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
30/10/2020	WS	3	1017	Golden eagle	1	102	0.00	0.00	0.00	0.00	0.00	72.00	30.00	0.00	0.00	0.00
30/10/2020	WS	3	1124	Golden eagle	1	330	0.00	0.00	0.00	0.00	0.00	105.00	135.00	75.00	15.00	0.00
30/10/2020	WS	3	1304	Golden eagle	2	535	0.00	0.00	0.00	0.00	0.00	325.00	120.00	90.00	0.00	0.00
30/10/2020	WS	3	1316	Golden eagle	1	20	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
30/10/2020	WS	3	1335	Golden eagle	1	11	0.00	0.00	0.00	0.00	0.00	0.00	11.00	0.00	0.00	0.00
04/11/2020	WS	2	1042	Golden eagle	1	2	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
04/11/2020	WS	2	1046	Golden eagle	1	9	0.00	0.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00	0.00
04/11/2020	WS	2	1056	Golden eagle	2	590	18.21	5.99	2.00	0.00	0.00	391.79	129.01	43.00	0.00	0.00
04/11/2020	WS	2	1240	Golden eagle	1	230	0.00	0.00	0.00	0.00	0.00	0.00	135.00	95.00	0.00	0.00
04/11/2020	WS	2	1405	Golden eagle	1	245	0.00	45.31	36.25	36.25	30.21	0.00	29.69	23.75	23.75	19.79

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20 m	21-40 m	41-100 m	101-150 m	>150 m	0-20 m	21-40 m	41-100 m	101-150 m	>150 m
07/11/2020	WS	1	1138	Golden eagle	1	85	15.28	0.00	0.00	0.00	0.00	69.72	0.00	0.00	0.00	0.00
07/11/2020	WS	1	1236	Golden eagle	1	32	24.46	0.00	0.00	0.00	0.00	7.54	0.00	0.00	0.00	0.00
07/11/2020	WS	1	1238	Golden eagle	1	25	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
07/11/2020	WS	1	1254	Golden eagle	1	190	53.16	34.67	0.00	0.00	0.00	61.84	40.33	0.00	0.00	0.00
25/11/2020	WS	3	1057	Golden eagle	1	57	0.00	0.00	0.00	0.00	0.00	0.00	57.00	0.00	0.00	0.00
25/11/2020	WS	3	1313	Golden eagle	1	2	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
15/12/2020	WS	1	0944	Golden eagle	1	155	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	155.00
15/12/2020	WS	1	0951	Golden eagle	1	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00
17/12/2020	WS	3	1336	Golden eagle	1	174	0.00	0.00	0.00	0.00	0.00	0.00	15.00	15.00	90.00	54.00
17/12/2020	WS	3	1344	Golden eagle	1	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.00	0.00	0.00
17/12/2020	WS	3	1351	Golden eagle	1	108	0.00	0.00	0.00	0.00	0.00	78.00	0.00	0.00	30.00	0.00
17/12/2020	WS	3	1448	Golden eagle	1	20	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
18/01/2021	WS	3	0941	Golden eagle	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
27/01/2021	WS	1	1259	Golden eagle	1	105	0.00	9.91	9.91	9.91	39.64	0.00	5.09	5.09	5.09	20.36
21/02/2021	WS	1	1209	Golden eagle	1	18	0.00	0.00	0.00	0.00	0.00	18.00	0.00	0.00	0.00	0.00
22/02/2021	WS	2	1225	Golden eagle	1	95	0.00	0.00	0.00	0.00	0.00	50.00	45.00	0.00	0.00	0.00
25/02/2021	WS	3	1016	Golden eagle	1	190	0.00	0.00	0.00	0.00	0.00	145.00	30.00	15.00	0.00	0.00
25/02/2021	WS	3	1315	Golden eagle	1	415	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00	75.00	280.00
02/03/2021	WS	1	1437	Golden eagle	1	144	0.00	0.00	0.00	0.00	0.00	24.00	30.00	60.00	30.00	0.00
02/03/2021	WS	1	1441	Golden eagle	1	54	0.00	0.00	0.00	0.00	0.00	30.00	24.00	0.00	0.00	0.00
02/03/2021	WS	1	1455	Golden eagle	1	140	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.00	45.00	0.00
05/03/2021	WS	2	1416	Golden eagle	1	90	0.00	0.00	0.00	0.00	0.00	90.00	0.00	0.00	0.00	0.00
06/03/2021	WS	3	0950	Golden eagle	2	260	0.00	0.00	0.00	0.00	0.00	95.00	90.00	60.00	15.00	0.00
06/03/2021	WS	3	1350	Golden eagle	1	155	0.00	0.00	0.00	0.00	0.00	125.00	15.00	15.00	0.00	0.00
06/04/2021	WS	2	1126	Golden eagle	1	245	0.00	71.83	68.96	0.00	0.00	0.00	53.17	51.04	0.00	0.00
07/04/2021	WS	5	1126	Golden eagle	2	255	0.00	0.44	0.53	0.53	0.00	0.00	74.56	89.47	89.47	0.00
26/05/2021	WS	1	1038	Golden eagle	1	230	48.52	44.79	78.38	0.00	0.00	16.48	15.21	26.62	0.00	0.00
26/05/2021	WS	1	1130	Golden eagle	1	795	74.18	61.82	136.00	160.73	222.55	15.82	13.18	29.00	34.27	47.45
17/06/2021	WS	2	1047	Golden eagle	1	6	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00
17/06/2021	WS	2	1130	Golden eagle	1	234	0.00	0.00	0.00	0.00	0.00	189.00	45.00	0.00	0.00	0.00
17/06/2021	WS	2	1144	Golden eagle	2	975	0.00	0.00	0.00	0.00	0.00	135.00	315.00	255.00	195.00	75.00
17/06/2021	WS	2	1210	Golden eagle	2	730	0.00	0.00	0.00	0.00	0.00	25.00	75.00	330.00	300.00	0.00
17/06/2021	WS	2	1232	Golden eagle	1	215	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	135.00	80.00
14/07/2021	WS	2	1026	Golden eagle	1	775	6.94	87.96	55.56	104.17	104.17	8.06	102.04	64.44	120.83	120.83
14/07/2021	WS	2	1107	Golden eagle	1	42	0.00	0.00	0.00	0.00	0.00	12.00	30.00	0.00	0.00	0.00
14/07/2021	WS	2	1157	Golden eagle	2	570	0.00	0.00	0.00	0.00	0.00	75.00	120.00	180.00	150.00	45.00
14/07/2021	WS	2	1315	Golden eagle	1	435	0.00	5.19	8.90	5.93	1.48	0.00	99.81	171.10	114.07	28.52
14/07/2021	WS	2	1512	Golden eagle	1	43	0.00	0.00	0.00	0.00	0.00	43.00	0.00	0.00	0.00	0.00
14/07/2021	WS	2	1514	Golden eagle	1	12	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00
14/07/2021	WS	2	1516	Golden eagle	1	15	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00
14/07/2021	WS	2	1546	Golden eagle	1	20	1.96	5.88	0.00	0.00	0.00	3.04	9.12	0.00	0.00	0.00
02/08/2021	WS	1	1319	Golden eagle	1	305	0.00	16.19	40.48	40.48	67.47	0.00	13.81	34.52	34.52	57.53
02/08/2021	WS	1	1327	Golden eagle	2	60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00
02/08/2021	WS	1	1723	Golden eagle	2	690	0.00	12.02	26.04	48.07	6.01	0.00	77.98	168.96	311.93	38.99
02/08/2021	WS	1	1732	Golden eagle	2	20	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	15.00	0.00
16/08/2021	WS	5	1337	Golden eagle	2	40	0.00	0.00	0.00	0.00	0.00	10.00	30.00	0.00	0.00	0.00
16/09/2021	WS	1	1142	Golden eagle	2	260	0.00	0.00	0.00	0.00	0.00	170.00	75.00	15.00	0.00	0.00
16/09/2021	WS	1	1516	Golden eagle	1	340	0.00	0.00	0.00	0.00	0.00	60.00	75.00	90.00	55.00	60.00
18/09/2021	WS	5	1448	Golden eagle	1	143	0.00	0.00	0.00	0.00	0.00	0.00	15.00	15.00	23.00	90.00
18/09/2021	WS	5	1513	Golden eagle	1	190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.00	100.00
29/09/2021	WS	2	1037	Golden eagle	1	23	0.00	0.00	0.00	0.00	0.00	23.00	0.00	0.00	0.00	0.00

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20 m	21-40 m	41-100 m	101-150 m	>150 m	0-20 m	21-40 m	41-100 m	101-150 m	>150 m
29/09/2021	WS	2	1044	Golden eagle	1	53	0.00	0.00	0.00	0.00	0.00	53.00	0.00	0.00	0.00	0.00
29/09/2021	WS	2	1045	Golden eagle	1	3	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
29/09/2021	WS	2	1055	Golden eagle	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
29/09/2021	WS	2	1149	Golden eagle	1	58	0.00	0.00	0.00	0.00	0.00	58.00	0.00	0.00	0.00	0.00
29/09/2021	WS	2	1454	Golden eagle	1	202	0.00	0.00	0.00	0.00	0.00	127.00	75.00	0.00	0.00	0.00
29/09/2021	WS	2	1502	Golden eagle	1	248	49.98	105.29	10.00	0.00	0.00	25.02	52.71	5.00	0.00	0.00
29/09/2021	WS	2	1528	Golden eagle	1	102	0.00	0.00	0.00	0.00	0.00	42.00	60.00	0.00	0.00	0.00
05/10/2021	WS	5	1252	Golden eagle	1	38	0.00	0.00	0.00	0.00	0.00	0.00	38.00	0.00	0.00	0.00
05/10/2021	WS	5	1345	Golden eagle	1	330	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	330.00
05/10/2021	WS	5	1526	Golden eagle	1	408	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00	108.00	240.00
20/10/2021	WS	4	1252	Golden eagle	1	175	0.00	38.50	64.17	47.06	0.00	0.00	6.50	10.83	7.94	0.00
20/10/2021	WS	4	1320	Golden eagle	1	20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	0.00
20/10/2021	WS	4	1344	Golden eagle	3	405	0.00	0.00	0.00	0.00	33.83	0.00	0.00	0.00	0.00	371.17
22/10/2021	WS	2	0835	Golden eagle	1	82	0.00	0.00	0.00	0.00	0.00	60.00	22.00	0.00	0.00	0.00
22/10/2021	WS	2	1027	Golden eagle	2	450	12.17	9.13	30.43	18.26	21.30	47.83	35.87	119.57	71.74	83.70
22/10/2021	WS	2	1312	Golden eagle	1	60	0.00	0.00	0.00	0.00	0.00	60.00	0.00	0.00	0.00	0.00
02/11/2021	WS	4	1406	Golden eagle	1	25	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00
07/11/2021	WS	2	1235	Golden eagle	1	4	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00
26/11/2021	WS	5	1155	Golden eagle	2	95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.00	30.00	45.00
26/11/2021	WS	5	1324	Golden eagle	1	25	0.00	0.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00
05/12/2021	WS	1	1334	Golden eagle	1	55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.00
10/12/2021	WS	2	0956	Golden eagle	1	2	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1002	Golden eagle	1	3	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1014	Golden eagle	1	35	0.00	0.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1020	Golden eagle	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1024	Golden eagle	1	70	0.00	0.00	0.00	0.00	0.00	70.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1027	Golden eagle	1	155	0.00	0.00	0.00	0.00	0.00	155.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1030	Golden eagle	1	69	0.00	0.00	0.00	0.00	0.00	69.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1118	Golden eagle	1	53	0.00	0.00	0.00	0.00	0.00	53.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1155	Golden eagle	1	51	0.00	0.00	0.00	0.00	0.00	51.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1158	Golden eagle	1	130	0.00	0.00	0.00	0.00	0.00	60.00	30.00	40.00	0.00	0.00
10/12/2021	WS	2	1247	Golden eagle	1	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00
10/12/2021	WS	2	1250	Golden eagle	1	16	0.00	0.00	0.00	0.00	0.00	16.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1319	Golden eagle	1	40	0.00	0.00	0.00	0.00	0.00	25.00	15.00	0.00	0.00	0.00
10/12/2021	WS	2	1344	Golden eagle	1	45	0.00	0.00	0.00	0.00	0.00	45.00	0.00	0.00	0.00	0.00
10/12/2021	WS	2	1436	Golden eagle	1	48	0.00	0.00	0.00	0.00	0.00	33.00	15.00	0.00	0.00	0.00
11/01/2022	WS	2	1014	Golden eagle	1	4	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00
11/01/2022	WS	2	1121	Golden eagle	1	35	0.00	0.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00
11/01/2022	WS	2	1129	Golden eagle	1	16	0.00	0.00	0.00	0.00	0.00	16.00	0.00	0.00	0.00	0.00
11/01/2022	WS	2	1153	Golden eagle	1	135	17.06	51.19	8.53	0.00	0.00	12.94	38.81	6.47	0.00	0.00
11/01/2022	WS	2	1413	Golden eagle	1	19	0.00	0.00	0.00	0.00	0.00	19.00	0.00	0.00	0.00	0.00
11/01/2022	WS	2	1428	Golden eagle	1	8	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00
31/01/2022	WS	5	1214	Golden eagle	1	50	0.00	0.00	0.00	0.00	0.00	0.00	5.00	15.00	0.00	30.00
31/01/2022	WS	5	1323	Golden eagle	1	315	0.00	0.00	0.00	0.00	0.00	45.00	45.00	60.00	105.00	60.00
11/02/2022	WS	1	1429	Golden eagle	1	204	0.00	0.00	0.00	0.00	0.00	39.00	60.00	15.00	30.00	60.00
01/03/2022	WS	1	1027	Golden eagle	1	22	0.00	0.00	0.00	0.00	0.00	15.00	7.00	0.00	0.00	0.00
01/03/2022	WS	1	1411	Golden eagle	1	3	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
14/04/2020	WS	3	0802	Golden plover	1	4	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00
14/04/2020	WS	3	1328	Golden plover	1	20	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
07/05/2020	WS	3	1437	Golden plover	1	4	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00
08/06/2020	WS	3	0916	Golden plover	1	4	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20 m	21-40 m	41-100 m	101-150 m	>150 m	0-20 m	21-40 m	41-100 m	101-150 m	>150 m
08/06/2020	WS	3	0920	Golden plover	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
08/06/2020	WS	3	0925	Golden plover	1	6	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00
08/06/2020	WS	3	0929	Golden plover	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
08/06/2020	WS	3	1133	Golden plover	1	3	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
08/06/2020	WS	3	1137	Golden plover	1	4	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00
15/03/2021	WS	5	1016	Golden plover	2	65	0.00	0.00	1.84	3.67	2.45	0.00	0.00	13.16	26.33	17.55
19/03/2021	WS	1	1014	Golden plover	3	10	0.88	0.00	0.00	0.00	0.00	9.12	0.00	0.00	0.00	0.00
19/03/2021	WS	1	1018	Golden plover	1	20	0.00	0.00	0.00	0.00	0.00	15.00	5.00	0.00	0.00	0.00
19/03/2021	WS	1	1419	Golden plover	1	50	0.00	0.00	0.00	0.00	0.00	0.00	15.00	35.00	0.00	0.00
17/04/2021	WS	1	0921	Golden plover	1	144	0.00	0.00	0.00	0.00	0.00	0.00	0.00	144.00	0.00	0.00
26/05/2021	WS	1	0813	Golden plover	2	20	19.63	0.00	0.00	0.00	0.00	0.37	0.00	0.00	0.00	0.00
26/05/2021	WS	1	1033	Golden plover	1	10	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26/05/2021	WS	1	1301	Golden plover	1	8	7.05	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00
08/06/2021	WS	1	0910	Golden plover	1	8	6.61	0.00	0.00	0.00	0.00	1.39	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1121	Golden plover	1	5	0.23	0.00	0.00	0.00	0.00	4.77	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1123	Golden plover	2	8	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1325	Golden plover	1	6	1.94	0.00	0.00	0.00	0.00	4.06	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1328	Golden plover	1	4	0.27	0.00	0.00	0.00	0.00	3.73	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1403	Golden plover	1	3	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1404	Golden plover	1	5	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1411	Golden plover	1	9	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1459	Golden plover	1	10	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/06/2021	WS	1	1506	Golden plover	1	3	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
01/03/2022	WS	1	1502	Golden plover	1	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00
08/06/2020	WS	3	1023	Greenshank	1	12	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00
08/07/2021	WS	1	1705	Greenshank	1	7	7.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/2021	WS	1	1710	Greenshank	1	10	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/2021	WS	1	1714	Greenshank	1	21	21.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
08/07/2021	WS	1	1727	Greenshank	1	18	18.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
19/05/2020	WS	4	0949	Greylag goose	1	17	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	0.00	0.00
19/05/2020	WS	4	0955	Greylag goose	3	40	0.00	0.00	0.00	0.00	0.00	40.00	0.00	0.00	0.00	0.00
19/05/2020	WS	4	1016	Greylag goose	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
19/05/2020	WS	4	1032	Greylag goose	2	220	0.00	0.00	0.00	0.00	0.00	45.00	115.00	60.00	0.00	0.00
19/05/2020	WS	4	1039	Greylag goose	1	45	0.00	0.00	0.00	0.00	0.00	30.00	15.00	0.00	0.00	0.00
19/05/2020	WS	4	1040	Greylag goose	1	45	0.00	0.00	0.00	0.00	0.00	15.00	30.00	0.00	0.00	0.00
19/05/2020	WS	4	1052	Greylag goose	2	160	0.00	0.00	0.00	0.00	0.00	45.00	30.00	30.00	55.00	0.00
08/06/2020	WS	3	1421	Greylag goose	4	185	0.00	0.00	0.00	0.00	0.00	0.00	0.00	120.00	65.00	0.00
07/04/2021	WS	5	1051	Greylag goose	9	65	0.00	0.00	0.00	0.00	0.00	65.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	0859	Greylag goose	3	41	0.00	0.00	0.00	0.00	0.00	41.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	0904	Greylag goose	10	88	0.00	0.00	0.00	0.00	0.00	88.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	1002	Greylag goose	3	33	0.00	0.00	0.00	0.00	0.00	33.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	1205	Greylag goose	2	20	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	1302	Greylag goose	1	56	0.00	0.00	0.00	0.00	0.00	56.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	1317	Greylag goose	2	42	0.00	0.00	0.00	0.00	0.00	42.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	1320	Greylag goose	2	48	0.00	0.00	0.00	0.00	0.00	48.00	0.00	0.00	0.00	0.00
20/04/2021	WS	4	1341	Greylag goose	2	8	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00
07/06/2021	WS	5	0835	Greylag goose	7	190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	130.00	60.00
11/04/2020	WS	2	0945	Hen harrier	1	75	0.00	0.00	0.00	0.00	0.00	75.00	0.00	0.00	0.00	0.00
11/04/2020	WS	2	1445	Hen harrier	1	675	47.67	15.89	15.89	39.72	59.58	132.33	44.11	44.11	110.28	165.42
06/05/2020	WS	2	0911	Hen harrier	1	15	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00
06/06/2020	WS	2	1304	Hen harrier	1	73	14.89	0.00	0.00	0.00	0.00	58.11	0.00	0.00	0.00	0.00

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20 m	21-40 m	41-100 m	101-150 m	>150 m	0-20 m	21-40 m	41-100 m	101-150 m	>150 m
06/07/2020	WS	2	0833	Hen harrier	1	20	0.00	0.00	0.00	0.00	0.00	20.00	0.00	0.00	0.00	0.00
06/07/2020	WS	2	0940	Hen harrier	1	40	0.00	0.00	0.00	0.00	0.00	40.00	0.00	0.00	0.00	0.00
06/07/2020	WS	2	1026	Hen harrier	1	28	10.39	0.00	0.00	0.00	0.00	17.61	0.00	0.00	0.00	0.00
06/07/2020	WS	2	1235	Hen harrier	1	8	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00
12/08/2020	WS	2	0855	Hen harrier	1	17	0.00	0.00	0.00	0.00	0.00	17.00	0.00	0.00	0.00	0.00
12/08/2020	WS	2	0930	Hen harrier	1	25	2.49	0.00	0.00	0.00	0.00	22.51	0.00	0.00	0.00	0.00
12/08/2020	WS	2	1214	Hen harrier	1	7	0.00	0.00	0.00	0.00	0.00	7.00	0.00	0.00	0.00	0.00
02/03/2021	WS	1	1450	Hen harrier	1	33	0.00	0.00	0.00	0.00	0.00	33.00	0.00	0.00	0.00	0.00
06/04/2021	WS	2	0738	Hen harrier	1	25	10.84	0.00	0.00	0.00	0.00	14.16	0.00	0.00	0.00	0.00
07/06/2021	WS	5	1147	Hen harrier	1	82	3.28	0.00	0.00	0.00	0.00	78.72	0.00	0.00	0.00	0.00
13/07/2021	WS	5	1203	Hen harrier	1	23	9.49	0.00	0.00	0.00	0.00	13.51	0.00	0.00	0.00	0.00
14/07/2021	WS	2	1356	Hen harrier	1	150	0.00	0.00	0.00	0.00	0.00	15.00	30.00	45.00	60.00	0.00
12/08/2021	WS	2	1055	Hen harrier	1	3	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
12/08/2021	WS	2	1057	Hen harrier	1	75	52.22	0.00	0.00	0.00	0.00	22.78	0.00	0.00	0.00	0.00
12/08/2021	WS	2	1229	Hen harrier	1	10	0.00	0.00	0.00	0.00	0.00	10.00	0.00	0.00	0.00	0.00
12/08/2021	WS	2	1230	Hen harrier	1	34	0.00	0.00	0.00	0.00	0.00	34.00	0.00	0.00	0.00	0.00
12/08/2021	WS	2	1233	Hen harrier	1	67	0.00	0.00	0.00	0.00	0.00	67.00	0.00	0.00	0.00	0.00
12/08/2021	WS	2	1238	Hen harrier	1	12	0.00	0.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00	0.00
16/08/2021	WS	5	1649	Hen harrier	1	103	0.00	0.00	0.00	0.00	0.00	103.00	0.00	0.00	0.00	0.00
07/11/2021	WS	2	1525	Hen harrier	1	130	4.15	18.66	18.66	12.44	0.00	5.85	26.34	26.34	17.56	0.00
26/11/2021	WS	5	1300	Hen harrier	1	35	0.00	0.00	0.00	0.00	0.00	35.00	0.00	0.00	0.00	0.00
01/12/2021	WS	5	1139	Hen harrier	1	145	0.00	0.00	0.00	0.00	0.00	145.00	0.00	0.00	0.00	0.00
23/01/2022	WS	4	1440	Hen harrier	1	128	0.00	0.00	0.00	0.00	0.00	30.00	15.00	38.00	45.00	0.00
27/01/2022	WS	5	1119	Hen harrier	1	30	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00	0.00
12/08/2020	WS	2	1121	Herring gull	2	80	0.00	0.00	0.00	0.00	0.00	0.00	15.00	30.00	35.00	0.00
20/04/2021	WS	4	1358	Herring gull	3	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	120.00	0.00
06/07/2020	WS	2	1107	Merlin	1	5	0.00	0.00	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00
06/07/2020	WS	2	1116	Merlin	1	80	0.00	0.00	0.00	0.00	0.00	0.00	30.00	15.00	35.00	0.00
09/07/2020	WS	3	1037	Merlin	1	30	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00	0.00
09/07/2020	WS	3	1153	Merlin	1	50	0.00	0.00	0.00	0.00	0.00	35.00	15.00	0.00	0.00	0.00
01/08/2020	WS	3	1505	Merlin	2	75	0.00	0.00	0.00	0.00	0.00	60.00	15.00	0.00	0.00	0.00
02/05/2021	WS	2	0822	Merlin	1	2	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00
02/05/2021	WS	2	0827	Merlin	1	3	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00
02/05/2021	WS	2	0844	Merlin	1	15	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00
14/07/2021	WS	2	1320	Merlin	1	40	0.00	0.00	0.00	0.00	0.00	0.00	10.00	30.00	0.00	0.00
09/09/2020	WS	4	0735	Peregrine falcon	1	83	0.00	0.00	0.00	0.00	0.00	15.00	45.00	23.00	0.00	0.00
09/09/2020	WS	4	0846	Peregrine falcon	1	35	0.00	0.00	0.00	0.00	0.00	20.00	0.00	15.00	0.00	0.00
22/12/2020	WS	2	0944	Peregrine falcon	1	45	0.00	0.00	0.00	0.00	0.00	30.00	15.00	0.00	0.00	0.00
22/12/2020	WS	2	0957	Peregrine falcon	1	4	0.00	0.00	0.00	0.00	0.00	4.00	0.00	0.00	0.00	0.00
22/12/2020	WS	2	1016	Peregrine falcon	1	37	0.00	0.00	0.00	0.00	0.00	37.00	0.00	0.00	0.00	0.00
02/05/2021	WS	2	1056	Peregrine falcon	1	15	0.00	0.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00	0.00
29/09/2021	WS	2	1015	Peregrine falcon	1	95	2.35	2.35	2.75	0.00	0.00	27.65	27.65	32.25	0.00	0.00
16/09/2020	WS	2	1127	Pink-footed goose	41	170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	170.00
16/09/2020	WS	2	1153	Pink-footed goose	67	220	45.30	11.65	0.00	0.00	0.00	129.70	33.35	0.00	0.00	0.00
16/09/2020	WS	2	1250	Pink-footed goose	45	75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75.00	0.00
16/09/2020	WS	2	1327	Pink-footed goose	48	120	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.00	60.00	0.00
16/09/2020	WS	2	1339	Pink-footed goose	37	225	0.00	67.54	16.89	42.21	0.00	0.00	52.46	13.11	32.79	0.00
16/09/2020	WS	2	1418	Pink-footed goose	51	215	0.00	0.00	0.00	0.00	0.00	0.00	170.00	45.00	0.00	0.00
16/09/2020	WS	2	1458	Pink-footed goose	50	130	0.00	0.00	67.20	0.00	0.00	0.00	0.00	62.80	0.00	0.00
16/09/2020	WS	2	1540	Pink-footed goose	48	180	0.00	0.00	6.97	62.69	13.93	0.00	0.00	8.03	72.31	16.07
16/09/2020	WS	2	1551	Pink-footed goose	166	170	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	170.00

Date	Observer	VP	Flight start time	Species	No. of birds	Duration (s)	Inside CRAA (seconds)					Outside CRAA (seconds)				
							0-20 m	21-40 m	41-100 m	101-150 m	>150 m	0-20 m	21-40 m	41-100 m	101-150 m	>150 m
01/08/2020	WS	3	1001	Short-eared owl	1	9	0.00	0.00	0.00	0.00	0.00	9.00	0.00	0.00	0.00	0.00
01/08/2020	WS	3	1002	Short-eared owl	1	6	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00
07/05/2020	WS	3	1445	White-tailed eagle	1	442	0.00	0.00	0.00	0.00	0.00	217.00	150.00	75.00	0.00	0.00
07/05/2020	WS	3	1506	White-tailed eagle	1	6	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	0.00
08/07/2020	WS	1	1008	White-tailed eagle	1	30	0.00	0.00	0.00	0.00	0.00	30.00	0.00	0.00	0.00	0.00
08/07/2020	WS	1	1020	White-tailed eagle	1	175	14.45	21.68	21.68	26.49	0.00	15.55	23.32	23.32	28.51	0.00
10/08/2020	WS	1	1212	White-tailed eagle	1	142	0.00	0.00	0.00	0.00	0.00	45.00	45.00	52.00	0.00	0.00
07/04/2021	WS	5	1126	White-tailed eagle	1	120	0.00	0.00	0.00	0.00	0.00	0.00	45.00	75.00	0.00	0.00
01/03/2022	WS	1	1303	White-tailed eagle	1	60	0.00	0.00	0.00	0.00	0.00	30.00	30.00	0.00	0.00	0.00
01/03/2022	WS	1	1307	White-tailed eagle	1	190	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.00	60.00	85.00
29/03/2020	WS	3	1030	Whooper swan	3	245	0.00	0.00	0.00	0.00	0.00	80.00	30.00	90.00	45.00	0.00
07/11/2020	WS	1	0913	Whooper swan	1	8	0.00	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	0.00
13/11/2021	WS	1	1022	Whooper swan	1	51	0.00	0.00	0.00	0.00	0.00	51.00	0.00	0.00	0.00	0.00
24/11/2021	WS	1	1144	Whooper swan	1	260	0.00	0.00	0.00	0.00	0.00	35.00	75.00	60.00	90.00	0.00

D.2 Moorland Breeding Bird Records

Moorland breeding bird surveys were undertaken during the 2021 breeding season and focused on recording activity of upland wader species within the survey area (**Table D-2**). Survey methodology is detailed in **Annex B** and survey timing/weather conditions in **Annex C**.

Table D-2 Wader activity recorded during moorland breeding bird surveys

Date	Survey visit	Observer	Species	Number recorded	Notes
26/03/2020	VP 1	WS	Golden plover	1	Heard only; north-east of survey location.
28/03/2020	VP 2	WS	Snipe	1	Close to survey location.
11/04/2020	SBBS 2	WS	Snipe	1	Singing.
11/04/2020	SBBS 2	WS	Snipe	1	Singing.
13/04/2020	SBBS 2	WS	Golden plover	1	Calling.
13/04/2020	SBBS 2	WS	Golden plover	1	
13/04/2020	SBBS 2	WS	Golden plover	1	Alarm calling.
13/04/2020	SBBS 2	WS	Golden plover	1	Alarm calling.
06/05/2020	BK 2	WS	Snipe	1	Calling.
08/05/2020	SBBS 3	WS	Snipe	1	Calling.
16/05/2020	SBBS 3	WS	Golden plover	2	
02/06/2020	SBBS 4	WS	Golden plover	1	Calling.
02/06/2020	SBBS 4	WS	Snipe	1	Calling.
06/06/2020	VP 2	WS	Snipe	1	Heard only; west of survey location.
07/06/2020	SBBS 4	WS	Snipe	1	
08/06/2020	SBBS 4	WS	Golden plover	1	Calling.
08/06/2020	SBBS 4	WS	Greenshank	2	Calling.
08/06/2020	SBBS 4	WS	Snipe	1	Calling.
08/06/2020	SBBS 4	WS	Golden plover	1	Calling.
08/06/2020	SBBS 4	WS	Golden plover	1	Calling.
08/06/2020	SBBS 4	WS	Golden plover	1	Calling.
08/06/2020	SBBS 4	WS	Golden plover	2	Calling.
08/06/2020	SBBS 4	WS	Snipe	1	Singing.
08/06/2020	SBBS 4	WS	Snipe	2	Singing.
08/06/2020	VP 3	WS	Snipe	1	Heard only; displaying south of survey location.
12/06/2020	SBBS 4	WS	Common sandpiper	2	Calling.
12/06/2020	SBBS 4	WS	Common sandpiper	1	
12/06/2020	SBBS 4	WS	Common sandpiper	1	Calling.
02/04/2021	BBS 1	WS	Snipe	1	
18/04/2021	SBBS 8	WS	Golden plover	1	Calling.
01/05/2021	BK 4	WS	Snipe	1	Calling.
01/05/2021	BK 4	WS	Snipe	1	Singing.
01/05/2021	SBBS 9	WS	Snipe	1	Calling.
09/05/2021	BBS 2	WS	Snipe	1	Calling.
11/05/2021	SBBS 9	WS	Common sandpiper	1	
12/05/2021	BBS 2	WS	Snipe	1	Calling.
12/05/2021	BBS 2	WS	Snipe	1	Calling.
12/05/2021	BBS 2	WS	Snipe	1	
26/05/2021	SBBS 9	WS	Greenshank	2	
07/06/2021	BBS 3	WS	Golden plover	1	
07/06/2021	VP 5	WS	Snipe	-	Heard only; south-east of survey location.
08/06/2021	VP 1	WS	Golden plover	1	Alarm calling close to survey location.
08/06/2021	VP 1	WS	Golden plover	1	Heard only.
10/06/2021	BBS 3	WS	Snipe	1	Singing.
10/06/2021	BBS 3	WS	Snipe	1	
10/06/2021	BBS 3	WS	Snipe	2	
10/06/2021	BBS 3	WS	Snipe	1	
10/06/2021	BBS 3	WS	Snipe	1	Calling.
11/06/2021	BBS 3	WS	Snipe	1	
12/06/2021	SBBS 10	WS	Snipe	1	Calling.
12/06/2021	SBBS 10	WS	Golden plover	1	Calling.
12/06/2021	SBBS 10	WS	Greenshank	2	Calling.
12/06/2021	SBBS 10	WS	Snipe	1	Singing.
12/06/2021	SBBS 10	WS	Golden plover	1	
12/06/2021	SBBS 10	WS	Snipe	1	Calling.
12/06/2021	SBBS 10	WS	Golden plover	2	
17/06/2021	VP 2	WS	Snipe	1	Calling; north-east of survey location.
17/06/2021	VP 2	WS	Snipe	1	Calling; south-west of survey location.
18/06/2021	SBBS 10	WS	Snipe	1	Singing.
06/07/2021	BBS 4	WS	Snipe	1	Calling.
06/07/2021	BBS 4	WS	Snipe	1	Calling.
08/07/2021	VP 1	WS	Greenshank	1	Alarm calling.
13/07/2021	BBS 4	WS	Snipe	1	Calling.

D.3 Winter Walkover Records

Table D-3 details all the species recorded. Refer to **Annex B** for survey methodology and **Annex C** for weather data.

Table D-3 Winter walkover survey records: 2020/2021 and 2021/2022 non-breeding seasons

Date	Survey visit	Observer	Species	Number recorded	Notes
06/11/2020	WS	1	Black grouse	1	In flight, Tom an Fheidh.
06/11/2020	WS	1	Buzzard	1	In flight, Bile Gharbh.
06/11/2020	WS	1	Buzzard	1	In flight, Allt a' Mhadaidh.
06/11/2020	WS	1	Goldfinch	-	
06/11/2020	WS	1	Hooded crow	-	
06/11/2020	WS	1	Raven	-	
06/11/2020	WS	1	Red grouse	1	In flight, Lochan a' Mhadaidh; female.
06/11/2020	WS	1	Red grouse	4	In flight near Lochan a' Mhadaidh.
06/11/2020	WS	1	Robin	-	
06/11/2020	WS	1	Woodpigeon	-	
06/11/2020	WS	1	Wren	-	
12/11/2020	WS	1	Blackbird	-	
12/11/2020	WS	1	Buzzard	1	In flight.
12/11/2020	WS	1	Buzzard	2	In flight.
12/11/2020	WS	1	Buzzard	1	In flight.
12/11/2020	WS	1	Buzzard	1	In flight.
12/11/2020	WS	1	Buzzard	1	In flight.
12/11/2020	WS	1	Coal tit	-	
12/11/2020	WS	1	Great tit	-	
12/11/2020	WS	1	Hooded crow	-	
12/11/2020	WS	1	Jay	-	
12/11/2020	WS	1	Raven	-	
12/11/2020	WS	1	Robin	-	

Date	Survey visit	Observer	Species	Number recorded	Notes
12/11/2020	WS	1	Wren	-	
19/11/2020	WS	1	Buzzard	1	In flight.
19/11/2020	WS	1	Buzzard	1	In flight.
19/11/2020	WS	1	Coal tit	-	
19/11/2020	WS	1	Great tit	-	
19/11/2020	WS	1	Hooded crow	-	
19/11/2020	WS	1	Meadow pipit	-	
19/11/2020	WS	1	Mistle thrush	-	
19/11/2020	WS	1	Raven	-	
19/11/2020	WS	1	Woodcock	1	In flight.
19/11/2020	WS	1	Wren	-	
25/11/2020	WS	1	Whooper swan	8	On Lochan Shieleachan.
09/02/2021	WS	2	Buzzard	1	
09/02/2021	WS	2	Golden eagle	1	Landed on crag to join male; copulation observed.
09/02/2021	WS	2	Golden eagle	1	Displaying; then landed and mated with female.
09/02/2021	WS	2	Raven	-	
09/02/2021	WS	2	Robin	-	
11/02/2021	WS	2	Coal tit	-	
11/02/2021	WS	2	Golden eagle	1	Hunting; then landed.
11/02/2021	WS	2	Golden eagle	1	Took off; hunting and displaying.
11/02/2021	WS	2	Great tit	-	
11/02/2021	WS	2	Kestrel	1	In flight; Loch Scardan; female.
11/02/2021	WS	2	Raven	-	
24/02/2021	WS	2	Blackbird	-	
24/02/2021	WS	2	Buzzard	1	In flight.
24/02/2021	WS	2	Chaffinch	-	
24/02/2021	WS	2	Coal tit	-	
24/02/2021	WS	2	Goldcrest	-	
24/02/2021	WS	2	Golden plover	1	
24/02/2021	WS	2	Raven	-	
24/02/2021	WS	2	Red grouse	-	
24/02/2021	WS	2	Song thrush	-	
24/02/2021	WS	2	Wren	-	
04/03/2021	WS	3	Chaffinch	-	
04/03/2021	WS	3	Coal tit	-	
04/03/2021	WS	3	Hooded crow	-	
04/03/2021	WS	3	Raven	-	
04/03/2021	WS	3	Red grouse	2	In flight; Stuc Scardan; pair.
04/03/2021	WS	3	Song thrush	-	
07/03/2021	WS	3	Blackbird	-	
07/03/2021	WS	3	Golden eagle	1	In flight, east of Mullach nam Maol.
07/03/2021	WS	3	Golden eagle	1	In flight, east of Mullach nam Maol.
07/03/2021	WS	3	Golden eagle	1	In flight, east of Mullach nam Maol.
07/03/2021	WS	3	Mallard	2	East of Lochan Mhadaidh.
07/03/2021	WS	3	Raven	-	
07/03/2021	WS	3	Red grouse	1	
07/03/2021	WS	3	Robin	-	
07/03/2021	WS	3	Slavonian grebe	1	
10/03/2021	WS	3	Blackbird	-	
10/03/2021	WS	3	Chaffinch	-	
10/03/2021	WS	3	Golden plover	2	North of Lochan Sheileachan.
10/03/2021	WS	3	Greylag goose	7	In flight, east of Stronmagachan.
10/03/2021	WS	3	Hooded crow	-	
10/03/2021	WS	3	Mallard	2	East of Drimfern.
10/03/2021	WS	3	Raven	-	
10/03/2021	WS	3	Wren	-	
10/11/2021	WS	4	Wren	-	
11/11/2021	WS	4	Blackbird	-	
11/11/2021	WS	4	Buzzard	1	In flight.
11/11/2021	WS	4	Buzzard	1	In flight.
11/11/2021	WS	4	Buzzard	1	In flight.
11/11/2021	WS	4	Chaffinch	-	
11/11/2021	WS	4	Coal tit	-	
11/11/2021	WS	4	Fieldfare	55	
11/11/2021	WS	4	Fieldfare	40	
11/11/2021	WS	4	Jay	-	
11/11/2021	WS	4	Kestrel	1	
11/11/2021	WS	4	Mallard	-	
11/11/2021	WS	4	Raven	-	
11/11/2021	WS	4	Robin	-	
11/11/2021	WS	4	Wren	-	
23/11/2021	WS	4	Buzzard	1	Perched.
23/11/2021	WS	4	Coal tit	-	
23/11/2021	WS	4	Golden eagle	1	
23/11/2021	WS	4	Lesser redpoll	-	
23/11/2021	WS	4	Raven	-	
23/11/2021	WS	4	Red grouse	5	
23/11/2021	WS	4	Snipe	1	In flight.
23/11/2021	WS	4	Whooper swan	1	
23/11/2021	WS	4	Whooper swan	1	
23/11/2021	WS	4	Whooper swan	1	
23/11/2021	WS	4	Whooper swan	1	
23/11/2021	WS	4	Whooper swan	1	
23/11/2021	WS	4	Wren	-	
04/12/2021	WS	5	Blackbird	-	
04/12/2021	WS	5	Buzzard	1	In flight.
04/12/2021	WS	5	Buzzard	1	Perched.
04/12/2021	WS	5	Buzzard	1	In flight.
04/12/2021	WS	5	Chaffinch	-	
04/12/2021	WS	5	Coal tit	-	
04/12/2021	WS	5	Hooded crow	-	
04/12/2021	WS	5	Jay	-	
04/12/2021	WS	5	Lesser redpoll	-	
04/12/2021	WS	5	Raven	-	
04/12/2021	WS	5	Robin	-	
04/12/2021	WS	5	Song thrush	-	
04/12/2021	WS	5	Woodcock	1	In flight.
04/12/2021	WS	5	Woodcock	1	In flight.
04/12/2021	WS	5	Wren	-	
28/12/2021	WS	5	Blackbird	-	
28/12/2021	WS	5	Buzzard	1	In flight.
28/12/2021	WS	5	Buzzard	1	In flight.

Date	Survey visit	Observer	Species	Number recorded	Notes
28/12/2021	WS	5	Buzzard	1	Perched.
28/12/2021	WS	5	Buzzard	1	Perched.
28/12/2021	WS	5	Chaffinch	-	
28/12/2021	WS	5	Coal tit	-	
28/12/2021	WS	5	Hen harrier	1	
28/12/2021	WS	5	Jay	-	
28/12/2021	WS	5	Raven	-	
28/12/2021	WS	5	Whooper swan	1	
28/12/2021	WS	5	Wren	-	
24/01/2022	WS	6	Chaffinch	-	
24/01/2022	WS	6	Coal tit	-	
24/01/2022	WS	6	Dunnock	-	
24/01/2022	WS	6	Golden eagle	1	
24/01/2022	WS	6	Hooded crow	-	
24/01/2022	WS	6	Meadow pipit	-	
24/01/2022	WS	6	Raven	-	
24/01/2022	WS	6	Siskin	-	
24/01/2022	WS	6	Wren	-	
28/01/2022	WS	6	Chaffinch	-	
28/01/2022	WS	6	Coal tit	-	
28/01/2022	WS	6	Goldcrest	-	
28/01/2022	WS	6	Great tit	-	
28/01/2022	WS	6	Hooded crow	-	
28/01/2022	WS	6	Mallard	1	Female.
28/01/2022	WS	6	Mallard	2	Male.
28/01/2022	WS	6	Mallard	5	
28/01/2022	WS	6	Woodpigeon	-	
28/01/2022	WS	6	Wren	-	
01/02/2022	WS	7	Buzzard	1	In flight; south of Meall Reidh.
01/02/2022	WS	7	Buzzard	1	In flight, Allt Crichie.
01/02/2022	WS	7	Great tit	-	
01/02/2022	WS	7	Jay	-	
01/02/2022	WS	7	Raven	-	
12/02/2022	WS	7	Dunnock	-	
12/02/2022	WS	7	Goldcrest	-	
12/02/2022	WS	7	Long-tailed tit	-	
12/02/2022	WS	7	Raven	-	
12/02/2022	WS	7	Song thrush	-	
12/02/2022	WS	7	Woodpigeon	-	
12/02/2022	WS	7	Wren	-	
07/03/2022	WS	8	Bullfinch	-	
07/03/2022	WS	8	Chaffinch	-	
07/03/2022	WS	8	Coal tit	-	
07/03/2022	WS	8	Dunnock	-	
07/03/2022	WS	8	Great spotted woodpecker	-	
07/03/2022	WS	8	Great tit	-	
07/03/2022	WS	8	White-tailed eagle	2	
07/03/2022	WS	8	Woodcock	1	Flushed.
07/03/2022	WS	8	Wren	-	

[21] Annex 1 of the EU Bird Directive

D.4 Scarce Breeding Bird Records

Table D-4 details all records of raptors, divers and owls recorded during surveys, however only Annex 1[21] or Schedule 1[22] species are considered to be scarce breeding birds (i.e. target species). Refer to **Annex B** for survey methodology, **Annex C** for weather data and **Confidential Technical Appendix 7.4** for confidential data relating to breeding activity of barn owl, hen harrier, golden eagle and merlin.

Table D-4 Raptor, owl and diver records: 2020 and 2021 breeding seasons

Date	Species	Number recorded	Notes	Sex	Age
24/03/2020	Tawny owl	1	Heard only.	-	-
28/03/2020	Golden eagle	2	In flight, Cruach na Gearr-choise.	-	Adult
29/03/2020	Golden eagle	1	One bird at the summit of Stac a Chuira.	-	Adult
31/03/2020	Golden eagle	1	Displaying.	-	Adult
31/03/2020	Golden eagle	1	Displaying.	-	Adult
12/04/2020	Tawny owl	1		-	-
13/04/2020	Peregrine falcon	1		Female	Adult
14/04/2020	Black-throated diver	1	In flight, Glen Aray.	-	Adult
19/04/2020	Golden eagle	1	Landed near historical eyrie.	-	Adult
20/04/2020	Golden eagle	1		-	Adult
20/04/2020	Tawny owl	1		-	-
08/05/2020	Hen harrier	1		Male	Adult
08/05/2020	Hen harrier	1		Male	Adult
08/05/2020	Hen harrier	1		Male	Adult
08/05/2020	Hen harrier	1	Carrying food.	Male	Adult
08/05/2020	Merlin	1		-	Adult
12/05/2020	Merlin	1	Heard only.	-	Adult
13/05/2020	Golden eagle	1	In flight, Creag na h-Iolaire.	-	Adult
07/06/2020	Golden eagle	1		-	Immature
07/06/2020	Golden eagle	1		-	Adult
07/06/2020	Hen harrier	1		Male	Adult
07/06/2020	Hen harrier	1		Male	Adult
12/06/2020	Golden eagle	1	Displaying.	-	Adult
06/07/2020	Merlin	1	Heard only.	-	Adult
06/07/2020	Merlin	1	Heard only.	-	Adult
07/07/2020	Golden eagle	1		-	Adult
07/07/2020	Hen harrier	1		Male	Adult
07/07/2020	Hen harrier	1		Female	Adult
07/07/2020	Hen harrier	1		Female	Adult
07/07/2020	Hen harrier	1		Male	Adult
07/07/2020	Hen harrier	1		Female	Adult
07/07/2020	Hen harrier	1		Male	Adult
07/07/2020	Hen harrier	1	Three food passes observed.	Male	Adult
07/07/2020	Hen harrier	1		Male	Adult
07/07/2020	Hen harrier	1		Male	Adult
07/07/2020	Merlin	1		Male	Adult
07/07/2020	Merlin	1		Male	Adult
07/07/2020	Merlin	1		Male	Adult
08/07/2020	Golden eagle	1	In flight, Beinn Ghlas.	-	Adult
10/07/2020	Golden eagle	1		-	Adult

[22] Schedule 1 of the Wildlife and Countryside Act 1981, as amended by the Nature Conservation Act (Scotland) 2004

Date	Species	Number recorded	Notes	Sex	Age
07/03/2021	Golden eagle	1	East of Mullach nam Maol.	-	Adult
07/03/2021	Golden eagle	1	East of Mullach nam Maol.	-	Adult
07/03/2021	Golden eagle	1	East of Mullach nam Maol.	-	Adult
15/03/2021	Golden eagle	1	Hunting north of Stronmacachan.	-	Immature
15/03/2021	Golden eagle	1	In flight, south of Lochan Mhaoidh.	-	Adult
15/03/2021	Golden eagle	1	In flight; east of survey area.	-	-
15/03/2021	Golden eagle	1	In flight; east of survey area.	-	-
18/03/2021	Kestrel	1	Hunting then landed.	-	-
18/03/2021	Kestrel	1	Hunting.	-	-
18/03/2021	Kestrel	1	Joined another kestrel.	-	-
26/03/2021	Golden eagle	1	In flight, Cruach Mhor.	-	-
01/04/2021	Tawny owl	1	Calling from woodland south-west of Meall Redih.	-	-
01/04/2021	Tawny owl	1	Calling from woodland south-west of Meall Redih.	-	-
09/04/2021	Golden eagle	1	Flew east from nest location to intercept white-tailed eagle.	-	Adult
09/04/2021	Golden eagle	1	In flight, Stuc Scardan.	-	Adult
09/04/2021	Golden eagle	1		-	Adult
10/04/2021	Golden eagle	1	Hunting.	-	Immature
10/04/2021	Golden eagle	1	In flight, Cruach Mhor.	-	Adult
10/04/2021	Hen harrier	1	In flight; Tom an Fheidh.	Male	Adult
01/05/2021	Tawny owl	1	Calling from woodland south-west of Tom and Fheidh.	-	-
02/05/2021	Kestrel	1	In flight; Lochan a Mhadaidh; hunting.	-	-
11/05/2021	Kestrel	1	In flight.	-	-
26/05/2021	Golden eagle	1	Perched on boulder.	-	Adult
07/06/2021	Golden eagle	1	In flight, Creag na Iodaire.	-	-
07/06/2021	Golden eagle	2	Displaying.	-	-
11/06/2021	Hen harrier	1	In flight.	Female	Adult
11/06/2021	Hen harrier	1	In flight, Cachlaidh Bhan.	Female	Adult
12/06/2021	Golden eagle	1	In flight, Beinn Ghlas.	-	Adult
12/06/2021	Kestrel	1	In flight, Glen Shira.	-	-
18/06/2021	Hen harrier	1	In flight, north of Tom an Fheidh.	Female	Adult
18/06/2021	Hen harrier	1	In flight, Tom an Fheidh.	Female	Adult
07/07/2021	Hen harrier	1	In flight, Sron Gharbh.	Female	Adult
07/07/2021	Kestrel	1	In flight, Ceann Chreagan.	-	-
07/07/2021	Kestrel	1	In flight, Ceann Chreagan.	-	-
08/07/2021	Kestrel	1	Roosting at quarry.	-	-
13/07/2021	Kestrel	1	In flight.	-	-
13/07/2021	Kestrel	1	In flight; hunting.	Male	-
13/07/2021	Kestrel	1	In flight; hunting.	Male	-
13/07/2021	Kestrel	1	In flight; south of Stuc Scardan; hunting.	-	-
14/07/2021	Golden eagle	1	Perched on rock; mobbed by possible merlin briefly.	-	Adult
15/07/2021	Hen harrier	1	In flight.	Female	Adult
15/07/2021	Hen harrier	1	In flight, north of Tom an Fhiadh.	Female	Adult
15/07/2021	Hen harrier	1	In flight, north of Tom an Fhiadh.	Female	Adult
15/07/2021	Kestrel	1	In flight, Snoc Raineach.	-	-
15/07/2021	Kestrel	1	In flight, Stuc Scardan.	-	-
19/07/2021	Kestrel	1	North of Ceann Chreagan.	-	-

Date	Species	Number recorded	Notes	Sex	Age
07/03/2022	White-tailed eagle	2		-	Adult

D.5 Black Grouse Records

Table D-5 details all black grouse records with lek numbers indicated where appropriate. Refer to **Annex B** for survey methodology and **Annex C** for weather data.

Table D-5 Black grouse activity records: 2020 and 2021

Lek number	Date	Survey visit	No. males	No. females	No. unsexed	Notes
-	26/03/2020	VP 1	1	-	-	Heard only; north of survey location.
1	12/04/2020	BK 1	1	-	-	Minimum of one male heard only; lekking.
2	06/05/2020	BK 2	1	-	-	Minimum of one male heard only; lekking.
3	06/05/2020	BK 2	1	-	-	
4	06/05/2020	BK 2	2	-	-	
-	14/05/2020	BK 2	-	1	-	
-	10/09/2020	VP 3	1	-		Approximately 700 metres west of survey location.
-	16/09/2020	VP 2	1	-		Approximately 1.3 kilometres south-west of survey location.
-	06/11/2020	WWO 1	-	1	-	In flight, north of Tom an Fheidh.
-	01/04/2021	BBS 1	-	1	-	Female foraging at Sron Gharbh, then flew north-west.
6	01/04/2021	BK 3	4	-	-	4 males lekking between 0640 and 0750.
-	01/04/2021	BK 3	1	-	-	Male foraging, then flew west at 0757.
-	01/04/2021	BK 3	1	-	-	Male flying south and landing on Meall Reidh.
-	01/04/2021	BK 3	1	-	-	Male flying south and landing on Meall Reidh.
-	05/04/2021	BK 3	1	-	-	Male flying west near lek location.
4	05/04/2021	BK 3	2	-	-	2 males, flying south from lek.
4	05/04/2021	BK 3	1	-	-	Male flying south from lek.
4	05/04/2021	BK 3	4	1	-	4 males and 1 female; lekking and perching in birch trees from 0610 until 0715.
5	16/04/2021	BK 3	2	-	-	Males lekking between 0555 and 0615.
5	16/04/2021	BK 3	1	-	-	Male flying south-west from lek location.
5	16/04/2021	BK 3	1	-	-	Male flying south from lek location.
4	16/04/2021	BK 3	-	-	-	Males heard lekking north of site; assumed to be lek at NN 102 176.
4	01/05/2021	BK 4	3	5	-	2 males lekking with 5 females present; one male also on lower slopes near females.
4	01/05/2021	BK 4	1	1	-	Lone male; lekking.
4	01/05/2021	BK 4	-	1	-	Female flying north from lek.
4	01/05/2021	BK 4	1	-	-	Male flying north from lek.
4	01/05/2021	BK 4	-	1	-	Female flying south from lek.
-	01/05/2021	SBBS 9	1	-	-	Male flying south from Glean Dubh towards Tom an Fhiadh.
-	07/05/2021	PSS	1	-	-	Male flying into plantation south-west of Ceann Chreagan. Observed during protected species survey.
6	13/05/2021	BK 4	4	-	-	Males lekking from 0436 until 0645.
5	26/05/2021	SBBS 9	-	-	-	Heard only between 0650 and 0700; west of Stuc Scardan.
-	07/06/2021	VP 5	-	-	-	Foraging on Sron Garbh.
-	15/07/2021	SBBS 11	1	-	-	In flight, north of Tom an Fiadh.

D.6 Bird Species Index

A total of 73 bird species or signs was recorded at, or adjacent, to the site during the ornithological surveys. **Table D-6** comprises a list of all these species along with their conservation status.

Table D-6 All bird species recorded at Ladyfield Renewable Energy Park (March 2020 to March 2022)

Species	Conservation status	Species	Conservation status
Black grouse	BoCC Red	Long-tailed tit	BoCC Green
Blackbird	BoCC Green	Mallard	BoCC Amber
Black-throated diver	Annex 1, Schedule 1, BoCC Amber	Meadow pipit	BoCC Amber
Blue tit	BoCC Green	Merlin	Annex 1, Schedule 1, BoCC Red
Bullfinch	BoCC Amber	Mistle thrush	BoCC Red
Buzzard	BoCC Green	Peregrine falcon	Annex 1, Schedule 1, BoCC Green
Canada goose	No status	Pied wagtail	BoCC Green
Carrion crow	BoCC Green	Pink-footed goose	BoCC Amber
Chaffinch	BoCC Green	Raven	BoCC Green
Coal tit	BoCC Green	Red grouse	BoCC Green
Common crossbill	Schedule 1; BoCC Green	Redstart	BoCC Amber
Common sandpiper	BoCC Amber	Redwing	Schedule 1, BoCC Amber
Cormorant	BoCC Green	Robin	BoCC Green
Cuckoo	BoCC Red	Sand martin	BoCC Green
Dipper	BoCC Amber	Sedge warbler	BoCC Amber
Dunnock	BoCC Amber	Short-eared owl	Annex 1, BoCC Amber
Fieldfare	Schedule 1, BoCC Red	Siskin	BoCC Green
Garden warbler	BoCC Green	Skylark	BoCC Red
Goldcrest	BoCC Green	Slavonian grebe	Annex 1, Schedule 1, BoCC Red
Golden eagle	Annex 1, Schedule 1, BoCC Green	Snipe	BoCC Amber
Golden plover	Annex 1, BoCC Green	Song thrush	BoCC Amber
Goldfinch	BoCC Green	Sparrowhawk	BoCC Amber
Grasshopper warbler	BoCC Red	Spotted flycatcher	BoCC Red
Great spotted woodpecker	BoCC Green	Stonechat	BoCC Green
Great tit	BoCC Green	Swallow	BoCC Green
Greenshank	Schedule 1, BoCC Amber	Tawny owl	BoCC Amber
Grey heron	BoCC Green	Teal	BoCC Amber
Grey wagtail	BoCC Amber	Tree pipit	BoCC Red
Greylag goose	BoCC Amber	Wheatear	BoCC Amber
Hen harrier	Annex 1, Schedule 1, BoCC Red	White-tailed eagle	Annex 1, Schedule 1, BoCC Amber
Herring gull	BoCC Red	Whooper swan	Annex 1, Schedule 1, BoCC Amber
Hooded crow	BoCC Green	Willow warbler	BoCC Amber
House Martin	BoCC Red	Wood warbler	BoCC Red
Jay	BoCC Green	Woodcock	BoCC Red
Kestrel	BoCC Amber	Woodpigeon	BoCC Green
Lesser-black backed gull	BoCC Amber	Wren	BoCC Green
Lesser redpoll	BoCC Red		

APPENDIX E COLLISION RISK ASSESSMENTS

ANNEX E. COLLISION RISK ASSESSMENTS

Delaunay Triangulation[23] from the proposed turbine locations was used to create a wind farm area[24] and from this the Collision Risk Analysis Area (CRAA) was created using a 500 metre (m) buffer (**Figure 7.1**). Using the larger 500 m area around the turbines accounts for possible inaccuracies in the recording of flightlines and ensures the assessment is precautionary.

The ultimate aim is to have 100 % coverage of the turbines and associated CRAA by the viewsheds, however in practice this is often unachievable as a result of the topography of the proposed development, presence of mature forestry and limited to no access outwith the Site. For the Development, full coverage of the CRAA was achieved.

Table E-1, **Table E-2** and **Table E-3** present the parameters which apply to each Collision Risk Model (CRM).

Table E-1 Wind farm parameters

Size of wind farm envelope	541.10	hectares (ha)
Number of turbines	13	turbines
Rotor diameter	136	metres (m)
Hub height	112	m
Max. rotor depth	1.4	m (at 15° pitch angle)
Max. chord	4.1	m
Pitch	15	degrees (°)
Rotation period	4.4	seconds (secs)
Turbine operation time	85	percent (%)
Risk height: highest	180	m
Risk height: lowest	44	m
Flight risk volume	735897545	m^3

Table E-2 CRM parameters per species

Species	Length (m)	Wingspan (m)	Assumed flight speed, v (ms^{-1})	Avoidance rate	Probability of collision	Bird transit time (secs)
Golden eagle	0.815	2.12	15	0.99	0.0804	0.1477
Golden plover	0.28	0.72	17.9	0.98	0.0495	0.0939
Hen harrier	0.48	1.1	12	0.99	0.0717	0.1567
Peregrine falcon	0.48	1.1	12.1	0.98	0.0713	0.1554
Pink-footed goose	0.675	1.525	17.3	0.998	0.0671	0.1199
White-tailed eagle	0.9	2.4	13.6	0.95	0.0901	0.1691

Table E-3 Visible area within the CRAA per vantage point

VP	Area (ha)
1	372.14
2	292.58

[23] Delaunay triangulation is a form of mathematical/computational geometry where a given set of points (in this case the turbine locations) are all joined to create discrete triangles. Further information is available here: https://uk.mathworks.com/help/matlab/math/delaunay-triangulation.html

[24] This was adjusted where appropriate depending on the spatial location of the turbines in relation to other turbines.

VP	Area (ha)
4	106.21
5	6.65

Birds are assumed to be active during all the daylight hours and this is estimated by calculating the number of hours per day between sunrise and sunset (adjusting for correct latitude) for the survey seasons as defined in **Table E-4** below.

Table E-4 Season definitions per species/species group

Species	Breeding season			Non-breeding season		
	Start date	End date	Hours presumed present	Start date	End date	Hours presumed present
Golden eagle	1st February	31st August	2790	1st September	31st January	1710
White-tailed eagle	1st February	31st August	2790	1st September	31st January	1710
Geese and swans	15th May	31st August	1810	1st September	14th May	2689
Raptors	15th March	31st August	2666	1st September	14th March	1833
Waders	1st April	31st July	2456	1st August	31st March	2043

Outputs for the CRM for the following species are presented in the following order below:

- Golden eagle;
- Golden plover;
- Hen harrier;
- Peregrine falcon;
- Pink-footed goose; and
- White-tailed eagle.

E.1 Golden Eagle

Non-Breeding Season 2020/2021

Table E-5 Golden eagle flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	31.08	9675.60	0.00000042
2	82.89	7855.80	0.0000011
4	0	3186.19	0
5	0	0	0

Table E-6 Golden eagle mortality estimates

Mean activity in wind farm at rotor height	0.00083	hr^{-1}
Total Combined rotor swept volume	418297	m^3
Bird occupancy	1.4136	hrs/season
Bird occupancy of rotor swept volume	2.8926	bird-sec
No. of transits through rotors	19.5884	per season
Estimated collisions	1.5752	per season
Estimated collisions after correction for operation	1.3389	per season
Estimated collisions after avoidance factor	0.0134	per season
Equivalent to 1 bird every	74.69	seasons

Breeding Season 2021

Table E-7 Golden eagle flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	674.65	17989.18	0.0000050
2	266.39	14043.88291	0.0000020
4	0	5097.91	0
5	2.06	239.43	0.000000015

Table E-8 Golden eagle mortality estimates

Mean activity in wind farm at rotor height	0.0038	hr^{-1}
Total Combined rotor swept volume	418297	m^3
Bird occupancy	10.5820	hrs/season
Bird occupancy of rotor swept volume	21.6541	bird-sec
No. of transits through rotors	146.6415	per season
Estimated collisions	11.7921	per season
Estimated collisions after correction for operation	10.0233	per season
Estimated collisions after avoidance factor	0.1002	per season
Equivalent to 1 bird every	9.98	seasons

Non-Breeding Season 2021/2022

Table E-9 Golden eagle flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	0	8525.69	0
2	123.43	8777.43	0.0000017
4	137.47	3186.19	0.0000018
5	0	239.43	0

Table E-10 Golden eagle mortality estimates

Mean activity in wind farm at rotor height	0.0019	hr^{-1}
Total Combined rotor swept volume	418297	m^3
Bird occupancy	3.2341	hrs/season
Bird occupancy of rotor swept volume	6.6180	bird-sec
No. of transits through rotors	44.8169	per season
Estimated collisions	3.6039	per season
Estimated collisions after correction for operation	3.0633	per season
Estimated collisions after avoidance factor	0.0306	per season
Equivalent to 1 bird every	32.64	seasons

E.2 Golden Plover

Non-Breeding Season 2020/2021

Table E-11 Golden plover flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	0	16374.10	0
2	0	13122.25	0
4	0	5097.91	0
5	12.24	33.25	0.00000010

Table E-12 Golden plover mortality estimates

Mean activity in wind farm at rotor height	0.000053	hr^{-1}
Total Combined rotor swept volume	317264	m^3
Bird occupancy	0.1085	hrs/season
Bird occupancy of rotor swept volume	0.1685	bird-sec
No. of transits through rotors	1.7950	per season
Estimated collisions	0.0888	per season
Estimated collisions after correction for operation	0.0755	per season
Estimated collisions after avoidance factor	0.0015	per season
Equivalent to 1 bird every	662.57	seasons

E.3 Hen Harrier

Breeding Season 2020

Table E-13 Hen harrier flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	0	13396.99	0
2	72.47	10532.91	0.00000073
4	0	3823.43	0
5	0	0	0

Table E-14 Hen harrier mortality estimates

Mean activity in wind farm at rotor height	0.00039	hr^{-1}
Total Combined rotor swept volume	355033	m^3
Bird occupancy	1.0464	hrs/season
Bird occupancy of rotor swept volume	1.8174	bird-sec
No. of transits through rotors	11.6003	per season
Estimated collisions	0.8313	per season
Estimated collisions after correction for operation	0.7066	per season
Estimated collisions after avoidance factor	0.0071	per season
Equivalent to 1 bird every	141.52	seasons

Non-Breeding Season 2021/2022

Table E-15 Hen harrier flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	0	13396.99	0
2	29.86	10532.91	0.00000030
4	0	3823.43	0
5	0	239.43	0

Table E-16 Hen harrier mortality estimates

Mean activity in wind farm at rotor height	0.000160345	hr^{-1}
Total Combined rotor swept volume	355033	m^3
Bird occupancy	0.2939	hrs/season
Bird occupancy of rotor swept volume	0.5105	bird-sec
No. of transits through rotors	3.2585	per season
Estimated collisions	0.2335	per season
Estimated collisions after correction for operation	0.1985	per season
Estimated collisions after avoidance factor	0.0020	per season
Equivalent to 1 bird every	503.80	seasons

E.4 Peregrine Falcon

Non-Breeding Season 2021/2022

Table E-17 Peregrine falcon flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	0	13396.99	0
2	2.56	10532.91	0.000000025
4	0	3823.43	0
5	0	239.43	0

Table E-18 Peregrine falcon mortality estimates

Mean activity in wind farm at rotor height	0.000014	hr^{-1}
Total Combined rotor swept volume	355033	m^3
Bird occupancy	0.0252	hrs/season
Bird occupancy of rotor swept volume	0.0438	bird-sec
No. of transits through rotors	0.2820	per season
Estimated collisions	0.0201	per season
Estimated collisions after correction for operation	0.0171	per season
Estimated collisions after avoidance factor	0.0003	per season
Equivalent to 1 bird every	2926.63	seasons

E.5 Pink-Footed Goose

Non-Breeding Season 2020/2021

Table E-19 Pink-footed goose flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	0	18606.93	0
2	8803.67	16633.22	0.000060
4	0	5735.14	0
5	0	119.71	0

Table E-20 Pink-footed goose mortality estimates

Mean activity in wind farm at rotor height	0.032	hr^{-1}
Total Combined rotor swept volume	391858	m^3
Bird occupancy	86.5979	hrs/season
Bird occupancy of rotor swept volume	166.0051	bird-sec
No. of transits through rotors	1384.0429	per season
Estimated collisions	92.8069	per season
Estimated collisions after correction for operation	78.8859	per season
Estimated collisions after avoidance factor	0.1578	per season
Equivalent to 1 bird every	6.34	seasons

E.6 White-Tailed Eagle

Breeding Season 2020

Table E-21 White-tailed eagle flight activity

VP	Seconds at risk height	Observation effort (HaHr)	Flying time at risk height (secsHahr^{-1})
1	46.72	13396.99	0.00000047
2	0	10532.91	0
4	0	3823.43	0
5	0	0	0

Table E-22 White-tailed eagle mortality estimates

Mean activity in wind farm at rotor height	0.00025	hr^{-1}
Total Combined rotor swept volume	434349	m^3
Bird occupancy	0.7059	hrs/season
Bird occupancy of rotor swept volume	1.4999	bird-sec
No. of transits through rotors	8.8692	per season
Estimated collisions	0.7995	per season
Estimated collisions after correction for operation	0.6795	per season
Estimated collisions after avoidance factor	0.0340	per season
Equivalent to 1 bird every	29.43	seasons

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Environmental Impact Assessment – Technical Appendix 7.2: Golden Eagle Displacement Evaluation

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

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Ladyfield Renewable Energy Park

Appendix 7.2: Golden Eagle Displacement Evaluation

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CONTENTS

1 INTRODUCTION

This Technical Appendix presents an evaluation of the planned Wind Turbine locations of the proposed Ladyfield Renewable Energy Park (the Development), in relation to their proximity to the Glen Etive & Glen Fyne Special Protection Area (the SPA – see EIA Report, **Figure 7.2**), and the possible consequent impacts of displacement on the SPA's qualifying feature, golden eagle.

A golden eagle pair are known to nest within the SPA, over 4km to the east of the Development Site, and so this evaluation has informed the Development's design layout process to avoid the risk of an adverse effect on integrity of the SPA being concluded due to the impacts of effective habitat loss on this eagle pair. The report does not consider collision risk associated with the Development, which was also considered in the layout process, and is included separately in the EIA Report's ornithology impact assessment.

Prior to EIA submission, correspondence with NatureScot on various ornithological matters has taken place, including submission of a similar evaluation to the one presented here (MacArthur Green, 2022[1]), but conducted on a preliminary 16-Wind Turbine layout. The findings from that report, and advice from NatureScot, were used to inform the final Development design. Key aspects of the preliminary evaluation are presented in **Annex A** of this Technical Appendix and used as a comparison with the final Development design to provide evidence of the steps taken to minimise the risk of an adverse effect on the SPA.

The displacement evaluation takes into account relevant sources of information related to the Development Site, and to the behaviour of golden eagles, in particular:

- Aerial imagery and National Vegetation Classification (NVC) habitat survey results within and surrounding the Development Site, used to determine habitat type and quality;
- Golden Eagle Topographical (GET) Model outputs of the Development Site and surrounding SPA, used to understand relative suitability of habitats to golden eagle (see EIA Report **Figure 7.14**); and
- Scientific articles investigating the behaviour of golden eagles in relation to Scottish wind farms (Fielding et al. 2021[2]; 2022[3]) as well as others on eagle ecology.

The aims of the evaluation are:

- To determine the absolute and relative quality of habitats for golden eagles surrounding each Wind Turbine location, and within the Development Site and adjacent SPA area as a whole;

[1] MacArthur Green (2022). Ladyfield Wind Farm: Golden Eagle Displacement Evaluation (October 2022).
[2] Fielding AH, Anderson D, Benn S, Dennis R, Geary M, Weston E, et al. (2021) Non-territorial GPS-tagged golden eagles *Aquila chrysaetos* at two Scottish wind farms: Avoidance influenced by preferred habitat distribution, wind speed and blade motion status. PLoS ONE 16(8): e0254159. https://doi.org/10.1371/journal.pone.0254159
[3] Fielding, A.H., Anderson, D., Benn, S., Dennis, R., Geary, M., Weston, E. and Whitfield, D.P. (2022), Responses of dispersing GPS-tagged Golden Eagles (*Aquila chrysaetos*) to multiple wind farms across Scotland. Ibis, 164: 102-117. https://doi.org/10.1111/ibi.12996

- To determine the likely behavioural response of golden eagles to individual Wind Turbines, and the wind farm as a whole, specifically the physical extent to which displacement around Wind Turbine locations may occur;
- To determine whether the effective loss of supporting habitat to the SPA would adversely affect the ability of the golden eagle pair to forage, and ultimately affect the viability of the territory and the integrity of the SPA.

2 EVALUATION CRITERIA

A set of criteria have been identified which can help inform the evaluation of the potential displacement effects on golden eagles:

1. **Turbine distance to SPA**: the distance, measured in metres, of each proposed Wind Turbine location, at hub, to the SPA boundary;
2. **GET Model mean score:** This is the mean score for habitat suitability within 300 m [4] of each individual Wind Turbine location, based on the GET Model's assignment of a score between 1 and 10 for every pixel, using GIS terrain data. This is based on the Fielding et al. (2019[5]) paper which analysed Scottish GPS tracking data and landscape features to create a model of predicted space use for golden eagles. The analysis identified three topographical variables which were particularly influential in predicting golden eagle distributions: slope angle, altitude, and distance from ridgelines. The GET model uses values for these parameters to predict relative golden eagle habitat preferences. Habitat with a GET score of 6+ is a good indicator of potential golden eagle activity; habitat with a score of 5 or less is used infrequently by golden eagles.
3. **Forestry cover:** based on the assumption that golden eagles do not utilise closed canopy conifer forestry, such as that covering large parts of the Development Site, but could use more open areas of forestry, such as areas of checked forestry planted on deeper peat within the east of the Development Site. These areas of open forestry may provide food sources such as deer, woodpigeons and corvids (see point 4 below). Within 300 m of each individual Wind Turbine location, two forestry criteria have been determined: 3(a) a percentage of forest cover; and 3(b) a classification of canopy cover (i.e. how dense or scattered trees are within the forested area).
4. **Prey Habitat Suitability:** using the dominant habitat types within 300 m of individual Wind Turbines to determine suitability for eagle prey, applying the system used by NatureScot in determining territory quality for golden eagle pairs within the Glen Etive & Glen Fyne SPA (e.g. Haworth et al., 2013[6]). This uses NVC habitat types and other features such as known occurrences of rabbit warrens or seabird colonies, to determine whether an area is a Rich Prey Community (RPC), Medium Prey Community (MPC) or Constrained Prey Community (CPC). In general, the Development Site's prey resource is likely to be reflective of the

[4] This area is based on the reasonable maximum extent of displacement effects likely to occur to golden eagles around Wind Turbines, based on the evidence collated under point 5: Displacement distance.

[5] Fielding, A., Haworth, P., Anderson, D., Benn, S., Dennis, R., Weston, E., & Whitfield, D. (2019). A simple topographic model to predict Golden Eagle *Aquila chrysaetos* space use during dispersal. Ibis. 162. 10.1111/ibi.12718.

[6] Haworth, P., Fielding, A. & Austin, S. 2013. NA3 Golden eagle range report - Glen Etive and Glen Fyne Special Protection Area. Scottish Natural Heritage Commissioned Report No. 579.

west-central Highlands ecological region determined by Watson (2010[7]) when investigating golden eagle prey. Red deer are widespread and numerous but red grouse are scarce and mountain hares are largely absent. Golden eagle diet comprises a wide variety of items but proportionately with more deer consumed than anywhere else in Scotland. From various Site visits it is evident from signs that deer are common in the forested areas, but across the Development Site and adjacent SPA area, prey species such as grouse and hare are uncommon.

5. **Displacement distance:** two recent scientific papers (Fielding et al. 2021; 2022) have attempted to quantify and test various hypotheses on golden eagle avoidance behaviour of Wind Turbines, using satellite tagged data of Scottish birds. The main findings of these are summarised in **Annex B**. For the purposes of this evaluation, the evidence extracted from these papers has been used to determine a reasonable extent of displacement effects around Wind Turbines, based on influencing factors of habitat suitability, which can be interpreted from the results of criteria 2 to 4 above.

From the above five criteria, the following can be determined:

- The area of SPA within 300 m of each Wind Turbine location;
- The overall quality of habitat within 300 m of each Wind Turbine location;
- The possible extent of displacement effects around each operational Wind Turbine, based on the findings in Fielding et al. (2021; 2022) that eagles show lower avoidance behaviour in areas of higher habitat quality;
- The area of SPA that may be effectively lost to foraging eagles based on estimated displacement extent around individual Wind Turbines;
- Whether the area of effective habitat loss would be of sufficient importance to affect the eagles' ability to forage successfully (i.e. whether breeding and/or survival may be affected); and
- Whether any Wind Turbines should be relocated to reduce the effects of displacement (and collision risk).

3 RESULTS

Table 1 presents the results of the evaluation for each Wind Turbine of the Development layout, using the five criteria (see Box 1 below for rationale).

[7] Watson, J. (2010). The Golden Eagle. London: Bloomsbury Publishing.

Table 1: Evaluation of Habitat Quality and Displacement Extent for Turbines

Turbine	Distance to SPA (m)	Main NVC Habitat Type[1]	% Forest Cover [2]	Canopy Cover[3]	Prey Habitat Suitability[4]	GET Model Mean Score[5]	Overall Habitat Quality [6]	Estimated Displacement Distance (m) [7]	Area of SPA Habitat Loss (ha)
T1	310	CP	90	4	CPC	3.1	Low	300	-
T2	480	CP	95	4	CPC	3.7	Low	300	-
T3	300	CP	90	4	CPC	3.4	Low	300	-
T4	760	CP	80	3	CPC	5.5	Low	300	-
T5	300	CP/M25	66	2	MPC	3.7	Low	300	-
T6	610	CP/CF	90	4	CPC	4.4	Low	300	-
T7	810	CP/CF	80	3	CPC	3.7	Low	300	-
T8	410	CP/M25	70	2	MPC	6.0	Moderate	200	-
T9	750	CP/M25	75	3	CPC	3.8	Low	300	-
T10	330	CP/M25	70	2	MPC	4.3	Moderate	200	-
T11	1020	CP/M25	66	3	CPC	4.9	Low	300	-
T12	285	CP/M25	70	2	MPC	5.2	Moderate	200	-
T13	600	CP/M15/M17	50	3	MPC	7.2	High	115	-

Box 1: Table 1 Notes:

1: Main NVC habitat community has been determined by field surveys in 2021 and 2022. M15 = wet heath; M17 = blanket bog; M25 = blanket bog or wet modified bog; CP = area mainly closed conifer plantation (no NVC category); CF = area mainly recently felled conifer plantation (no NVC category). In general, open moorland outside of the forest is dominated by purple moor-grass (*Molinia*), but cottongrass is co-dominant in bog areas. There is low heather coverage. Within open forested areas, the bog/heath has been heavily modified by historic forestry management, with areas of erosion. The results of this feed into determination of Prey Habitat Suitability, alongside forest cover and canopy cover criteria.

2: Forest cover = percentage within 300 m radius of Wind Turbine which is covered by conifer forestry.

3: canopy cover = density of forestry coverage within 300 m radius of Wind Turbine: class 1: 0-25%, class 2: 26-50%, class 3: 51-75%, class 4: 76-100%.

4: MPC = Medium Prey Community: existing prey productivity could be improved further by improved management of the existing habitat e.g. upland areas which are overgrazed or have experienced a harsh muirburn regime. This includes bog and wet heath where there are no obvious Rich Prey Communities (RPCs). CPC = Constrained Prey Community: these communities contain virtually no or very little golden eagle prey. e.g. bracken, blocks of purple moor grass, mat grass or closed canopy commercial forestry. Here, bog and wet heath are taken to be MPCs, in the absence of rich prey sources, and areas with significant forest closed forest cover or clearfell are considered CPCs.

5: Mean GET Model score (1-10, with 10 high habitat suitability) within 300 m radius of individual Wind Turbine. Categories 6 and above are considered preferred eagle habitat. See EIA Report Figure 7.14 for results of GET Model analysis.

6: Overall habitat quality rating based on combined considerations of suitability of habitat for golden eagle prey, conifer forest cover and the GET Model mean score.

7: Estimated extent of displacement effects: Although Fielding et al. (2021; 2022) have shown that displacement was not complete until very close to operational Wind Turbine towers, beyond this distance a reduction in activity may still be of sufficient amount to equate to effective displacement from habitats. Evidence in Fielding et al. (2022) suggested that after operation, very few GPS tag records were within 115m of a Wind Turbine tower, i.e. double the maximum distance where collision could occur based on the max rotor diameter of any wind farm in the study. This value equates closely to the rotor diameter of the working candidate Wind Turbine for the Development which is 115.7m (i.e. 2 x rotor radius of 57.85m). For the purposes of this evaluation, **115m is therefore considered to be the minimum effective displacement distance** around a Wind Turbine tower, which is considered sufficiently precautionary since the two studies found that displacement effects were independent of a Wind Turbine's rotor diameter.

The maximum displacement distance is considered to be the spatial extent to which the size of reduction in activity around operational Wind Turbines equates to an effective loss of the ability to forage successfully within (acknowledging that lesser displacement effects could still occur at wider distances). Fielding et al. (2021 and 2022) provide graphs of statistical analyses (**Figures 3 and 4, Annex B**) which can help inform potential effective displacement extents. As a starting point, and although stopping short of providing an alternative value, Fielding et al. (2022) state that from their findings the previously assumed 500m displacement distance in Scotland is "too precautionary", and that the modelled displacement distance from a Wind Turbine hub was 70 m, albeit that actual displacement distances may be greater because of the possible confounding effects of construction disturbance influencing some pre-operational data points.

Figure 3, Annex B from Fielding et al. (2022) shows the modelled mean distance of tag records within 1 km of Wind Turbines, categorised by GET Model score 1-10, before and after operation. Prior to operation, the mean tag record distance should be close to 500m, assuming even flight distribution within 1km, when taken across all GET scores. At the pre-operation graph's intercept, at the lowest GET score, the mean value is roughly 550m, and at high GET scores, the mean value is below 500m, indicating a relative attraction to better habitats. In comparison, the mean value for the lowest GET score for operational Wind Turbines is approximately 750-800m. As the GET Model score increased, tag records became increasingly closer to Wind Turbines, reducing to around 550m at GET score 10. This shows that although mean distances of records increase post-operation, these distances are reduced in preferred habitats.

In the Fielding et al. (2021), when looking at a smaller number of wind farms, observed mean distance to a Wind Turbine hub was 75 m larger on average once Wind Turbines became operational. When modelling post-operation data (**Figure 4, Annex B**), the fitted 3D mean distance to a Wind Turbine hub was 287 m (still blades) and 282 m (turning blades). Maximum mean distance was approximately 300 m at the lowest GET model score for both turning and stationary blades, steadily decreasing for higher GET scores for stationary Wind Turbines at least.

Therefore, based on the evidence presented in Fielding et al. (2021; 2022), the **maximum displacement effect**, which is likely to occur at lower GET model scores (i.e. in less-preferred habitat), **is considered to be 300 m**. This value is considered as being precautionary, based on the assumption that the lower estimates given by Fielding et al. (2022) may be influenced by during-construction behaviour of eagles.

4 DISCUSSION

Overall, the quality of the Development Site for golden eagle is considered to be relatively low within the context of the SPA and local area, particularly further west where closed canopy conifer forest and recent clearfell are the dominant habitats (EIA Report **Figure 8.3**). In the main, the Site is also relatively flat and suboptimal for eagle soaring conditions, as shown with the low GET scores (EIA Report **Figure 7.14**). The mean GET score for a 300 m buffer around all Wind Turbines is 4.6, indicating unpreferred topography.

Towards the eastern boundary, abutting the SPA, the habitat is likely to be somewhat more suitable, with the open forest and moorland areas providing greater foraging opportunities, and parts, to the south in particular, being nearer open, steeper slopes more conducive to eagle flight activity.

For the majority of Wind Turbines in forested areas, the effects of displacement on golden eagle will likely be negligible, due to the current unsuitability of the habitat. Based on the recent research by Fielding et al. (2021; 2022), Wind Turbines that are at least 300 m from the edge of the SPA would likely provide a minimal displacement risk of eagles within the SPA, regardless of habitat quality.

The previous evaluation of the preliminary 16 Wind Turbine layout (**Annex A**) had five Wind Turbines closer than 300 m from the SPA boundary (**Annex A, Table A1**). For the final layout, one Wind Turbine (T12), at c.285 m distant, is located just under 300 m from the SPA, but the evaluation presented in Table 1 suggests that based on habitat and physical conditions this is a suitable buffer distance, and that no overlap, and no effective habitat loss within the SPA is predicted for any Wind Turbine.

Based on the above evaluation, the following can therefore be concluded:

- Using evidence from scientific studies, a displacement extent of 300 m around Wind Turbines is a reasonably precautionary maximum value, with shorter buffer distances suitable in better habitat and topographical conditions for golden eagle foraging;
- As a consequence, with suitable buffers from the SPA employed on Site for all Wind Turbines, the Development layout would result in no effective SPA habitat loss due to displacement around Wind Turbines;
- The mean GET model score within 300 m of Wind Turbines is 4.6, suggesting generally unpreferred Site conditions (preferred areas being ranked 6-10 by the GET model);
- Habitat quality and topographical conditions within the Site are generally of low suitability for foraging golden eagle, with better conditions only occurring along the eastern margins, and particularly to the south, in open moorland closer to T13; and
- Overall the final Development design would have a lower impact on golden eagles than the preliminary 16 Wind Turbine layout considered in **Annex A**, because of no effective SPA habitat loss, and the smaller extent of land subject to displacement within the Site.

ANNEX A. RESULTS FROM PRELIMINARY 16 WIND TURBINE LAYOUT EVALUATION (OCTOBER 2022)

Table A1: Evaluation of Habitat Quality and Displacement Extent for Wind Turbines

Turbine	Distance to SPA (m)	Area of SPA Habitat Overlap within 300 m (ha)	Main NVC Habitat Type[1]	% Forest Cover [2]	Canopy Cover[3]	Prey Habitat Suitability[4]	GET Model Mean Score[5]	Overall Habitat Quality [6]	Estimated Displacement Distance (m) [7]	Area of SPA Habitat Loss (ha)
T1	125	8.2	CP/M15	69	4	CPC	3.7	Low	300	8.2
T2	145	8.6	CP/M15	64	3	CPC	2.7	Low	300	8.6
T3	200	3.2	CP/M25	75	2	MPC	4.6	Moderate	200	-
T4	623	0	CP/M25	95+	3	CPC	3.7	Low	300	-
T5	452	0	CP/M25	91	2	CPC	5.8	Moderate	200	-
T6	300	0	CP/M25	95	3	CPC	4.5	Moderate	200	-
T7	300	0	M17/M25	0	0	MPC	7.7	High	115	-
T8	995	0	CP	95+	4	CPC	4.5	Low	300	-
T9	137	6.9	CP/M15	73	4	CPC	2.8	Low	300	6.9
T10	535	0	CP	95+	3	CPC	4.1	Low	300	-
T11	185	4.4	CP/M15	82	4	CPC	3.2	Low	300	4.4
T12	423	0	CP	95+	4	CPC	4.6	Low	300	-
T13	869	0	CP/CF	85	4	CPC	3.6	Low	300	-
T14	1078	0	CP/CF	57	4	CPC	3.8	Low	300	-
T15	1000	0	CP/M25	67	3	CPC	4.9	Moderate	200	-
T16	590	0	CP/M15	52	4	MPC	7.2	High	115	-

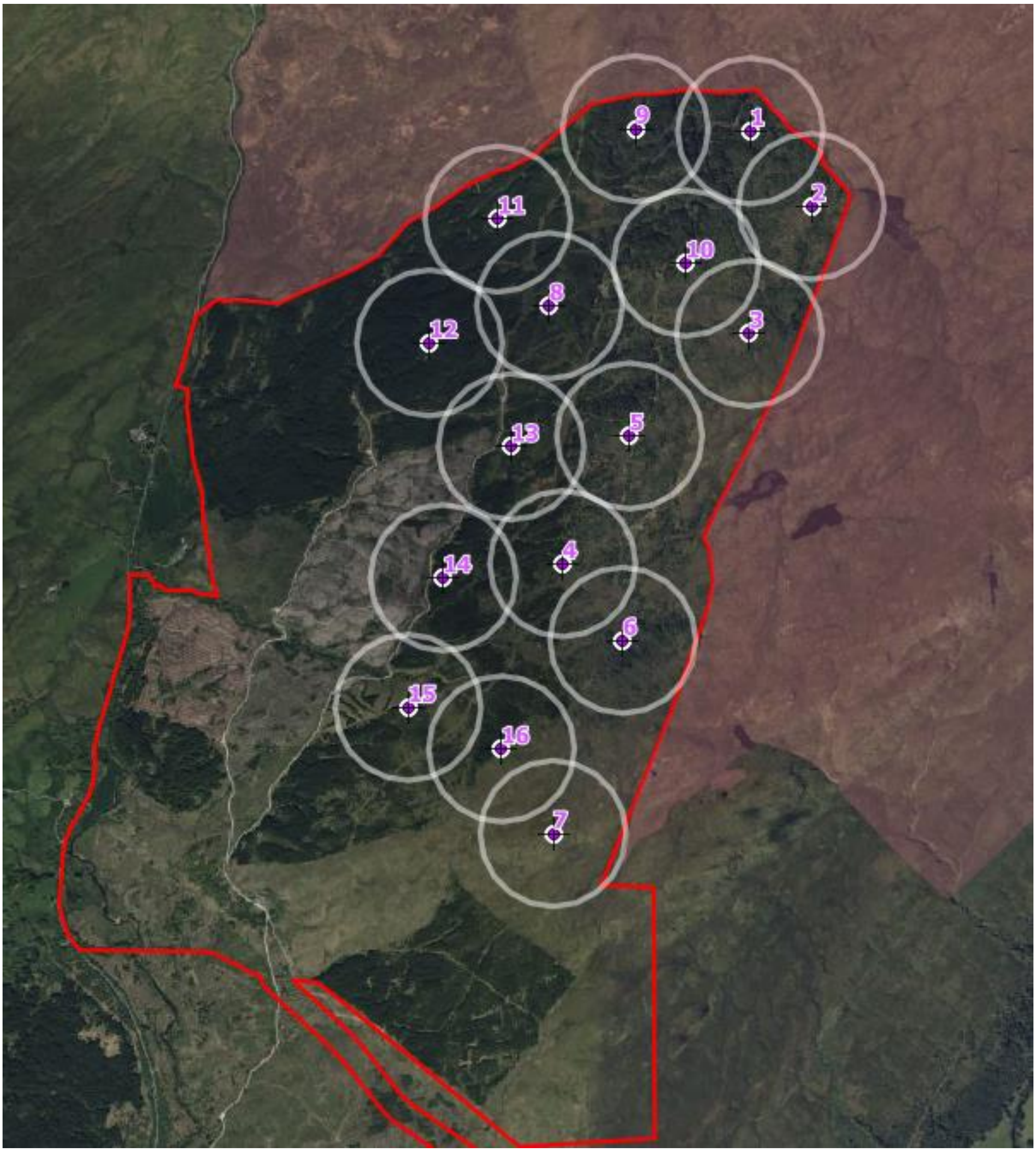

Figure 1: Preliminary layout with 300 m radius shown around individual Wind Turbines and extent of Glen Etive & Glen Fyne SPA (shaded).

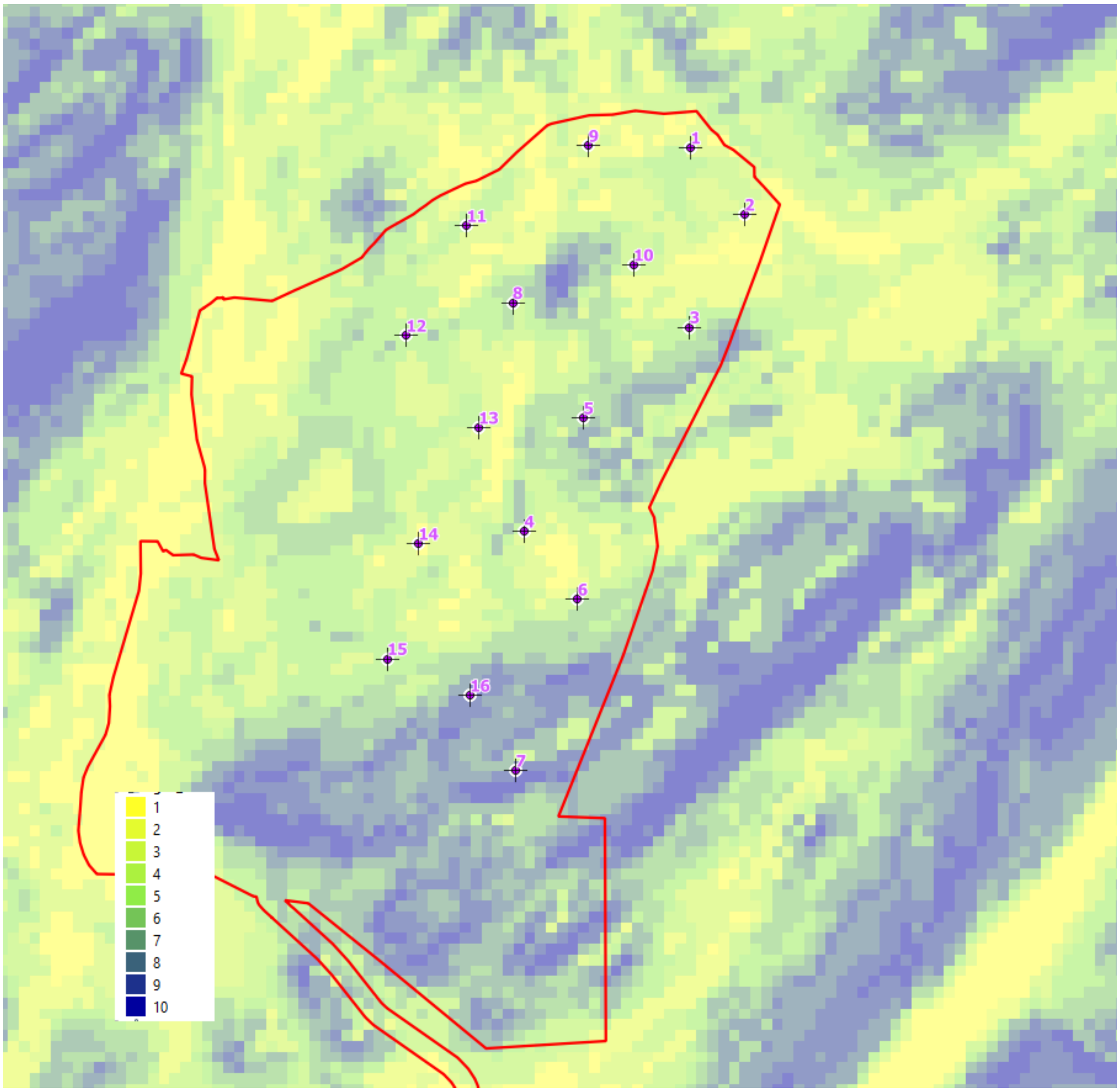

Figure 2: GET Model output showing preliminary 16 Wind Turbine layout.

ANNEX B. EVIDENCE OF GOLDEN EAGLE DISPLACMENT AT SCOTTISH WIND FARMS

Fielding *et al.* (2021) analysed GPS data from dispersing golden eagles near two Scottish wind farms. They found that operation of turbines effectively caused an abandonment of habitat within the interior of both wind farms, regardless of intrinsic habitat preference (determined by GET Model scores) underlying inner turbine locations. After turbine operation eagle activity was largely restricted to the vicinity of outer turbines in preferred habitat and as the GET score at the turbine location increased, golden eagle records were closer. The observed mean distance to a turbine hub was 75 m larger on average once turbines became operational, but avoidance did not differ in proximity to turbines of different rotor diameter, inferring that birds reacted to the presence of turbine towers and not to their blades. Only one of 17,346 post-operation records was within one rotor blade diameter distance (80m and 115m for the two wind farms) of a turbine hub (< 0.01%) and 83 were within two rotor diameters distance of a turbine hub (0.48%). By comparison, in 2,283 pre-operation records, ten (0.44%) distances were within one diameter distance of a future turbine location and 233 (10.21%) within two diameters distance. Evidence showed that for both wind farms, birds rarely approached closer than 80 m to the tip of turbine blades (i.e. 120-135m from hub). The authors concluded that "*our results suggested that assessing the impact of a wind farm (in Scotland, at least) should be based primarily on the functional loss of all habitat within a buffer around the outer turbines. A displacement distance of 75 m has been found although on a precautionary basis the buffer should be larger*".

Fielding *et al.* (2022) analysed the tag records of 59 natal dispersal birds within 1km of 80 wind farms, including throughout Argyll. Measurements were taken of tag records from wind turbine hubs, in 2D and 3D (the latter to account for birds avoiding turbines by flying higher over them). The range of turbine rotor diameters where tag records were within 1km was from 32m to 115m (mean 87.4m, SD 20.2m). Results showed that eagles were eight times less likely to be within a rotor diameter's distance to hub during operation - very few records were within 115m of a turbine hub (i.e. double maximum distance where collision could occur, based on max rotor radius of 57.5m). It was found that birds went slightly closer to longer rotor blades (associated with larger turbines and newer wind farms) although not to the turbine tower, indicating avoidance of the tower rather than blades. The study was also consistent with Fielding et al. (2021), finding that eagles went closer to turbines in preferred habitats but at greater distances after turbine operation. As the GET Model score increased, tag records became increasingly closer to turbines. Records using bird age indicated no habituation (which may suggest that results may also apply to adult breeders).

The authors concluded that "*according to the best GLMM and validation models, avoidance occurred at about 70 m from the turbine hub. However, many of our pre-operational data included the construction phase which, while conservative with regard to Our tested hypothesis, could underestimate the displacement distance if Golden Eagles were disturbed by turbine construction as well as operation. It is likely, nevertheless, that a 500-m displacement distance assumed in Scotland is too precautionary for Golden Eagles, especially when arbitrarily based*".

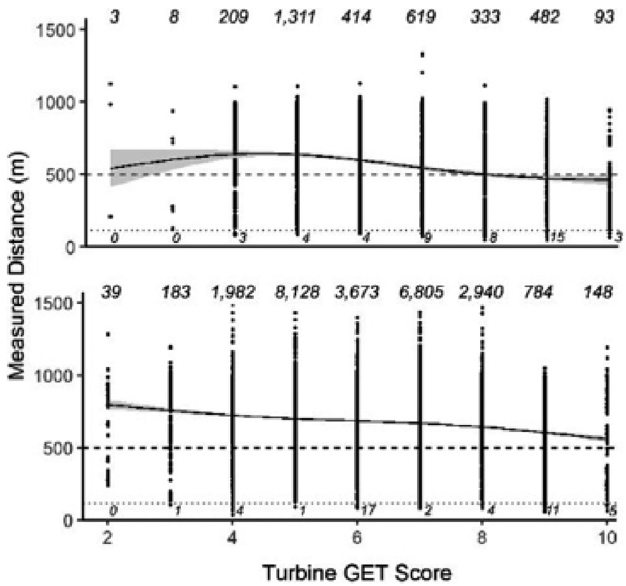

Figure 3. The relationship between GET score (10 = most intrinsically preferred habitat) at a turbine location and measured distance of GPS-telemetry records from that location, before (upper plot) and after (lower plot) a turbine had started operating there. Solid trend line = mean distance; 95% CL within grey shading. Dashed horizontal line = 500 m distance; dotted line = 115 m distance, the study's widest rotor diameter away from a turbine hub location (i.e. double the maximum blade length). Italicized numbers above each plot's GET score give scores' *n* in telemetry records, and, above the dotted 150 m line, the subset of each score's *n* within 115 m distance.

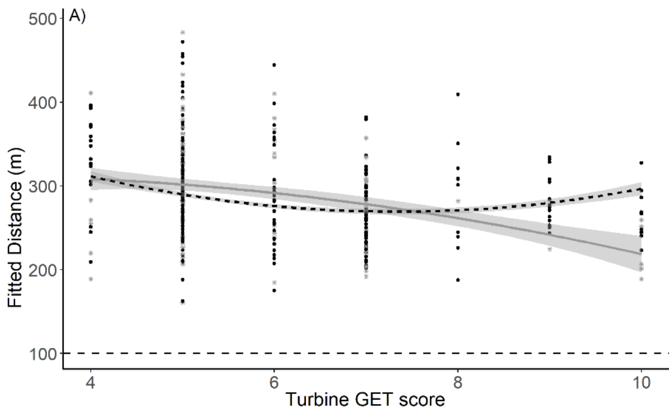

Figure 4: Relationship between GET score at a turbine and fitted distance of an eagle flight line to a turbine hub, for turbines with moving blades (black dots, black short-dashed mean trend line) or stationary (grey stars, solid grey mean trend line). No turbine location had a GET score < 4. From Fielding et al. (2021).

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Environmental Impact Assessment – Technical Appendix 7.3: Golden Eagle Population Model

Ladyfield Renewable Energy Park

October 2023

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Appendix 7.3
Golden Eagle Population Model

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CONTENTS

1 INTRODUCTION

Population modelling has been used to assess potential impacts for some Scottish wind farm projects where golden eagle has been identified as a sensitive feature, and has commonly been based on the golden eagle population modelling (GEPM) methods used in Whitfield *et al.* (2004[1]; 2006[2], 2008[3]); Fielding and Haworth (2010[4]) and Haworth (2014[5]). The GEPM procedure has been used here for assessing the potential effects of the proposed Ladyfield Renewable Energy Park ('the Development'), near Inveraray, Argyll, on golden eagles. The model uses a deterministic matrix formulation and can be used to explore how additional eagle mortality may affect predicted growth rates of the appropriate reference populations, in this case, the Natural Heritage Zone (NHZ) 14: Argyll West & Islands golden eagle population and the Glen Etive & Glen Fyne Special Protection Area (SPA) population.

There are four key parameters in the model:

- number of occupied ranges;
- mean number of young fledged per pair per year;
- annual survival rate of young birds; and
- annual survival rate of adult, range-holding birds.

Estimates for the first two are available with a reasonably high degree of confidence for the NHZ 14 population, and the Glen Etive & Glen Fyne SPA population (assuming that productivity within the SPA is similar to that of the wider NHZ 14 population).

The latter two parameters are more difficult to estimate at the level of regional populations and therefore the values for these have been informed by studies conducted on other populations, in combination with regional information, such as trends in the number of occupied ranges, which can be used to modify their values (Haworth 2014[5]).

Only the female half of the population is modelled. Therefore, calculated collision rates were halved, assuming a 1:1 sex ratio, equal activity and equal risk of collision (as per O' Toole *et al.* 2002[6]; Whitfield *et al.* 2008[3]).

Fielding and Haworth (2010[4]) describe how alternative scenarios can be modelled to obtain predicted rates of population growth over a duration of 25 years, with or without a proposed wind farm and with varying rates of additional mortality on adults and/or sub-adults. The predicted

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[1] Whitfield, D.P., Fielding, A.H., McLeod, D.R.A. & Haworth, P.F. 2004. Modelling the effects of persecution on the population dynamics of golden eagles in Scotland. Biological Conservation 119: 319–333.
[2] Whitfield, D. P., Fielding, A. H., McLeod, D. R. A., Haworth, P. F. & Watson, J. 2006. A conservation framework for the golden eagle in Scotland: refining condition targets and assessment of constraint influences. Biological Conservation, 130(4), 465-480.
[3] Whitfield, D P, Fielding, A H, McLeod, D R A and Haworth, P F (2008). A conservation framework for golden eagles: implications for their conservation and management in Scotland. Scottish Natural Heritage.
[4] Fielding, A. and Haworth, P. (2010). Golden eagles and wind farms: A report created under an SNH Call-of-Contract Arrangement. Haworth Conservation.
[5] Haworth, P. (2014). The Dunmaglass Wind Farm Regional Eagle Conservation Management Plan. Haworth Conservation.
[6] O'Toole, L., Fielding, A.H. & Haworth, P.F. (2002). Re-introduction of the golden eagle into the Republic of Ireland. Biological Conservation, 103, 303-312.

population growth rate, the expected number of occupied territories after a period of 25 years and the time to reach a notional population target (e.g. the level associated with the wider concept of "Favourable Conservation Status" outlined below) can be reviewed whilst varying levels of additional mortality.

The parameter ranges considered in the GEPM for assessing the potential impacts of the Development and other wind farms cumulatively are outlined in turn in **Table 1** and detailed in the text below.

Table 1 Parameters used in the GEPM

Parameter	Golden Eagle Conservation Framework Report 2008	Values to be used in Ladyfield GEPM	Rationale
Number of pairs within NHZ 14	44	68	A total of 44 active territories (equating to number of pairs) in NHZ 14 was estimated by Whitfield *et al.* (2008[3]) using the 2003 national census results. The total number of home ranges in southwest uplands and North England region (see **Figure 1**) occupied by pairs in 2015 was given as 72 by Hayhow *et al.* (2017[7]). Excluding four occupied home ranges in the south of Scotland in 2015 (as per Scottish Raptor Monitoring Scheme, SRMS 2015 report[8]), this is considered the closest approximation to the current NHZ 14 population as it excludes the high density of pairs in Mull, which is within the SRMS's Argyll region, but not NHZ 14 (see **Figure 1**).
Number of pairs within Glen Etive & Glen Fyne SPA	19	19	Cited SPA population from 2003 national census data. This is likely to be a minimum estimate of the current SPA population, based on territory increases elsewhere across Argyll/ NHZ 14 since 2003.
Total number of ranges within NHZ 14	59	91	Number of known territories in 2003 and the population cap used in GEPM for NHZ 14 by Whitfield *et al.* (2008[3]) was 59. Number of known home ranges in southwest uplands and North England region in 2015 was given as 101 by Hayhow *et al.* (2017). Ten home ranges in South Scotland were checked in 2015 (as per SRMS 2015 report), and these are excluded here.
Total number of ranges within Glen Etive & Glen Fyne SPA	23	23	Occupancy rates within the SPA are likely to be at least as high as within NHZ 14 in general. Assuming an occupancy rate of 82% in Argyll region (including Mull) in 2015 (SRMS 2015 report), the total number of SPA ranges could be 23.
Favourable Conservation Status of NHZ 14: Occupancy	75%	75%	75% occupancy rate of total available ranges within NHZ 14, using both the 2003 and 2015 national census data.

[7] Daniel B. Hayhow, Stuart Benn, Andrew Stevenson, Patrick K. Stirling-Aird & Mark A. Eaton (2017) Status of Golden Eagle Aquila chrysaetos in Britain in 2015, Bird Study, 64:3, 281-294.
[8] Challis, A., Wilson, M.W., Holling, M., Roos, S., Stevenson, A. & Stirling-Aird, P. (2016). Scottish Raptor Monitoring Scheme Report 2015. BTO Scotland, Stirling. Available at: https://raptormonitoring.org/annual-report (Accessed 02.10.23)

Parameter	Golden Eagle Conservation Framework Report 2008	Values to be used in Ladyfield GEPM	Rationale
Favourable Conservation Status of Glen Etive & Glen Fyne SPA: Occupancy	82%	82%	With total number of ranges unknown, assumes a similar occupancy rate of 82% in Argyll region (including Mull) in 2015 (SRMS 2015 report).
S1 – survival rate from fledging to age 4 (note this is not the annual rate but the product of four annual rates)	0.400	0.257 0.400 0.510	0.257 for ages 0-4 combined is the value extrapolated from the model, based on the best fit of a stable population from 2023 onwards, using the predicted adult survival (0.9512) and the long-term mean productivity rate (0.4 – see below). This is considered to be a precautionary worst-case representation of a static future population trend. 0.400 was used by Whitfield *et al.* (2008[3]) and Haworth (2014[5]). This equates to a 40% survival from fledging to adulthood (annual survival of 0.795[4]). This was considered to be the minimal sub-adult survival rate which would predict stability or expansion for any credible measure of productivity which has been identified. 0.510 for ages 0-4 combined is the value extrapolated from the model, based on the best fit of a population increase from 44 pairs in 2003 to 68 pairs in 2015, using the predicted adult survival (0.9512) and the long-term mean productivity rate (0.4 – see below). Assumes continuation of this trend.
S2 – adult survival (note this is the annual rate)	0.9512	0.9512	0.9512 was used by Whitfield *et al.* (2006[2], 2008[3]) and Haworth (2014). This is a precautionary estimate which equates to a minimal adult survival rate (20 years of occupation) which predicts stability or expansion for any credible measure of productivity which has been identified. No NHZ or SPA-specific information is available.
Mean fledging rate per pair within NHZ 14 and Glen Etive & Glen Fyne SPA (both sexes)	0.46 0.55	0.40 0.42 0.46	For the 2003 national census, the productivity rate for NHZ 14 was given as 0.55 (Whitfield *et al.* 2008[3]), with the long-term mean (1982 to 2003) given as 0.46. Long-term mean fledging rate for Argyll region from 2009 to 2018 was estimated as 0.4, as presented by the SRMS in their regional trends for the species[9]. The five-year average for Argyll (2016-2020) provided in the SRMS annual reports was 0.42.

[9] https://raptormonitoring.org/wp-content/uploads/2023/01/Golden-Eagle-trends-2009-2018.pdf

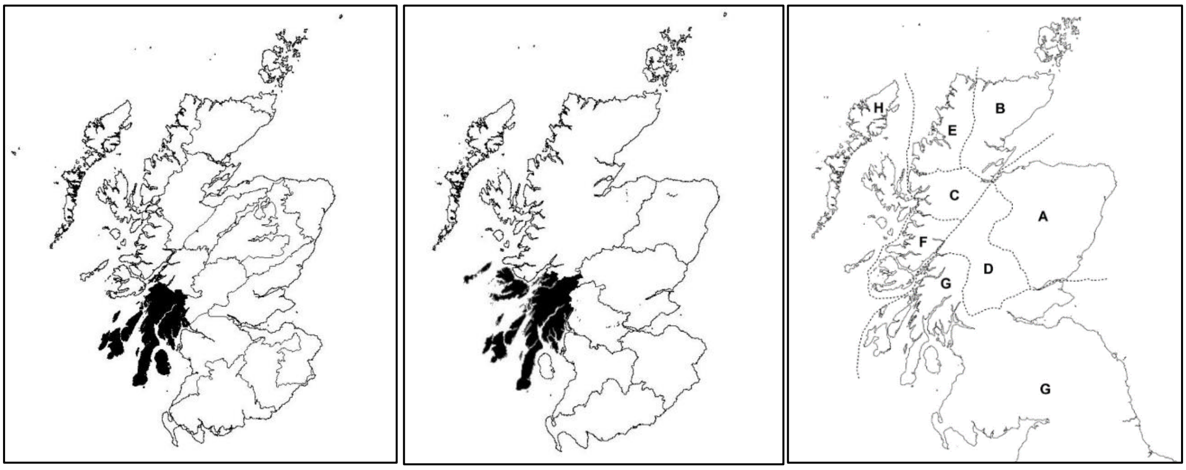

Figure 1: NHZ 14 extent (left); Argyll region used by Scottish Raptor Monitoring Scheme (middle); and regions of Scotland used for 2015 national census in Hayhow *et al.* (2017), with area G (southwest uplands and north England) being applicable here.

2 CONSERVATION STATUS OF NHZ 14 POPULATION

Whitfield *et al.* (2008[3]) proposed three tests that should be applied to a golden eagle population to assess its conservation status. All three tests must be passed to achieve a favourable status.

1. Regionally, at least 66% of known territories should be occupied by pairs.
2. Demographic parameter values should allow the maintenance of a stable or expanding population. With limited information available on survival rates, an annual adult survival of 95.12% was adopted as the lower limit for a favourable conservation status classification. This equates to an expected average of 20 years of territory occupation by an adult. A minimum acceptable rate for sub-adult survival of 40% (across the first four years of life which equates to an annual survival rate of 79.5%) was used. Under these survival rates an average reproductive rate of about 0.28 fledglings per pair per year is the minimum required to maintain a stable population (i.e. a growth rate of 1). It follows, however, that if these parameter values varied regionally then lower rates in one parameter could be compensated for, to a degree, by higher rates in another parameter.
3. Compare the predicted population projections from the population model against the observed trends in the number of occupied territories from previous censuses. If the observed population trend failed to match predictions then the survival rates applied in the Level 2 test were probably too high (for example, if stability or increase was predicted but decline was observed). Under these circumstances it would be assumed that survival was below the lower limit for favourable status and the population would be deemed to have failed the Level 3 test.

The NHZ 14 golden eagle population was assessed by Whitfield *et al.* (2008[3]) as being in favourable conservation status, fulfilling the criteria for the three tests:

1. The population passed the Level 1 test because, in 2003, 44 ranges out of 59 known at that time were occupied, giving an occupation rate of 75%.
2. For the Level 2 test, Whitfield *et al.* (2008[3]) ran a population model for the NHZ with a starting population set at the 2003 level, and with a capped population set at the number of known territories. The output was the mean predicted number of occupied territories after 21-30 years

averaged over 100 simulated runs using randomly generated parameter values. NHZ 14 passed both Level 2 tests with observed fledging rates of 0.46 (mean for the 1982, 1992 and 2003 national surveys) and 0.55 for the 2003 national survey (i.e. above the minimum mean reproductive rate of 0.28).

3. The Level 3 test was passed because the productivity rates (0.46-0.55 per pair), which permit population expansion, was expressed by a stable population of 44 pairs in 1992 and 2003.

3 GEPM INPUT PARAMETERS

3.1 Level 1 Test: Number of Currently Occupied Ranges

In Whitfield *et al.* (2008[3]) a target of 66% occupation of known territories was prescribed before each NHZ population could be considered to be in favourable condition. For the NHZ 14 population, this would be 61 out of a possible 91 known territories. Evidence in 2015 suggested that 68 territories were occupied (75% occupation).

3.2 Level 2 Test: Survival Rates

Survival rates specific to the NHZ 14 population are unknown and so precautionary values for S1 (sub-adult) and S2 (adult) survival rates were used in the model, taken from the sources detailed below.

- **S2 survival: 0.9512** was used in Whitfield *et al.* (2008[3]) for various NHZs and for the NHZ 14 population in Haworth (2014[5]). This was defined as the lowest rate for attaining favourable conservation status used in Whitfield *et al.* (2006[2]).
- **S1 survival:** a four-year survival rate of **0.510** for survival from ages 0-4 (equating to annual survival of 0.823) was derived using the model to match the observed increased population growth from 2003 to 2015, with conservative adult survival (0.9512) and the long-term mean observed productivity rates for much of this period (0.4 from 2009 to 2018 monitoring). This is higher than the national mean survival rate of 0.400 used in the Golden Eagle Conservation Framework model, which was defined as the lowest rate for attaining favourable conservation status used in Whitfield *et al.* (2006[2]), in combination with the S2 survival rate above.

Using the S1 survival rate = 0.510 in the model as per Whitfield *et al.* (2008[3]), the current NHZ 14 population would be expected to reach a carrying capacity of 91 pairs by year 8 (around 2031), whereafter, all excess individuals would have to be recruited to neighbouring NHZ populations to breed. To simulate this in the GEPM a cap of 91 was placed on the number of pairs. Once this population size was achieved in the model the growth rate becomes 1.00 (i.e. stable). Consequently, the rates of growth provided below refer to the period of growth prior to this limit being attained. These were calculated as the average of the annual rates but omitted the first three annual values as these reflect starting conditions in the model and not the stable growth rate (Caswell 2001[10]).

[10] Caswell, H. (2001) Matrix Population Models. Sinauer Associates, Inc., Sunderland, MA.

3.3 Level 2 Test: Mean Fledging Rate

The mean fledging rate of 0.4 was based on the long-term mean value in Argyll from 2009 to 2018, as per **Table 1**, and this is considered to be the most appropriate value for use in the model.

4 NHZ 14: RESULTS OF THE GEPM

4.1 Baseline Scenario

With the more recent data now available, an updated evaluation of the current conservation status of the NHZ 14 population can be made, within the context of the three tests described above.

1. Occupancy: based on results of the most recent census, 68 out of a possible 91 territories are likely to be currently occupied within NHZ 14, resulting in an occupancy rate of 75%, thereby exceeding the minimum 66% occupancy rate: **Favourable Conservation Status achieved**.
2. The mean productivity per pair is currently around 0.4 (0.2 females per pair). With around 0.28 fledglings per pair per year considered by Whitfield et al. (2008) to be the minimum required to maintain a stable population: **Favourable Conservation Status achieved**.
3. The predicted growth rates correspond to the steady growth between the 2003 census and the 2015 population estimate (an increase in the NHZ 14 population from 44 to 68 pairs): **Favourable Conservation Status achieved**.

This means that on the basis of the most recent data, the NHZ 14 population is in **Favourable Conservation Status**.

In **Table 2** below, a growth rate above 1.00 indicates population increase, a rate below 1.00 indicates decline. A rate of 1.05 would indicate 5% annual growth. Note that the mean growth rate only applies until the population attains the carrying capacity (91 pairs), after which the population would be assumed to remain stable with an average growth rate of 1.0. The most realistic scenario, based on known demographic parameters (S1 survival rate of 0.510 and long-term mean fledging rate of 0.40), has been highlighted red.

Table 2 Predicted mean annual growth rate of NHZ 14 golden eagle population under baseline scenario (excluding any effects associated with the Development)

		Mean fledging rate		
		0.40	**0.42**	**0.46**
S1 survival rate	**0.257**	1.000	1.002	1.006
	0.300	1.007	1.009	1.013
	0.400	1.021	1.023	1.028
	0.510	1.034	1.034	1.044

When considering this scenario (highlighted red), without additional mortality due to predicted collisions at the Development alone or cumulatively, the annual population growth rate observed since 2003 (1.034, or 3.4%) would theoretically permit the carrying capacity of the NHZ 14 (91 pairs) to be reached within eight years. Once all available territories are occupied it is reasonable to suppose that individuals unable to acquire territories would emigrate to other NHZs.

4.2 With Additional Mortality due to Predicted Collisions at the Development

The collision model mean annual mortality prediction of 0.072 birds per year (i.e. one every 13.9 years) due to the Development was included in the GEPM as an additional source of mortality to the NHZ 14 population (note this was halved to account for female only collisions under the assumption of equal collision risk for both sexes). Using the mean fledging rate of 0.40, and an S1 survival rate of 0.510, the population growth rate (prior to reaching carrying capacity) remained the same at 3.4% (**Table 3**), and the period taken for the population limit of 91 pairs to be attained would remain at eight years.

Table 3 Predicted mean annual growth rate of NHZ 14 golden eagle population with a mean annual collision rate of 0.072 (both sexes) associated with the Development.

		Mean fledging rate		
		0.40	0.42	0.46
S1 survival rate	0.257	1.000	1.002	1.006
	0.300	1.006	1.009	1.013
	0.400	1.020	1.023	1.028
	0.510	1.034	1.034	1.044

This demonstrates that the NHZ 14 golden eagle population would be expected to continue to expand at a similar rate, despite the additional collision mortality predicted to be associated with the Development.

4.3 With NHZ 14 Cumulative Annual Collision Rate

A worst-case cumulative annual collision rate for both sexes combined for all other installed, constructed, consented or application stage wind farm projects, including the Development, within NHZ 14 was estimated to be 1.129 collisions per year (assuming all collisions are attributable to NHZ 14 adult birds; note for the female only GEPM this equates to mortality of 0.5 females).

Using this value, the annual population growth rate (prior to reaching carrying capacity) was reduced from 3.4% to 2.8% based on an S1 survival rate of 0.510 (**Table 4**). At this rate of growth, the carrying capacity of 91 pairs would be achieved by year 10 (an increase of two years compared to the baseline and Development only scenarios described above). This suggests that the NHZ 14 golden eagle population is likely to continue to increase despite the additional mortality predicted to be associated with collisions with wind turbines at the Development and other projects within NHZ 14. Only in the most precautionary scenarios modelled (assuming roughly static population growth; S1 survival = 0.257; fledging rate = 0.40 and 0.42) would the population show a slight long-term decline due to additional mortality.

Table 4 Predicted mean annual growth rate of NHZ 14 golden eagle population with a mean annual cumulative collision rate of 1.129 associated with all NHZ 14 projects.

		Mean fledging rate		
		0.40	0.42	0.46
S1 survival rate	0.257	0.992	0.995	1.000
	0.300	1.000	1.002	1.007
	0.400	1.015	1.018	1.022
	0.510	1.028	1.031	1.038

4.4 NHZ 14: Summary and Conclusions

Based on the increase in number of occupied territories between 2003 and 2015, the NHZ 14 golden eagle population is currently considered to be in favourable conservation status. Modelling of the potential effects of collisions on the population suggest that:

- under an unimpacted (baseline) scenario, growth would continue until the NHZ's carrying capacity of 91 pairs is reached (within a model prediction of eight years);
- with additional mortality due to predicted collisions at the Development (0.072 per year), population growth would be predicted to be 3.4%, which is unchanged from the baseline scenario. This would not delay the carrying capacity being reached after eight years;
- with additional collision mortality from the Development and all other wind farm projects within NHZ 14 (1.129 per year), annual population growth rate would remain positive but be reduced to 2.8%, resulting in a predicted delay until the NHZ 14 carrying capacity would be attained, by two years (to 10 years); and
- with continued growth predicted over the long-term, despite additional mortality associated with collisions due to the Development and other projects, it is predicted that Favourable Conservation Status would be maintained, and there would be no significant effects on the NHZ 14 population as a result of additional mortality associated with collisions.

5 GLEN ETIVE & GLEN FYNE SPA: RESULTS OF THE GEPM

5.1 Baseline Scenario

The Glen Etive & Glen Fyne SPA golden eagle population (likely minimum of 19 pairs) was rated as being in 'favourable, maintained' condition by NatureScot in 2015, likely based on data collected from the national golden eagle census in the same year. It is assumed for the purposes of the model that the most realistic parameters used for NHZ 14 (S1 survival = 0.510, S2 survival = 0.9512; mean fledging rate = 0.4) are also applicable to the SPA population.

Under the unimpacted (baseline) scenario (without additional mortality due to predicted collisions at the Development alone or cumulatively) the population growth rate observed since 2003 would theoretically permit the carrying capacity of the SPA (assumed to be 23 pairs, see **Table 1**) to be reached within five years. Once all available territories are occupied it is reasonable to suppose that individuals unable to acquire territories would emigrate outside of the SPA.

5.2 With Additional Mortality due to Predicted Collisions at the Development

The collision model mean annual mortality prediction of 0.072 birds per year (i.e. one every 13.9 years) due to the Development was included in the GEPM as an additional source of mortality to the SPA population. Using the mean NHZ 14 fledging rate of 0.40, and an S1 survival rate of 0.510, the growth rate and period taken for the population limit of 23 pairs to be attained would be unchanged.

5.3 With SPA In-combination Annual Collision Rate

No other wind farm projects were identified that are within likely golden eagle territory range of the SPA and would contribute to in-combination collision rates. Although other overhead transmission line projects were identified within possible range, the collision risk associated with these was considered likely to be very low (see EIA Report Chapter 7: Ornithology).

5.4 Glen Etive & Glen Fyne SPA: Summary and Conclusions

Based on the site condition survey conducted for NatureScot in 2015, the Glen Etive & Glen Fyne SPA golden eagle population is currently considered to be in favourable conservation status. Modelling of the potential effects of collisions on the population suggest that:

- under the unimpacted (baseline) scenario it would take five years before the SPA's possible carrying capacity of 23 pairs is reached;
- with additional mortality due to predicted collisions at the Development (0.072 per year), there would be no delay for the carrying capacity to be reached after five years; and
- with continued growth, or stability of population predicted over the long-term, despite additional mortality associated with collisions due to the Development, it is predicted that favourable condition of the SPA would be maintained, and there would be no adverse effect on integrity of the Glen Etive & Glen Fyne SPA as a result of additional mortality associated with collisions.

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Environmental Impact Assessment – Technical Appendix 8.1: National Vegetation Classification & Habitats Survey

Ladyfield Renewable Energy Park

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Project No.: 0669622

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Ladyfield Renewable Energy Park National Vegetation Classification & Habitats Survey

Technical Appendix 8.1

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CONTENTS

1 INTRODUCTION

MacArthur Green carried out National Vegetation Classification (NVC) and habitats surveys for the proposed Ladyfield Renewable Energy Park ('the Development'), on the Site near Inveraray, Argyll and Bute, in 2021 and 2022.

The aim of an NVC survey is to identify and map the vegetation communities present within the Site in order to identify those areas of greatest ecological interest (i.e. Annex I habitats[1]; potential Groundwater Dependent Terrestrial Ecosystems (GWDTE); and Scottish Biodiversity List (SBL) priority habitats). This information was used to inform the Development's design process and the ecological assessment for the Development's Environmental Impact Assessment Report (EIAR).

This report details the findings of the NVC surveys together with an evaluation of those communities described.

2 THE SITE AND STUDY AREA

The extent of the survey area and Site (equivalent to the study area) is shown on EIAR Figure 8.3. In general, much of the Site comprises mature Sitka spruce (*Picea sitchensis*) conifer plantation, with large extents of recently clear-felled forest and recent restock. Towards the eastern half of the Site on higher ground, the density of plantation coverage thins, likely due to underlying wetter, peaty conditions, and heath and mire habitats are present, albeit mainly in a heavily modified and degraded state.

Outside of the forested areas there are extents of open moorland, comprising a mixture of wet heath on slopes and more rocky areas, and bog habitats on flatter ground.

Semi-natural woodland on Site is largely confined to watercourse margins, with a larger extent along the River Aray at the entrance of the southern access route.

3 METHODOLOGY

3.1 National Vegetation Classification (NVC)

The vegetation was surveyed by suitably qualified and experienced botanical surveyors using the NVC scheme (Rodwell, 1991-2000; 5 volumes) and in accordance with NVC survey guidelines (Rodwell, 2006). The NVC scheme provides a standardised system for classifying and mapping semi-natural habitats and ensures that surveys are carried out to a consistent level of detail and accuracy.

Homogeneous stands and mosaics of vegetation were identified and mapped by eye and drawn as polygons on high resolution aerial imagery field maps. These polygons were surveyed qualitatively to record dominant and constant species, sub-dominant species and other notable species present. The surveyors worked progressively across the study area to ensure that no areas were missed, and that mapping was accurate. NVC communities were attributed to the mapped polygons using surveyor experience and matching field data against published floristic tables

[1] As defined by the Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora – the 'Habitats Directive'.

(Rodwell, 1991-2000). Stands were classified to sub-community level where possible, although in many cases the vegetation was mapped to community level only because the vegetation was too species-poor or patches were too small to allow meaningful sub-community determination; or because some areas exhibited features or fine-scale patterns of two or more sub-communities.

Quadrat sampling was not used in this survey because experienced NVC surveyors do not necessarily need to record quadrats in order to reliably identify NVC communities and sub-communities (Rodwell, 2006). Notes were made about the structure and flora of larger areas of vegetation in many places (such as the abundance and frequency of species, and in some cases condition and evident anthropogenic impacts). It can be better to record several larger scale qualitative samples than one or two smaller quantitative samples; furthermore, qualitative information from several sample locations can be vital for understanding the dynamics and trends in local (Site) vegetation patterns (Rodwell, 2006).

Due to small scale vegetation and habitat variability and numerous zones of habitat transitional between similar NVC communities, many polygons can represent complex mosaics of two or more NVC communities. Where polygons have been mapped as mosaics an approximate percentage cover of each NVC community within the polygon is given so that the dominant community and character of the vegetation could still be ascertained.

3.2 Phase 1 Habitat Characterisation

The NVC and mapping data was also correlated to their equivalent habitats according to the Phase 1 habitat classification (JNCC, 2010), considering the species composition and habitat quality. The Phase 1 characterisation has been utilised to allow a broader visual representation of the habitats within the study area. Polygons or areas where there are mosaic NVC communities have generally been assigned a single Phase 1 classification based on the dominant NVC type (despite some polygons containing multiple Phase 1 types, often in low percentages). Therefore, the Phase 1 characterisation is generally a broader overview, and the NVC data should be referred to for further detail in any specific area.

Botanical nomenclature in this report follows that of Stace (2019) for vascular plants, Atherton *et al.* (2010) for bryophytes and Purvis *et al.* (1992) for lichens.

4 SURVEY DETAILS & LIMITATIONS

Surveys were undertaken from the 4th to 7th July 2021, with a follow up survey on 1st September 2022 to fill gaps in survey coverage due to changes in proposed infrastructure layout. Surveys were therefore carried out during the optimal season for habitat surveys. The weather conditions on all survey days were amenable to surveys. Some parts of the Site were not surveyed because they are not within proximity to proposed infrastructure and therefore would be unaffected by the Development.

The NVC system does not cover all possible semi-natural vegetation or habitat types that may be found. Since the NVC was adopted for use in Britain in the 1980s further survey work and an increased knowledge of vegetation communities has led to additional communities being described that do not fall within the NVC system. Where such communities are found and recorded they are given a non-NVC community code and are described.

It should be noted that the results from this survey, and the matches made in describing communities, represent a current community evaluation at the time of survey (as opposed to one seeking to describe what the community was before any human interference, or what it might become in the future). In light of this, a clear constraint of the vegetation survey and evaluation process as used in this and other surveys is that it offers only a snapshot of the vegetation communities present and should not be interpreted as a static long-term reference.

Ecological surveys are limited by factors which affect the presence of plants such as the time of year and weather. The ecological surveys undertaken to support this project have not therefore produced a complete list of plants and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. However, the results of these surveys have been reviewed and are considered to be sufficient to undertake the assessment.

5 RESULTS

5.1 Summary of Habitat Types & NVC Communities

A total of 21 NVC communities and six non-NVC communities were recorded within the survey area, and these corresponded to 17 Phase 1 habitat types. These communities and habitat types, and their respective site-specific correlations are summarised below in Table 5-1.

Table 5-1 Phase 1 habitat type equivalents of NVC communities and other habitats recorded

Phase 1 Habitats	NVC Communities & Other Non-NVC Habitats/Features Recorded
A1.1.1 Broadleaved Semi-Natural Woodland	W4 *Betula pubescens – Molinia caerulea* woodland W11 *Quercus petraea – Betula pubescens – Oxalis acetosella* woodland W17 *Quercus petraea – Betula pubescens – Dicranum majus* woodland
A1.2.2 Coniferous Plantation Woodland	CP Coniferous Plantation (non-NVC type)
A4.2 Recently-Felled Coniferous Woodland	CF Clear-Felled Woodland (non-NVC type)
B1.1 Unimproved Acid Grassland	U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland U5 *Nardus stricta – Galium saxatile* grassland U6 *Juncus squarrosus – Festuca ovina* grassland
B5 Marsh/Marshy Grassland	MG10 *Holcus lanatus – Juncus effusus* rush-pasture M23 *Juncus effusus/acutiflorus – Galium palustre* rush-pasture Je *Juncus effusus* acid grassland community (non-NVC type)
C1.1 Bracken – Continuous	U20 *Pteridium aquilinum – Galium saxatile* community
C3.1 Tall Herb & Fern: Tall Ruderal	W24 *Rubus fruticosus – Holcus lanatus* underscrub

Phase 1 Habitats	NVC Communities & Other Non-NVC Habitats/Features Recorded
D1.1 Dry Dwarf Shrub Heath - Acid	H9 *Calluna vulgaris – Deschampsia flexuosa* heath H12 *Calluna vulgaris – Vaccinium myrtillus* heath
D2 Wet Dwarf Shrub Heath	M15 *Trichophorum germanicum – Erica tetralix* wet heath
E1.6.1 Blanket Bog	M3 *Eriophorum angustifolium* bog pool community M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire M18 *Erica tetralix – Sphagnum papillosum* blanket mire
E1.7 Wet Modified Bog	M20 *Eriophorum vaginatum* blanket mire M25 *Molinia caerulea – Potentilla erecta* mire
E2.1 Acid/Neutral Flush/Spring	M6 *Carex echinata - Sphagnum fallax/denticulatum* mire
E2.2 Basic Flush/Spring	M10 *Carex dioica - Pinguicula vulgaris* mire
F1 Swamp	S9 *Carex rostrata* swamp
G1 Open Water	SW Standing Water (non-NVC type)
G2 Running Water	RW Running Water (non-NVC type)
J4 Bare Ground	BG Bare Ground, Tracks, Hardstandings etc (non-NVC type)

The following sections describe each of these Phase 1 habitat types and the communities underpinning these within the Site. Habitats are described in the order they appear within the Phase 1 classification. The survey results are displayed in EIAR Figure 8.3 which combines Phase 1 symbology with NVC data.

A number of target notes (TNs) were also made during surveys, often to pinpoint areas or species of special interest. These target notes are detailed within Annex A, and target note photographs are included within Annex B. Further photographs of a number of the typical habitat types found within the Site are provided within Annex D.

5.2 Woodland & Scrub

5.2.1 A1.1.1 Broadleaved Semi-Natural Woodland

Broadleaved semi-natural woodland is present as small, scattered patches within the southern and central parts of the study area, the largest of which follows a section of the Allt a' Mhadaidh burn.

The canopy in the study area is often composed of well established, mature, semi-natural tree species. This habitat varies in nature, containing the following NVC communities; W4 *Betula pubescens – Molinia caerulea* woodland, W11 *Quercus petraea – Betula pubescens – Oxalis acetosella* woodland and W17 *Quercus petraea – Betula pubescens – Dicranum majus* woodland.

The W4 community has a canopy dominated with *Betula pubescens* and *B. pendula* with a field layer dominated by *Juncus effusus* with the wetter areas being dominated with an extensive bryophyte cover consisting of *Sphagnum capillifolium* and *S. fallax*. The majority of this community was recorded as the W4b *Juncus effusus* sub-community with the occasional vascular species of *Holcus lanatus* and *Deschampsia cespitosa*. This sub-community appears within mosaics with other grassland and mire communities. The remaining areas were recorded as the wetter W4c *Sphagnum* sub-community where the occasional bog species were recorded such as *Erica tetralix* and *Eriophorum vaginatum*.

The W11 community here mainly features two small woodland stands found close to the upper reaches of the Allt Pharuig burn within the more central part of the study area. A mature canopy is formed from the species *Betula sp*., *Fraxinus excelsior* and *Sorbus aucuparia* with a field layer most closely associated with the U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland (see Section 5.3.1 below). There is also a narrow margin of W11 woodland adjacent to the River Aray where the northern access route would pass.

The W17 community was recorded within the study area where it runs alongside the River Aray at the southern access route start. It has a mixed mature canopy of *Quercus* spp., *Betula* spp., *Fagus sylvatica*, *Alnus glutinosa*, *Sorbus aucuparia* and occasional *Pinus sylvestris*. The field layer becomes heathier with *Calluna vulgaris* and *Molinia caerulea* being the dominant species along with some grasses such as *Holcus lanatus, Deschampsia cespitosa,* and *Agrostis sp*. Other species included *Oxalis acetosella* and *Dryopteris* spp. The mosses *Thuidium tamariscinum* and *Kindbergia praelonga* are abundant in the basal layer.

5.2.2 A1.2.2 Coniferous Plantation Woodland

The majority of the study area was made up of densely planted commercial coniferous plantation woodland (CP), which dominates the northern and central parts of the study area. These plantation woodlands are mostly dominated by *Picea sitchensis*, integrated with the occasional scattered trees of *Pinus sylvestris*. Within areas where the canopy was more open this woodland type could be found forming mosaics with other mire communities.

These types of plantation woodlands are of negligible botanical value due to over-shading and loss of the field flora; patchy areas of moss, *Eriophorum vaginatum* and/or *Molinia caerulea* is therefore generally all that persists beneath the deep shade and the litter shed by the conifers.

5.2.3 A4.2 Recently Felled Coniferous Woodland

Along the western side of the study area there were areas of recently felled coniferous woodland composed of *Picea sitchensis.* At the time of study, the field layer had not re-established itself which meant much of the area was devoid of NVC-type vegetation.

5.3 Grasslands & Marsh

5.3.1 B1.1 Unimproved Acid Grassland

Unimproved acid grassland was found to be scattered in small swards around the central and southern parts of the study area. The acid grassland within the study area is of the U4 *Festuca ovina – Agrostis capillaris – Galium saxatile* grassland community, U5 *Nardus stricta – Galium saxatile* grassland community, and U6 *Juncus squarrosus – Festuca ovina* grassland community. U4 and U5 are the most commonplace and extensive of these communities within the study area, with U6 comprising a much smaller proportion. These grassland communities were recorded as homogenous stands and also within mosaics with other grassland, mire and woodland communities.

As well as community level U4, and to a much lesser extent, the U4d *Luzula multiflora - Rhytidiadelphus loreus* sub-community was recorded. Overall, the stands of U4 within the study area were very widespread and common on well-drained slopes. The community often contained an abundance of *Deschampsia cespitosa* with a variable mix of *Agrostis capillaris*, *A. vinealis*, *Festuca ovina* and *Anthoxanthum odoratum*. The herbs *Potentilla erecta* and *Galium saxatile* are very common and there can also be small quantities of other vascular species such as *Nardus stricta*, *Avenella flexuosa*, *Juncus squarrosus*, *Carex binervis*, and *C. nigra*. Mosses are common, especially *Hylocomium splendens*, *Pleurozium schreberi*, *Hypnum jutlandicum* and *Rhytidiadelphus squarrosus*.

While the majority of the *Nardus stricta* dominated U5 was recorded at community level, in some locations the U5b *Agrostis canina – Polytrichum commune* sub-community was found. Many of the grassland species found within the U5 community replicate many of the species found within U4 as described above with the moss *P. commune* often appearing abundant.

The U6 community was recorded at community level only, with the community being identified by the dominance of *Juncus squarrosus* in the sward. The community appears was found most common on well-drained to quite wet, level to gently sloping ground. The flora of most of the U6 here has much in common with that of the U4 and U5 acid grassland communities described above. The community varied at times and only appears within mosaics with other mire and grassland communities, often forming a more minor component of these mosaics.

5.3.2 B5 Marsh/Marshy Grassland

Marshy grassland is a poorly defined habitat that includes several different sward types in which *Molinia caerulea*, *Juncus* spp. and/or *Carex* spp. can be prominent in mesic conditions. This habitat was found to have close associations with areas of bracken, acid grassland, and wet modified bog in some areas. Within the study area, the M23, and MG10a communities are included within its limits along with the non-NVC community 'Je' (*Juncus effusus* dominated). MG10 can fall within either marshy grassland or neutral grassland classifications, however here due to the abundance of *Juncus* spp. it has been included within marshy grassland.

Marsh/marshy grassland is the most common habitat but widely scattered within the study area, present along watercourse valleys, and as noted above is predominately made up of MG10 *Holcus lanatus – Juncus effusus* rush-pasture and M23 *Juncus effusus/acutiflorus – Galium palustre* rush-pasture communities. These communities also form mosaics and transitional areas with other grassland and mire communities.

The MG10 community was recorded only once as dominant within a mosaic with the U20 grassland community (see Section 5.4.1 below). Species diversity was predominantly limited to *Anthoxanthum odoratum*, *Rumex acetosa*, *Galium palustre*, *Ranunculus repens* and *Cirsium palustre*. Moss cover included *Calliergonella cuspidata* and *Rhytidiadelphus squarrosus*.

The M23 NVC community forms the majority of this habitat across the study area and is often species poor with *Juncus* spp. being the dominant species. Associated with surface water features, it is rather linear in its distribution, following the riparian zone of watercourses. Both M23 sub-communities are found within the study area, however the M23a *Juncus acutiflorus* sub-community is less extensive than the M23b *Juncus effusus* sub-community where it occurs more often in areas where there has been greater surface water movement.

Generally, areas of M23 are dominated by mixtures of *Juncus effusus* and/or *Juncus acutiflorus* with patches of a low diversity of grasses such as *Deschampsia cespitosa*, *Holcus lanatus*, *Anthoxanthum odoratum* and *Agrostis* spp. Within the more herb rich areas, a variety of species were frequently to occasionally recorded such as *Galium palustre*, *G. uliginosum*, *Cardamine pratensis*, *Lotus pedunculatus*, *Trifolium repens*, *Epilobium palustre*, *Cirsium palustre, Rumex acetosa*, *Viola palustris*, *Potentilla erecta, Succisa pratensis, Carex nigra, C. echinata, C. panicea,* and *Ranunculus repens*; and more rarely *Achillea millefolium*, *Stellaria graminea* and *Caltha palustris*. Wefts of mosses are also common through M23 between these species including *Calliergonella cuspidata*, *Kindbergia praelonga*, and *Rhytidiadelphus squarrosus.*

The 'Je' non-NVC grassland community is present here as patches of a *Juncus* spp. dominated calcifuge grassland, at times found within a mosaic with the U20 grassland community and M25 mire community. This is vegetation in which dominant and tall tussocks of *Juncus effusus* grow abundantly among a few shorter 'acid grassland' swards including frequent to occasional *Agrostis capillaris, Holcus lanatus, Rumex acetosa, Potentilla erecta* and *Galium saxatile*. Other occasional species include *Carex nigra*, *Deschampsia cespitosa, Molinia caerulea* and *Ranunculus repens*. Mosses typical of acid communities are also very abundant, and in some cases can be the only species present along with a uniform sward of *Juncus* spp., the most common mosses are *Hylocomium splendens*, *Pleurozium schreberi*, *Polytrichum. commune, Pseudoscleropodium purum, Rhytidiadelphus squarrosus* and *Rhytidiadelphus loreus.* This vegetation does not fit into any NVC community as it lacks the wetland element and key indicators of M6 and M23 *Juncus* spp. mires and has a more acidophilous flora than MG10 *Juncus effusus* rush-pasture; it is therefore classed separately.

5.4 Tall Herb & Fern

5.4.1 C1.1 Bracken: Continuous

Areas of bracken appear across the study area with many of these areas focussed within the central area and along the forest margins to the north of the Site. These areas were recorded as the U20 Pteridium aquilinum – Galium saxatile community and as the U20a *Anthoxanthum odoratum* sub-community. *Pteridium aquilinum* dominates these swards and where particularly the U20a sub-community was recorded, the associated species composition forms a more acid grassland assemblage with species such as *Agrostis capillaris*, *Galium saxatile*, *Potentilla erecta* and the mosses *Rhytidiadelphus squarrosus* and *Hylocomium splendens*, having a close affinity with the U4 acid grassland community.

5.4.2 C3.1 Tall Ruderal

This habitat type within the study area to the north east of Bile Gharbh and is made up of a single area of the W24 *Rubus fruticosus – Holcus lanatus* underscrub community. *Rubus fruticosus* dominates the sward, and is interspersed with some scattered Betula spp., and forms a mosaic with the W17 *Quercus petraea – Betula pubescens – Dicranum majus* woodland (see Section 5.2.1 above).

5.5 Heathland

5.5.1 D1.1 Dry Dwarf Shrub Heath – Acid

Acid dry dwarf shrub heath forms a very small proportion of the study area. It appears in the form of the H9 *Calluna vulgaris – Deschampsia flexuosa* heath and H12 *Calluna vulgaris – Vaccinium myrtillus* heath. The H9 community appears as a homogenous stand whereas the H12 community forms a mosaic with the M25 *Molinia caerulea – Potentilla erecta* mire community (see Section 5.6.1 below).

The H9 heath community appears once along the northern boundary of the study area, recorded to community level only, being species poor dominated by *Calluna vulgaris* with occasional *Avenella flexuosa*, and the mosses *Hylocomium splendens* and *Plagiothecium undulatum*.

The H12 community forms a mosaic dominated by the M25 community along the north eastern boundary of the study area and was recorded to community level only. The community species assemblage is heavily dominated by *Calluna vulgaris* and contains a usually high density of *Vaccinium myrtillus*. Other species found in the sward included many of the species referred to above as well as *Potentilla erecta*, *Galium saxatile*, and *Avanella flexuosa*,

5.5.2 D2 Wet Dwarf Shrub Heath

Wet dwarf shrub heath is found across the study area although it becomes more abundant to the south. It is entirely made up of the M15 *Trichophorum germanicum – Erica tetralix* wet heath NVC community, being recorded at community level along with all sub-communities; M15a Carex panicea sub-community; M15b Typical sub-community; M15c Cladonia spp. sub-community; and M15d *Vaccinium myrtillus* sub-community.

The dominants can be variable within these sub-communities. The most obvious components present included *Calluna vulgaris, Trichophorum germanicum* and *Vaccinium myrtillus*. Other species present in the sward were *Molinia caerulea, Juncus squarrosus, Avenella flexuosa, Carex echinata, Anthoxanthum odoratum, Potentilla erecta* and *Narthecium ossifragum*. The moss layer contained mostly *Pleurozium schreberi* and *Hypnum* sp. Within the wetter areas, *Sphagna* were present with *Sphagnum capillifolium* and *S. compactum* recorded.

On several occasions the M15a sub-community appears within mosaics with other bog communities, often identified as an area subject to water run-off and containing a large proportion of sedges, in this case *C. nigra* and *C. panicea* in addition to *C. echinata*. The M15b sub-community is by far the largest component of this community and most variable within its species composition, containing many of the species referred to above. It often appears as homogenous stands or within mosaics with other grassland and mire communities. The often lichen *Cladonia* spp. dominated M15c sub-community contains many of the vegetative components of the community as a whole. The moss *Racomitrium lanuginosum* forms a dense coverage and is commonly found on drier ground. The drier and grassier assemblage of the M15d sub-community would often have a greater abundance of *T. germanicum* along with *Nardus stricta*.

5.5.3 D6 Wet Heath/Acid Grassland Mosaic

In one area along the north eastern boundary a mosaic composed of the M15 *Trichophorum germanicum – Erica tetralix* wet heath community, the U5 *Nardus stricta – Galium saxatile* grassland community, and the M25 *Molinia caerulea – Potentilla erecta* mire community. This was identified as a wet heath/acid grassland mosaic due to the extent by which each community formed part of that mosaic. The species assemblage for each community appeared as outlined in Sections 5.5.2 and 5.3.1 above.

5.6 Mire

5.6.1 E1.6.1 Blanket Bog

Blanket bog is relatively scattered across the study area within the more elevated parts and watershed plateaus, particularly around the central area north east of Ceann Chreagan, and is represented by the M3 *Eriophorum angustifolium* bog pool community, the M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire community, and the M18 *Erica tetralix – Sphagnum papillosum* blanket mire community. These communities tend to represent areas of relatively more undamaged, active and better-quality bog, with frequent to abundant *Sphagna* in the basal layer.

The M3 community is proportionally the smallest part of this habitat within the study area and often appears within mosaics with other more dominant bog communities. These areas contain scattered patches of *Eriophorum angustifolium* and, to a lesser extent, *E. vaginatum* over a dense and extensive carpet of *Sphagnum fallax*, *S. cuspidatum*, *S. capillifolium*, and occasionally *S. papillosum*. Some of these areas also included small patches of bare peat.

M17 occurs most often as pure stands of this community and only occasionally appear in mosaics with other mire and acid grassland communities within the study area. This type of blanket bog was recorded as the M17a *Drosera rotundifolia – Sphagnum* spp. sub-community, M17b *Cladonia* spp. sub-community, and M17c *Juncus squarrosus – Rhytidiadelphus loreus* sub-community. There is a mix of *Trichophorum germanicum* and *Eriophorum vaginatum*, although the densities can be variable in places. The sward also contains a mix of other species ranging from frequent and occasional, to locally abundant, species present included *Erica tetralix*, *Eriophorum angustifolium*, *Vaccinium myrtillus*, *Molinia caerulea*, *Empetrum nigrum*, *Calluna vulgaris, Narthecium ossifragum*, *Avenella flexuosa* and *Galium saxatile*. The basal layer includes *Sphagnum papillosum*, *S. fallax*, *S. palustre*, *S. capillifolium*, *Hylocomium splendens*, *Pleurozium schreberi* and *Rhytidiadelphus loreus*. The more abundant M17a sub-community contains most of the community constants while the M17b sub-community differentiated by the greater presence of the moss *Racomitrium lanuginosum* and *Cladonia* spp. The drier M17c sub-community was found to contain a much higher proportion of *Juncus squarrosus* and *Nardus stricta* with *C. vulgaris* and *E. vaginatum* not being so dominant.

A single pure stand of M18 blanket mire was recorded in the form of the M18b *Empetrum nigrum* ssp. *nigrum – Cladonia* spp. sub-community. This type of blanket mire often represents the best examples of blanket mire vegetation. It was found in an area where the M17 blanket mire community appears often and as such, contains many of the species referred to above. Cladonia spp., forms an abundant cover with the mosses *S. capillifolium* and *S. papillosum* appearing dominant.

5.6.2 E1.7 Wet Modified Bog

Wet modified bog in the study area encompasses M20 *Eriophorum vaginatum* blanket mire and the M25 *Molinia caerulea – Potentilla erecta* mire. This habitat features strongly across the study area including within the more open areas within the conifer plantation to the north.

Within the study area, M20 wet modified bog is most abundant across level to gently sloping peat and was often found in mosaics with other bog communities. It appears to have been derived from blanket bog through grazing that has led to the scarcity or absence of *Calluna vulgaris* in the sward. Most M20 was recorded at community level, however some areas were recorded as the M20a Species-poor sub-community and the M20b *Calluna vulgaris – Cladonia* spp. sub-community. This is blanket bog vegetation in which tussocks of *Eriophorum vaginatum* are abundant to dominant but with little or no *Calluna vulgaris*. The M20a sub-community identifies the areas where the main vascular component of the sward is dominated by *E. vaginatum* and is otherwise species poor apart from a little *Avenella flexuosa*. Where there is a scattering of *Vaccinium myrtillus*, Galium saxatile, occasional *Molinia caerulea*, along with a greater presence of *C. vulgaris* and patches of *Cladonia* spp., these areas were identified as representing the M20b sub-community. The mosses *Pleurozium schreberi*, *Hypnum jutlandicum, Polytrichum commune* and *Sphagnum capillifolium* were found to be common throughout M20 and its sub-communities in variable amounts.

This community has been classified as wet modified bog rather than blanket bog due to the community's lower relative quality as a result of likely historical habitat alteration or modification through a long history of grazing.

The much more abundant M25 mire areas were identified due to *Molinia* overwhelmingly dominating the sward. This community was identified at community level and in the form of the M25a *Erica tetralix* sub-community and the M25b *Anthoxanthum odoratum* sub-community when categorised as wet modified bog. The bulk of this community is composed of the M25a sub-community with a species assemblage of short *Calluna vulgaris*, *Vaccinium myrtillus*, *Erica tetralix*, *Juncus squarrosus*, *J. effusus, J. acutiflorus*, *Nardus stricta*, *Narthecium ossifragum*, *Anthoxanthum odoratum*, *Potentilla erecta*, *Agrostis capillaris*, *A. canina*, *Avenella flexuosa*, *Carex nigra*, *C. echinata* and mosses such as *Hylocomium splendens*, *Pleurozium schreberi*, *Hypnum jutlandicum*, *Rhytidiadelphus squarrosus*, *Polytrichum commune, Sphagnum capillifolium, S. fallax* and *S. palustre*. This flora can have much in common with M15 wet heath, and the M25a here might well be derived from previous wet heath as a result of grazing and burning, both of which can lead to increases of *Molinia* and corresponding decreases of dwarf shrubs.

The M25b was dominated by *Molinia caerulea* in at times a tussocky sward and was found to form mosaics with the other bog, marshy grassland and woodland communities. The M25b sub-community can be classified as marshy grassland where these areas are more dominated by grassland species. In this instance, this sub-community has been classified as wet modified bog due to its close association with other bog related communities and within areas where it is surround by bog communities. In some places where the *Molinia* was not purely dominant, species included variable abundances of *Potentilla erecta, Galium saxatile, Anthoxanthum odoratum, Holcus lanatus, Avenella flexuosa, Rumex acetosa, Agrostis capillaris, Juncus effusus,* and the mosses *Polytrichum commune* and *Pleurozium schreberi*. At times Juncus effusus could become more established within the wetter areas of this sub-community along with a more herb rich assemblage containing *Prunella vulgaris*, *Viola palustris*, and *Succisa pratensis*.

5.6.3 E2.1 Acid/Neutral Flush

Acid/neutral flushes and springs appear in small and scattered areas across the study area, being most apparent within the south. These features were recorded as the M6 *Carex echinata* – *Sphagnum fallax/denticulatum* mire community, the majority of which formed the M6c *Juncus effusus* sub-community.

These are rush or sedge mires on wet and mostly flushed ground whose soils appear to be acidic, as judged by the abundance of *Sphagnum* mosses (especially *Sphagnum fallax* and *S. palustre*) and the moss *Polytrichum commune*. Individual areas of M6 are generally only small and occurring as flushes scattered among heaths and grasslands or as acidic areas of rush mire within mosaics of acid grassland and rush pasture. The M6c sub-community is a rush mire dominated by tall swards of *Juncus effusus* with a carpet of *Sphagnum* moss spread within it.

5.6.4 E2.2 Basic Flush

Within four areas of the study area basic flushes were found and recorded as target notes (see Annex A below) and within a single mosaic alongside the M23 and M25 mire communities. These basic flushes are represented by the M10 *Carex dioica* – *Pinguicula vulgaris* mire community.

The M10 community comprises base-enriched flush mires whose short vegetation includes the sedges *Carex panicea*, *C. flacca*, *C. demissa* and *Eriophorum angustifolium*, and mosses such as *Campylium stellatum*, *Palustriella commutata*, and *Scorpidium revolvens*.

5.7 Swamp, Marginal & Inundation Habitats

5.7.1 F1 Swamp

Two small areas of swamp were recorded within the study area along the eastern boundary, forming part of Lochan Sheileachan and Lochan a' Mhadaidh. This habitat is represented by the S9 *Carex rostrata* swamp community where it was recorded to community level only. These areas formed mosaics within areas of standing water and were completely dominated by the sedge *Carex rostrata*.

5.8 Open Water

5.8.1 G1 Standing Water

There are three areas of standing water (SW) within the study area, two of which form part of Lochan Sheileachan and Lochan a' Mhadaidh to the east as part of mosaics with the S9 *Carex rostrata* swamp community (see Section 5.7.1 above).

5.8.2 G2 Running Water

A number of minor watercourses are present within the study area.

5.9 Rock Exposure & Waste

5.9.1 I1.4.1 Other Exposure – Acid/Neutral

Three areas of bare rock were recorded as Bare Ground (BG) within the south east of the study area.

5.10 Miscellaneous

5.10.1 J4 Bare Ground

Bare ground is a non-NVC community (BG) within the study area and includes existing tracks, hardstandings and public roads. Any areas that were devoid of vegetation and that could not be classified as any other habitat have also been included here.

5.11 Invasive Non-Native Species

A small stand of giant rhubarb (*Gunnera manicata*) was recorded alongside a watercourse at NN09260,14586.

5.12 Notable Species

No notable or rare species were incidentally recorded during the habitat surveys; however, this does not preclude their presence from the study area.

6 EVALUATION OF BOTANICAL INTEREST

6.1 Overview

NVC communities can be compared with a number of habitat classifications in order to help in the assessment of the sensitivity and conservation interest of certain areas. The following sections compare the survey results and the NVC communities identified against three classifications:

- SEPA guidance on GWDTEs;
- Habitats Directive (92/43/EEC) Annex I habitats; and
- Scottish Biodiversity List (SBL) priority habitats.

6.2 Groundwater Dependent Terrestrial Ecosystems (GWDTE)

SEPA has classified a number of NVC communities as potentially dependent on groundwater (SEPA, 2017a & 2017b). Wetlands or habitats containing these particular NVC communities are to be considered GWDTE unless further information can be provided to demonstrate this is not the case. Many of the NVC communities on the list are very common habitat types across Scotland, and some are otherwise generally of low ecological value. Furthermore, some of the NVC communities may be considered GWDTE only in certain hydrogeological settings.

Designation as a potential GWDTE does not therefore infer an intrinsic biodiversity value, and GWDTE status has not been used as criteria to determine a habitats respective conservation importance. There is however a statutory requirement to consider GWDTEs and the data gathered during the NVC surveys has been used to inform this assessment (see Chapter 10: Hydrology & Hydrogeology).

Using SEPA's guidance, Table 6-1 shows which communities recorded within the study area may be considered GWDTE. Those communities which may have limited (moderate) dependency on groundwater in certain settings are marked in yellow and NVC communities recorded that are likely to be considered high, or sensitive GWDTE in certain hydrogeological settings are highlighted in red.

Table 6-1 Communities within the study area which may potentially be classified as GWDTE

NVC Code	NVC Community Name
M15	*Trichophorum germanicum – Erica tetralix* wet heath
M25	*Molinia caerulea – Potentilla erecta* mire
MG10	*Holcus lanatus – Juncus effusus* rush pasture
U6	*Juncus squarrosus – Festuca ovina* grassland
Je[2]	*Juncus effusus* acid grassland
W4	*Betula pubescens – Molinia caerulea* woodland
M6	*Carex echinata – Sphagnum fallax/denticulatum* mire
M10	*Carex dioica - Pinguicula vulgaris* mire
M23	*Juncus effusus/acutiflorus – Galium palustre* rush pasture

The location and extent of all identified potential GWDTE are provided on an appropriate NVC map; see EIAR Figure 8.4.

Within Figure 8.4 the potential GWDTE sensitivity of each polygon containing a potential GWDTE is classified on a four-tier approach as follows:

- 'Highly – dominant' where potential high GWDTE(s) dominate the polygon
- 'Highly - sub-dominant' where potential high GWDTE(s) make up a sub-dominant percentage cover of the polygon
- 'Moderately – dominant' where potential moderate GWDTE(s) dominate the polygon and no potential high GWDTEs are present
- 'Moderately - sub-dominant' where potential moderate GWDTE(s) make up a sub-dominant percentage cover of the polygon and no potential high GWDTEs are present.

Where a potential high GWDTE exists in a polygon it outranks any potential moderate GWDTE communities within that same polygon.

[2] In light of the SEPA classification on potential GWDTEs the non NVC type 'Je' should also qualify for potential GWDTE status. The classification of moderate sensitivity is keeping in line with other similar *Juncus* spp. dominated grassland communities (e.g. MG10).

GWDTE sensitivity has been assigned solely on the SEPA listings (SEPA, 2017a & 2017b). However, depending on a number of factors such as geology, superficial geology, presence of peat and topography, many of the potential GWDTE communities recorded may in fact be only partially groundwater fed or not dependant on groundwater. Determining the actual groundwater dependency of particular areas or habitat requires further assessment (see Chapter 10: Hydrology & Hydrogeology).

6.3 Annex I Habitats

6.3.1 Overview

A number of NVC communities can also correlate to various Annex I habitat types. However, the fact that an NVC community can be attributed to an Annex I type does not necessarily mean all instances of that NVC community constitute Annex I habitat. Its Annex I status can depend on various factors such as quality, extent, species assemblages, geographical setting and substrates.

Using Joint Nature Conservation Committee (JNCC) Annex I habitat listings and descriptions[3], which have then been compared with survey results and field observations, the following NVC communities within the study area which are considered to constitute Annex I habitat are shown in Table 6-2.

Table 6-2 Annex I Habitats and Corresponding NVC Communities

Annex I Habitat	Corresponding NVC Communities & Other Non-NVC Habitats/Features Recorded
91A0 Old Sessile Oakwoods	W17 *Quercus petraea – Betula pubescens – Dicranum majus* woodland
4010 North Atlantic wet heaths with *Erica tetralix*	M15 *Trichophorum germanicum – Erica tetralix* wet heath
4030 European dry heaths	H9 *Calluna vulgaris – Deschampsia flexuosa* heath H12 *Calluna vulgaris – Vaccinium myrtillus* heath
7130 Blanket bog	M3 *Eriophorum angustifolium* bog pool community M17 *Trichophorum germanicum – Eriophorum vaginatum* blanket mire M18 *Erica tetralix – Sphagnum papillosum* blanket mire M20 Eriophorum vaginatum blanket and raised mire
7230 Alkaline fens	M10 *Carex dioica - Pinguicula vulgaris* mire

Further details on the inclusion or omission of certain NVC communities/sub-communities and/or Annex I types are also provided below.

6.3.2 91A0 Old sessile oak woods with Ilex and Blechnum in the British Isles

This habitat type comprises a range of woodland types dominated by mixtures of *Quercus* spp. and *Betula* spp. It is characteristic of base-poor soils in areas of at least moderately high rainfall in northern and western parts of the UK. The habitat corresponds particularly to NVC types W10e, W11, W16b and W17.

[3] http://jncc.defra.gov.uk/page-1523

The areas of W11 recorded within the study area were not deemed to be of Annex I status because they are fragments of birchwoods with no *Quercus* spp. and they generally lack any characteristics such as a rich bryophyte assemblage which would refer to them as 'old sessile oak woods'.

6.3.3 4010 Northern Atlantic wet heaths with Erica tetralix

Wet heath usually occurs on acidic, nutrient-poor substrates, such as shallow peats or sandy soils with impeded drainage. The vegetation is typically dominated by mixtures *Erica tetralix*, *Calluna vulgaris*, grasses, sedges and *Sphagnum* bog-mosses. All examples of M15 wet heath were included within the 4010 Northern Atlantic wet heaths category.

6.3.4 4030 European dry heaths

European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf shrubs dominate the vegetation. The most common dwarf shrub is *Calluna vulgaris*.

The dry heath communities recorded, H9 and H12 fall within this Annex I type. These NVC types can also be included within the Annex I type H4060 Alpine and Boreal heaths, but only where they are at higher altitudes and include arctic-alpine floristic elements. These communities within the study area are lower altitudinal examples so they all fall under the 4030 European dry heaths Annex I type.

6.3.5 7130 Blanket bog

The blanketing of the ground with a variable depth of peat gives the habitat type its name and results in the various morphological types according to their topographical position. Blanket bogs show a complex pattern of variation related to climatic factors, particularly illustrated by the variety of patterning of the bog surface in different parts of the UK. Such climatic factors also influence the floristic composition of bog vegetation.

'Active' bogs are defined as supporting a significant area of vegetation that is normally peat-forming. Typical species include the important peat-forming species, such as *Sphagnum* spp. and *Eriophorum* spp., or *Molinia caerulea* in certain circumstances, together with *Calluna vulgaris* and other ericaceous species. The most abundant NVC blanket bog types are M17, M18, M19, M20 and M25.

Annex I type 7130 Blanket bog therefore correlates directly with a number of NVC communities within the study area such as the M17, M19 and M20 mires. However, 7130 Blanket bog can also include bog pool communities (M1-M3) where these occur within blanket mires such as M17-M20. As such M3 within the study area is also assigned to the blanket bog Annex I type, as it is often associated with areas of M17, M19 and M20 mire.

As noted above, M25 mire can also fall within the blanket bog Annex I type, usually where the underlying peat depth is greater than 0.5m and the habitat is wet and contains peat forming species. As described above, M25 within the study area is for the most part species-poor and at the drier end of the scale. Many areas are a ubiquitous swathe of *Molinia* tussocks with few associate species and generally lack many of the main peat forming species such as *Sphagnum* mosses. Much of the M25 within the study area is also grazed, in some areas quite intensively, and this has resulted in many areas of M25 appearing transitional to acid grassland communities (U4 – U6) and in intricate mosaics with these same communities. General field observations of M25 also indicate that this habitat is often unlikely to be on deep peat within the study area. Given the character of the majority of M25 within the study area it has not been considered to be of Annex I habitat quality in this case.

6.3.6 7230 Alkaline fens

Alkaline fens consist of a complex assemblage of vegetation types characteristic of sites where there is tufa and/or peat formation with an elevated water table and a calcareous base-rich water supply. The core vegetation is short sedge mire. All examples of M10 mire in the study area fall within this Annex I habitat type.

6.4 Scottish Biodiversity List Priority Habitats

The SBL is a list of animals, plants and habitats that Scottish Ministers consider to be of principal importance for biodiversity conservation in Scotland. The SBL was published in 2005 to satisfy the requirement under Section 2(4) of The Nature Conservation (Scotland) Act 2004.

The SBL identifies habitats which are the highest priority for biodiversity conservation in Scotland: these are termed 'priority habitats'. Some of these priority habitats are quite broad and can correlate to many NVC types.

The relevant SBL priority habitat types (full descriptions of which can be found on the NatureScot website[4]), and associated NVC types recorded within the study area are as follows:

- Wet woodland: W4b;
- Upland birchwoods: W11 and W17;
- Blanket bog: M17, M18, M20, and M3 (M3 where associated with M17-M20), and M15[5]/M25 where peat depth is greater than 0.5m;
- Upland flushes, fens and swamps: S9, M10, and M23a;
- Upland heathland: H9 and H12; and
- Lowland fens: S9.

These SBL priority habitats correspond with UK Biodiversity Action Plan (BAP) Priority Habitats[6].

6.5 Sensitivity Summary

Table 6-3 provides a summary of all the NVC communities and non-NVC types recorded within the study area and any associated habitat sensitivities as described in the sections above.

[4] https://www.nature.scot/scotlands-biodiversity/habitat-definitions
[5] Excluding the M15a *Carex panicea* sub-community, due to its general flushed nature over shallower substances.
[6] http://jncc.defra.gov.uk/page-5718

Table 6-3 Summary of study area communities and sensitivities

NVC/Non-NVC Codes Recorded	Potential GWDTE Status	Annex I Habitat	SBL Priority Habitat Type
Mires & Wet Heath			
M3	-	7130 Blanket bogs (examples associated with M17-M20)	Blanket bog
M6, M6c	High	-	Upland flushes, fens and swamps
M10	High	7230 Alkaline fens	Upland flushes, fens and swamps
M15, M15a, M15b, M15c, M15d	Moderate	4010 Northern Atlantic wet heaths with Erica tetralix	Upland heathland
M17a, M17b, M17c	-	7130 Blanket bogs	Blanket bog
M18b	-	7130 Blanket bogs	Blanket bog
M20, M20a, M20b	-	-	-
M23a, M23b	High	-	Upland flushes, fens and swamps (applies to M23a only)
M25, M25a, M25b	Moderate	-	-
Dry Heaths			
H9	-	4030 European dry heaths	Upland heathland
H12	-	4030 European dry heaths	Upland heathland
Calcifugous Grasslands			
U4, U4d	-	-	-
U5, U5b	-	-	-
U6	Moderate	-	-
U20, U20a	-	-	-
Mesotrophic Grasslands			
MG10	Moderate	-	-
Woodland & Scrub			
W4b, W4c	High	-	
W11	-	-	Upland birchwoods
W17	-	91A0 Old Sessile Oakwoods	Upland birchwoods
Swamps & Tall-Herb Fens			
S9	-	-	Upland flushes, fens and swamps
Non-NVC Types			
BG	-	-	-

Non-NVC Types			
CF	-	-	-
CP	-	-	-
Je	Moderate	-	-
RW	-	-	-
SW	-	-	-

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ANNEX A. NVC TARGET NOTES

A number of target notes were also made during surveys, often to pinpoint springs/flushes, or an area or species of interest, these target notes are shown on EIAR Figure 8.3 and detailed within Table A.1 below. A representative sample of corresponding target note photographs is provided in Annex B.

Table A-1 Survey Area Target Notes

Target Note ID	Easting	Northing	NVC Community	Description	Photo Reference
1	211045	716654	M3	*Menyanthes trifoliata*, some shoots of *Carex rostrata*, with *Sphagnum* cover low and much bare peat.	B-1
2	210510	714213	M3	Example of bog pools in wider area, containing *Sphagnum cuspidatum*, *S. fallax*, *Eriophorum angustifolium*, *Agrostis stolonifera*, and *S. capillifolium.*	
3	210623	714265	M10	Flush contains the species *Carex nigra*, *C. panicea*, *C. pulicaris*, *Pinguicula vulgaris* and brown mosses like *Scorpidium scorpioides.* Ground conditions very dry at time of survey.	B-2
4	210862	714020	M10	Similar species to TN3 above with patches of *Agrostis stolonifera*. Ground conditions very dry at time of survey.	
5	211000	713460	M10	Similar in composition to TN3 above.	

ANNEX B. TARGET NOTE PHOTOGRAPHS

The following photographs correlate to the target notes described within Annex A, Table A.1. Photographs are not provided here for all target notes, due to the similarity in many photographs.

Photo B-1 Target Note 1

Photo B-2 Target Note 3

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Environmental Impact Assessment – Technical Appendix 8.2: Protected Species Survey Report

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

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Protected Species Survey Report

Technical Appendix 8.2

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CONTENTS

1 INTRODUCTION

MacArthur Green carried out protected species surveys for the proposed Ladyfield Renewable Energy Park ('the Development'), on the Site near Inveraray, Argyll and Bute, in 2021 and 2022.

The surveys in May 2021 and September 2022 primarily focussed on otter (*Lutra lutra*), water vole (*Arvicola amphibius*), badger (*Meles meles*), red squirrel (*Sciurus vulgaris*) and pine marten (*Martes martes*). A separate survey was also undertaken in August 2022 to evaluate the habitat suitability on site for fish.

A watching brief was also kept throughout these surveys, and during all ecological surveys at the site, and signs recorded for other protected species potentially inhabiting the site and respective survey areas such as adder (*Vipera berus*), common or viviparous lizard (*Zootoca vivipara*), and slow worm (*Anguis fragilis*).

Surveys for bats were carried out and are reported separately in Technical Appendix 8.3.

These protected species surveys were undertaken to aid and inform the design and ecological assessment for the Development's Environmental Impact Assessment Report (EIAR).

2 THE SITE & SURVEY AREA

The Site is located approximately 4.7 km north of Inveraray, in Argyll and Bute. Stands of mixed-age conifer plantation cover most of the Site, with some areas having been recently felled. In addition, more open areas of heath, blanket bog and marshy grassland habitats are also found on Site. The land is drained by several small and minor watercourses that are mostly tributaries of the River Aray, which lies to the west of the Site.

The survey area in which protected species surveys were undertaken incorporated a buffer of up to 250 m around the proposed Wind Turbines provided at the time of survey, with specific buffer distances in some areas as appropriate for the specific species surveyed for. As the layout was subsequently refined, this meant that the area covered by surveys is larger than required for the final Development layout.

The 2021 surveys covered an access route option at the time, which lead over open moorland from the forestry near Meall Reidh, around 2 km to the south of the Site (see EIAR Figure 7.2 for breeding bird survey area which covered roughly the same area). Some results therefore relate to this part of the protected species survey area, which is outside of the final Site boundary.

3 LEGAL PROTECTION

Details of the legal protection of the protected species surveyed for are given in **Annex A** of this report.

4 METHODS

Surveys for protected species were undertaken between 4th and 7th May 2021. The weather conditions during surveys were generally cold and dry. A follow-up survey was undertaken within previously un-surveyed areas due to a layout change, on 1st and 2nd September 2022, and conditions were warm and dry. A fish habitat suitability survey was undertaken on 10th August 2022 in warm, dry conditions.

The survey methods used are detailed in **Annex B** and details of surveys are presented in **Annex C**.

4.1 Survey Limitations/Constraints

There is uncertainty associated with identifying scats produced by pine marten due to their variability in composition and their similarity with those produced by other species such as fox. DNA analysis is often used as a method to increase reliability of identification, although it is often not possible to determine to species level with this method due to possible degradation of samples or the collection of scat samples from species that cannot be sequenced (Croose *et al.*, 2014). The scats recorded within survey area that were undeterminable between pine marten and fox were therefore considered as 'potential pine marten' and a precautionary approach is applied when discussing their presence and utilisation of the site and the habitats within the wider area.

Due to the mobile nature of protected species, it is possible that new protected features may be created in the period between surveys and the commencement of construction. Pre- and during construction protected species checks would be carried out in advance of construction activities in order to determine current presence of protected species and their features (see EIAR Chapter 8: Ecology).

5 RESULTS

5.1 Protected Species

The protected species survey results from 2021 and 2022 are summarised in **Table 5-1** below, with full detailed results provided within **Annex C**, selected photographs are presented in **Annex D**. Survey results are displayed on EIAR Figure 8.5.

Table 5-1 Protected species survey results summary

Species	Survey Results Summary	General Habitat Suitability
Otter	One old spraint was recorded within the site, on a tributary of the River Aray.	Numerous minor watercourses drain the site, the majority of which are tributaries of the River Aray which runs just to the west of the site. These minor watercourses provide relatively limited foraging resources, with culverts impeding much fish movement, but suitable commuting routes for otter within the wider area, and provide connectivity to water bodies such as Lochan a' Mhadaidh to the east of the site. The River Aray provides suitable opportunities for foraging and shelter (Annex D, Photo 6), but no signs were recorded in proximity to possible crossing locations. The Allt-Sheileachan which runs within and adjacent to the northern site boundary is suitable for foraging and commuting but lacks suitable shelter features.
Water vole	Several burrows of the correct size for water vole were recorded along the former access route option to the south	Several of the smaller watercourses within the survey area offer habitat that may be suitable for water vole, with steep, soft banks and slow flows. The

Species	Survey Results Summary	General Habitat Suitability
	of the Site. An old latrine was found at one of these burrows, but no confirmed evidence of water vole presence was recorded within the Site.	vegetation is of a type that could provide good foraging for water vole.
Badger	Evidence of badger was recorded along the former access route option to the south of the Site, including setts, feeding signs, paths and guard hairs. Two badger setts were recorded >1 km from the nearest proposed infrastructure (confidential locations not shown here). One possible feeding sign was recorded within the Site.	Some areas of the site offer suitable habitat for supporting badger, with areas of mineral soil offering drier and more suitable substrate for building setts than the surrounding peat. There are varied foraging opportunities across the site, with good connectivity between the woodland and more open habitat types.
Pine marten	Several possible scats were recorded across the survey area. An incidental record was made of a dead pine marten on the A819 road adjacent to the site during the surveys in September 2022.	The mixed-age conifer forestry offers potential shelter for pine marten (Caryl, 2008), with areas of more open land for hunting available nearby.
Red squirrel	One squirrel feeding station was recorded within forestry along the former access route option to the south of the Site, which contained numerous stripped cones.	The coniferous forestry within the Site offers suitability for foraging and drey building, with mature trees of cone-bearing age, which may be utilised by red squirrels. Smaller areas of broadleaved woodland in the central and southern sections of the site also may be utilised. The Site is located within a region identified as a red squirrel stronghold area (Forestry Commission, 2010).
Reptiles	Sightings of common lizard were recorded, in addition to features with the potential to act as hibernacula. These features included dry stone walls and rock piles.	The Site has some areas of open heathland and grassland habitats suitable for reptiles to forage and bask, in addition to areas of woodland and denser vegetation and bracken which may offer hibernation potential.
General	One disused mammal hole, of a size to potentially support protected species, was recorded. No further field signs were recorded to confirm the hole's use. A fox was recorded on the site visit in September 2022.	

5.2 Fish Habitat Suitability

Watercourses within the Site were checked where accessible, to determine the overall suitability for fish species likely to be present in the local area. The main points of access, and most useful in terms of assessing the ability for fish to pass up or downstream were where existing forestry tracks cross watercourses. Here, culverts or similar infrastructure which may restrict movement are often present. The aspect from these locations also allowed a wider evaluation of the watercourse, with features such as size, depth and surrounding habitat and topography noted. Results are presented in Table 5-1.

Table 5-1 Fish Habitat Suitability Results

ID	Grid Reference	Status	General Habitat Suitability
1	NN10373 16103	Impassable	1 m wide burn through forestry with impassable culvert underneath track.
2	NN10203 15719	Impassable	Burn through clearfell, narrow in places. Confluence of two burns but downslope has impassable culvert.
3	NN10055 15351	Passable	Through clearfell then overgrown plantation upstream. Passable culvert downstream.
4	NN09915 15097	Passable	Larger watercourse with broadleaved trees along margins. Large culvert under track but may be passable.
5	NN09664 14994	Passable	Very small watercourse with culvert.
6	NN09596 14834	Impassable	Culvert may be impassable for small fish.
7	NN09273 14493	Impassable	Impassable culvert downstream of track.
8	NN09268 14656	Passable	Culvert may be passable.
9	NN09336 15041	Passable	Small, overgrown burn downstream of track
10	NN09484 15249	Impassable	Large culvert – may be impassable.
11	NN09617 15689	Impassable	Impassable culvert and waterfall.
12	NN09727 15789	Impassable	Culvert may be impassable.
13	NN09854 15976	Impassable	Impassable culvert.
14	NN09825 16129	Passable	Small burn with culvert.
15	NN09453 13584	Impassable	Culvert may be passable.

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ANNEX A. LEGAL PROTECTION

Otter receives protection under the Conservation Regulations (1994) (as amended) only[1].

Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)

Under Regulation 39 (1) it is an offence to:

a) deliberately or recklessly to capture, injure or kill a wild animal of a European protected species;

b) deliberately or recklessly:

   i. to harass a wild animal or group of wild animals of a European protected species;

   ii. to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;

   iii. to disturb such an animal while it is rearing or otherwise caring for its young;

   iv. to obstruct access to a breeding site or resting place of such an animal, or otherwise to deny the animal use of the breeding site or resting place;

   v. to disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs; or

   vi. to disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young;

c) deliberately or recklessly to take or destroy the eggs of such an animal; or

d) to damage or destroy a breeding site or resting place of such an animal.

Regulation 44 (2e) allows a licence to be granted for the activities noted in Regulation 39 such that:

Preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment.

Otter is also listed on Appendix I of CITES, Appendix II of the Bern Convention and Annexes II and IV of the Habitats Directive (1994). It is also listed as globally threatened on the IUCN/WCMC Red Data List.

[1] The Conservation Amendment (Scotland) Regulations (2007) removed EPS from Schedule 5 and 8 of the Wildlife and Countryside Act 1981.

Water vole is not protected by Section 9, subsection 1 of the Wildlife and Countryside Act but is covered by Section 9, subsection 4 and Section 10[2].

Wildlife and Countryside Act (1981), Nature Conservation (Scotland) Act 2004

Under Section 9, Subsection 4, Paragraphs (a) and (b)[4], it is an offence to:

- Intentionally or recklessly damage or destroy, or obstruct access to, any structure or place which any wild animal included in Schedule 5 uses for shelter or protection.
- Intentionally or recklessly disturb any such animal while it is occupying a structure or place which it uses for that purpose.

Under Section 10, Subsection 3, Paragraph (c)[4], any person shall not be guilty of an offence by reason of:

- Any act made unlawful by that section if he shows:
    a) That each of the conditions specified in subsection (3A) was satisfied in relation to the carrying out of the unlawful act; or
    b) That the unlawful act was carried out in relation to an animal bred and, at the time the act was carried out, lawfully held in captivity.
- Section 3A states those conditions referred to in Subsection 3c are:
    a) That the unlawful act was the incidental result of a lawful operation or other activity;
    b) That the person who carried out the lawful operation or other activity:
        i. took reasonable precautions for the purpose of avoiding carrying out the unlawful act; or
        ii. did not foresee, and could not reasonably have foreseen, that the unlawful act would be an incidental result of the carrying out of the lawful operation or other activity; and
    3) That the person who carried out the unlawful act took, immediately upon the consequence of that act becoming apparent to the person, such steps as were reasonably practicable in the circumstances to minimise the damage or disturbance to the wild animal, or the damage or obstruction to the structure or place, in relation to which the unlawful act was carried out.

[2] as amended by the Nature Conservation (Scotland) Act 2004.

Badger is protected under the Protection of Badgers Act 1992 (as amended by the Nature Conservation (Scotland) Act 2004 (as amended)).

The following applies under this legislation:

Part 1. – A person is guilty of an offence if, except as permitted by or under this Act, he wilfully kills, injures or takes, or attempts to kill, injure or take, a badger.

1. If, in any proceedings for an offence under subsection (1) above consisting of attempting to kill, injure or take a badger, there is evidence from which it could reasonably be concluded that at the material time the accused was attempting to kill, injure or take a badger, he shall be presumed to have been attempting to kill, injure or take a badger unless the contrary is shown.
2. A person is guilty of an offence if, except as permitted by or under this Act, he has in his possession or under his control any dead badger or any part of, or anything derived from, a dead badger.

Part 3. –

1. A person is guilty of an offence if, except as permitted by or under this Act, he interferes with a badger sett by doing any of the following things–
    a. damaging a badger sett or any part of it;
    b. destroying a badger sett;
    c. obstructing access to, or any entrance of, a badger sett;
    d. causing a dog to enter a badger sett; or
    e. disturbing a badger when it is occupying a badger sett,
    f. intending to do any of those things or being reckless as to whether his actions would have any of those consequences.
2. A person is guilty of an offence if, except as permitted by or under this Act, he knowingly causes or permits to be done an act which is made unlawful by subsection (1) above.

Note: A badger sett is defined in law as any structure or place which displays signs of current use by a badger.

Red squirrel and **pine marten** are protected by the following legislation:

Wildlife and Countryside Act (1981), Nature Conservation (Scotland) Act 2004

Under Section 9, Subsection 1, it is an offence to:

Intentionally or recklessly:

- Kill, injure or take any wild animal listed on Schedule 5;
- Damages or destroys or obstructs access to, any structure or place that any animal listed on Schedule 5 uses for shelter or protection;
- Disturbs any such animal while it is occupying a structure or place which is uses for that purpose
- Sell, offer or expose for sale, or possess or transport for the purpose of sale, any live or dead wild animal included in Schedule 5, or any part of, or anything derived from, such an animal.
- Publish or cause to be published any advertisement likely to be understood as conveying that he buys or sells, or intends to buy or sell, any of those things.

Adder, slow worm and **viviparous lizard** are protected by the following legislation:

These three species of reptile are noted within Schedule 5 of the Wildlife and Countryside Act (1981). However, Schedule 5 of the 1981 act notes that these species are protected 'in respect of section 9(5) only'.

Section 9(5) states:

- Subject to the provisions of this part, if any person
  a) Sells, offers or exposes for sale, or has in his possession or transports for the purpose of sale, any live or dead wild animal included in Schedule 5, or any part of, or anything derived from, such an animal; or
  b) Publishes or causes to be published any advertisement likely to be understood as conveying that he buys or sells, or intends to buy or sell, any of those things.
- he shall be guilty of an offence

An amendment was made to Schedule 5 on 18 March 1988 relating to slow worm and viviparous lizard to give them protection under Section 9(1). A further amendment was made to Schedule 5 on 27 March 1991 relating to adders which afford them protection under Section 9(1).

Section 9(1) (as amended by the Nature Conservation (Scotland) Act 2004) states:

'Subject to the provisions of this Part, if any person intentionally or recklessly kills, injures or takes any wild animal included in schedule 5, he shall be guilty of an offence.'

ANNEX B. SURVEY METHODS

B.1 Otter

All accessible watercourses within the survey area were surveyed for otter field signs. Otter field signs and survey methods are described in Bang & Dahlstrøm (2001), Sargent & Morris (2003) and Chanin (2003), and include:

- **Holts:** underground features where otters live. They can be tunnels within bank sides, underneath root-plates or boulder piles, and even man-made structures such as disused drains. Holts are used by otters to rest up during the day and are the usual location of natal or breeding sites. Otters may use holts permanently or temporarily;
- **Couches:** these are above ground resting-up sites. They may be partially sheltered, or fully exposed. Couches may be regularly used, especially in reed beds and on in-stream islands. They have been known to be used as natal and breeding sites. Couches can be very difficult to identify and may consist of an area of flattened grass or earth. Where rocks or rock armour are used as couches, these can be almost impossible to identify without observing the otter *in situ*;
- **Prints:** otters have characteristic footprints that can be found in soft ground and muddy areas;
- **Spraints:** otter faeces may be used to mark territories, often on in-stream boulders. They can be present within or outside the entrances of holts and couches. Spraints have a characteristic smell and often contain fish remains;
- **Feeding signs:** the remains of prey items may be found at preferred feeding stations. Remains of fish, crabs or skinned amphibians can indicate the presence of otter;
- **Paths:** these are terrestrial routes that otters take when moving between resting-up sites and watercourses, or at high flow conditions when they will travel along bank sides in preference to swimming; and
- **Slides and play areas:** slides are typically worn areas on steep slopes where otters slide on their bellies, often found between holts or couches and watercourses. Play areas are used by juvenile otters in play and are often evident by trampled vegetation and the presence of slides. These are often positioned in sheltered areas adjacent to the natal holt.

Any of the above signs (apart from paths) are diagnostic of the presence of otter. However, it is often not possible to identify couches with confidence unless other field signs are also present. Sprainst are the most reliably identifiable evidence of the presence of this species.

B.2 Water Vole

All watercourses within the survey area were surveyed for water vole field signs following the methodology prescribed in Dean *et al*. (2016). This involved searching for the following field signs:

- **Faeces:** recognisable by their size, shape, and content. If not too dried-out these are also distinguishable from rat droppings by their smell;

- **Latrines:** faeces, often deposited at discrete locations;
- **Feeding stations:** food items are often brought to feeding stations along pathways and hauled onto platforms. Recognisable as neat piles of chewed vegetation up to 10cm long;
- **Burrows:** appear as a series of holes along the water's edge distinguishable from rat burrows by size and position;
- **Lawns:** may appear as grazed areas around land holes;
- **Nests:** where the water table is high above ground woven nests may be found;
- **Footprints:** tracks may occur at the water's edge and lead into bank side vegetation. May be distinguishable from rat footprints by size; and
- **Runways in vegetation:** low tunnels pushed through vegetation near the water's edge; these are less obvious than rat runs.

Dean *et al*. (2016) states that water vole droppings are the only field sign that can be used to determine water vole presence reliably on their own. Experience is required to distinguish feeding signs, burrows and footprints of water voles from those of other species. A collection of these field signs found in close proximity can indicate water vole presence.

B.3 Badger

Land with the potential to support badger within the survey area was searched for field signs with particular attention given to areas around woodland and areas underlain by mineral soils. Field signs of badger are described in Neal and Cheeseman (1996), Bang and Dahlstrøm (2001), and Scottish Badgers (2018). Field evidence searched for included:

- **Setts:** single and/or groups of holes;
- **Prints:** badgers have characteristic footprints that can be found in soft ground and muddy areas;
- **Latrines and dung pits:** these are small excavated pits in which droppings are deposited. Latrines are a collection of dung pits used as territorial markers;
- **Hairs:** tufts of hair can often be found on fences, or in the entrances to setts;
- **Feeding signs:** small scrapes, also known as snuffle holes, where badgers have searched for insects and plant tubers. Feeding signs can also include dug up wasp or bee nests and ripped up dung of other species including cattle;
- **Scratching posts:** marks on trees (including fallen trees) where badgers have scratched leaving claw marks or ripped at areas of rotten bark to search for food; and
- **Paths:** these are routes that badgers take when moving between setts and foraging areas.

Where setts were recorded their sett entrance classification and sett type were noted, in line with the definitions outlined in Scottish Badgers (2018), which are reproduced below in **Table 6-1** and **Table 6-2** below.

Table 6-1 Sett entrance classifications and associated descriptions[3]

Classification	Description
Well Used	Are clear of debris and vegetation, sides worn smooth but not necessarily excavated recently.
Partially Used	Are not in regular use and have debris e.g. twigs and leaves in the entrance. They could be used after only a minimal amount of clearance.
Disused	Not in use for some time, are partially blocked and could not be used without considerable effort. Rabbits and foxes may take over part of a sett and keep disused entrances open.
Collapses	Where a tunnel has collapsed.
Air Holes	Where badgers have made a small hole in a tunnel roof from below.

Table 6-2 Categories of sett and associated descriptions[4]

Category	Description
Main	Main setts usually have several holes with large spoil heaps, and the sett generally looks well used. There are obvious paths to and from the sett and between sett entrances. In the British National Badger Survey the average number of holes for a main sett was twelve, although main setts may be much smaller, even a single hole in exceptional circumstances. Although normally the breeding sett and in continuous use, it is possible to find a main sett that has some disused or dormant entrances.
Annexe	These are often close to a main sett, normally less than 150m away, and are connected to the main sett by one or more well-worn paths. Usually there are several holes but the sett may not be in use all the time, even if the main sett is very active. The average number of holes per annexe sett in the British survey was eight.
Subsidiary	These are usually at least 50m from a main sett, and do not have an obvious path connecting with another sett. They are not continuously active. The average number of holes per subsidiary sett in the British survey was four.
Outlier	These often have little spoil outside the holes, have no obvious path connecting them with another sett, and are only used sporadically. When not in use by badgers, they are often taken over by foxes or even rabbits. However, they can still be recognised as badger setts by the shape of the tunnel (not the actual entrance hole), which is at least 25cm in diameter, and rounded or a flattened oval shape (i.e. broader than high). Fox and rabbit tunnels are smaller and often taller than they are broad. The average number of holes per outlying sett in the British survey was two.
Other	In some cases, it can be difficult to assess the status of a sett, and it is open to interpretation. It is therefore recommended that if there is uncertainty as to the type of sett present, setts should be referred to as 'Other'.

B.4 Pine Marten

Signs of pine marten were searched for within the survey area following guidance from O'Mahony *et al*. (2006). Survey methods included:

- **Scats**: searches for pine marten scats were made along linear features such as fence lines, stone walls or forestry tracks/rides. Also searches for scats on prominent features such as

[3] From Scottish Badgers (2018).
[4] From Scottish Badgers (2018).

tree stumps, dead logs or stones, and around rock piles and dense scrub where the species could establish a den.

- **Dens**: identification of features which could be used as a den. Dens can include the utilisation of upturned trees, tree cavities, rocks or manmade structures such as log piles or large bird boxes.

B.5 Red squirrel

Areas of woodland that have the potential to support red squirrel were surveyed for squirrels, following guidance from Gurnell *et al.* (2009). Survey methods included:

- **Sightings**: visual sightings of red squirrels;
- **Dreys**: dreys are usually built close to the main stem of a tree, over 3m from ground level and over 50x30cm in size; and
- **Feeding signs**: predated cone (cone cores) searches in areas of woodland.

B.6 Reptiles

Targeted reptile surveys were not undertaken, however, incidental records of reptile sightings, or signs such as shed skins, and features of particular importance (i.e. potential hibernacula) were recorded.

B.7 Other Species

A watching brief was maintained for all other protected, notable, and/or invasive species during surveys and presence or field signs recorded as appropriate (e.g. smooth newt (*Lissotriton vulgaris*), palmate newt (*Lissotriton helveticus*), hares (*Lepus* spp.), and American mink (*Neovison vison*)).

B.8 Species Scoped Out

Surveys for beaver, wildcat and great crested newt were scoped out of field surveys due to the absence of suitable habitat or the survey area being located outwith their known range or distribution.

ANNEX C. PROTECTED SPECIES SURVEY RESULTS

Table B-1 below details the relevant data collected for protected species during surveys, sorted by species, then survey date (see also EIAR Figure 8.5). Confidential information relating to badger setts has been excluded (locations are >1 km from any proposed infrastructure).

Table B-1 Protected species survey results

Species	Sign	PS ID	Easting	Northing	Survey date	Notes
Badger	Feeding Signs / Snuffle Holes	PS005	210099	715317	04/05/2021	Mammal track through planation with potential badger feedings signs.
Badger	Feeding Signs / Snuffle Holes	PS015	209488	711378	06/05/2021	Badger snuffle holes adjacent to bracken.
Badger	Path	PS016	209522	711288	06/05/2021	Possible badger path through woodland.
Badger	Feeding Signs / Snuffle Holes	PS018	209535	711214	06/05/2021	Badger feedings signs. Numerous snuffle holes.
Badger	Path	PS021	209428	711106	06/05/2021	Badger path along woodland edge boundary.
Badger	Feeding Signs / Snuffle Holes	PS022	209374	711435	06/05/2021	Badger feeding signs. Snuffle holes.
General	Mammal Hole	PS023	209397	711427	06/05/2021	Mammal hole in root of tree. Cannot see full extent of cavity. Cavity full of beech leaves so not in current use. Would require monitoring for badger if works within 30m.
Otter	Spraint	PS011	209931	715099	05/05/2021	Old otter spraint on rock near track.
Pine Marten	Potential Scat	PS001	210642	717043	04/05/2021	Potential pine marten scat with hair and small mammal bones. Found on top of moss near a small outcrop of stones.
Pine Marten	Potential Scat	PS002	210966	716965	04/05/2021	Potential pine marten scat with hair and small mammal bones. Found on top of moss near a small outcrop of stones.
Pine Marten	Potential Scat	PS004	210676	716493	04/05/2021	Potential pine marten scat with hair and small mammal bones.

Species	Sign	PS ID	Easting	Northing	Survey date	Notes
Pine Marten	Potential Scat	PS020	209428	711202	06/05/2021	Pine marten scat on fallen branch adjacent to steep slope with boulders. Some gaps in boulders bit none with extensive activity and signs of use.
Red Squirrel	Feeding Signs	PS019	209497	711239	06/05/2021	Squirrel feeding station. Numerous squirreled cones located near rock. Road signs for red squirrel along track through woodland.
Reptile	Common Lizard Sighting	PS003	210669	716702	04/05/2021	Common lizard sighted near burn.
Reptile	Potential Hibernaculum	PS006	210450	715418	04/05/2021	Potential reptile hibernacula next to burn. Circular collection of rocks, possibly an old sheep pen which is covered in moss. Stone pile low to the ground with some gaps within the rocks which look high enough to not flood in the winter.
Reptile	Potential Hibernaculum	PS007	210445	715395	05/05/2021	Potential reptile hibernacula next to burn. Circular collection of rocks, possibly an old sheep pen which is covered in moss. Stone pile low to the ground with some gaps within the rocks which look high enough to not flood in the winter.
Reptile	Potential Hibernaculum	PS008	210434	715388	05/05/2021	Potential reptile hibernacula next to burn. Rectangular collection of rocks, which is covered in moss. Stone pile approximately 1 m high in places. Some gaps within the rocks which are high and protected enough to not flood in the winter.
Reptile	Potential Hibernaculum	PS009	210428	715378	05/05/2021	Potential reptile hibernacula next to burn. Circular collection of rocks, possibly an old sheep pen which is covered in moss. Stone pile low to the ground with some gaps within the rocks which look high enough to not flood in the winter.
Reptile	Potential Hibernaculum	PS010	210037	715058	05/05/2021	Stone wall with potential hibernacula cavities.
Reptile	Potential Hibernaculum	PS012	210235	714577	05/05/2021	Potential hibernacula. Rock pile with cavities that could be used as a hibernacula.
Reptile	Potential Hibernaculum	PS013	210125	714205	05/05/2021	Potential hibernacula. Rock piles in this area next to burn with cavities that could be used as a hibernacula feature.

Species	Sign	PS ID	Easting	Northing	Survey date	Notes
Reptile	Potential Hibernaculum	PS014	209508	711426	06/05/2021	Stone wall. Potential hibernacula. Cavities in stone wall which is 1.5m high.
Reptile	Potential Hibernaculum	PS017	209478	711091	06/05/2021	Stone wall. Potential hibernacula. Cavities in stone wall which are 1m high.
Reptile	Potential Hibernaculum	PS024	209601	711427	06/05/2021	Potential hibernacula. Stone wall which is 1m high along deer fence.
Reptile	Potential Hibernaculum	PS025	209856	711621	06/05/2021	Potential hibernacula. Stone wall which is 1m high.
Reptile	Common Lizard Sighting	PS031	210983	713598	07/05/2021	Common lizard sighted.
Reptile	Potential Hibernaculum	PS033	210254	713220	07/05/2021	Stone wall. Reptile hibernacula.
Water vole	Burrow	PS026	210500	712500	06/05/2021	Water vole burrow. Large circular burrow near watercourse. Burrow splits into 2 tunnels. Two other burrows in this area. No conclusive sign of water vole presence, such as droppings and clippings.
Water vole	Burrow	PS027	210642	712821	06/05/2021	Water vole burrow. Large circular burrow near watercourse. No conclusive sign of water vole presence, such as droppings and clippings
Water vole	Burrow	PS028	210445	712882	06/05/2021	Water vole burrow along bank of river with run. Old latrine present with very swollen water vole droppings.
Water vole	Latrine	PS029	210445	712882	06/05/2021	Old latrine present with very swollen water vole droppings near burrow entrance.
Water vole	Burrow	PS030	210423	714226	06/05/2021	Water vole. 2 burrows 1.2m from burn. Water vole size. No other conclusive signs.
Water vole	Burrow	PS032	210924	713563	07/05/2021	Water vole burrow on bank of burn.

ANNEX D. PROTECTED SPECIES PHOTOGRAPHS

Photo 1 Large disused mammal hole amongst tree roots (PS023)

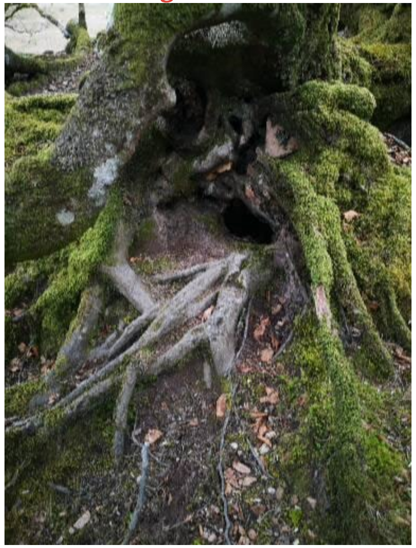

Photo 2 Water vole burrow (PS026)

Photo 3 Water vole burrow (PS027)

Photo 4 Water vole burrow with latrine nearby (PS028)

Photo 5 Water vole burrow (PS030)

Photo 6 River Aray at approx. location of southern watercourse crossing

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Environmental Impact Assessment – Technical Appendix 8.3: Bat Survey Report

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

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Ladyfield Renewable Energy Park
Bat Survey Report

Technical Appendix 8.3

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1 INTRODUCTION

MacArthur Green carried out a series of bat surveys for the proposed Ladyfield Renewable Energy Park (‘the Development’) in 2021, on the Site near Inveraray, Argyll and Bute. These surveys took the form of:

- A desk study;
- A Preliminary Bat Roost Assessment (PRA); and
- Automated detector bat activity surveys.

The aim of the surveys was to quantify Site usage by bats and variation in bat activity levels within the Site, and to inform the Development’s Environmental Impact Assessment Report (EIAR).

2 THE SITE AND SURVEY AREA

The Site is located approximately 4.7 km north of Inveraray, in Argyll and Bute. Stands of mixed-age conifer plantation cover most of the Site, with some areas having been recently felled. In addition, more open areas of heath, blanket bog and marshy grassland habitats are also found on Site. The land is drained by several small and minor watercourses that are mostly tributaries of the River Aray, which lies to the west of the Site.

The bat detector survey area covered the proposed Wind Turbine locations at the time of survey in 2021, and consisted of 14 detector deployment locations, as shown in Figure 8.7. The number and extent of Wind Turbines within the Site was subsequently reduced for the final layout, and so the distribution and number of detectors deployed was greater than required by the NatureScot (Scottish Natural Heritage, SNH *et al.* 2019) guidance.

As well as covering the Wind Turbine infrastructure area, the PRA survey area covered an access route option at the time, which lead over open moorland from the forestry near Meall Reidh, around 2 km to the south of the Site (see EIAR Figure 7.2 for breeding bird survey area which covered roughly the same area). Some results therefore relate to this part of the PRA survey area, which is outside of the final Site boundary.

3 BATS AND WIND FARMS

3.1 Policy and Guidance

All bat species are protected under the following legislation:

- The Habitats Directive 92/43/EEC (as amended);
- The Wildlife and Countryside Act 1981 (as amended); and
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended).

Details pertaining to the legal status of bats are included within Annex A and in Table A-1.

In the UK and Europe, guidelines have been produced with regards to assessing the ecological impact upon bats from wind farm developments. These guidelines help to inform survey and mitigation strategies.

The following guidance documents have been used in the preparation of this report:

- Collins, J. (ed) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London; and
- NatureScot (formerly Scottish Natural Heritage), Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT). (2019). *Bats and Onshore Wind Turbines: Survey Assessment and Mitigation*.

4 METHODS

4.1 Desk-Based Study

A National Biodiversity Network (NBN)[1] Atlas Scotland search was completed to obtain bat records from 2007 to 2022 within 10 km of the Site.

4.2 Field Survey Methods

4.2.1 Preliminary Bat Roost Assessment

The PRA was undertaken in May 2021, and followed the assessment methodology as set out in Collins (2016), to identify any Potential Roost Features (PRFs) in trees, buildings and structures, which could support roosting bats. A follow-up survey was conducted in September 2022 to close any survey gaps in parts of the Site which were previously not surveyed, but are now close to proposed final infrastructure.

Where PRFs were identified, they were assigned a value of low, moderate or high suitability which indicates the likelihood of bats being present and informs the requirement for further survey work, such as a climbing inspection and/or dusk and dawn bat activity surveys.

4.2.2 Automated Detector Activity Surveys

SNH *et al.* (2019) recommends that, "*Where developments have more than ten turbines, detectors should be placed within the developable area at ten potential turbine locations plus a third of additional potential turbine Sites up to a maximum of 40 detectors for the largest developments.*"

The Development layout at the time of survey in 2021 included 22 proposed Wind Turbines. A 22-turbine Site requires 14 locations to be sampled. Detectors were placed at potential Wind Turbine locations across the Site, deployed seasonally (three deployment periods) from May to September. SNH *et al.* (2019) also recommends a minimum of ten consecutive nights of sampling per seasonal deployment. Detector locations are shown in Figure 8.7.

Anabat Express and Swift detectors recording zero-crossing and full spectrum files were deployed for a minimum period of fourteen consecutive nights across the survey area (i.e. exceeding minimum survey requirements) and were positioned at a height of 2 m. Each detector recorded bats from dusk to dawn with detectors starting 30 minutes before dusk and finishing 30 minutes after dawn.

[1] *NBN Atlas occurrence download at https://nbnatlas.org accessed August 2022.*

Detector operating times are shown in Table B-1 of Annex B with a description of the habitat type at each location shown in Table B-2 of Annex B.

Following the publication of updated guidance (SNH *et al.* 2019) stating that '*full spectrum automatic detectors should be deployed, as a minimum*'. NatureScot was consulted by MacArthur Green (21st March 2019) and advised that the use of zero-crossing detectors would be permitted with a transition period towards full spectrum detectors. They recommended deploying a few full-spectrum detectors alongside zero-crossing detectors at a subset of locations, so that detectability could be calibrated. This was incorporated into the survey method for the Site. At location 7, an Anabat Express detector recording zero-crossing files was deployed alongside an Anabat Swift (Location 7R) detector which was set to full spectrum. The Express detector was deployed with a sensitive value of 8 (High). The full spectrum detector was deployed with the following settings:

- Sensitively value of 14;
- Minimum frequency of 15 kHz;
- Maximum frequency of 250 kHz;
- Maximum file length of 15s;
- Minimum event of -2 ms; and
- Sampling rate of 320 kHz.

Data was analysed using Kaleidoscope Pro Auto ID classifier which assigns a species label to a sound file. To ensure that all non-*Pipistrellus* calls (excluding Nathusius' pipistrelle calls) were identified correctly by the software, they were manually reviewed by an experienced bat ecologist using Kaleidoscope Viewer and AnalookW software. This method of analysis is in line with current guidelines for data analysis which recommends the manual checking of all non-*Pipistrellus* calls when using automated methods (Collins, 2016). Sound files labelled as noise were not reviewed. Guidance on call parameters was taken from Russ (2012).

For the purposes of this report and for analysis, a single bat registration was classed as a single labelled Kaleidoscope file containing a sequence of bat pulses.

In line with SNH *et al.* (2019) guidance, further analysis of bat data was carried out using the secure online tool Ecobat (Mammal Society, 2017), to gain a measure of relative bat activity at the Site. Ecobat data was then evaluated in accordance with SNH *et al.* (2019) guidance to determine the overall Site risk level. The Ecobat analysis automatically analyses data per month and not per season. The results are presented based on this analysis per month.

4.3 Methods for Analysing Bat Activity Levels and Risks

SNH *et al.* (2019) guidance details the methodology for analysing bat activity levels. This method is summarised below and involves the following steps:

1. Estimating bat activity levels;
2. Categorising collision risk of the relevant species;
3. Identifying population relevant abundance (size of the populations);

4. Categorising the potential vulnerability of bat populations by combining collision risk with population abundance;
5. Categorising the Site risk level;
6. Completing the overall risk assessment; and
7. An assessment of significance and mitigation.

The following sections outline the methods used in each step.

4.3.1 Step 1: Bat Activity Levels

A measure of relative bat activity was obtained using Ecobat for automated data. SNH *et al.* (2019) explains that, "*The tool compares data entered by the user with bat survey information collected from similar areas at the same time of year and in comparable weather conditions…. Ecobat generates a percentile rank for each night of activity and provides a numerical way of interpreting the levels of bat activity recorded at a Site across regions in Britain*". Table 4-1 below, taken from SNH *et al.* (2019) shows the five percentile categories for ease of reference. Only static data from automated activity surveys was analysed with the Ecobat tool.

The reference range data set were stratified to include:

- Only records from within 30 days of the survey date;
- Only records from within 100 km^2 of the survey location; and
- Records using any make/model of bat detector.

Table 4-1: Percentile Score and Categorised Level of Bat Activity (SNH *et al.* 2019)

Percentile Score	Bat Activity
81 to 100	High
61 to 80	Moderate to High
41 to 60	Moderate
21 to 40	Low to Moderate
0 to 20	Low

4.3.2 Step 2: Vulnerability to Collision

Appendix 3 of SNH *et al.* (2019) presents a generic assessment of vulnerability to collision for UK species, based on species behaviour, flight characteristics and casualties in the UK and Europe.

Table 4-2 provides a summary of the vulnerability of each bat species to collision.

Table 4-2: Vulnerability of Bat Species to Turbine Impact in the UK.

Risk of Turbine Impact (Collision Risk)		
Low Risk	**Medium Risk**	**High Risk**
Myotis spp.	Serotine	Common pipistrelle
Long-eared bats	Barbastelle	Soprano pipistrelle
Horseshoe bats		Noctule
		Leisler's bat
		Nathusius' pipistrelle

Habitat characteristics at the location of Wind Turbines can have an important influence on the vulnerability of bat species to collision. For example, proximity to key feeding Sites and commuting routes such as water features and woodland edge habitats is known to increase the likelihood of bat collision (SNH *et al.* 2019).

4.3.3 Step 3: Population Relative Abundance

SNH *et al.* (2019) details the sensitivity of a bat species to impact based on their population's relative abundance in Scotland as detailed in Table 4-3. Species with the rarest relative abundance are more susceptible to significant effects.

Table 4-3: Population Relative Abundance of Bats in Scotland.

Relative Abundance	Species
Common	Common pipistrelle
	Soprano pipistrelle
Rarer	Brown long-eared bat
	Daubenton's bat
	Natterer's bat
Rarest	Whiskered bat
	Brandt's bat
	Nathusius' pipistrelle
	Noctule bat
	Leisler's bat

4.3.4 Step 4: Potential Vulnerability of Bat Populations

Table4-4 below, sourced from SNH *et al.* (2019), uses the measure of collision risk, in combination with population relative abundance, to indicate the potential vulnerability of populations of British bat species. The overall potential vulnerability of bat populations is identified as: low (yellow), medium (orange), high (red).

Table 4-4: Level of Potential Vulnerability of Populations of British Bat Species.

Relative Abundance of Bats in Scotland	Collision Risk: Low collision risk	Medium collision risk	High collision risk
Common species			Common pipistrelle Soprano pipistrelle
Rarer species	Brown long-eared bat Daubenton's bat Natterer's bat		
Rarest species	Whiskered bat Brandt's bat		Nathusius' pipistrelle Noctule bat Leisler's bat

4.3.5 Step 5: Categorise the Site Risk Level

The Site risk level is categorised through a combination of habitat risk and project size which is then entered into the table matrix as shown below in Table 4-5 to calculate the overall Site risk level. The full matrix table, as provided within SNH *et al.* (2019), is shown in Annex C of this report which includes descriptions on how to determine the habitat risk and project size for the Site.

Table 4-5: Initial Site Risk Assessment.

Site Risk Level (1-5) *	Project Size			
Habitat Risk		Small	Medium	Large
	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5

Key: Green (1-2) – low/lowest Site risk; Amber (3) – medium Site risk; Red (4-5) – high/highest Site risk

* Some Sites could conceivably be assessed as being of no (0) risk to bats. This assessment is only likely to be valid in more extreme environments, such as above the known altitudinal range of bats, or outside the known geographical distribution of any resident British species.

4.3.6 Step 6: Risk Assessment

The overall risk assessment is undertaken for high collision risk species identified on Site and involves combining Site risk level (Section 4.3.5, Table 4-5) with the detector activity level (Section 4.3.1, Table 4-1). The overall risk assessment matrix is shown in Table 4-6 below where 'Low' Site risk level (green) is 0-4, 'Medium' Site risk level (amber) is 5-12, and 'High' Site risk level (red) is 15-25.

Table 4-6: Overall Risk Assessment.

Site Risk Level	Detector activity category (or equivalent justified categorisation) Nil (0)	Low (1)	Low-Moderate (2)	Moderate (3)	Moderate-High (4)	High (5)
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	15	18
Highest (5)	0	5	10	15	20	25

4.3.7 Step 7: Assessment of Significance and Mitigation

The outputs of the risk assessment detailed in step 6 above are then used to assess the significance of effect within the Ecological Impact Assessment. At this stage, other Site-specific factors should be considered such as habitat characteristics (and how they may change), behaviour of species at the Site, and location of the Site regarding the natural range of the species and how this could affect favourable conservation status.

Mitigation measures as detailed within SNH *et al.* (2019) are then considered where appropriate.

5 BAT SURVEY LIMITATIONS

The guidance recommends the minimum level of pre-application survey required for ground level static detectors to be ten nights of recordings in each of spring (April - May), summer (June to mid-August) and autumn (Mid-August to October). In Scotland, due to unfavourable weather conditions and low activity levels for bats in April, ground-level automated activity surveys commenced in May and were completed in September.

Automated activity surveys should capture a sufficient number of nights (minimum of ten nights) with appropriate weather conditions for bat activity (i.e., temperatures of 8°C in Scotland at dusk, maximum ground level wind speed of 5m/s and no, or only very light, rainfall). To account for the potential limitations of weather on the number of suitable nights recorded, surveys were carried out over longer deployment periods, with a minimum of fourteen nights recorded.

The Ecobat analysis automatically analyses data per month and not per season. The results are presented based on this analysis per month.

Due to unforeseen errors with the detectors, microphones or batteries, it was not always possible to achieve fourteen consecutive nights of recordings. Only one detector failed to record any data during a deployment period (Location 7R in August – September). As the majority of locations recorded for more than ten nights, with a total of 625 complete nights recorded which is beyond the minimum number of nights required for a Site of this size, the small loss of data is not considered to have materially altered the overall assessment of risk. The survey timings can be seen in Annex B, Tables B-1 and B-2.

For some *Myotis* spp. calls it was only possible to identify the call to genus level. It is possible that for *Myotis* spp. these recordings could represent species not identified in the analysis of the recorded data. *Myotis* spp. bats are categorised as low collision risk species.

Anabat detectors are a commonly used bat detector for acoustic monitoring at wind farm Sites, however all bat detectors have limitations and will only monitor bat activity within a limited area, which for Anabats is usually around 30 m, depending on a variety of environmental factors. Furthermore, due to passive monitoring methodologies depending on sound reaching the microphone, the detection rate of bat calls varies with a bias towards loud bat calls with quieter calls, namely brown long-eared bats (low collision risk species), potentially being under-recorded.

At location 7/7R, an Anabat Express detector recording zero-crossing files was deployed alongside an Anabat Swift detector set to full spectrum. The Anabat Express detector recorded fewer registrations in comparison to the Anabat Swift full spectrum detector, over the season. During this deployment visit, there were some differences in detectability between species, with the Swift recording more common pipistrelle, soprano pipistrelle and *Myotis* spp. registrations, while the Express detector recorded the same number of brown long-eared bat registrations. The difference in species detectability between detectors at the same location highlights the suite of variables affecting how well bats are recorded including, the difference in detectability between microphones, the detector type, and if a recording is filtered out as noise during analysis.

6 SURVEY RESULTS & ANALYSIS

6.1 Desk-Based Study

The NBN Atlas data search returned records of the following bat species within 10 km of the Site between 2007-2022 inclusive:

- Daubenton's bat (*Myotis daubentonii*).

6.2 Preliminary Bat Roost Assessment

PRF records of the May 2021 survey are shown in Figure 8.8 with the detailed results (target notes) listed in Table D-1, Annex D.

In summary, there were 19 PRFs recorded, all of which were tree features. The majority of the trees were single isolated individuals or within a small cluster. Potential bat roost categories are as follows; 13 low and 6 moderate; see Figure 8.8.

No high or moderate classification PRFs were recorded within 300 m of a proposed Wind Turbine location and as such did not require further surveys. The closest low PRF was located 122 m from T11.

An area of semi-natural broadleaved woodland is found along the margin of the River Aray, at the southern end of the south access route, to be used during construction only. This woodland has a mixed mature canopy of birch, oak, beech, alder, rowan and occasional Scots pine, and much of it can be categorised as low or moderate potential for bat roosts. There are a few examples of standing deadwood which may be of high roost potential, although at distance from the access track.

6.3 Automated Detector Activity Surveys

MacArthur Green deployed detectors at 14 locations within the survey area from May to September in 2021 over a total period of 46 days and collecting 625 complete recording nights of data (see Table B-1 and B-2 of Annex B and Figure 8.8).

Between May to September, bats were detected on 46 nights. A total of five bat species and one genus classification were recorded for these locations. The total number of passes recorded for each species across all detectors within the Site is shown below in Table 6-1.

Table 6-1 Total Number of Bat Passes for Each Species Across all Locations

Species/Species Group	No of Registrations	Percentage of total (%)
Common pipistrelle	1551	20.0
Soprano pipistrelle	5722	74.0
Brown long-eared bat	89	1.2
Myotis spp.	30	0.4
Daubenton's	317	4.1
Natterer's	28	0.4
Total	7737	100.1

The survey results were processed using the Ecobat tool to gain a measure of relative bat activity at the Development. The full Ecobat report is appended in Annex F below. The summarised results and analysis are presented in Steps 1 – 6 below.

6.3.1 Step 1: Bat Activity Levels

Average Annual Site Activity Levels

Table 6-2, Chart 6-1 and Chart 6-2 detail the average annual Site activity levels calculated using the Ecobat tool.

Table 6-2: Average Annual Site Activity Levels (taken from Ecobat Analysis)

Species/ Group	Median Percentile	Activity Level	95 % confidence interval	Max Percentile	Activity Level	Nights Recorded
Myotis spp.	38	Low – Moderate	54.5 - 54.5	71	Moderate – High	14
Daubenton's bat	3	Low	3 - 45	83	High	159
Natterer's bat	3	Low	3 - 3	52	Moderate	23
Common pipistrelle	38	Low – Moderate	47 - 79	99	High	217
Soprano pipistrelle	61	Moderate – High	74 – 89.5	99	High	372
Brown long-eared bat	3	Low	3 – 52	66	Moderate – High	59

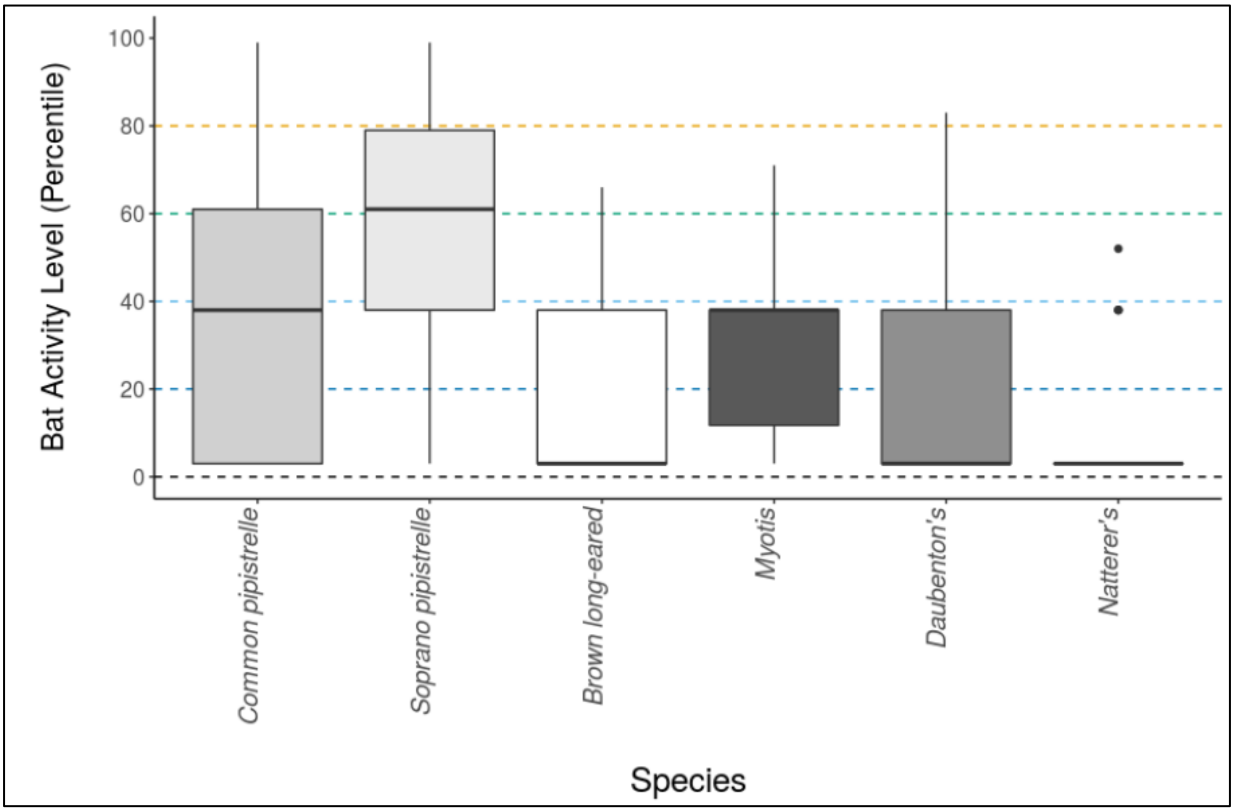

Chart 6-1: Average Annual Site Activity Levels

Monthly Location Specific Activity Levels

Data on the monthly activity levels per location is provided in Table E-1 of Annex E.

6.3.2 Step 2, 3 and 4: Collision Risk, Population Relative Abundance and Potential Vulnerability

Table 6-3 details the collision risk, population relative abundance and potential vulnerability of the bat species recorded within the Site.

Table 6-3: Collision Risk, Population Relative Abundance and Potential Vulnerability.

Bat Species	Collision Risk	Population Relative Abundance	Potential Vulnerability
Common pipistrelle	High	Common	Medium
Soprano pipistrelle	High	Common	Medium
Daubenton's bat	Low	Rarer	Low
Natterer's bat	Low	Rarer	Low
Myotis spp.	Low	Rarer	Low
Brown long-eared bat	Low	Rarer	Low

6.3.3 Step 5: Categorising Site Risk Level

The Site risk level is determined by project size and habitat risk (see Table 4-5). The Development consists of 13 Wind Turbines that are over 50 m in height, and so falls within the 'Medium' project size, as shown in Table 4-5 and Table C-1 of Annex C.

In terms of habitat risk for bats, there are no buildings, structures, or trees with moderate and/or high bat roosting potential within 200 m plus the rotor radius of Wind Turbines. Foraging habitat quality and connectivity within this buffer area is moderate with forestry, small upland burns and open areas of heath, blanket bog, marshy grassland and acid grassland habitats present, resulting in a habitat risk classification of 'Moderate' as shown in Table 4-5 and Table C-1 of Annex C.

According to Table 4-5 above, the 'Medium' project size combined with a 'Moderate' habitat risk level results in an overall Site risk assessment of 'Medium' (3).

6.3.4 Step 6: Risk Assessment – High Collision Risk Species Only

The overall risk assessment is undertaken for high collision risk species which were identified within the Site. Low-risk species have a low risk of collision with a turbine blade, so the impact of the Development on the local bat population would likely be negligible.

The overall risk assessment involves multiplying the Site's risk level (Section 4.3.5, Table 4-5) with the median and the maximum Ecobat activity levels (Section 4.3.1,Table 4-1) to calculate both the typical (median) Site risk level, and the maximum Site risk level.

Table 6-4 combines the seasonal data and summarises the overall risk assessment score for high-risk species based on the median and maximum percentiles for the Site. The overall Site risk scores for all high collision risk species based on the median percentile were 'Medium' (6 - 12), while the overall Site risk score based on the maximum percentiles were 'High' (12 - 15).

Table 6-4: Risk Assessment Scores Based on Median and Maximum Percentiles for High Collision Risk Species

Species	Risk Assessment Score based on Median Percentile	Risk Assessment Score based on Max. Percentile
Common pipistrelle	Medium (6)	High (15)
Soprano pipistrelle	Medium (12)	High (15)

Figures 8.9 and 8.10 illustrate the results of the median monthly risk assessment scores for high collision risk bat species recorded at the Site at each survey location, illustrating how bat activity and risk levels varies within the Site across the year and by species. This data is also presented in Table E-1 of Annex E which includes both the median and maximum monthly risk assessment scores.

High-risk assessment scores were recorded across the Site per month. To provide an indication of how activity varied across the survey period for high collision risk species, the percentage of locations where a high-risk assessment score was calculated from the median and maximum percentiles. Table 6-5 shows the percentage of sample locations where a high-risk assessment score was recorded.

The maximum percentile scores, which can be used to suggest peaks in bat activity, are also summarised in Table 6-5 below.

Table 6-5: The Percentage of Locations with High Risk Assessment Scores based on Monthly Median and Maximum Percentiles for High Collision Risk Species

	Species	May	June	July	August	September
Median Percentile	Common pipistrelle	0%	14.3%	7.1%	7.1%	0%
	Soprano pipistrelle	7.1%	7.1%	21.4%	14.3%	0%
Maximum Percentile	Common pipistrelle	14.3%	14.3%	21.4%	14.3%	7.1%
	Soprano pipistrelle	28.6%	21.3%	42.3%	42.3%	35.7%

6.4 Proximity of Roost Sites Based on Activity Data

The Ecobat output includes an analysis of bat activity data at sample locations, referenced against the known roost emergence times for each high collision risk bat species (Russ, 2012). This indicates whether a roost Site may be present in close proximity to a sample location.

Bat activity at several locations indicated the potential for nearby roost Sites at locations 1, 2, 3, 5, 6, 7 and 12 which recorded *Pipistrellus* species during their known emergence time ranges, as detailed in Table 6-6. Majority of these registrations were recorded in May, August and September which is out with the maternity roost season (15th June to 30th July). Location 3 and 5 had a total of 3 *Pipistrellus* species calls during the maternity roost season.

Table 6-6 Sample Locations within Proximity to a Roost

Sample Locations	Bat Species	Date
Location 1	Soprano pipistrelle	09/09/2021
Location 2	Soprano pipistrelle	19/05/2021, 31/08/2021, 01-02/09/2021, 04/09/2021, 08/09/2021 & 10/09/2021
	Common pipistrelle	08/09/2021
Location 3	Soprano pipistrelle	25/05/2021, 26/07/2021, 31/08/2021, 04/09/2021, 09/09/2021, 11/09/2021
	Common pipistrelle	21/07/2021,
Location 5	Common pipistrelle	26/07/2021
Location 6	Soprano pipistrelle	19/05/2021
Location 7	Soprano pipistrelle	31/08/2021, 04/09/2021, 13-14/09/2021
Location 12	Soprano pipistrelle	07/09/2021

7 REFERENCES

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ANNEX A. BATS LEGAL STATUS

All bat species receive protection under the Conservation Regulations (1994) (as amended).

The information contained in this Annex is a summarised version of the legislation and should be read in conjunction with the appropriate legislation.

It is an offence to:

- Deliberately or recklessly to capture, injure or kill a wild animal of a European protected species;
- Deliberately or recklessly:
  - Harass a wild animal or group of wild animals of a European protected species;
  - Disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
  - Disturb such an animal while it is rearing or otherwise caring for its young;
  - To obstruct access to a breeding Site or resting place of such an animal, or otherwise to deny the animal use of the breeding Site or resting place (i.e. roost Sites);
  - To disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs; or
  - To disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young;
- To damage or destroy a breeding Site or resting place of such an animal.

Table A-1 Legal and Conservation Status of all UK Bats[2]

Species	Legislation / Convention													
	Bern Convention Appendix II	Bonn Convention Appendix II	WCA	Habitats Directive Annex IV	Habitats Directive Annex II	Habs Regs 1994 (as amended) *Scotland*	Conservation of Habs & Species Regs 2010	Conservation Regs (N Ireland) 1995	CROW Act 2000	NERC Act 2006	Wild Mammals Protection Act	UK BAP Priority species	IUCN Red List*	EUROBATS Agreement
Greater horseshoe bat	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	LC	✓
Lesser horseshoe bat	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	LC	✓
Daubenton's bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Natterer's bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Whiskered bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Brandt's bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Bechstein's bat	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NT	✓
Alcathoe bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		DD	✓
Noctule	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	LC	✓
Leisler's bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Serotine	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Common pipistrelle	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Soprano pipistrelle	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	LC	✓
Nathusius' pipistrelle	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Brown long-eared bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	LC	✓
Grey long-eared bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓
Barbastelle	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	NT	✓
Greater mouse-eared bat	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓		LC	✓

*IUCN categories: LC is Least Concern, NT is Near Threatened, DD is Data deficient; see www.iucnredlist.org for more details.

[2] Source: Bat Conservation Trust http://www.bats.org.uk/pages/bats_and_the_law.html

ANNEX B. SURVEY TIMINGS & DETECTOR LOCATIONS

Table B-1 Summary of Temporal Survey Effort

Survey Date	Detector Locations	Total Number of Complete Recording Nights
May 19th 2021 – June 04th 2021	1	15
	2	15
	3	15
	4	16
	5	16
	6	16
	7	16
	7R*	16
	8	16
	9	15
	10	15
	11	15
	12	15
	13	15
	14	15
July 20th 2021 – August 4th 2021	1	15
	2	15
	3	15
	4	16
	5	15
	6	15
	7	15
	7R*	15
	8	15
	9	15
	10	15
	11	14
	12	14
	13	14
	14	14
August 31st 2021 – September 15th 2021	1	14
	2	15
	3	15
	4	15
	5	15
	6	15

Survey Date	Detector Locations	Total Number of Complete Recording Nights
	7	15
	7R*	0
	8	15
	9	15
	10	15
	11	15
	12	15
	13	14
	14	10
Total Nights	-	**625**

* Location 7R is not included in the total number of nights as this detector was at the same location as location 7 and was used as a reference detector to determine the variability of detectability between a zero-crossing detector (Express) and a full spectrum detector (Swift).

Table B-2 Description of Detector Locations

Location	Easting	Northing	Bearing	Habitat
1	210547	713448	4	Open moorland. Within 100 m of a watercourse
2	210079	713468	130	In wayleave, beside forestry
3	209790	713708	306	In wayleave, beside forestry
4	209798	714597	44	In forestry. Within 100 m of a watercourse
5	210124	715016	68	In forestry. Within 100 m of a watercourse
6	210508	715064	42	In forestry. Within 100 m of a watercourse
7 & 7R	209981	715295	244	Clearfell
8	210537	715433	236	In forestry. Within 100 m of a watercourse
9	210316	715827	246	In forestry. Within 100 m of a watercourse
10	210766	715962	234	In forestry. Within 100 m of a watercourse
11	210570	716277	250	In forestry. Within 100 m of a watercourse
12	210398	716494	48	Forestry edge
13	211011	716434	148	In forestry. Within 100 m of a watercourse
14	210809	716790	286	In forestry. Within 100 m of a watercourse

ANNEX C. INITIAL SITE RISK ASSESSMENT

Table C-1 Initial Site Risk Assessment[3].

Site Risk Level (1-5)[4]	Project Size			
Habitat Risk		Small	Medium	Large
	Low	1	2	3
	Moderate	2	3	4
	High	3	4	5
Key: Green (1-2) – low/lowest Site risk; Amber (3) – medium Site risk; Red (4-5) – high/highest Site risk				

Habitat Risk	Description
Low	Small number of potential roost features, of low quality. Low-quality forging habitats that could be used by small numbers of foraging bats. Isolated Site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost Sites on or near the Site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost Sites on or near the Site, and/or confirmed roosts present close to or on the Site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong liner features such as rivers, blocks of woodland and mature hedgerows. At/near edge of range and or an important flyway. Close to key roost and /or swarming.

Project Size	Description
Small	Small scale development (<10 turbines). No other wind energy developments within 10 km. Comprising turbines <50 m in height.
Medium	Larger developments (between 10 and 40). May have some other wind development within 5 km. Comprising turbines 50 – 100 m in height.
Large	Largest developments (>40 turbines) with other wind energy developments within 5 km. Comprising turbines >100 m in height.

[3] Sourced from: Scottish Natural Heritage, Natural England, Natural Resources Wales, Renewable UK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter & Bat Conservation Trust (BCT). (2019). *Bats and Onshore Wind Turbines: Survey Assessment and Mitigation.*

[4] Some Sites could conceivably be assessed as being of no (0) risk to bats. This assessment is only likely to be valid in more extreme environments, such as above the known altitudinal range of bats, or outside the known geographical distribution of any resident British species.

ANNEX D. PRELIMINARY BAT ROOST ASSESSMENT

Table D-1 Preliminary Bat Roost Assessment Target Notes

PRF_ID	Feature	Notes	PRF Category	Grid Reference
T01	Tree	Silver birch with cavity between branches which looks be a small tear out feature. Tree overhanging burn.	Low	NN 10099 15119
T02	Tree	Mature silver birch trees along burn on either side of the track. Trees are of an age that may support a PRF. Given precautionary low PRF category.	Low	NN 10008 15087
T03	Tree	Sliver birch tree with cracked branch which may have cavities suitable for a bat.	Low	NN 09895 15091
T04	Tree	Sliver birch tree with cracked branch which may have cavities suitable for a bat and cavity high on branch. Given moderate PRF category.	Low	NN 09878 15086
T05	Tree	Sliver birch tree with loose bark. Given precautionary low PRF category.	Low	NN 09870 15083
T06	Tree	Mature beech trees with moderate PRF cavities near old quarry. Other trees in the area may (mixed woodland birch/beech/Scots pine/larch) also have moderate to low PRF.	Moderate	NN 09588 11316
T07	Tree	Woodland west of track. Mixed woodland which is dominated by birch with infrequent beech, Sitka spruce and Scots pine. Trees of a maturity to support bat PRF. Approx 15% of trees may support a PRF of varying suitability. Individual tree survey not completed. May require further survey depending on infrastructure location and design.	Moderate	NN 09506 11324
T08	Tree	Large mature birch with four moderate PRF cavities. Knot hole and tear out.	Moderate	NN 10731 13389
T09	Tree	Tree with butt rot cavity at 2m which extends up tree.	Moderate	NN 10684 13173
T10	Tree	Birch with cavity along watercourse. Can survey from the ground.	Low	NN 10088 13078
T11	Tree	Birch with cavity along watercourse. Climbing required.	Low	NN 10159 13089
T12	Tree	Birch with cavity along watercourse. Can survey from the ground.	Low	NN 10325 13244
T13	Tree	Birch with cavity along watercourse. Climbing required.	Low	NN 10337 13257
T14	Tree	Birch with cavity along watercourse. Can survey from the ground.	Low	NN 10358 13284
T15	Tree	Dead tree with cavity along watercourse. Can survey from the ground.	Low	NN 10525 13558
T16	Tree	Two trees with cavities along watercourse. Requires climbing.	Low	NN 10546 13623
T17	Tree	Birch with cavity along watercourse. Can survey from the ground.	Low	NN 10376 13335
T18	Tree	Birch trees. Scattered trees on side of hill with moderate and low PRF. Extends for approx. 300 m and can be seen on aerial mapping start NN 10153 12899 ends NN 09915 12389.	Moderate	NN 10153 12899
T19	Tree	Scattered birch trees with some trees with moderate PRF.	Moderate	NN 09476 11435

ANNEX E. MONTHLY LOCATION SPECIFIC DATA

Table E-1 Monthly Location Specific Data for High Collision Risk Species

Location ID	Species	Month	Median Percentile	Median Activity Category (Taken from Table 4-1)	Maximum Percentile	Maximum Activity Category (Taken from Table 4-1)	Site Risk (Taken from Table 4-5)	Overall Median Category Score (Taken from Table 4-6)	Overall Median Category Score	Overall Maximum Category Score (Taken from Table 4-6)	Overall Maximum Category Score
1	*Myotis daubentonii*	May	3	Low	3	Low	3	3	Low	3	Low
1	*Myotis daubentonii*	Jul	3	Low	3	Low	3	3	Low	3	Low
1	*Myotis daubentonii*	Aug	3	Low	3	Low	3	3	Low	3	Low
1	*Myotis daubentonii*	Sep	52	Moderate	78	Moderate-High	3	9	Medium	12	Medium
1	*Myotis nattereri*	Sep	3	Low	52	Moderate	3	3	Low	9	Medium
1	*Pipistrellus pipistrellus*	May	3	Low	3	Low	3	3	Low	3	Low
1	*Pipistrellus pipistrellus*	Jul	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
1	*Pipistrellus pipistrellus*	Aug	3	Low	3	Low	3	3	Low	3	Low
1	*Pipistrellus pipistrellus*	Sep	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
1	*Pipistrellus pygmaeus*	May	3	Low	66	Moderate-High	3	3	Low	12	Medium
1	*Pipistrellus pygmaeus*	Jun	3	Low	3	Low	3	3	Low	3	Low
1	*Pipistrellus pygmaeus*	Jul	61	Moderate-High	78	Moderate-High	3	12	Medium	12	Medium
1	*Pipistrellus pygmaeus*	Aug	3	Low	3	Low	3	3	Low	3	Low
1	*Pipistrellus pygmaeus*	Sep	52	Moderate	82	High	3	9	Medium	15	High
1	*Plecotus auritus*	Jul	3	Low	3	Low	3	3	Low	3	Low
1	*Plecotus auritus*	Sep	3	Low	3	Low	3	3	Low	3	Low
10	*Myotis daubentonii*	Jul	3	Low	3	Low	3	3	Low	3	Low
10	*Myotis daubentonii*	Aug	21	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
10	*Myotis daubentonii*	Sep	3	Low	38	Low-Moderate	3	3	Low	6	Medium
10	*Pipistrellus pipistrellus*	May	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
10	*Pipistrellus pipistrellus*	Jun	3	Low	3	Low	3	3	Low	3	Low
10	*Pipistrellus pipistrellus*	Jul	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
10	*Pipistrellus pipistrellus*	Aug	3	Low	3	Low	3	3	Low	3	Low
10	*Pipistrellus pipistrellus*	Sep	3	Low	3	Low	3	3	Low	3	Low
10	*Pipistrellus pygmaeus*	May	21	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
10	*Pipistrellus pygmaeus*	Jul	3	Low	52	Moderate	3	3	Low	9	Medium
10	*Pipistrellus pygmaeus*	Aug	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
10	*Pipistrellus pygmaeus*	Sep	3	Low	38	Low-Moderate	3	3	Low	6	Medium
11	*Myotis daubentonii*	May	3	Low	3	Low	3	3	Low	3	Low
11	*Myotis daubentonii*	Jul	3	Low	52	Moderate	3	3	Low	9	Medium
11	*Myotis daubentonii*	Aug	3	Low	3	Low	3	3	Low	3	Low
11	*Myotis daubentonii*	Sep	52	Moderate	61	Moderate-High	3	9	Medium	12	Medium
11	*Myotis nattereri*	Sep	3	Low	3	Low	3	3	Low	3	Low
11	*Pipistrellus pipistrellus*	May	3	Low	3	Low	3	3	Low	3	Low
11	*Pipistrellus pipistrellus*	Jun	66	Moderate-High	66	Moderate-High	3	12	Medium	12	Medium
11	*Pipistrellus pipistrellus*	Jul	3	Low	38	Low-Moderate	3	3	Low	6	Medium

Location ID	Species	Month	Median Percentile	Median Activity Category (Taken from Table 4-1)	Maximum Percentile	Maximum Activity Category (Taken from Table 4-1)	Site Risk (Taken from Table 4-5)	Overall Median Category Score (Taken from Table 4-6)	Overall Median Category Score	Overall Maximum Category Score (Taken from Table 4-6)	Overall Maximum Category Score
11	*Pipistrellus pipistrellus*	Aug	3	Low	3	Low	3	3	Low	3	Low
11	*Pipistrellus pipistrellus*	Sep	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
11	*Pipistrellus pygmaeus*	May	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
11	*Pipistrellus pygmaeus*	Jun	66	Moderate-High	66	Moderate-High	3	12	Medium	12	Medium
11	*Pipistrellus pygmaeus*	Jul	38	Low-Moderate	71	Moderate-High	3	6	Medium	12	Medium
11	*Pipistrellus pygmaeus*	Aug	32	Low-Moderate	66	Moderate-High	3	6	Medium	12	Medium
11	*Pipistrellus pygmaeus*	Sep	52	Moderate	71	Moderate-High	3	9	Medium	12	Medium
11	*Plecotus auritus*	Jul	3	Low	3	Low	3	3	Low	3	Low
12	*Myotis daubentonii*	Jul	3	Low	38	Low-Moderate	3	3	Low	6	Medium
12	*Myotis daubentonii*	Aug	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
12	*Myotis daubentonii*	Sep	38	Low-Moderate	61	Moderate-High	3	6	Medium	12	Medium
12	*Myotis nattereri*	Sep	3	Low	3	Low	3	3	Low	3	Low
12	*Pipistrellus pipistrellus*	May	3	Low	38	Low-Moderate	3	3	Low	6	Medium
12	*Pipistrellus pipistrellus*	Jun	3	Low	3	Low	3	3	Low	3	Low
12	*Pipistrellus pipistrellus*	Jul	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
12	*Pipistrellus pipistrellus*	Aug	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
12	*Pipistrellus pipistrellus*	Sep	3	Low	3	Low	3	3	Low	3	Low
12	*Pipistrellus pygmaeus*	May	38	Low-Moderate	66	Moderate-High	3	6	Medium	12	Medium
12	*Pipistrellus pygmaeus*	Jun	50	Moderate	61	Moderate-High	3	9	Medium	12	Medium
12	*Pipistrellus pygmaeus*	Jul	66	Moderate-High	78	Moderate-High	3	12	Medium	12	Medium
12	*Pipistrellus pygmaeus*	Aug	40	Low-Moderate	78	Moderate-High	3	6	Medium	12	Medium
12	*Pipistrellus pygmaeus*	Sep	76	Moderate-High	88	High	3	12	Medium	15	High
12	*Plecotus auritus*	Jul	3	Low	3	Low	3	3	Low	3	Low
12	*Plecotus auritus*	Sep	3	Low	3	Low	3	3	Low	3	Low
13	*Myotis*	May	71	Moderate-High	71	Moderate-High	3	12	Medium	12	Medium
13	*Myotis*	Jun	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
13	*Myotis daubentonii*	May	3	Low	38	Low-Moderate	3	3	Low	6	Medium
13	*Myotis daubentonii*	Jun	3	Low	3	Low	3	3	Low	3	Low
13	*Myotis daubentonii*	Jul	3	Low	3	Low	3	3	Low	3	Low
13	*Myotis daubentonii*	Aug	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
13	*Myotis daubentonii*	Sep	3	Low	3	Low	3	3	Low	3	Low
13	*Myotis nattereri*	Sep	3	Low	3	Low	3	3	Low	3	Low
13	*Pipistrellus pipistrellus*	May	3	Low	3	Low	3	3	Low	3	Low
13	*Pipistrellus pipistrellus*	Jul	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
13	*Pipistrellus pygmaeus*	May	3	Low	38	Low-Moderate	3	3	Low	6	Medium
13	*Pipistrellus pygmaeus*	Jun	3	Low	3	Low	3	3	Low	3	Low
13	*Pipistrellus pygmaeus*	Jul	52	Moderate	52	Moderate	3	9	Medium	9	Medium
13	*Pipistrellus pygmaeus*	Sep	3	Low	38	Low-Moderate	3	3	Low	6	Medium

Location ID	Species	Month	Median Percentile	Median Activity Category (Taken from Table 4-1)	Maximum Percentile	Maximum Activity Category (Taken from Table 4-1)	Site Risk (Taken from Table 4-5)	Overall Median Category Score (Taken from Table 4-6)	Overall Median Category Score	Overall Maximum Category Score (Taken from Table 4-6)	Overall Maximum Category Score
14	*Myotis*	May	3	Low	3	Low	3	3	Low	3	Low
14	*Pipistrellus pipistrellus*	May	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
14	*Pipistrellus pipistrellus*	Jul	3	Low	38	Low-Moderate	3	3	Low	6	Medium
14	*Pipistrellus pipistrellus*	Sep	3	Low	3	Low	3	3	Low	3	Low
14	*Pipistrellus pygmaeus*	May	3	Low	3	Low	3	3	Low	3	Low
14	*Pipistrellus pygmaeus*	Jun	3	Low	3	Low	3	3	Low	3	Low
14	*Pipistrellus pygmaeus*	Jul	21	Low-Moderate	76	Moderate-High	3	6	Medium	12	Medium
14	*Pipistrellus pygmaeus*	Aug	45	Moderate	52	Moderate	3	9	Medium	9	Medium
14	*Pipistrellus pygmaeus*	Sep	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
2	*Myotis*	May	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
2	*Myotis*	Jun	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
2	*Myotis daubentonii*	May	21	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
2	*Myotis daubentonii*	Jun	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
2	*Myotis daubentonii*	Jul	3	Low	52	Moderate	3	3	Low	9	Medium
2	*Myotis daubentonii*	Aug	21	Low-Moderate	71	Moderate-High	3	6	Medium	12	Medium
2	*Myotis daubentonii*	Sep	52	Moderate	83	High	3	9	Medium	15	High
2	*Myotis nattereri*	May	3	Low	3	Low	3	3	Low	3	Low
2	*Myotis nattereri*	Aug	3	Low	3	Low	3	3	Low	3	Low
2	*Myotis nattereri*	Sep	3	Low	3	Low	3	3	Low	3	Low
2	*Pipistrellus pipistrellus*	May	3	Low	71	Moderate-High	3	3	Low	12	Medium
2	*Pipistrellus pipistrellus*	Jun	35	Low-Moderate	66	Moderate-High	3	6	Medium	12	Medium
2	*Pipistrellus pipistrellus*	Jul	61	Moderate-High	87	High	3	12	Medium	15	High
2	*Pipistrellus pipistrellus*	Aug	77	Moderate-High	83	High	3	12	Medium	15	High
2	*Pipistrellus pipistrellus*	Sep	61	Moderate-High	86	High	3	12	Medium	15	High
2	*Pipistrellus pygmaeus*	May	52	Moderate	87	High	3	9	Medium	15	High
2	*Pipistrellus pygmaeus*	Jun	42	Moderate	81	High	3	9	Medium	15	High
2	*Pipistrellus pygmaeus*	Jul	90	High	96	High	3	15	High	15	High
2	*Pipistrellus pygmaeus*	Aug	96	High	97	High	3	15	High	15	High
2	*Pipistrellus pygmaeus*	Sep	87	High	96	High	3	15	High	15	High
2	*Plecotus auritus*	Jun	3	Low	3	Low	3	3	Low	3	Low
2	*Plecotus auritus*	Jul	3	Low	38	Low-Moderate	3	3	Low	6	Medium
2	*Plecotus auritus*	Aug	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
2	*Plecotus auritus*	Sep	38	Low-Moderate	66	Moderate-High	3	6	Medium	12	Medium
3	*Myotis*	May	21	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
3	*Myotis*	Jun	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
3	*Myotis daubentonii*	May	3	Low	38	Low-Moderate	3	3	Low	6	Medium
3	*Myotis daubentonii*	Jun	3	Low	3	Low	3	3	Low	3	Low
3	*Myotis daubentonii*	Jul	38	Low-Moderate	74	Moderate-High	3	6	Medium	12	Medium

Location ID	Species	Month	Median Percentile	Median Activity Category (Taken from Table 4-1)	Maximum Percentile	Maximum Activity Category (Taken from Table 4-1)	Site Risk (Taken from Table 4-5)	Overall Median Category Score (Taken from Table 4-6)	Overall Median Category Score	Overall Maximum Category Score (Taken from Table 4-6)	Overall Maximum Category Score
3	*Myotis daubentonii*	Aug	45	Moderate	66	Moderate-High	3	9	Medium	12	Medium
3	*Myotis daubentonii*	Sep	3	Low	38	Low-Moderate	3	3	Low	6	Medium
3	*Myotis nattereri*	Sep	21	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
3	*Pipistrellus pipistrellus*	May	3	Low	52	Moderate	3	3	Low	9	Medium
3	*Pipistrellus pipistrellus*	Jun	61	Moderate-High	61	Moderate-High	3	12	Medium	12	Medium
3	*Pipistrellus pipistrellus*	Jul	84	High	96	High	3	15	High	15	High
3	*Pipistrellus pipistrellus*	Aug	91	High	93	High	3	15	High	15	High
3	*Pipistrellus pipistrellus*	Sep	66	Moderate-High	71	Moderate-High	3	12	Medium	12	Medium
3	*Pipistrellus pygmaeus*	May	61	Moderate-High	91	High	3	12	Medium	15	High
3	*Pipistrellus pygmaeus*	Jun	63	Moderate-High	87	High	3	12	Medium	15	High
3	*Pipistrellus pygmaeus*	Jul	94	High	98	High	3	15	High	15	High
3	*Pipistrellus pygmaeus*	Aug	99	High	99	High	3	15	High	15	High
3	*Pipistrellus pygmaeus*	Sep	70	Moderate-High	95	High	3	12	Medium	15	High
3	*Plecotus auritus*	May	3	Low	3	Low	3	3	Low	3	Low
3	*Plecotus auritus*	Jul	21	Low-Moderate	61	Moderate-High	3	6	Medium	12	Medium
3	*Plecotus auritus*	Aug	21	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
3	*Plecotus auritus*	Sep	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
4	*Myotis daubentonii*	Jul	38	Low-Moderate	61	Moderate-High	3	6	Medium	12	Medium
4	*Pipistrellus pipistrellus*	May	21	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
4	*Pipistrellus pipistrellus*	Jun	3	Low	3	Low	3	3	Low	3	Low
4	*Pipistrellus pipistrellus*	Jul	21	Low-Moderate	66	Moderate-High	3	6	Medium	12	Medium
4	*Pipistrellus pipistrellus*	Sep	3	Low	3	Low	3	3	Low	3	Low
4	*Pipistrellus pygmaeus*	May	38	Low-Moderate	61	Moderate-High	3	6	Medium	12	Medium
4	*Pipistrellus pygmaeus*	Jun	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
4	*Pipistrellus pygmaeus*	Jul	71	Moderate-High	86	High	3	12	Medium	15	High
4	*Pipistrellus pygmaeus*	Aug	71	Moderate-High	71	Moderate-High	3	12	Medium	12	Medium
4	*Pipistrellus pygmaeus*	Sep	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
4	*Plecotus auritus*	Sep	3	Low	3	Low	3	3	Low	3	Low
5	*Myotis daubentonii*	May	3	Low	3	Low	3	3	Low	3	Low
5	*Myotis daubentonii*	Jun	3	Low	3	Low	3	3	Low	3	Low
5	*Myotis daubentonii*	Jul	3	Low	52	Moderate	3	3	Low	9	Medium
5	*Myotis daubentonii*	Aug	3	Low	3	Low	3	3	Low	3	Low
5	*Myotis daubentonii*	Sep	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
5	*Myotis nattereri*	Sep	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
5	*Pipistrellus pipistrellus*	May	3	Low	3	Low	3	3	Low	3	Low
5	*Pipistrellus pipistrellus*	Jun	3	Low	3	Low	3	3	Low	3	Low
5	*Pipistrellus pipistrellus*	Jul	3	Low	38	Low-Moderate	3	3	Low	6	Medium
5	*Pipistrellus pipistrellus*	Aug	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium

Location ID	Species	Month	Median Percentile	Median Activity Category (Taken from Table 4-1)	Maximum Percentile	Maximum Activity Category (Taken from Table 4-1)	Site Risk (Taken from Table 4-5)	Overall Median Category Score (Taken from Table 4-6)	Overall Median Category Score	Overall Maximum Category Score (Taken from Table 4-6)	Overall Maximum Category Score
5	*Pipistrellus pipistrellus*	Sep	3	Low	3	Low	3	3	Low	3	Low
5	*Pipistrellus pygmaeus*	May	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
5	*Pipistrellus pygmaeus*	Jun	3	Low	3	Low	3	3	Low	3	Low
5	*Pipistrellus pygmaeus*	Jul	69	Moderate-High	79	Moderate-High	3	12	Medium	12	Medium
5	*Pipistrellus pygmaeus*	Aug	79	Moderate-High	87	High	3	12	Medium	15	High
5	*Pipistrellus pygmaeus*	Sep	38	Low-Moderate	71	Moderate-High	3	6	Medium	12	Medium
5	*Plecotus auritus*	Sep	3	Low	3	Low	3	3	Low	3	Low
6	*Myotis daubentonii*	May	3	Low	3	Low	3	3	Low	3	Low
6	*Myotis daubentonii*	Jun	61	Moderate-High	61	Moderate-High	3	12	Medium	12	Medium
6	*Myotis daubentonii*	Aug	3	Low	3	Low	3	3	Low	3	Low
6	*Myotis daubentonii*	Sep	3	Low	52	Moderate	3	3	Low	9	Medium
6	*Pipistrellus pipistrellus*	May	66	Moderate-High	96	High	3	12	Medium	15	High
6	*Pipistrellus pipistrellus*	Jun	98	High	99	High	3	15	High	15	High
6	*Pipistrellus pipistrellus*	Jul	21	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
6	*Pipistrellus pipistrellus*	Sep	3	Low	3	Low	3	3	Low	3	Low
6	*Pipistrellus pygmaeus*	May	83	High	98	High	3	15	High	15	High
6	*Pipistrellus pygmaeus*	Jun	98	High	99	High	3	15	High	15	High
6	*Pipistrellus pygmaeus*	Jul	52	Moderate	79	Moderate-High	3	9	Medium	12	Medium
6	*Pipistrellus pygmaeus*	Aug	35	Low-Moderate	66	Moderate-High	3	6	Medium	12	Medium
6	*Pipistrellus pygmaeus*	Sep	3	Low	52	Moderate	3	3	Low	9	Medium
6	*Plecotus auritus*	May	28	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
6	*Plecotus auritus*	Jun	52	Moderate	66	Moderate-High	3	9	Medium	12	Medium
6	*Plecotus auritus*	Jul	3	Low	3	Low	3	3	Low	3	Low
7	*Myotis*	May	3	Low	3	Low	3	3	Low	3	Low
7	*Myotis daubentonii*	May	3	Low	3	Low	3	3	Low	3	Low
7	*Myotis daubentonii*	Jul	21	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
7	*Myotis daubentonii*	Aug	57	Moderate	61	Moderate-High	3	9	Medium	12	Medium
7	*Myotis daubentonii*	Sep	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
7	*Myotis nattereri*	Jul	3	Low	3	Low	3	3	Low	3	Low
7	*Pipistrellus pipistrellus*	May	66	Moderate-High	96	High	3	12	Medium	15	High
7	*Pipistrellus pipistrellus*	Jun	94	High	97	High	3	15	High	15	High
7	*Pipistrellus pipistrellus*	Jul	52	Moderate	83	High	3	9	Medium	15	High
7	*Pipistrellus pipistrellus*	Aug	38	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
7	*Pipistrellus pipistrellus*	Sep	3	Low	71	Moderate-High	3	3	Low	12	Medium
7	*Pipistrellus pygmaeus*	May	3	Low	61	Moderate-High	3	3	Low	12	Medium
7	*Pipistrellus pygmaeus*	Jun	52	Moderate	66	Moderate-High	3	9	Medium	12	Medium
7	*Pipistrellus pygmaeus*	Jul	79	Moderate-High	96	High	3	12	Medium	15	High
7	*Pipistrellus pygmaeus*	Aug	79	Moderate-High	90	High	3	12	Medium	15	High

Location ID	Species	Month	Median Percentile	Median Activity Category (Taken from Table 4-1)	Maximum Percentile	Maximum Activity Category (Taken from Table 4-1)	Site Risk (Taken from Table 4-5)	Overall Median Category Score (Taken from Table 4-6)	Overall Median Category Score	Overall Maximum Category Score (Taken from Table 4-6)	Overall Maximum Category Score
7	*Pipistrellus pygmaeus*	Sep	84	High	88	High	3	15	High	15	High
7	*Plecotus auritus*	May	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
7	*Plecotus auritus*	Jul	3	Low	3	Low	3	3	Low	3	Low
7	*Plecotus auritus*	Sep	3	Low	3	Low	3	3	Low	3	Low
8	*Myotis daubentonii*	Jun	3	Low	3	Low	3	3	Low	3	Low
8	*Myotis daubentonii*	Aug	3	Low	3	Low	3	3	Low	3	Low
8	*Myotis daubentonii*	Sep	3	Low	66	Moderate-High	3	3	Low	12	Medium
8	*Myotis nattereri*	Sep	3	Low	38	Low-Moderate	3	3	Low	6	Medium
8	*Pipistrellus pipistrellus*	Jun	66	Moderate-High	66	Moderate-High	3	12	Medium	12	Medium
8	*Pipistrellus pipistrellus*	Jul	3	Low	61	Moderate-High	3	3	Low	12	Medium
8	*Pipistrellus pipistrellus*	Aug	3	Low	3	Low	3	3	Low	3	Low
8	*Pipistrellus pygmaeus*	May	52	Moderate	74	Moderate-High	3	9	Medium	12	Medium
8	*Pipistrellus pygmaeus*	Jun	52	Moderate	61	Moderate-High	3	9	Medium	12	Medium
8	*Pipistrellus pygmaeus*	Jul	78	Moderate-High	96	High	3	12	Medium	15	High
8	*Pipistrellus pygmaeus*	Aug	66	Moderate-High	89	High	3	12	Medium	15	High
8	*Pipistrellus pygmaeus*	Sep	38	Low-Moderate	71	Moderate-High	3	6	Medium	12	Medium
8	*Plecotus auritus*	Jul	3	Low	3	Low	3	3	Low	3	Low
8	*Plecotus auritus*	Aug	3	Low	3	Low	3	3	Low	3	Low
8	*Plecotus auritus*	Sep	3	Low	3	Low	3	3	Low	3	Low
9	*Myotis*	May	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
9	*Myotis daubentonii*	Jul	21	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
9	*Myotis nattereri*	Aug	3	Low	3	Low	3	3	Low	3	Low
9	*Pipistrellus pipistrellus*	May	52	Moderate	52	Moderate	3	9	Medium	9	Medium
9	*Pipistrellus pipistrellus*	Jun	28	Low-Moderate	52	Moderate	3	6	Medium	9	Medium
9	*Pipistrellus pipistrellus*	Jul	38	Low-Moderate	38	Low-Moderate	3	6	Medium	6	Medium
9	*Pipistrellus pipistrellus*	Aug	3	Low	3	Low	3	3	Low	3	Low
9	*Pipistrellus pygmaeus*	May	38	Low-Moderate	86	High	3	6	Medium	15	High
9	*Pipistrellus pygmaeus*	Jun	65	Moderate-High	78	Moderate-High	3	12	Medium	12	Medium
9	*Pipistrellus pygmaeus*	Jul	85	High	98	High	3	15	High	15	High
9	*Pipistrellus pygmaeus*	Aug	77	Moderate-High	90	High	3	12	Medium	15	High
9	*Pipistrellus pygmaeus*	Sep	64	Moderate-High	76	Moderate-High	3	12	Medium	12	Medium
9	*Plecotus auritus*	Jul	3	Low	3	Low	3	3	Low	3	Low
9	*Plecotus auritus*	Sep	45	Moderate	52	Moderate	3	9	Medium	9	Medium

ANNEX F. ECOBAT REPORT

This report was produced free of charge by the Mammal Society to support evidence-based conservation of bats.

The following analyses are based on data supplied by the user to the Mammal Society's Ecobat website. The outputs are designed to assist decision-making, but do not replace expert interpretation by the user. The creation of the Ecobat tool was supported by the Natural Environment Research Council (NERC).

Bat Activity Analysis

Site Name: Ladyfield

Author: MacArthur Green

27/04/2022

Summary

Bats were detected on **46** nights between **2021-05-19** and **2021-09-14**, using **14** static bat detectors. Throughout this period **6** species were recorded. **Table 1.** Detectors were placed at the following locations:

Detector ID	Latitude	Longitude
loc3	56.27759	-5.073917
loc2	56.27556	-5.069083
loc9	56.29682	-5.066953
loc7	56.29191	-5.071970
loc14	56.30565	-5.059690
loc13	56.30254	-5.056175
loc5	56.28946	-5.069467
loc11	56.30096	-5.063178
loc1	56.27557	-5.061518
loc6	56.29005	-5.063307
loc8	56.29337	-5.063104
loc4	56.28557	-5.074423
loc12	56.30283	-5.066109

loc10	56.29821	-5.059789

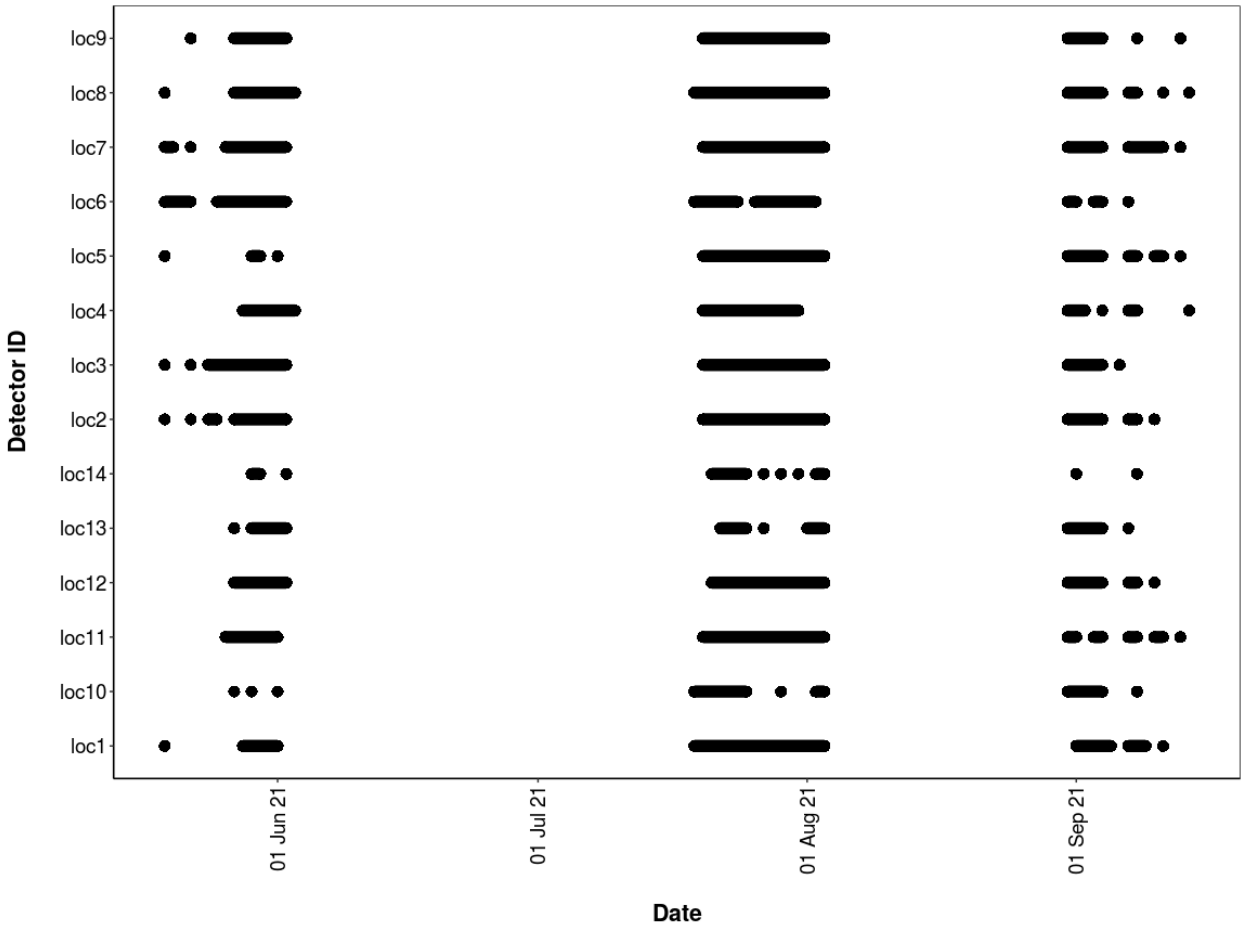
Survey Nights

Table 2. The number of nights that bats were detected on each recorder. This is not the same as the number of nights that detectors were active if there were nights when no bats were detected.

Detector ID	No. of nights
loc1	33
loc10	20
loc11	32
loc12	32
loc13	21
loc14	15
loc2	37
loc3	40
loc4	26
loc5	29
loc6	33
loc7	38
loc8	34
loc9	30

Survey Nights

Figure 1. Horizontal bars show nights when acoustic detectors recorded bats.



PART 1: Percentiles Analysis

This first part of the analysis looks at the relative activity levels of the bats you recorded. We take your value for the total bat passes each night for each species, and compare this to the values in our reference database. We tell you what percentile your data falls at, and therefore what the relative activity level is. For example, if the reference database has values of 5, 10, 15, 20 and you submit a value of 18, this will be the 80th percentile, and be classed as high activity.

The reference range dataset was stratified to include:

- Only records from within 30 days of the survey date.
- Only records from within 100km radius of the survey location.
- Records using any make of bat detector.

PER DETECTOR

Table 3. Summary table showing the number of nights recorded bat activity fell into each activity band for each species.

Detector ID	Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
loc1	*Myotis daubentonii*	0	3	1	1	6
loc1	*Myotis nattereri*	0	0	1	0	2
loc1	*Pipistrellus pipistrellus*	0	0	2	9	9
loc1	*Pipistrellus pygmaeus*	1	10	5	2	9
loc1	*Plecotus auritus*	0	0	0	0	10
loc10	*Myotis daubentonii*	0	0	0	3	5
loc10	*Pipistrellus pipistrellus*	0	0	1	4	5
loc10	*Pipistrellus pygmaeus*	0	0	1	7	8
loc11	*Myotis daubentonii*	0	1	2	0	7
loc11	*Myotis nattereri*	0	0	0	0	1
loc11	*Pipistrellus pipistrellus*	0	1	0	2	7
loc11	*Pipistrellus pygmaeus*	0	10	3	6	11
loc11	*Plecotus auritus*	0	0	0	0	2
loc12	*Myotis daubentonii*	0	1	1	4	6
loc12	*Myotis nattereri*	0	0	0	0	4
loc12	*Pipistrellus pipistrellus*	0	0	4	3	8
loc12	*Pipistrellus pygmaeus*	2	15	2	5	4
loc12	*Plecotus auritus*	0	0	0	0	4
loc13	*Myotis*	0	1	0	1	0

loc13	*Myotis daubentonii*	0	0	0	4	9
loc13	*Myotis nattereri*	0	0	0	0	3
loc13	*Pipistrellus pipistrellus*	0	0	0	2	2
loc13	*Pipistrellus pygmaeus*	0	0	3	3	6
loc14	*Myotis*	0	0	0	0	1
loc14	*Pipistrellus pipistrellus*	0	0	0	2	4
loc14	*Pipistrellus pygmaeus*	0	2	1	3	6
loc2	*Myotis*	0	0	1	3	0
loc2	*Myotis daubentonii*	1	4	4	7	12
loc2	*Myotis nattereri*	0	0	0	0	4
loc2	*Pipistrellus pipistrellus*	5	12	3	3	5
loc2	*Pipistrellus pygmaeus*	26	3	3	0	3
loc2	*Plecotus auritus*	0	2	0	4	8
loc3	*Myotis*	0	0	1	2	2
loc3	*Myotis daubentonii*	0	3	1	8	9
loc3	*Myotis nattereri*	0	0	0	1	1
loc3	*Pipistrellus pipistrellus*	12	8	1	3	5
loc3	*Pipistrellus pygmaeus*	24	5	3	4	3
loc3	*Plecotus auritus*	0	1	0	5	6
loc4	*Myotis daubentonii*	0	1	2	2	2
loc4	*Pipistrellus pipistrellus*	0	1	0	4	9
loc4	*Pipistrellus pygmaeus*	2	10	4	6	3
loc4	*Plecotus auritus*	0	0	0	0	1
loc5	*Myotis daubentonii*	0	0	1	5	11

loc5	*Myotis nattereri*	0	0	0	1	0
loc5	*Pipistrellus pipistrellus*	0	0	0	2	11
loc5	*Pipistrellus pygmaeus*	1	13	0	6	7
loc5	*Plecotus auritus*	0	0	0	0	2
loc6	*Myotis daubentonii*	0	1	1	0	6
loc6	*Pipistrellus pipistrellus*	5	2	1	1	7
loc6	*Pipistrellus pygmaeus*	7	4	9	1	7
loc6	*Plecotus auritus*	0	1	1	1	2
loc7	*Myotis*	0	0	0	0	1
loc7	*Myotis daubentonii*	0	1	2	3	5
loc7	*Myotis nattereri*	0	0	0	0	1
loc7	*Pipistrellus pipistrellus*	6	5	5	7	11
loc7	*Pipistrellus pygmaeus*	13	12	0	4	3
loc7	*Plecotus auritus*	0	0	0	1	2
loc8	*Myotis daubentonii*	0	1	0	2	8
loc8	*Myotis nattereri*	0	0	0	1	2
loc8	*Pipistrellus pipistrellus*	0	2	0	0	6
loc8	*Pipistrellus pygmaeus*	6	13	5	5	3
loc8	*Plecotus auritus*	0	0	0	0	3
loc9	*Myotis*	0	0	0	1	0
loc9	*Myotis daubentonii*	0	0	0	1	1
loc9	*Myotis nattereri*	0	0	0	0	1
loc9	*Pipistrellus pipistrellus*	0	0	4	2	4
loc9	*Pipistrellus pygmaeus*	9	11	3	2	4
loc9	*Plecotus auritus*	0	0	1	1	1

Table 4. Summary table showing key metrics for each species recorded. The reference range is the number of nights for each species that your data were compared to. We recommend a Reference Range of 200+ to be confident in the relative activity level.

Detector ID	Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded	Reference Range
loc1	*Myotis daubentonii*	3	3 - 40.5	78	11	384
loc1	*Myotis nattereri*	3	3 - 3	52	3	258
loc1	*Pipistrellus pipistrellus*	38	20.5 - 38	52	20	4134
loc1	*Pipistrellus pygmaeus*	52	27.5 - 59	82	27	5366
loc1	*Plecotus auritus*	3	3 - 3	3	10	533
loc10	*Myotis daubentonii*	3	3 - 20.5	38	8	384
loc10	*Pipistrellus pipistrellus*	21	3 - 38	52	10	4134
loc10	*Pipistrellus pygmaeus*	21	3 - 38	52	16	5366
loc11	*Myotis daubentonii*	3	3 - 27.5	61	10	384
loc11	*Myotis nattereri*	3	0	3	1	258
loc11	*Pipistrellus pipistrellus*	3	3 - 20.5	66	10	4134
loc11	*Pipistrellus pygmaeus*	38	27.5 - 49.5	71	30	5366
loc11	*Plecotus auritus*	3	3 - 3	3	2	533
loc12	*Myotis daubentonii*	21	3 - 38	61	12	384
loc12	*Myotis nattereri*	3	3 - 3	3	4	258
loc12	*Pipistrellus pipistrellus*	3	3 - 38	52	15	4134
loc12	*Pipistrellus pygmaeus*	64	45 - 69.5	88	28	5366
loc12	*Plecotus auritus*	3	3 - 3	3	4	533
loc13	*Myotis*	55	54.5 - 54.5	71	2	1817
loc13	*Myotis*	3	3 -	38	13	384

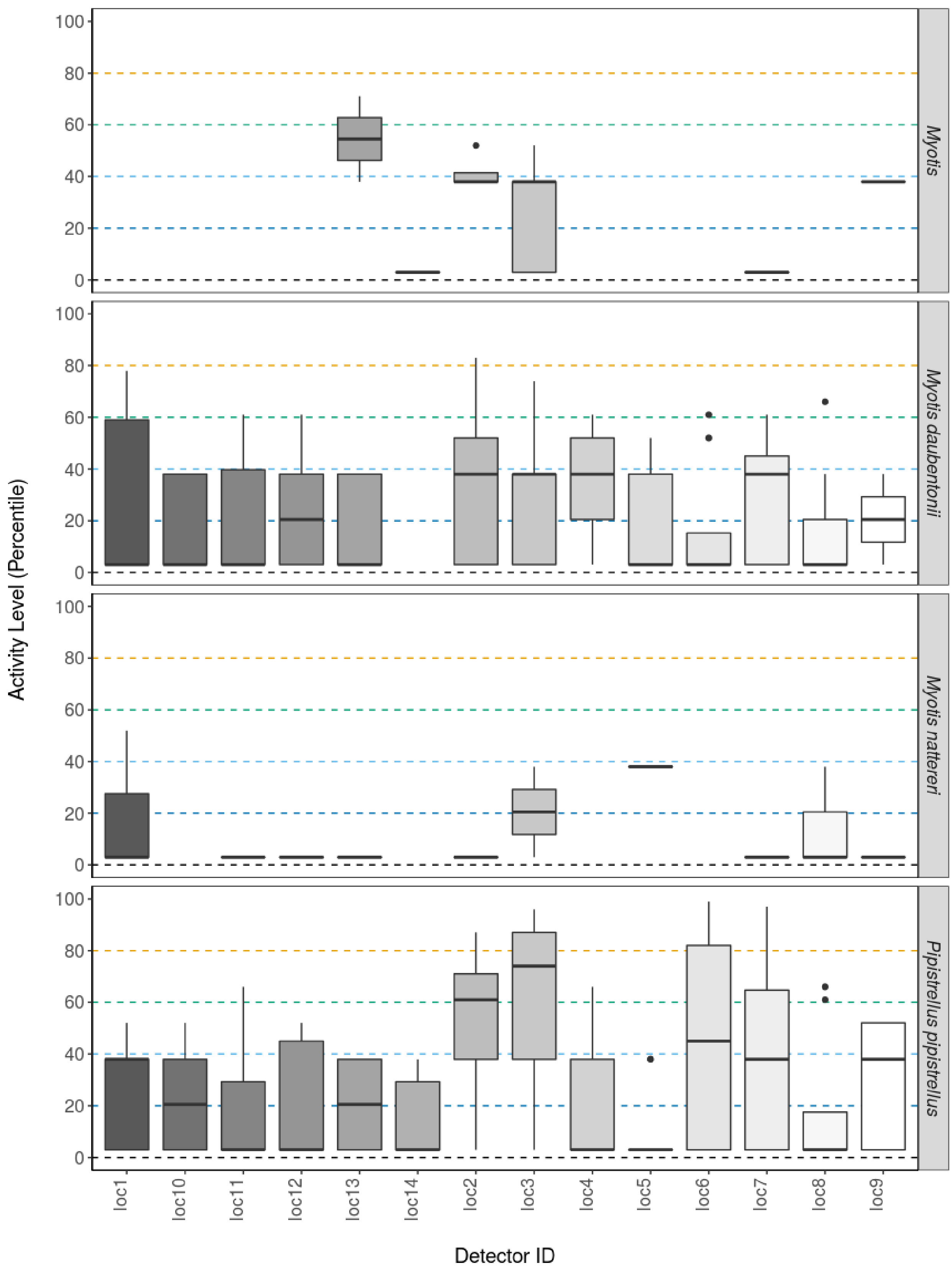
	daubentonii		20.5			
loc13	*Myotis nattereri*	3	3 - 3	3	3	258
loc13	*Pipistrellus pipistrellus*	21	3 - 38	38	4	4134
loc13	*Pipistrellus pygmaeus*	21	3 - 45	52	12	5366
loc14	*Myotis*	3	0	3	1	1817
loc14	*Pipistrellus pipistrellus*	3	3 - 20.5	38	6	4134
loc14	*Pipistrellus pygmaeus*	21	3 - 45	76	12	5366
loc2	*Myotis*	38	38 - 38	52	4	1817
loc2	*Myotis daubentonii*	38	20.5 - 43	83	28	384
loc2	*Myotis nattereri*	3	3 - 3	3	4	258
loc2	*Pipistrellus pipistrellus*	61	43 - 67	87	28	4134
loc2	*Pipistrellus pygmaeus*	86	74 - 89.5	97	35	5366
loc2	*Plecotus auritus*	3	3 - 34.5	66	14	533
loc3	*Myotis*	38	3 - 45	52	5	1817
loc3	*Myotis daubentonii*	38	20.5 - 38	74	21	384
loc3	*Myotis nattereri*	21	20.5 - 20.5	38	2	258
loc3	*Pipistrellus pipistrellus*	74	47 - 79	96	29	4134
loc3	*Pipistrellus pygmaeus*	87	67 - 89	99	39	5366
loc3	*Plecotus auritus*	21	3 - 38	61	12	533
loc4	*Myotis daubentonii*	38	20.5 - 52	61	7	384
loc4	*Pipistrellus pipistrellus*	3	3 - 34.5	66	14	4134
loc4	*Pipistrellus pygmaeus*	52	42 - 63.5	86	25	5366
loc4	*Plecotus auritus*	3	0	3	1	533
loc5	*Myotis*	3	3 -	52	17	384

	daubentonii		20.5			
loc5	*Myotis nattereri*	38	0	38	1	258
loc5	*Pipistrellus pipistrellus*	3	3 - 3	38	13	4134
loc5	*Pipistrellus pygmaeus*	61	37 - 62.5	87	27	5366
loc5	*Plecotus auritus*	3	3 - 3	3	2	533
loc6	*Myotis daubentonii*	3	3 - 27.5	61	8	384
loc6	*Pipistrellus pipistrellus*	45	20.5 - 72	99	16	4134
loc6	*Pipistrellus pygmaeus*	52	38.5 - 68.5	99	28	5366
loc6	*Plecotus auritus*	38	3 - 52	66	5	533
loc7	*Myotis*	3	0	3	1	1817
loc7	*Myotis daubentonii*	38	3 - 45	61	11	384
loc7	*Myotis nattereri*	3	0	3	1	258
loc7	*Pipistrellus pipistrellus*	38	27.5 - 52	97	34	4134
loc7	*Pipistrellus pygmaeus*	77	61 - 81.5	96	32	5366
loc7	*Plecotus auritus*	3	3 - 3	38	3	533
loc8	*Myotis daubentonii*	3	3 - 20.5	66	11	384
loc8	*Myotis nattereri*	3	3 - 3	38	3	258
loc8	*Pipistrellus pipistrellus*	3	3 - 32	66	8	4134
loc8	*Pipistrellus pygmaeus*	64	52 - 69.5	96	32	5366
loc8	*Plecotus auritus*	3	3 - 3	3	3	533
loc9	*Myotis*	38	0	38	1	1817
loc9	*Myotis daubentonii*	21	20.5 - 20.5	38	2	384
loc9	*Myotis nattereri*	3	0	3	1	258
loc9	*Pipistrellus pipistrellus*	38	3 - 52	52	10	4134
loc9	*Pipistrellus pygmaeus*	66	52 - 78	98	29	5366

loc9	*Plecotus auritus*	38	3 - 52	52	3	533

###Figures

Figure 2. The recorded activity of bats during the survey. The centre line indicates the median activity level whereas the box represents the interquartile range (the spread of the middle 50% of nights of activity)



Activity Level (Percentile)
Detector ID
Myotis
Myotis daubentonii
Myotis nattereri
Pipistrellus pipistrellus
0
20
40
60
80
100
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9

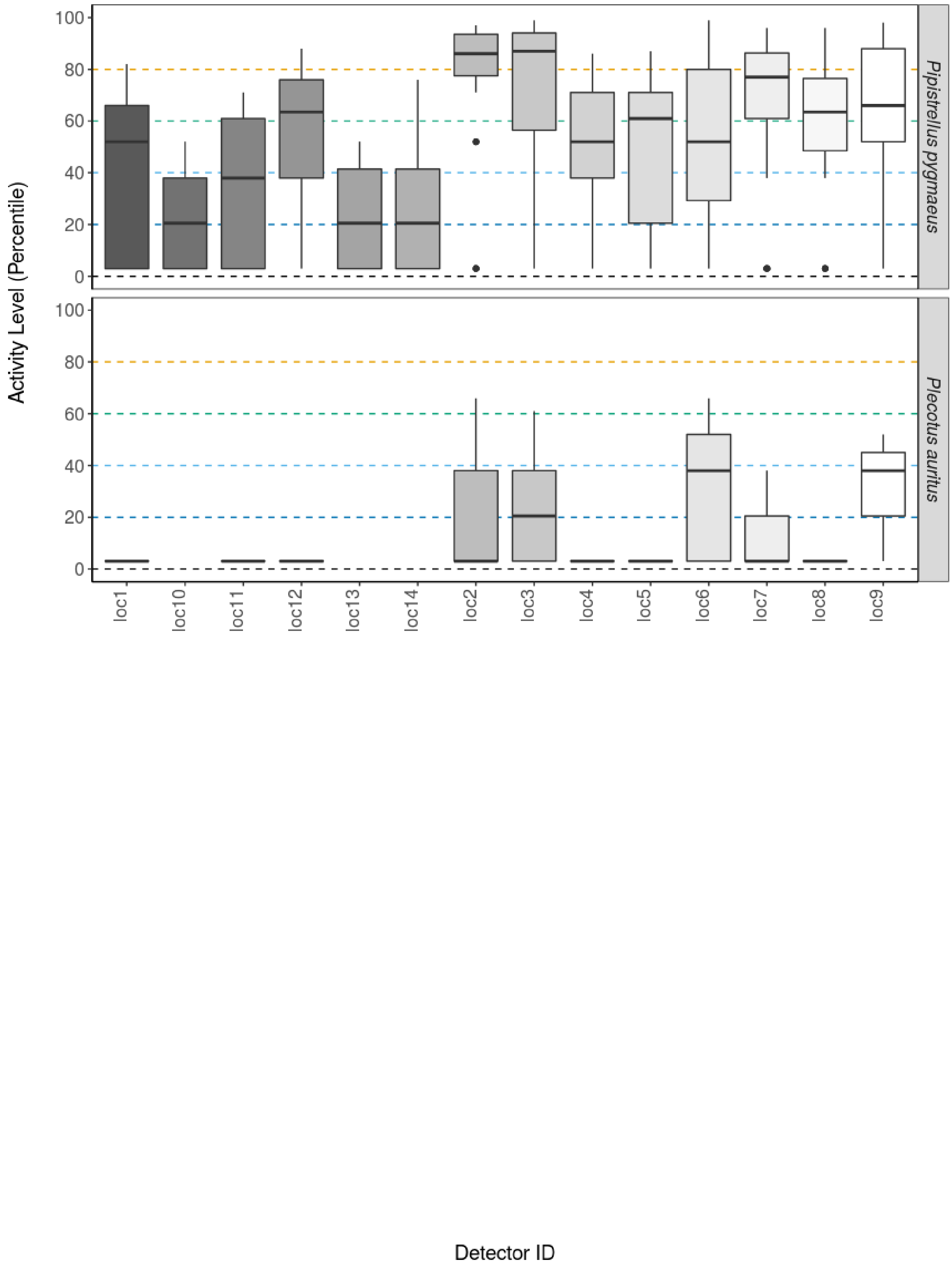
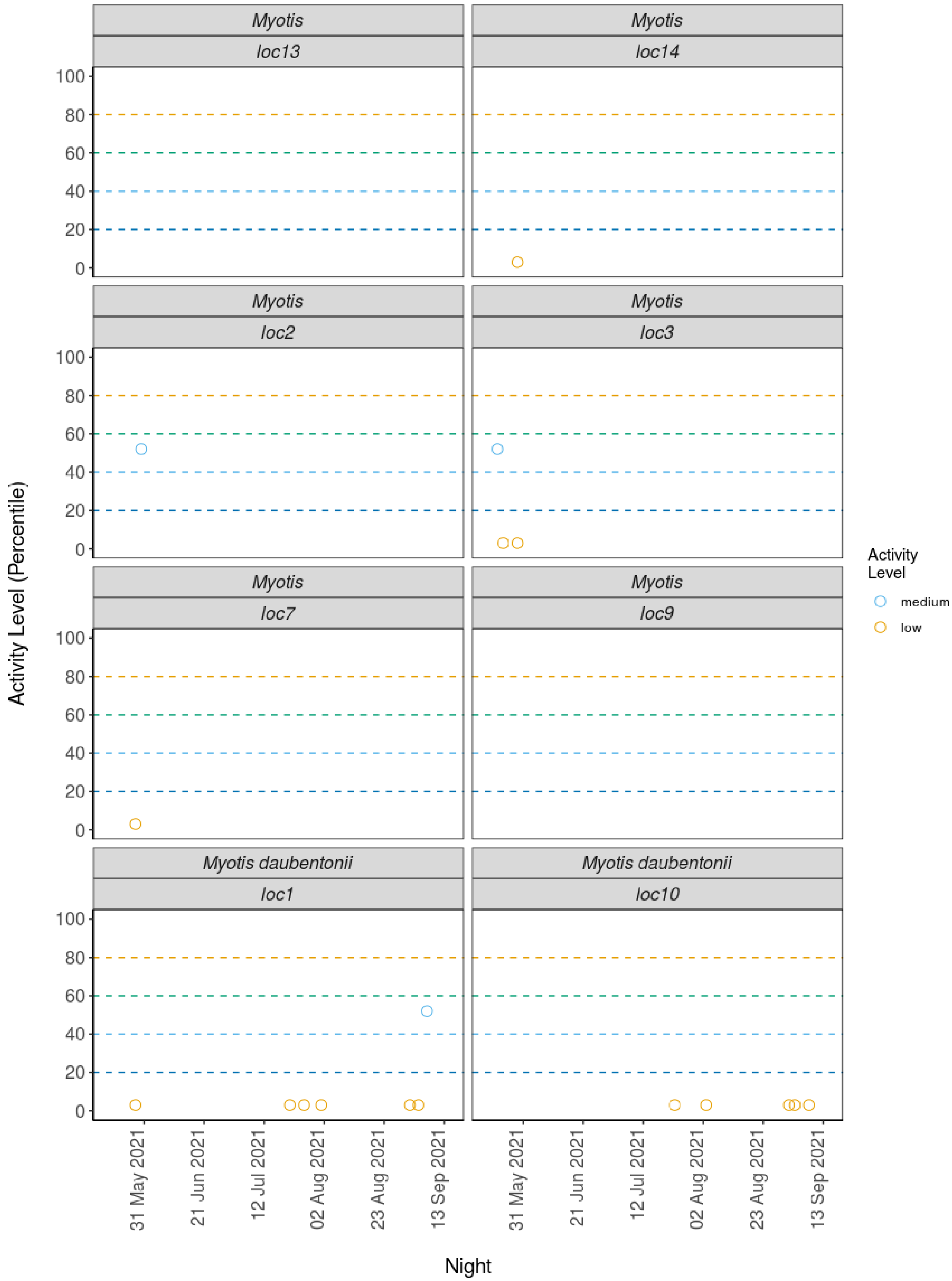
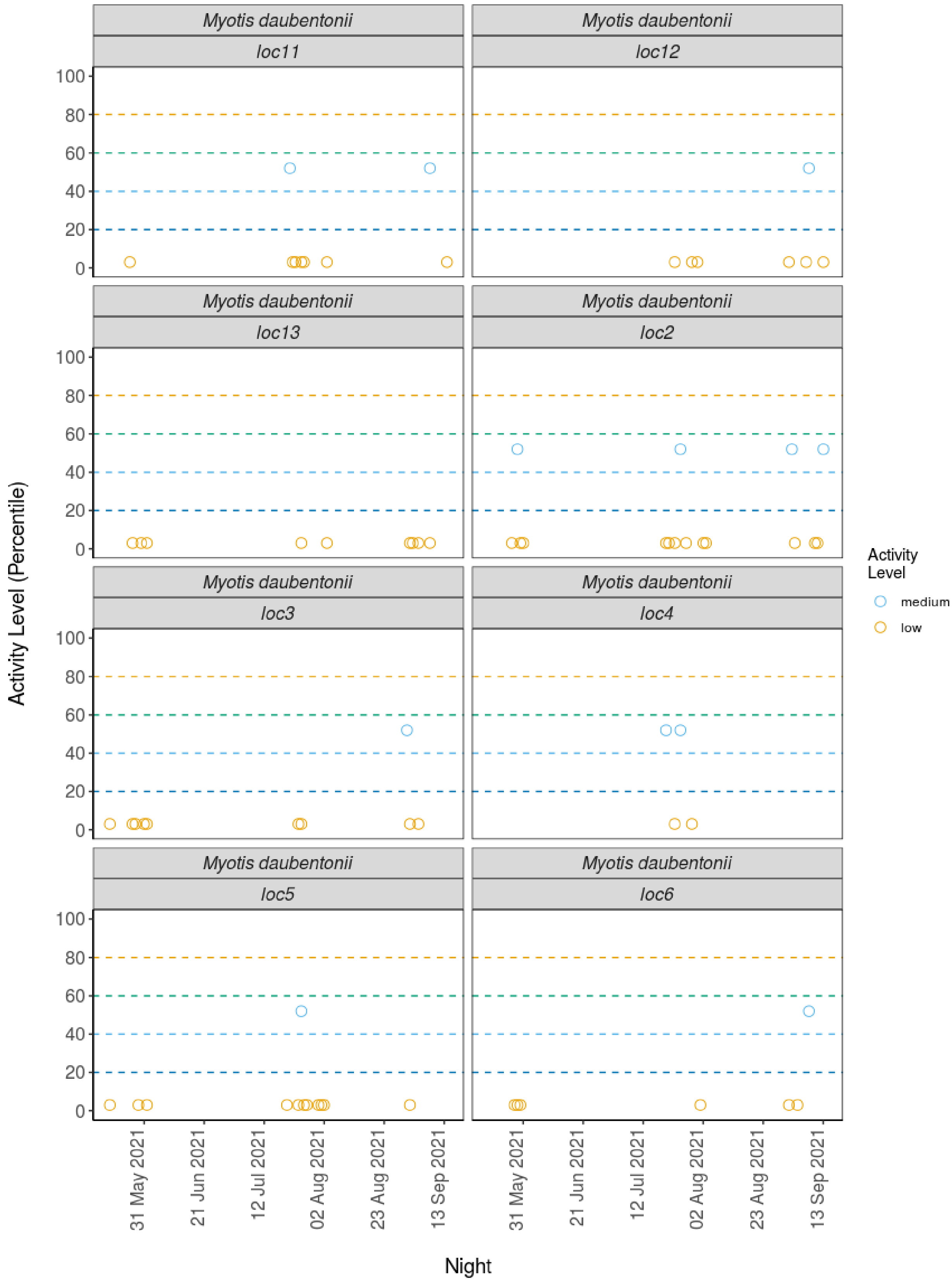

Activity Level (Percentile)
0
20
40
60
80
100
Pipistrellus pygmaeus
Plecotus auritus
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID

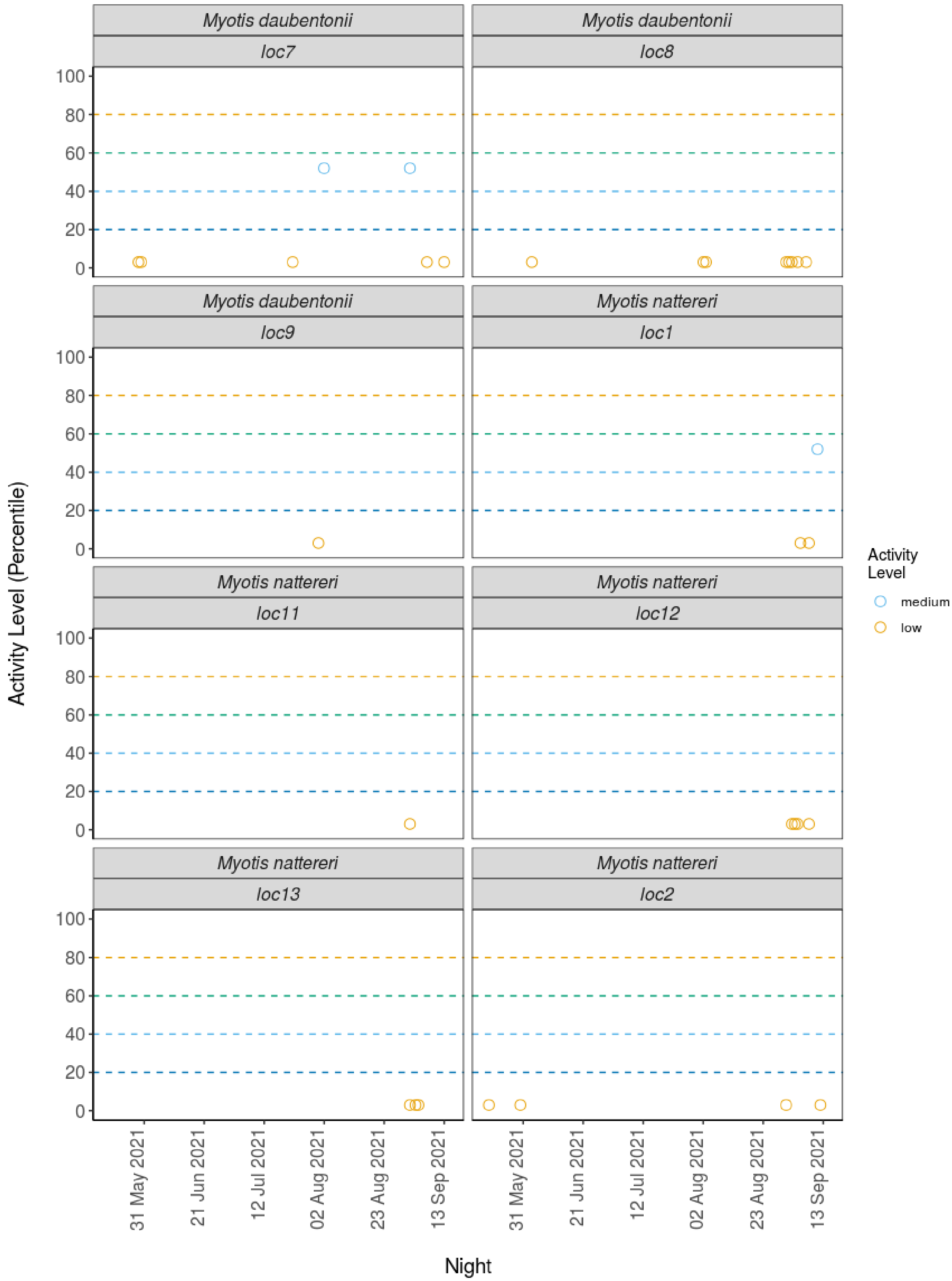
Figure 3. The activity level (percentile) of bats recorded across each night of the bat survey.



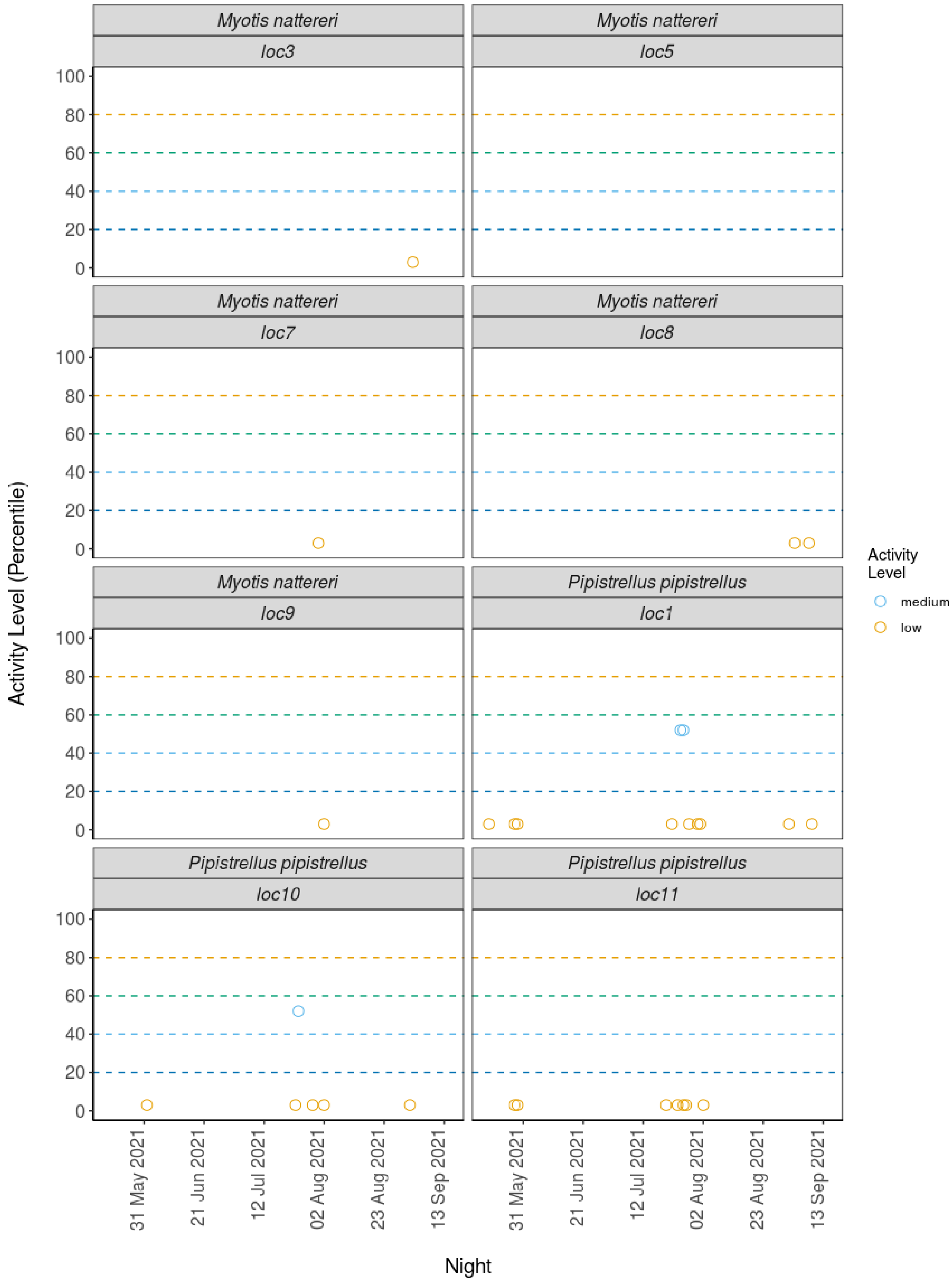
Myotis
loc13
Myotis
loc14
Myotis
loc2
Myotis
loc3
Myotis
loc7
Myotis
loc9
Myotis daubentonii
loc1
Myotis daubentonii
loc10
Activity Level (Percentile)
100
80
60
40
20
0
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Night
Activity Level
medium
low



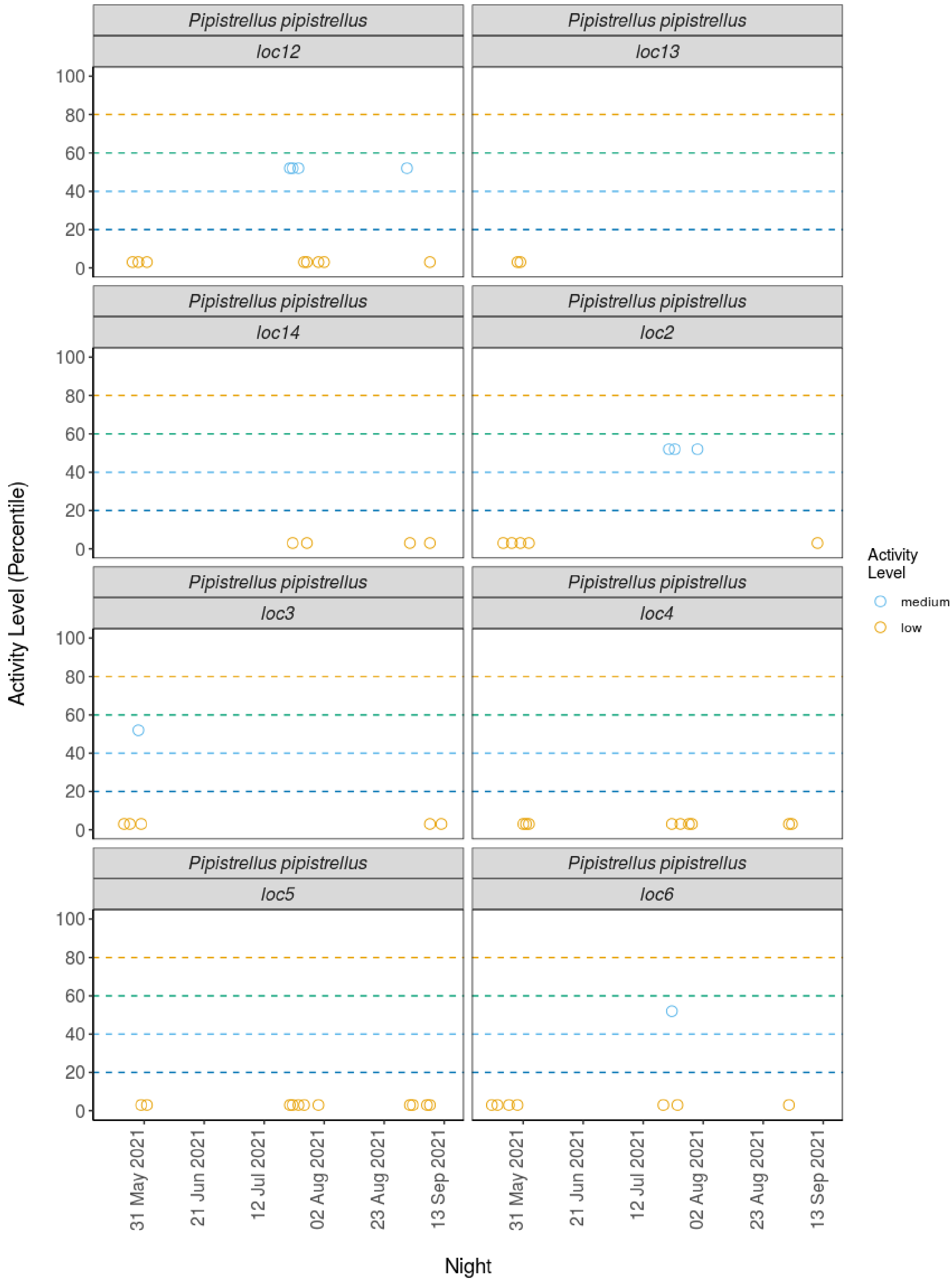
Myotis daubentonii
loc11
Myotis daubentonii
loc12
Myotis daubentonii
loc13
Myotis daubentonii
loc2
Myotis daubentonii
loc3
Myotis daubentonii
loc4
Myotis daubentonii
loc5
Myotis daubentonii
loc6
Activity Level (Percentile)
0
20
40
60
80
100
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Night
Activity Level
medium
low

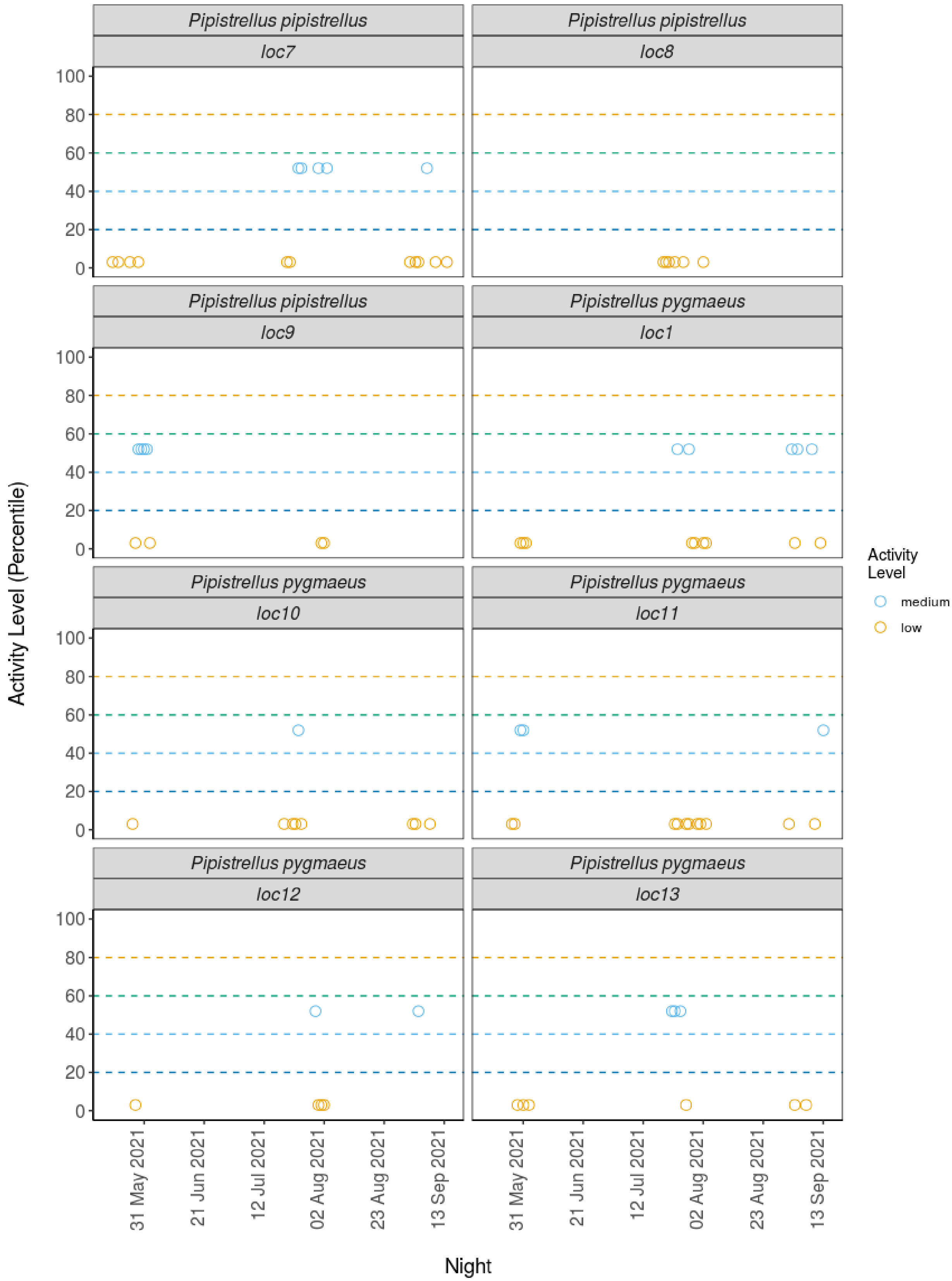


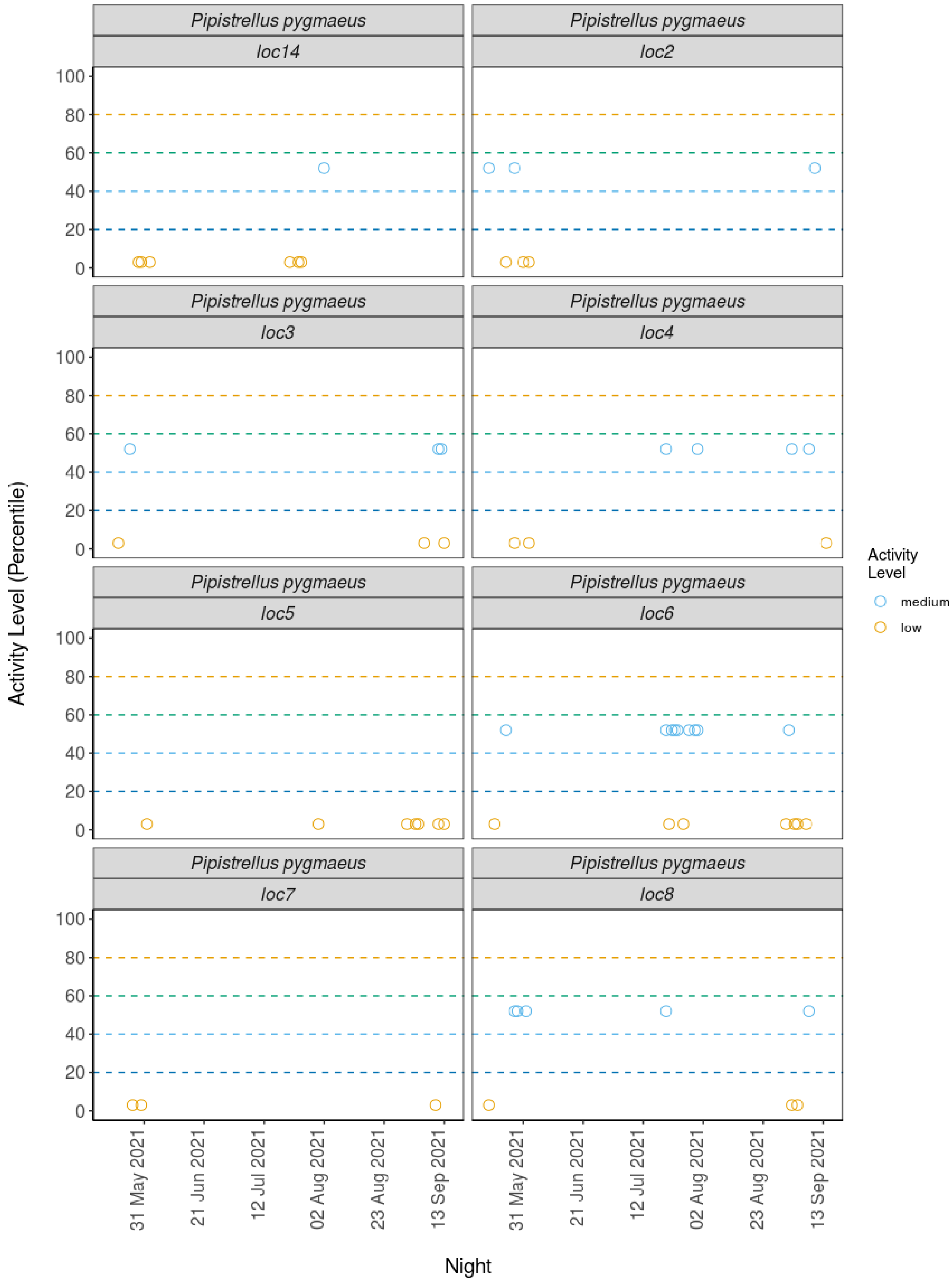
Myotis daubentonii
loc7
Myotis daubentonii
loc8
Myotis daubentonii
loc9
Myotis nattereri
loc1
Myotis nattereri
loc11
Myotis nattereri
loc12
Myotis nattereri
loc13
Myotis nattereri
loc2
Activity Level (Percentile)
0
20
40
60
80
100
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Night
Activity Level
medium
low



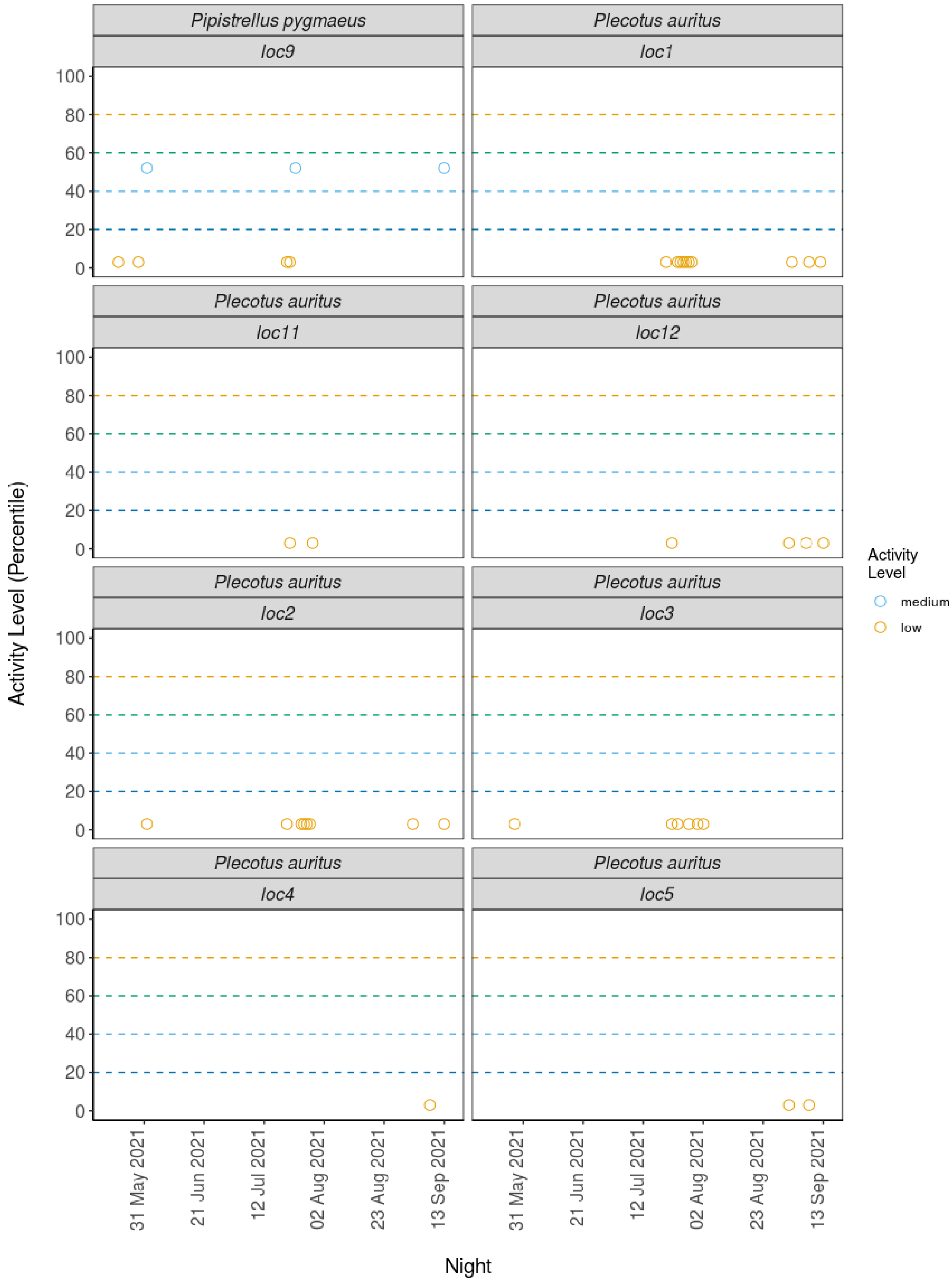
Myotis nattereri
loc3
Myotis nattereri
loc5
Myotis nattereri
loc7
Myotis nattereri
loc8
Myotis nattereri
loc9
Pipistrellus pipistrellus
loc1
Pipistrellus pipistrellus
loc10
Pipistrellus pipistrellus
loc11
Activity Level (Percentile)
0
20
40
60
80
100
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Night
Activity Level
medium
low


Pipistrellus pipistrellus
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
Activity Level (Percentile)
100
80
60
40
20
0
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Night
Activity Level
medium
low

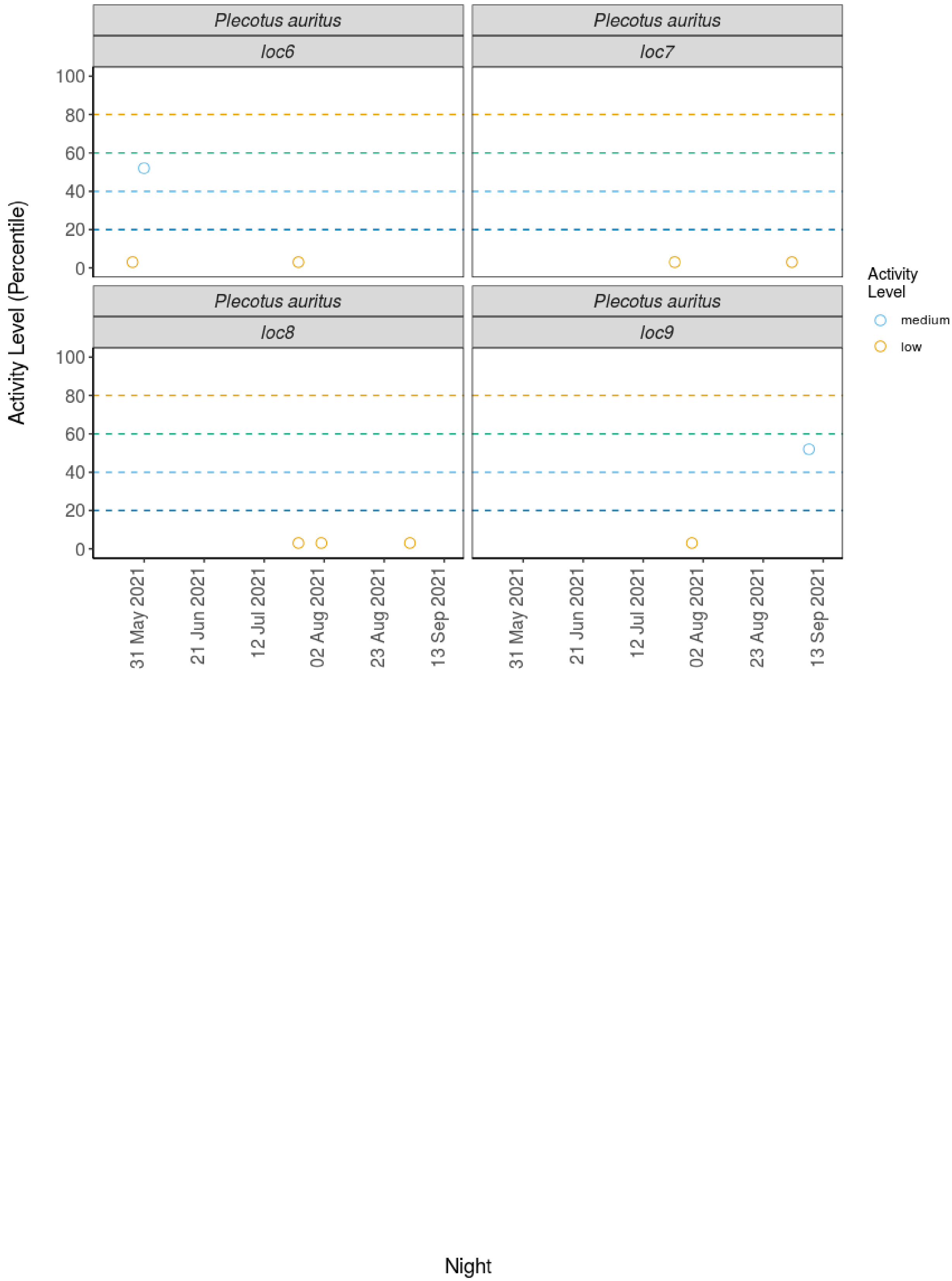

Pipistrellus pipistrellus
loc7
Pipistrellus pipistrellus
loc8
Pipistrellus pipistrellus
loc9
Pipistrellus pygmaeus
loc1
Pipistrellus pygmaeus
loc10
Pipistrellus pygmaeus
loc11
Pipistrellus pygmaeus
loc12
Pipistrellus pygmaeus
loc13
Activity Level (Percentile)
0
20
40
60
80
100
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Night
Activity Level
medium
low



Pipistrellus pygmaeus
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
Activity Level (Percentile)
100
80
60
40
20
0
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Night
Activity Level
medium
low



Pipistrellus pygmaeus
loc9
Plecotus auritus
loc1
Plecotus auritus
loc11
Plecotus auritus
loc12
Plecotus auritus
loc2
Plecotus auritus
loc3
Plecotus auritus
loc4
Plecotus auritus
loc5
Activity Level (Percentile)
100
80
60
40
20
0
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Night
Activity Level
medium
low



Plecotus auritus
loc6
Plecotus auritus
loc7
Plecotus auritus
loc8
Plecotus auritus
loc9
Activity Level (Percentile)
100
80
60
40
20
0
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Activity Level
medium
low
Night

PER DETECTOR, PER MONTH

Table 5. Summary table showing the number of nights recorded bat activity fell into each activity band for each species at each detector during each month.

Detector ID	Species/Species Group	Month	Nights of High Activity	Nights of Moderate / High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
loc1	*Myotis daubentonii*	May	0	0	0	0	1
loc1	*Myotis daubentonii*	Jul	0	0	0	0	2
loc1	*Myotis daubentonii*	Aug	0	0	0	0	1
loc1	*Myotis daubentonii*	Sep	0	3	1	1	2
loc1	*Myotis nattereri*	Sep	0	0	1	0	2
loc1	*Pipistrellus pipistrellus*	May	0	0	0	0	3
loc1	*Pipistrellus pipistrellus*	Jul	0	0	2	6	3
loc1	*Pipistrellus pipistrellus*	Aug	0	0	0	0	1
loc1	*Pipistrellus pipistrellus*	Sep	0	0	0	3	2
loc1	*Pipistrellus pygmaeus*	May	0	1	0	0	2
loc1	*Pipistrellus pygmaeus*	Jun	0	0	0	0	1
loc1	*Pipistrellus pygmaeus*	Jul	0	7	2	1	2
loc1	*Pipistrellus pygmaeus*	Aug	0	0	0	0	2
loc1	*Pipistrellus pygmaeus*	Sep	1	2	3	1	2
loc1	*Plecotus auritus*	Jul	0	0	0	0	7
loc1	*Plecotus auritus*	Sep	0	0	0	0	3
loc10	*Myotis daubentonii*	Jul	0	0	0	0	1

loc10	*Myotis daubentonii*	Aug	0	0	0	1	1
loc10	*Myotis daubentonii*	Sep	0	0	0	2	3
loc10	*Pipistrellus pipistrellus*	May	0	0	0	1	0
loc10	*Pipistrellus pipistrellus*	Jun	0	0	0	0	1
loc10	*Pipistrellus pipistrellus*	Jul	0	0	1	3	2
loc10	*Pipistrellus pipistrellus*	Aug	0	0	0	0	1
loc10	*Pipistrellus pipistrellus*	Sep	0	0	0	0	1
loc10	*Pipistrellus pygmaeus*	May	0	0	0	1	1
loc10	*Pipistrellus pygmaeus*	Jul	0	0	1	2	4
loc10	*Pipistrellus pygmaeus*	Aug	0	0	0	2	0
loc10	*Pipistrellus pygmaeus*	Sep	0	0	0	2	3
loc11	*Myotis daubentonii*	May	0	0	0	0	1
loc11	*Myotis daubentonii*	Jul	0	0	1	0	4
loc11	*Myotis daubentonii*	Aug	0	0	0	0	1
loc11	*Myotis daubentonii*	Sep	0	1	1	0	1
loc11	*Myotis nattereri*	Sep	0	0	0	0	1
loc11	*Pipistrellus pipistrellus*	May	0	0	0	0	2
loc11	*Pipistrellus pipistrellus*	Jun	0	1	0	0	0
loc11	*Pipistrellus pipistrellus*	Jul	0	0	0	1	4
loc11	*Pipistrellus pipistrellus*	Aug	0	0	0	0	1
loc11	*Pipistrellus*	Sep	0	0	0	1	0

	pipistrellus						
loc11	*Pipistrellus pygmaeus*	May	0	0	2	1	2
loc11	*Pipistrellus pygmaeus*	Jun	0	1	0	0	0
loc11	*Pipistrellus pygmaeus*	Jul	0	3	0	3	5
loc11	*Pipistrellus pygmaeus*	Aug	0	2	0	0	2
loc11	*Pipistrellus pygmaeus*	Sep	0	4	1	2	2
loc11	*Plecotus auritus*	Jul	0	0	0	0	2
loc12	*Myotis daubentonii*	Jul	0	0	0	1	3
loc12	*Myotis daubentonii*	Aug	0	0	0	1	0
loc12	*Myotis daubentonii*	Sep	0	1	1	2	3
loc12	*Myotis nattereri*	Sep	0	0	0	0	4
loc12	*Pipistrellus pipistrellus*	May	0	0	0	1	2
loc12	*Pipistrellus pipistrellus*	Jun	0	0	0	0	1
loc12	*Pipistrellus pipistrellus*	Jul	0	0	3	1	3
loc12	*Pipistrellus pipistrellus*	Aug	0	0	1	1	1
loc12	*Pipistrellus pipistrellus*	Sep	0	0	0	0	1
loc12	*Pipistrellus pygmaeus*	May	0	1	0	2	1
loc12	*Pipistrellus pygmaeus*	Jun	0	1	0	1	0
loc12	*Pipistrellus pygmaeus*	Jul	0	9	1	0	1
loc12	*Pipistrellus pygmaeus*	Aug	0	2	0	0	2
loc12	*Pipistrellus pygmaeus*	Sep	2	2	1	2	0
loc12	*Plecotus auritus*	Jul	0	0	0	0	1

loc12	*Plecotus auritus*	Sep	0	0	0	0	3
loc13	*Myotis*	May	0	1	0	0	0
loc13	*Myotis*	Jun	0	0	0	1	0
loc13	*Myotis daubentonii*	May	0	0	0	1	2
loc13	*Myotis daubentonii*	Jun	0	0	0	0	1
loc13	*Myotis daubentonii*	Jul	0	0	0	0	1
loc13	*Myotis daubentonii*	Aug	0	0	0	3	1
loc13	*Myotis daubentonii*	Sep	0	0	0	0	4
loc13	*Myotis nattereri*	Sep	0	0	0	0	3
loc13	*Pipistrellus pipistrellus*	May	0	0	0	0	2
loc13	*Pipistrellus pipistrellus*	Jul	0	0	0	2	0
loc13	*Pipistrellus pygmaeus*	May	0	0	0	1	2
loc13	*Pipistrellus pygmaeus*	Jun	0	0	0	0	1
loc13	*Pipistrellus pygmaeus*	Jul	0	0	3	1	1
loc13	*Pipistrellus pygmaeus*	Sep	0	0	0	1	2
loc14	*Myotis*	May	0	0	0	0	1
loc14	*Pipistrellus pipistrellus*	May	0	0	0	1	0
loc14	*Pipistrellus pipistrellus*	Jul	0	0	0	1	2
loc14	*Pipistrellus pipistrellus*	Sep	0	0	0	0	2
loc14	*Pipistrellus pygmaeus*	May	0	0	0	0	2
loc14	*Pipistrellus pygmaeus*	Jun	0	0	0	0	1
loc14	*Pipistrellus pygmaeus*	Jul	0	2	0	1	3
loc14	*Pipistrellus*	Aug	0	0	1	1	0

	pygmaeus						
loc14	*Pipistrellus pygmaeus*	Sep	0	0	0	1	0
loc2	*Myotis*	May	0	0	1	2	0
loc2	*Myotis*	Jun	0	0	0	1	0
loc2	*Myotis daubentonii*	May	0	0	1	2	3
loc2	*Myotis daubentonii*	Jun	0	0	0	1	0
loc2	*Myotis daubentonii*	Jul	0	0	1	2	4
loc2	*Myotis daubentonii*	Aug	0	1	0	1	2
loc2	*Myotis daubentonii*	Sep	1	3	2	1	3
loc2	*Myotis nattereri*	May	0	0	0	0	2
loc2	*Myotis nattereri*	Aug	0	0	0	0	1
loc2	*Myotis nattereri*	Sep	0	0	0	0	1
loc2	*Pipistrellus pipistrellus*	May	0	1	0	0	3
loc2	*Pipistrellus pipistrellus*	Jun	0	1	0	0	1
loc2	*Pipistrellus pipistrellus*	Jul	1	6	3	1	0
loc2	*Pipistrellus pipistrellus*	Aug	2	2	0	0	0
loc2	*Pipistrellus pipistrellus*	Sep	2	2	0	2	1
loc2	*Pipistrellus pygmaeus*	May	2	1	2	0	2
loc2	*Pipistrellus pygmaeus*	Jun	1	0	0	0	1
loc2	*Pipistrellus pygmaeus*	Jul	12	0	0	0	0
loc2	*Pipistrellus pygmaeus*	Aug	4	0	0	0	0
loc2	*Pipistrellus pygmaeus*	Sep	7	2	1	0	0
loc2	*Plecotus auritus*	Jun	0	0	0	0	1
loc2	*Plecotus auritus*	Jul	0	0	0	1	5

loc2	*Plecotus auritus*	Aug	0	0	0	1	0
loc2	*Plecotus auritus*	Sep	0	2	0	2	2
loc3	*Myotis*	May	0	0	1	1	2
loc3	*Myotis*	Jun	0	0	0	1	0
loc3	*Myotis daubentonii*	May	0	0	0	2	4
loc3	*Myotis daubentonii*	Jun	0	0	0	0	1
loc3	*Myotis daubentonii*	Jul	0	2	0	3	2
loc3	*Myotis daubentonii*	Aug	0	1	1	2	0
loc3	*Myotis daubentonii*	Sep	0	0	0	1	2
loc3	*Myotis nattereri*	Sep	0	0	0	1	1
loc3	*Pipistrellus pipistrellus*	May	0	0	1	1	3
loc3	*Pipistrellus pipistrellus*	Jun	0	1	0	0	0
loc3	*Pipistrellus pipistrellus*	Jul	9	3	0	0	0
loc3	*Pipistrellus pipistrellus*	Aug	3	0	0	1	0
loc3	*Pipistrellus pipistrellus*	Sep	0	4	0	1	2
loc3	*Pipistrellus pygmaeus*	May	2	3	1	2	1
loc3	*Pipistrellus pygmaeus*	Jun	1	0	0	1	0
loc3	*Pipistrellus pygmaeus*	Jul	12	0	0	0	0
loc3	*Pipistrellus pygmaeus*	Aug	4	0	0	0	0
loc3	*Pipistrellus pygmaeus*	Sep	5	2	2	1	2
loc3	*Plecotus auritus*	May	0	0	0	0	1
loc3	*Plecotus auritus*	Jul	0	1	0	3	4
loc3	*Plecotus auritus*	Aug	0	0	0	1	1
loc3	*Plecotus auritus*	Sep	0	0	0	1	0

loc4	*Myotis daubentonii*	Jul	0	1	2	2	2
loc4	*Pipistrellus pipistrellus*	May	0	0	0	1	1
loc4	*Pipistrellus pipistrellus*	Jun	0	0	0	0	2
loc4	*Pipistrellus pipistrellus*	Jul	0	1	0	3	4
loc4	*Pipistrellus pipistrellus*	Sep	0	0	0	0	2
loc4	*Pipistrellus pygmaeus*	May	0	1	0	1	1
loc4	*Pipistrellus pygmaeus*	Jun	0	0	0	2	1
loc4	*Pipistrellus pygmaeus*	Jul	2	8	2	0	0
loc4	*Pipistrellus pygmaeus*	Aug	0	1	0	0	0
loc4	*Pipistrellus pygmaeus*	Sep	0	0	2	3	1
loc4	*Plecotus auritus*	Sep	0	0	0	0	1
loc5	*Myotis daubentonii*	May	0	0	0	0	2
loc5	*Myotis daubentonii*	Jun	0	0	0	0	1
loc5	*Myotis daubentonii*	Jul	0	0	1	2	5
loc5	*Myotis daubentonii*	Aug	0	0	0	0	2
loc5	*Myotis daubentonii*	Sep	0	0	0	3	1
loc5	*Myotis nattereri*	Sep	0	0	0	1	0
loc5	*Pipistrellus pipistrellus*	May	0	0	0	0	1
loc5	*Pipistrellus pipistrellus*	Jun	0	0	0	0	1
loc5	*Pipistrellus pipistrellus*	Jul	0	0	0	1	5
loc5	*Pipistrellus pipistrellus*	Aug	0	0	0	1	0

loc5	*Pipistrellus pipistrellus*	Sep	0	0	0	0	4
loc5	*Pipistrellus pygmaeus*	May	0	0	0	2	0
loc5	*Pipistrellus pygmaeus*	Jun	0	0	0	0	1
loc5	*Pipistrellus pygmaeus*	Jul	0	10	0	1	1
loc5	*Pipistrellus pygmaeus*	Aug	1	1	0	0	1
loc5	*Pipistrellus pygmaeus*	Sep	0	2	0	3	4
loc5	*Plecotus auritus*	Sep	0	0	0	0	2
loc6	*Myotis daubentonii*	May	0	0	0	0	3
loc6	*Myotis daubentonii*	Jun	0	1	0	0	0
loc6	*Myotis daubentonii*	Aug	0	0	0	0	1
loc6	*Myotis daubentonii*	Sep	0	0	1	0	2
loc6	*Pipistrellus pipistrellus*	May	3	2	0	0	4
loc6	*Pipistrellus pipistrellus*	Jun	2	0	0	0	0
loc6	*Pipistrellus pipistrellus*	Jul	0	0	1	1	2
loc6	*Pipistrellus pipistrellus*	Sep	0	0	0	0	1
loc6	*Pipistrellus pygmaeus*	May	5	1	1	1	1
loc6	*Pipistrellus pygmaeus*	Jun	2	0	0	0	0
loc6	*Pipistrellus pygmaeus*	Jul	0	2	7	0	2
loc6	*Pipistrellus pygmaeus*	Aug	0	1	0	0	1
loc6	*Pipistrellus pygmaeus*	Sep	0	0	1	0	3
loc6	*Plecotus auritus*	May	0	0	1	0	1

loc6	*Plecotus auritus*	Jun	0	1	0	1	0
loc6	*Plecotus auritus*	Jul	0	0	0	0	1
loc7	*Myotis*	May	0	0	0	0	1
loc7	*Myotis daubentonii*	May	0	0	0	0	2
loc7	*Myotis daubentonii*	Jul	0	0	0	1	1
loc7	*Myotis daubentonii*	Aug	0	1	1	0	0
loc7	*Myotis daubentonii*	Sep	0	0	1	2	2
loc7	*Myotis nattereri*	Jul	0	0	0	0	1
loc7	*Pipistrellus pipistrellus*	May	3	2	0	0	4
loc7	*Pipistrellus pipistrellus*	Jun	2	0	0	0	0
loc7	*Pipistrellus pipistrellus*	Jul	1	2	3	3	2
loc7	*Pipistrellus pipistrellus*	Aug	0	0	1	3	0
loc7	*Pipistrellus pipistrellus*	Sep	0	1	1	1	5
loc7	*Pipistrellus pygmaeus*	May	0	1	0	0	2
loc7	*Pipistrellus pygmaeus*	Jun	0	1	0	1	0
loc7	*Pipistrellus pygmaeus*	Jul	6	4	0	2	0
loc7	*Pipistrellus pygmaeus*	Aug	1	3	0	0	0
loc7	*Pipistrellus pygmaeus*	Sep	6	3	0	1	1
loc7	*Plecotus auritus*	May	0	0	0	1	0
loc7	*Plecotus auritus*	Jul	0	0	0	0	1
loc7	*Plecotus auritus*	Sep	0	0	0	0	1
loc8	*Myotis daubentonii*	Jun	0	0	0	0	1
loc8	*Myotis daubentonii*	Aug	0	0	0	0	3

loc8	*Myotis daubentonii*	Sep	0	1	0	2	4
loc8	*Myotis nattereri*	Sep	0	0	0	1	2
loc8	*Pipistrellus pipistrellus*	Jun	0	1	0	0	0
loc8	*Pipistrellus pipistrellus*	Jul	0	1	0	0	5
loc8	*Pipistrellus pipistrellus*	Aug	0	0	0	0	1
loc8	*Pipistrellus pygmaeus*	May	0	2	2	1	1
loc8	*Pipistrellus pygmaeus*	Jun	0	1	1	1	0
loc8	*Pipistrellus pygmaeus*	Jul	5	7	1	0	0
loc8	*Pipistrellus pygmaeus*	Aug	1	2	0	1	0
loc8	*Pipistrellus pygmaeus*	Sep	0	1	1	2	2
loc8	*Plecotus auritus*	Jul	0	0	0	0	1
loc8	*Plecotus auritus*	Aug	0	0	0	0	1
loc8	*Plecotus auritus*	Sep	0	0	0	0	1
loc9	*Myotis*	May	0	0	0	1	0
loc9	*Myotis daubentonii*	Jul	0	0	0	1	1
loc9	*Myotis nattereri*	Aug	0	0	0	0	1
loc9	*Pipistrellus pipistrellus*	May	0	0	3	0	1
loc9	*Pipistrellus pipistrellus*	Jun	0	0	1	0	1
loc9	*Pipistrellus pipistrellus*	Jul	0	0	0	2	0
loc9	*Pipistrellus pipistrellus*	Aug	0	0	0	0	2
loc9	*Pipistrellus pygmaeus*	May	1	1	0	1	2
loc9	*Pipistrellus pygmaeus*	Jun	0	1	1	0	0
loc9	*Pipistrellus pygmaeus*	Jul	6	3	1	0	2

loc9	*Pipistrellus pygmaeus*	Aug	2	2	0	0	0
loc9	*Pipistrellus pygmaeus*	Sep	0	4	1	1	0
loc9	*Plecotus auritus*	Jul	0	0	0	0	1
loc9	*Plecotus auritus*	Sep	0	0	1	1	0

Table 6. Summary table showing key metrics for each species recorded per month. Please note that we cannot split the reference range by month, hence this column is not shown in this table.

Detector ID	Species/Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded
loc1	*Myotis daubentonii*	May	3	3 - 40.5	3	1
loc1	*Myotis daubentonii*	Jul	3	3 - 40.5	3	2
loc1	*Myotis daubentonii*	Aug	3	3 - 40.5	3	1
loc1	*Myotis daubentonii*	Sep	52	3 - 40.5	78	7
loc1	*Myotis nattereri*	Sep	3	3 - 3	52	3
loc1	*Pipistrellus pipistrellus*	May	3	20.5 - 38	3	3
loc1	*Pipistrellus pipistrellus*	Jul	38	20.5 - 38	52	11
loc1	*Pipistrellus pipistrellus*	Aug	3	20.5 - 38	3	1
loc1	*Pipistrellus pipistrellus*	Sep	38	20.5 - 38	38	5
loc1	*Pipistrellus pygmaeus*	May	3	27.5 - 59	66	3
loc1	*Pipistrellus pygmaeus*	Jun	3	27.5 - 59	3	1
loc1	*Pipistrellus pygmaeus*	Jul	61	27.5 - 59	78	12
loc1	*Pipistrellus pygmaeus*	Aug	3	27.5 - 59	3	2
loc1	*Pipistrellus pygmaeus*	Sep	52	27.5 - 59	82	9
loc1	*Plecotus auritus*	Jul	3	3 - 3	3	7
loc1	*Plecotus auritus*	Sep	3	3 - 3	3	3
loc10	*Myotis daubentonii*	Jul	3	3 - 20.5	3	1
loc10	*Myotis daubentonii*	Aug	21	3 - 20.5	38	2

loc10	*Myotis daubentonii*	Sep	3	3 - 20.5	38	5
loc10	*Pipistrellus pipistrellus*	May	38	3 - 38	38	1
loc10	*Pipistrellus pipistrellus*	Jun	3	3 - 38	3	1
loc10	*Pipistrellus pipistrellus*	Jul	38	3 - 38	52	6
loc10	*Pipistrellus pipistrellus*	Aug	3	3 - 38	3	1
loc10	*Pipistrellus pipistrellus*	Sep	3	3 - 38	3	1
loc10	*Pipistrellus pygmaeus*	May	21	3 - 38	38	2
loc10	*Pipistrellus pygmaeus*	Jul	3	3 - 38	52	7
loc10	*Pipistrellus pygmaeus*	Aug	38	3 - 38	38	2
loc10	*Pipistrellus pygmaeus*	Sep	3	3 - 38	38	5
loc11	*Myotis daubentonii*	May	3	3 - 27.5	3	1
loc11	*Myotis daubentonii*	Jul	3	3 - 27.5	52	5
loc11	*Myotis daubentonii*	Aug	3	3 - 27.5	3	1
loc11	*Myotis daubentonii*	Sep	52	3 - 27.5	61	3
loc11	*Myotis nattereri*	Sep	3	0	3	1
loc11	*Pipistrellus pipistrellus*	May	3	3 - 20.5	3	2
loc11	*Pipistrellus pipistrellus*	Jun	66	3 - 20.5	66	1
loc11	*Pipistrellus pipistrellus*	Jul	3	3 - 20.5	38	5
loc11	*Pipistrellus pipistrellus*	Aug	3	3 - 20.5	3	1
loc11	*Pipistrellus pipistrellus*	Sep	38	3 - 20.5	38	1
loc11	*Pipistrellus*	May	38	27.5 -	52	5

	pygmaeus			49.5		
loc11	*Pipistrellus pygmaeus*	Jun	66	27.5 - 49.5	66	1
loc11	*Pipistrellus pygmaeus*	Jul	38	27.5 - 49.5	71	11
loc11	*Pipistrellus pygmaeus*	Aug	32	27.5 - 49.5	66	4
loc11	*Pipistrellus pygmaeus*	Sep	52	27.5 - 49.5	71	9
loc11	*Plecotus auritus*	Jul	3	3 - 3	3	2
loc12	*Myotis daubentonii*	Jul	3	3 - 38	38	4
loc12	*Myotis daubentonii*	Aug	38	3 - 38	38	1
loc12	*Myotis daubentonii*	Sep	38	3 - 38	61	7
loc12	*Myotis nattereri*	Sep	3	3 - 3	3	4
loc12	*Pipistrellus pipistrellus*	May	3	3 - 38	38	3
loc12	*Pipistrellus pipistrellus*	Jun	3	3 - 38	3	1
loc12	*Pipistrellus pipistrellus*	Jul	38	3 - 38	52	7
loc12	*Pipistrellus pipistrellus*	Aug	38	3 - 38	52	3
loc12	*Pipistrellus pipistrellus*	Sep	3	3 - 38	3	1
loc12	*Pipistrellus pygmaeus*	May	38	45 - 69.5	66	4
loc12	*Pipistrellus pygmaeus*	Jun	50	45 - 69.5	61	2
loc12	*Pipistrellus pygmaeus*	Jul	66	45 - 69.5	78	11
loc12	*Pipistrellus pygmaeus*	Aug	40	45 - 69.5	78	4
loc12	*Pipistrellus pygmaeus*	Sep	76	45 - 69.5	88	7
loc12	*Plecotus auritus*	Jul	3	3 - 3	3	1
loc12	*Plecotus auritus*	Sep	3	3 - 3	3	3
loc13	*Myotis*	May	71	54.5 -	71	1

				54.5		
loc13	*Myotis*	Jun	38	54.5 - 54.5	38	1
loc13	*Myotis daubentonii*	May	3	3 - 20.5	38	3
loc13	*Myotis daubentonii*	Jun	3	3 - 20.5	3	1
loc13	*Myotis daubentonii*	Jul	3	3 - 20.5	3	1
loc13	*Myotis daubentonii*	Aug	38	3 - 20.5	38	4
loc13	*Myotis daubentonii*	Sep	3	3 - 20.5	3	4
loc13	*Myotis nattereri*	Sep	3	3 - 3	3	3
loc13	*Pipistrellus pipistrellus*	May	3	3 - 38	3	2
loc13	*Pipistrellus pipistrellus*	Jul	38	3 - 38	38	2
loc13	*Pipistrellus pygmaeus*	May	3	3 - 45	38	3
loc13	*Pipistrellus pygmaeus*	Jun	3	3 - 45	3	1
loc13	*Pipistrellus pygmaeus*	Jul	52	3 - 45	52	5
loc13	*Pipistrellus pygmaeus*	Sep	3	3 - 45	38	3
loc14	*Myotis*	May	3	0	3	1
loc14	*Pipistrellus pipistrellus*	May	38	3 - 20.5	38	1
loc14	*Pipistrellus pipistrellus*	Jul	3	3 - 20.5	38	3
loc14	*Pipistrellus pipistrellus*	Sep	3	3 - 20.5	3	2
loc14	*Pipistrellus pygmaeus*	May	3	3 - 45	3	2
loc14	*Pipistrellus pygmaeus*	Jun	3	3 - 45	3	1
loc14	*Pipistrellus pygmaeus*	Jul	21	3 - 45	76	6
loc14	*Pipistrellus*	Aug	45	3 - 45	52	2

	pygmaeus					
loc14	*Pipistrellus pygmaeus*	Sep	38	3 - 45	38	1
loc2	*Myotis*	May	38	38 - 38	52	3
loc2	*Myotis*	Jun	38	38 - 38	38	1
loc2	*Myotis daubentonii*	May	21	20.5 - 43	52	6
loc2	*Myotis daubentonii*	Jun	38	20.5 - 43	38	1
loc2	*Myotis daubentonii*	Jul	3	20.5 - 43	52	7
loc2	*Myotis daubentonii*	Aug	21	20.5 - 43	71	4
loc2	*Myotis daubentonii*	Sep	52	20.5 - 43	83	10
loc2	*Myotis nattereri*	May	3	3 - 3	3	2
loc2	*Myotis nattereri*	Aug	3	3 - 3	3	1
loc2	*Myotis nattereri*	Sep	3	3 - 3	3	1
loc2	*Pipistrellus pipistrellus*	May	3	43 - 67	71	4
loc2	*Pipistrellus pipistrellus*	Jun	35	43 - 67	66	2
loc2	*Pipistrellus pipistrellus*	Jul	61	43 - 67	87	11
loc2	*Pipistrellus pipistrellus*	Aug	77	43 - 67	83	4
loc2	*Pipistrellus pipistrellus*	Sep	61	43 - 67	86	7
loc2	*Pipistrellus pygmaeus*	May	52	74 - 89.5	87	7
loc2	*Pipistrellus pygmaeus*	Jun	42	74 - 89.5	81	2
loc2	*Pipistrellus pygmaeus*	Jul	90	74 - 89.5	96	12
loc2	*Pipistrellus pygmaeus*	Aug	96	74 - 89.5	97	4
loc2	*Pipistrellus pygmaeus*	Sep	87	74 - 89.5	96	10

loc2	*Plecotus auritus*	Jun	3	3 - 34.5	3	1
loc2	*Plecotus auritus*	Jul	3	3 - 34.5	38	6
loc2	*Plecotus auritus*	Aug	38	3 - 34.5	38	1
loc2	*Plecotus auritus*	Sep	38	3 - 34.5	66	6
loc3	*Myotis*	May	21	3 - 45	52	4
loc3	*Myotis*	Jun	38	3 - 45	38	1
loc3	*Myotis daubentonii*	May	3	20.5 - 38	38	6
loc3	*Myotis daubentonii*	Jun	3	20.5 - 38	3	1
loc3	*Myotis daubentonii*	Jul	38	20.5 - 38	74	7
loc3	*Myotis daubentonii*	Aug	45	20.5 - 38	66	4
loc3	*Myotis daubentonii*	Sep	3	20.5 - 38	38	3
loc3	*Myotis nattereri*	Sep	21	20.5 - 20.5	38	2
loc3	*Pipistrellus pipistrellus*	May	3	47 - 79	52	5
loc3	*Pipistrellus pipistrellus*	Jun	61	47 - 79	61	1
loc3	*Pipistrellus pipistrellus*	Jul	84	47 - 79	96	12
loc3	*Pipistrellus pipistrellus*	Aug	91	47 - 79	93	4
loc3	*Pipistrellus pipistrellus*	Sep	66	47 - 79	71	7
loc3	*Pipistrellus pygmaeus*	May	61	67 - 89	91	9
loc3	*Pipistrellus pygmaeus*	Jun	63	67 - 89	87	2
loc3	*Pipistrellus pygmaeus*	Jul	94	67 - 89	98	12
loc3	*Pipistrellus pygmaeus*	Aug	99	67 - 89	99	4

loc3	*Pipistrellus pygmaeus*	Sep	70	67 - 89	95	12
loc3	*Plecotus auritus*	May	3	3 - 38	3	1
loc3	*Plecotus auritus*	Jul	21	3 - 38	61	8
loc3	*Plecotus auritus*	Aug	21	3 - 38	38	2
loc3	*Plecotus auritus*	Sep	38	3 - 38	38	1
loc4	*Myotis daubentonii*	Jul	38	20.5 - 52	61	7
loc4	*Pipistrellus pipistrellus*	May	21	3 - 34.5	38	2
loc4	*Pipistrellus pipistrellus*	Jun	3	3 - 34.5	3	2
loc4	*Pipistrellus pipistrellus*	Jul	21	3 - 34.5	66	8
loc4	*Pipistrellus pipistrellus*	Sep	3	3 - 34.5	3	2
loc4	*Pipistrellus pygmaeus*	May	38	42 - 63.5	61	3
loc4	*Pipistrellus pygmaeus*	Jun	38	42 - 63.5	38	3
loc4	*Pipistrellus pygmaeus*	Jul	71	42 - 63.5	86	12
loc4	*Pipistrellus pygmaeus*	Aug	71	42 - 63.5	71	1
loc4	*Pipistrellus pygmaeus*	Sep	38	42 - 63.5	52	6
loc4	*Plecotus auritus*	Sep	3	0	3	1
loc5	*Myotis daubentonii*	May	3	3 - 20.5	3	2
loc5	*Myotis daubentonii*	Jun	3	3 - 20.5	3	1
loc5	*Myotis daubentonii*	Jul	3	3 - 20.5	52	8
loc5	*Myotis daubentonii*	Aug	3	3 - 20.5	3	2
loc5	*Myotis daubentonii*	Sep	38	3 - 20.5	38	4
loc5	*Myotis nattereri*	Sep	38	0	38	1
loc5	*Pipistrellus pipistrellus*	May	3	3 - 3	3	1

loc5	*Pipistrellus pipistrellus*	Jun	3	3 - 3	3	1
loc5	*Pipistrellus pipistrellus*	Jul	3	3 - 3	38	6
loc5	*Pipistrellus pipistrellus*	Aug	38	3 - 3	38	1
loc5	*Pipistrellus pipistrellus*	Sep	3	3 - 3	3	4
loc5	*Pipistrellus pygmaeus*	May	38	37 - 62.5	38	2
loc5	*Pipistrellus pygmaeus*	Jun	3	37 - 62.5	3	1
loc5	*Pipistrellus pygmaeus*	Jul	69	37 - 62.5	79	12
loc5	*Pipistrellus pygmaeus*	Aug	79	37 - 62.5	87	3
loc5	*Pipistrellus pygmaeus*	Sep	38	37 - 62.5	71	9
loc5	*Plecotus auritus*	Sep	3	3 - 3	3	2
loc6	*Myotis daubentonii*	May	3	3 - 27.5	3	3
loc6	*Myotis daubentonii*	Jun	61	3 - 27.5	61	1
loc6	*Myotis daubentonii*	Aug	3	3 - 27.5	3	1
loc6	*Myotis daubentonii*	Sep	3	3 - 27.5	52	3
loc6	*Pipistrellus pipistrellus*	May	66	20.5 - 72	96	9
loc6	*Pipistrellus pipistrellus*	Jun	98	20.5 - 72	99	2
loc6	*Pipistrellus pipistrellus*	Jul	21	20.5 - 72	52	4
loc6	*Pipistrellus pipistrellus*	Sep	3	20.5 - 72	3	1
loc6	*Pipistrellus pygmaeus*	May	83	38.5 - 68.5	98	9
loc6	*Pipistrellus pygmaeus*	Jun	98	38.5 - 68.5	99	2
loc6	*Pipistrellus*	Jul	52	38.5 -	79	11

	pygmaeus			68.5		
loc6	*Pipistrellus pygmaeus*	Aug	35	38.5 - 68.5	66	2
loc6	*Pipistrellus pygmaeus*	Sep	3	38.5 - 68.5	52	4
loc6	*Plecotus auritus*	May	28	3 - 52	52	2
loc6	*Plecotus auritus*	Jun	52	3 - 52	66	2
loc6	*Plecotus auritus*	Jul	3	3 - 52	3	1
loc7	*Myotis*	May	3	0	3	1
loc7	*Myotis daubentonii*	May	3	3 - 45	3	2
loc7	*Myotis daubentonii*	Jul	21	3 - 45	38	2
loc7	*Myotis daubentonii*	Aug	57	3 - 45	61	2
loc7	*Myotis daubentonii*	Sep	38	3 - 45	52	5
loc7	*Myotis nattereri*	Jul	3	0	3	1
loc7	*Pipistrellus pipistrellus*	May	66	27.5 - 52	96	9
loc7	*Pipistrellus pipistrellus*	Jun	94	27.5 - 52	97	2
loc7	*Pipistrellus pipistrellus*	Jul	52	27.5 - 52	83	11
loc7	*Pipistrellus pipistrellus*	Aug	38	27.5 - 52	52	4
loc7	*Pipistrellus pipistrellus*	Sep	3	27.5 - 52	71	8
loc7	*Pipistrellus pygmaeus*	May	3	61 - 81.5	61	3
loc7	*Pipistrellus pygmaeus*	Jun	52	61 - 81.5	66	2
loc7	*Pipistrellus pygmaeus*	Jul	79	61 - 81.5	96	12
loc7	*Pipistrellus pygmaeus*	Aug	79	61 - 81.5	90	4
loc7	*Pipistrellus pygmaeus*	Sep	84	61 - 81.5	88	11
loc7	*Plecotus auritus*	May	38	3 - 3	38	1
loc7	*Plecotus auritus*	Jul	3	3 - 3	3	1

loc7	*Plecotus auritus*	Sep	3	3 - 3	3	1
loc8	*Myotis daubentonii*	Jun	3	3 - 20.5	3	1
loc8	*Myotis daubentonii*	Aug	3	3 - 20.5	3	3
loc8	*Myotis daubentonii*	Sep	3	3 - 20.5	66	7
loc8	*Myotis nattereri*	Sep	3	3 - 3	38	3
loc8	*Pipistrellus pipistrellus*	Jun	66	3 - 32	66	1
loc8	*Pipistrellus pipistrellus*	Jul	3	3 - 32	61	6
loc8	*Pipistrellus pipistrellus*	Aug	3	3 - 32	3	1
loc8	*Pipistrellus pygmaeus*	May	52	52 - 69.5	74	6
loc8	*Pipistrellus pygmaeus*	Jun	52	52 - 69.5	61	3
loc8	*Pipistrellus pygmaeus*	Jul	78	52 - 69.5	96	13
loc8	*Pipistrellus pygmaeus*	Aug	66	52 - 69.5	89	4
loc8	*Pipistrellus pygmaeus*	Sep	38	52 - 69.5	71	6
loc8	*Plecotus auritus*	Jul	3	3 - 3	3	1
loc8	*Plecotus auritus*	Aug	3	3 - 3	3	1
loc8	*Plecotus auritus*	Sep	3	3 - 3	3	1
loc9	*Myotis*	May	38	0	38	1
loc9	*Myotis daubentonii*	Jul	21	20.5 - 20.5	38	2
loc9	*Myotis nattereri*	Aug	3	0	3	1
loc9	*Pipistrellus pipistrellus*	May	52	3 - 52	52	4
loc9	*Pipistrellus pipistrellus*	Jun	28	3 - 52	52	2
loc9	*Pipistrellus pipistrellus*	Jul	38	3 - 52	38	2
loc9	*Pipistrellus pipistrellus*	Aug	3	3 - 52	3	2

loc9	*Pipistrellus pygmaeus*	May	38	52 - 78	86	5
loc9	*Pipistrellus pygmaeus*	Jun	65	52 - 78	78	2
loc9	*Pipistrellus pygmaeus*	Jul	85	52 - 78	98	12
loc9	*Pipistrellus pygmaeus*	Aug	77	52 - 78	90	4
loc9	*Pipistrellus pygmaeus*	Sep	64	52 - 78	76	6
loc9	*Plecotus auritus*	Jul	3	3 - 52	3	1
loc9	*Plecotus auritus*	Sep	45	3 - 52	52	2

PER SITE

In this 'Per Site' section of the analysis, all values are taken from across all of the detectors to provide site-wide averages/medians.

Table 7. Summary table showing the number of nights recorded bat activity fell into each activity band for each species.

Species/Species Group	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
Myotis	0	1	2	7	4
Myotis daubentonii	1	16	15	40	87
Myotis nattereri	0	0	1	3	19
Pipistrellus pipistrellus	28	31	21	44	93
Pipistrellus pygmaeus	91	108	42	54	77
Plecotus auritus	0	4	2	12	41

Table 8. Summary table showing key metrics for each species recorded.

Species/Species Group	Median Percentile	95% CIs	Max Percentile	Nights Recorded
Myotis	38	54.5 - 54.5	71	14
Myotis daubentonii	3	3 - 45	83	159
Myotis nattereri	3	3 - 3	52	23
Pipistrellus pipistrellus	38	47 - 79	99	217
Pipistrellus pygmaeus	61	74 - 89.5	99	372
Plecotus auritus	3	3 - 52	66	59

###Figures

Figure 4. The activity level (percentile) of bats recorded across each night of the bat survey for the **entire site**.

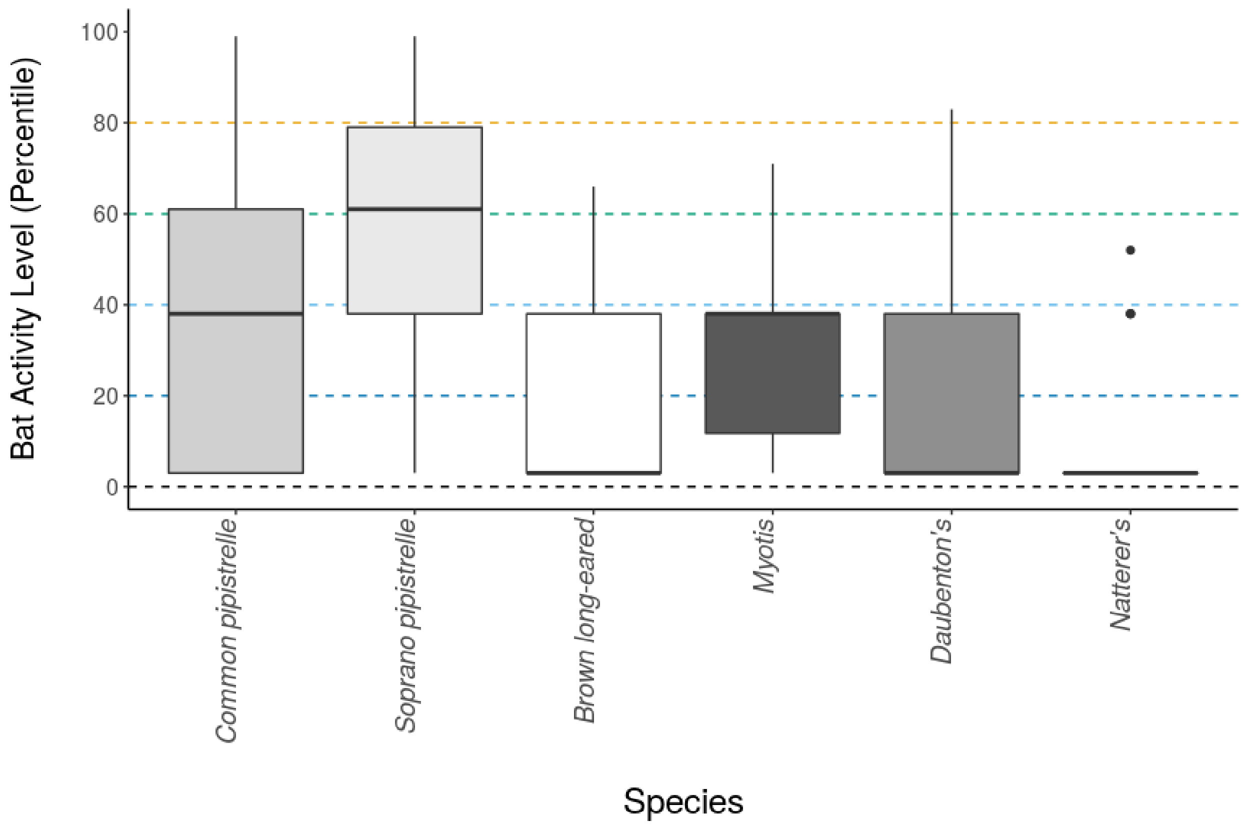
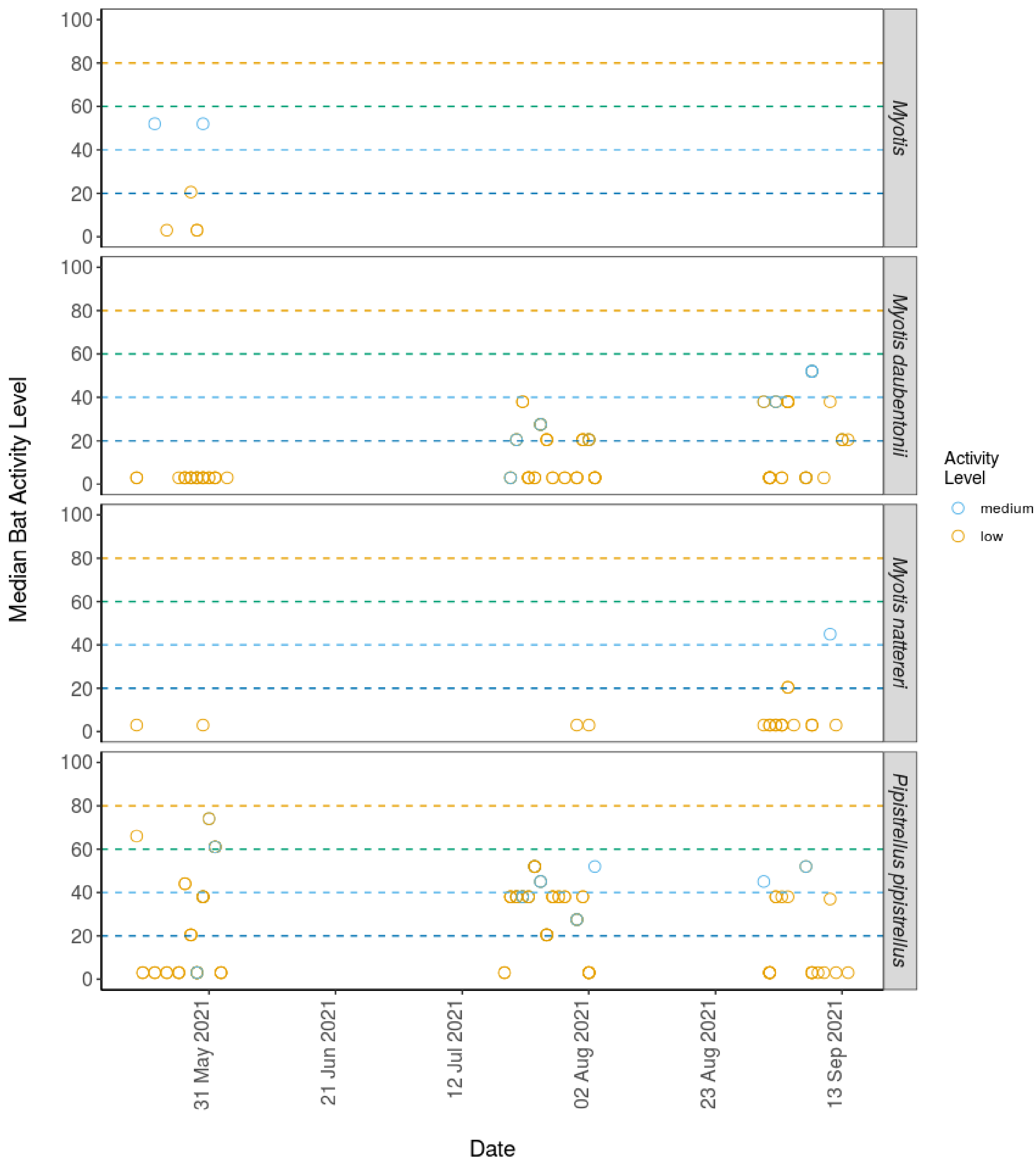
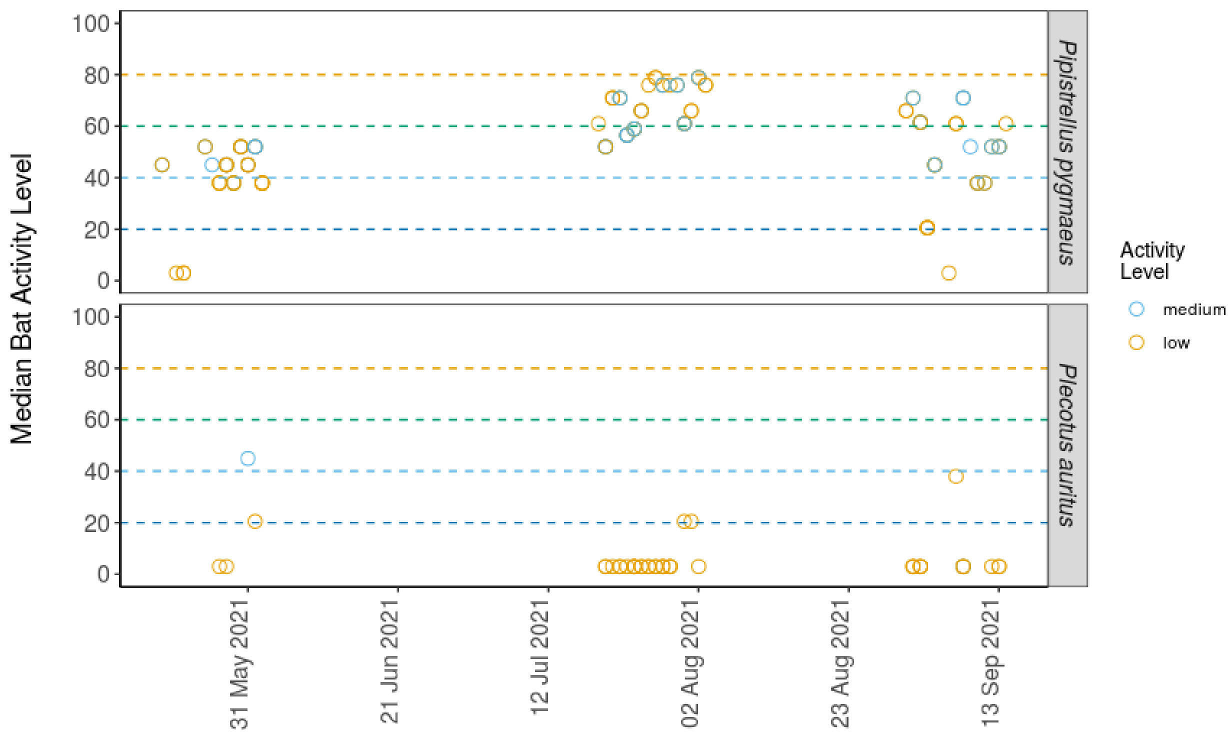


Figure 5. The median activity levels of bats recorded across all detectors each night.



Median Bat Activity Level
Myotis
Myotis daubentonii
Myotis nattereri
Pipistrellus pipistrellus
100
80
60
40
20
0
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Date
Activity Level
medium
low



Median Bat Activity Level
100
80
60
40
20
0
Pipistrellus pygmaeus
Plecotus auritus
31 May 2021
21 Jun 2021
12 Jul 2021
02 Aug 2021
23 Aug 2021
13 Sep 2021
Activity Level
medium
low

Date

PER SITE, PER MONTH

Table 9. Summary table showing the number of nights recorded bat activity fell into each activity band for each species during each month.

Species/Species Group	Month	Nights of High Activity	Nights of Moderate/ High Activity	Nights of Moderate Activity	Nights of Low/ Moderate Activity	Nights of Low Activity
Myotis	May	0	1	2	4	4
Myotis	Jun	0	0	0	3	0
Myotis daubentonii	May	0	0	1	5	18
Myotis daubentonii	Jun	0	1	0	1	4
Myotis daubentonii	Jul	0	3	5	12	26
Myotis daubentonii	Aug	0	3	2	8	12
Myotis daubentonii	Sep	1	9	7	14	27
Myotis nattereri	May	0	0	0	0	2
Myotis nattereri	Jul	0	0	0	0	1
Myotis nattereri	Aug	0	0	0	0	2
Myotis nattereri	Sep	0	0	1	3	14
Pipistrellus pipistrellus	May	6	5	4	5	26
Pipistrellus pipistrellus	Jun	4	4	1	0	7
Pipistrellus pipistrellus	Jul	11	13	13	25	32
Pipistrellus pipistrellus	Aug	5	2	2	6	7
Pipistrellus pipistrellus	Sep	2	7	1	8	21
Pipistrellus pygmaeus	May	10	12	8	13	20
Pipistrellus pygmaeus	Jun	4	5	2	6	6
Pipistrellus	Jul	43	55	18	11	21

pygmaeus						
Pipistrellus pygmaeus	Aug	13	14	1	4	8
Pipistrellus pygmaeus	Sep	21	22	13	20	22
Plecotus auritus	May	0	0	1	1	2
Plecotus auritus	Jun	0	1	0	1	1
Plecotus auritus	Jul	0	1	0	4	23
Plecotus auritus	Aug	0	0	0	2	2
Plecotus auritus	Sep	0	2	1	4	13

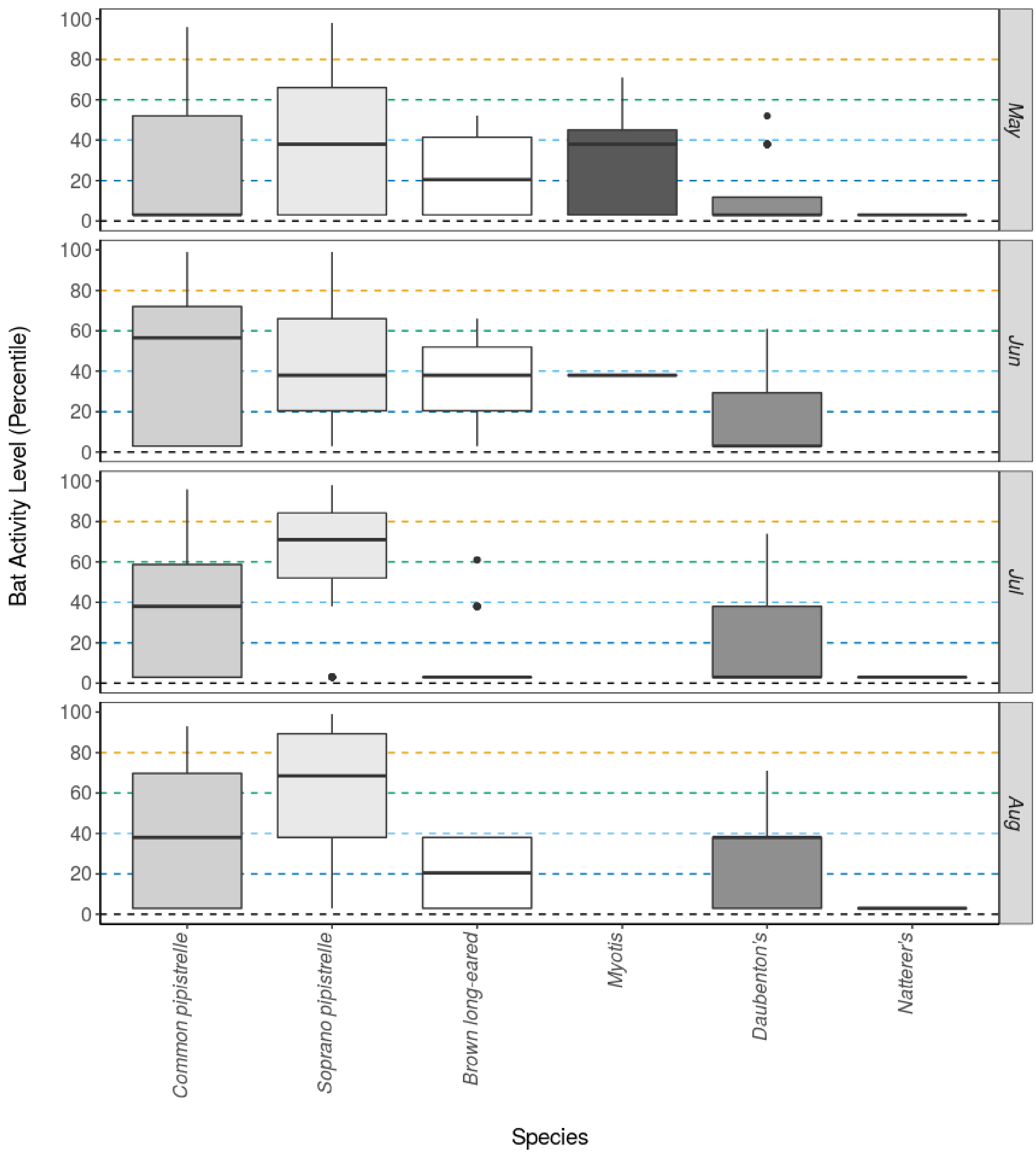
Table 10. Summary table showing key metrics for each species recorded per month.

Species/Species Group	Month	Median Percentile	95% CIs	Max Percentile	Nights Recorded
Myotis	May	38	54.5 - 54.5	71	11
Myotis	Jun	38	54.5 - 54.5	38	3
Myotis daubentonii	May	3	3 - 45	52	24
Myotis daubentonii	Jun	3	3 - 27.5	61	6
Myotis daubentonii	Jul	3	3 - 45	74	46
Myotis daubentonii	Aug	38	3 - 45	71	25
Myotis daubentonii	Sep	38	3 - 45	83	58
Myotis nattereri	May	3	3 - 3	3	2
Myotis nattereri	Jul	3	0	3	1
Myotis nattereri	Aug	3	3 - 3	3	2
Myotis nattereri	Sep	3	3 - 3	52	18
Pipistrellus pipistrellus	May	3	47 - 79	96	46
Pipistrellus pipistrellus	Jun	57	47 - 79	99	16
Pipistrellus pipistrellus	Jul	38	47 - 79	96	94
Pipistrellus pipistrellus	Aug	38	47 - 79	93	22
Pipistrellus pipistrellus	Sep	3	47 - 79	86	39
Pipistrellus pygmaeus	May	38	74 - 89.5	98	63
Pipistrellus pygmaeus	Jun	38	74 - 89.5	99	23
Pipistrellus pygmaeus	Jul	71	74 - 89.5	98	148
Pipistrellus pygmaeus	Aug	69	74 - 89.5	99	40
Pipistrellus pygmaeus	Sep	52	74 - 89.5	96	98
Plecotus auritus	May	21	3 - 52	52	4

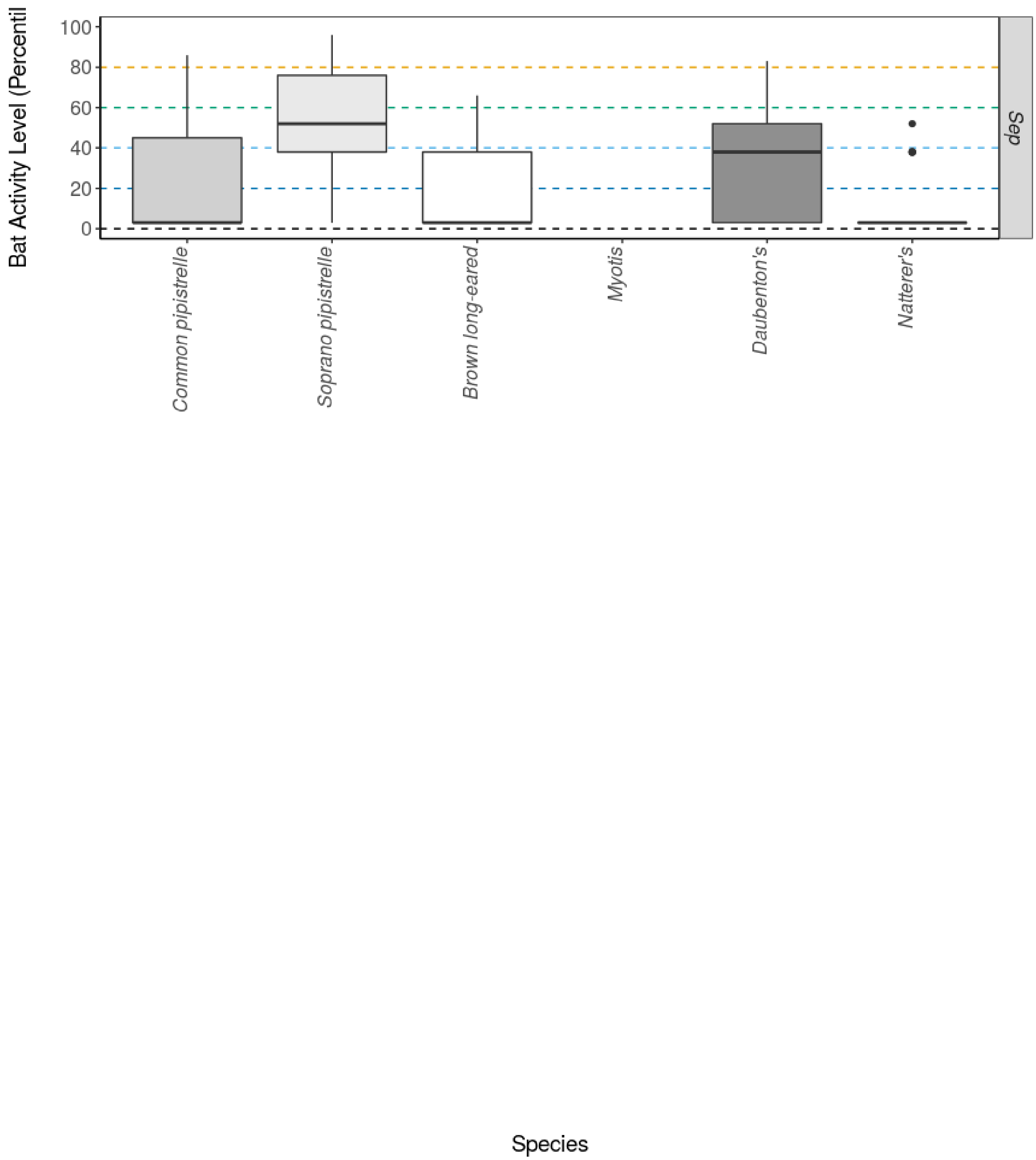
Plecotus auritus	Jun	38	3 - 52	66	3
Plecotus auritus	Jul	3	3 - 52	61	28
Plecotus auritus	Aug	21	3 - 38	38	4
Plecotus auritus	Sep	3	3 - 52	66	20

###Figures

Figure 6. The activity level (percentile) of bats recorded across each night of the bat survey for the entire site, split between months.



Bat Activity Level (Percentile)
100
80
60
40
20
0
May
Jun
Jul
Aug
Common pipistrelle
Soprano pipistrelle
Brown long-eared
Myotis
Daubenton's
Natterer's
Species



Bat Activity Level (Percentil
100
80
60
40
20
0
Common pipistrelle
Soprano pipistrelle
Brown long-eared
Myotis
Daubenton's
Natterer's
Sep
Species

PART 2: Nightly Analysis

ENTIRE SURVEY PERIOD

Sunrise and Sunset Times

Table 11. The times of sunset and sunrise the following morning for surveys beginning on the date shown.

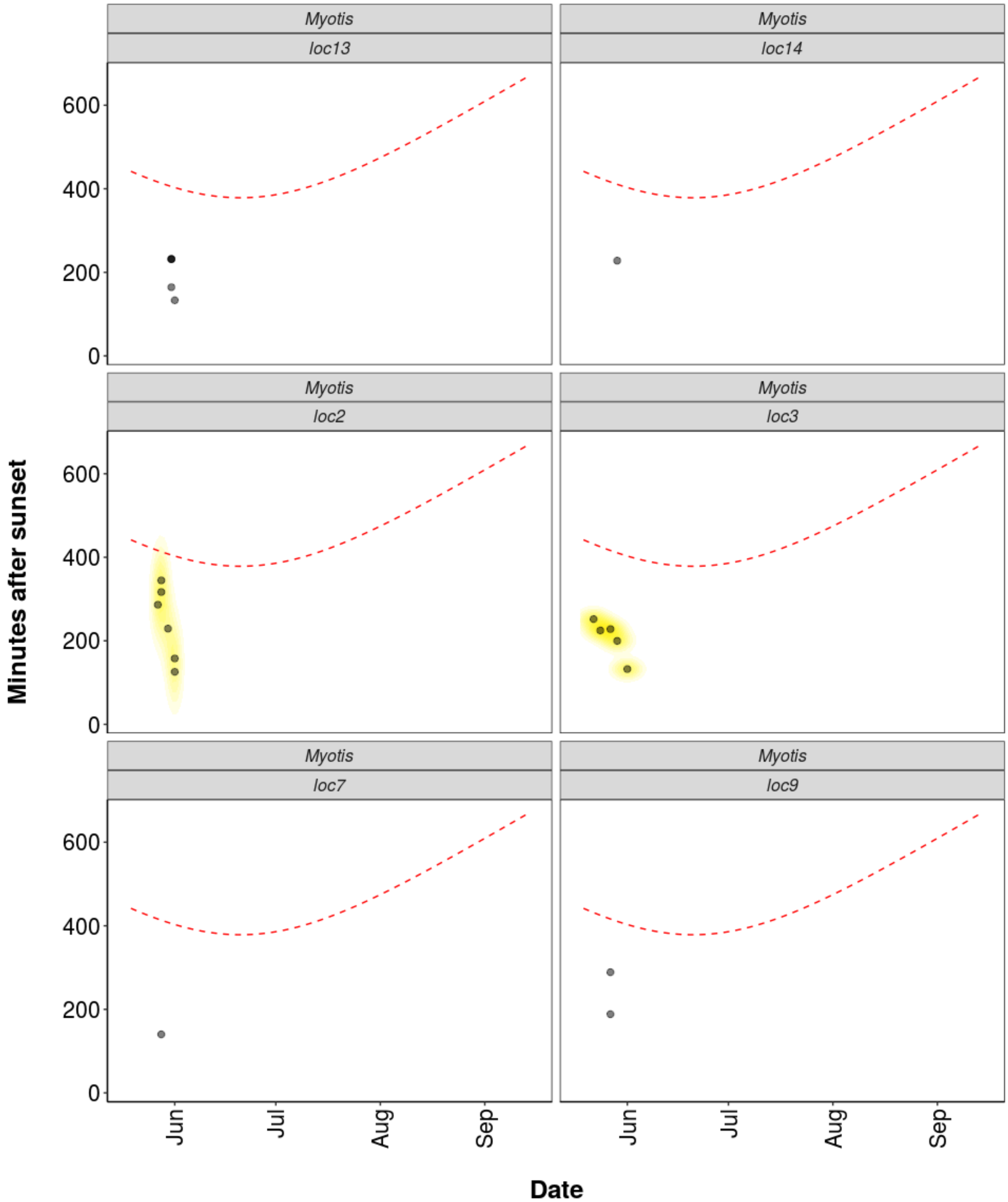
Night (y-m-d)	Sunset (hh:mm)	Sunrise (hh:mm)	Night Length (hours)
2021-05-19	21:36	04:58	7.4
2021-05-20	21:38	04:56	7.3
2021-05-21	21:40	04:54	7.2
2021-05-22	21:41	04:53	7.2
2021-05-24	21:45	04:50	7.1
2021-05-25	21:46	04:49	7.0
2021-05-26	21:48	04:47	7.0
2021-05-27	21:50	04:46	6.9
2021-05-28	21:51	04:45	6.9
2021-05-29	21:53	04:43	6.8
2021-05-30	21:54	04:42	6.8
2021-05-31	21:56	04:41	6.8
2021-06-01	21:57	04:40	6.7
2021-06-02	21:58	04:39	6.7
2021-06-03	22:00	04:38	6.6
2021-07-19	21:54	05:02	7.1
2021-07-20	21:53	05:04	7.2
2021-07-21	21:51	05:05	7.2
2021-07-22	21:49	05:07	7.3
2021-07-23	21:48	05:09	7.4
2021-07-24	21:46	05:11	7.4
2021-07-25	21:44	05:12	7.5
2021-07-26	21:42	05:14	7.5
2021-07-27	21:41	05:16	7.6
2021-07-28	21:39	05:18	7.7
2021-07-29	21:37	05:20	7.7
2021-07-30	21:35	05:22	7.8

2021-07-31	21:33	05:24	7.8
2021-08-01	21:31	05:26	7.9
2021-08-02	21:29	05:28	8.0
2021-08-03	21:27	05:29	8.0
2021-08-31	20:20	06:25	10.1
2021-09-01	20:18	06:27	10.2
2021-09-02	20:15	06:29	10.2
2021-09-03	20:12	06:31	10.3
2021-09-04	20:10	06:33	10.4
2021-09-05	20:07	06:35	10.5
2021-09-06	20:04	06:37	10.5
2021-09-07	20:02	06:39	10.6
2021-09-08	19:59	06:41	10.7
2021-09-09	19:56	06:43	10.8
2021-09-10	19:54	06:45	10.8
2021-09-11	19:51	06:47	10.9
2021-09-12	19:48	06:49	11.0
2021-09-13	19:46	06:51	11.1
2021-09-14	19:43	06:53	11.2

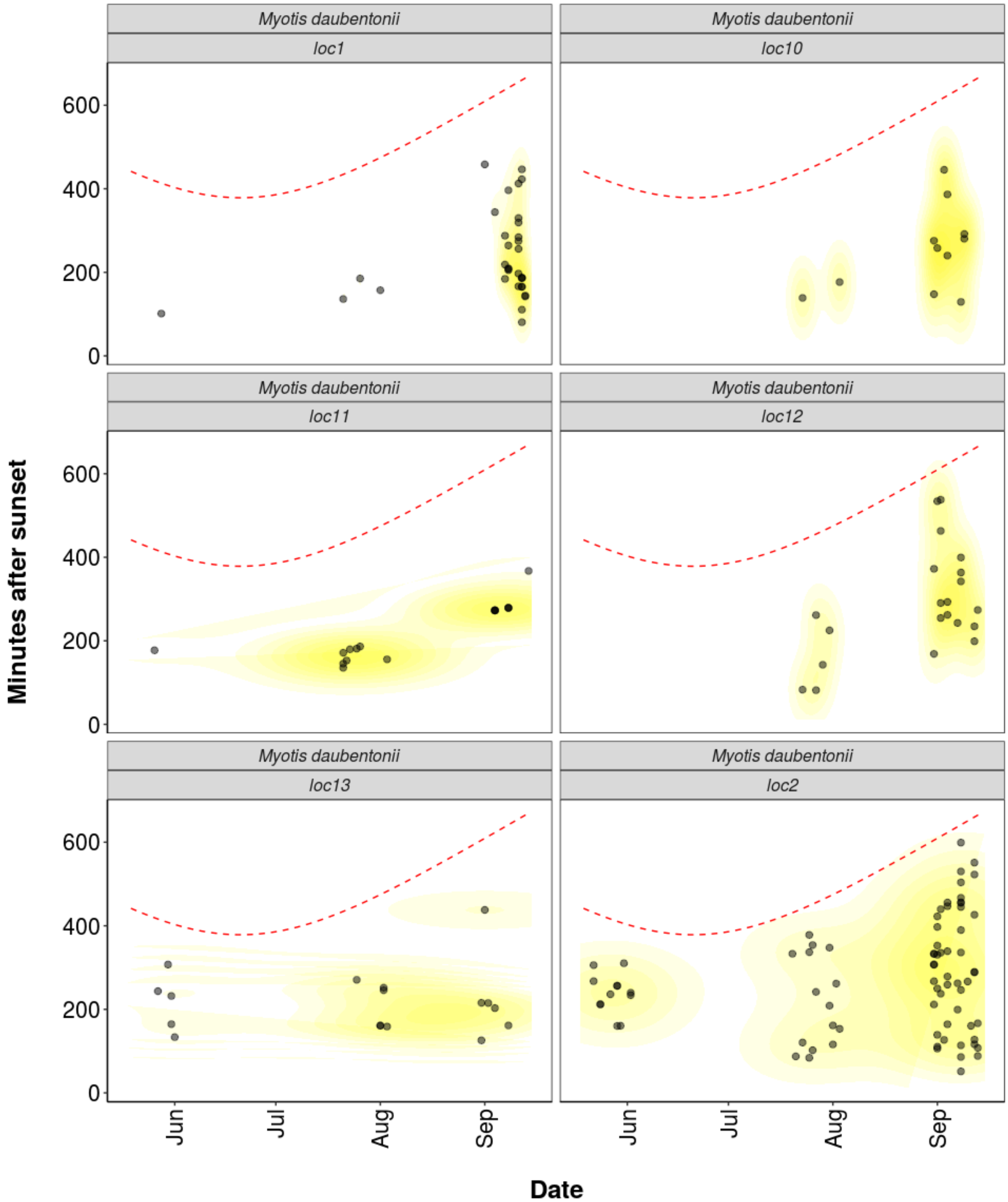
Distribution of Bat Activity Across the Night through Time

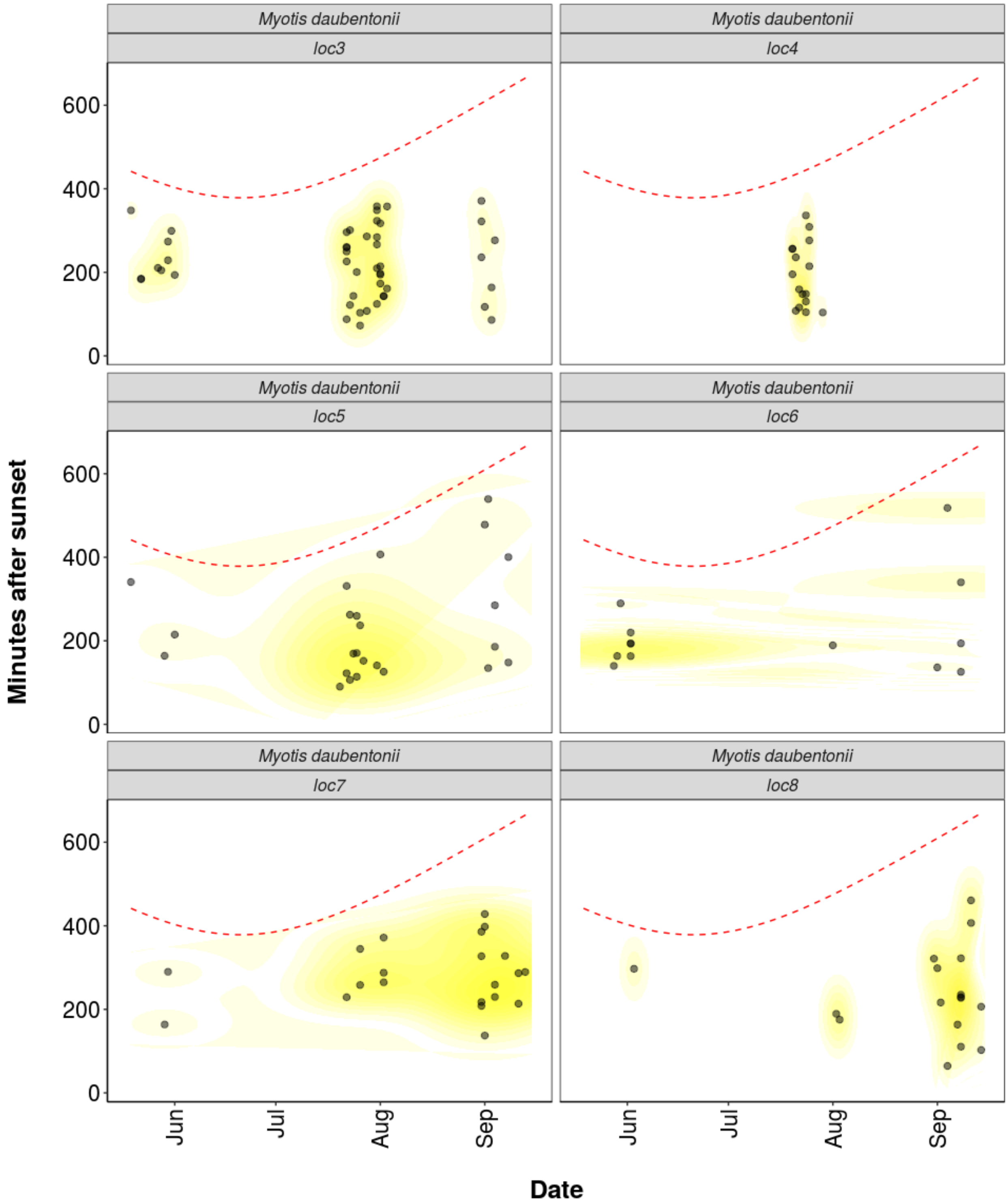
Per Detector

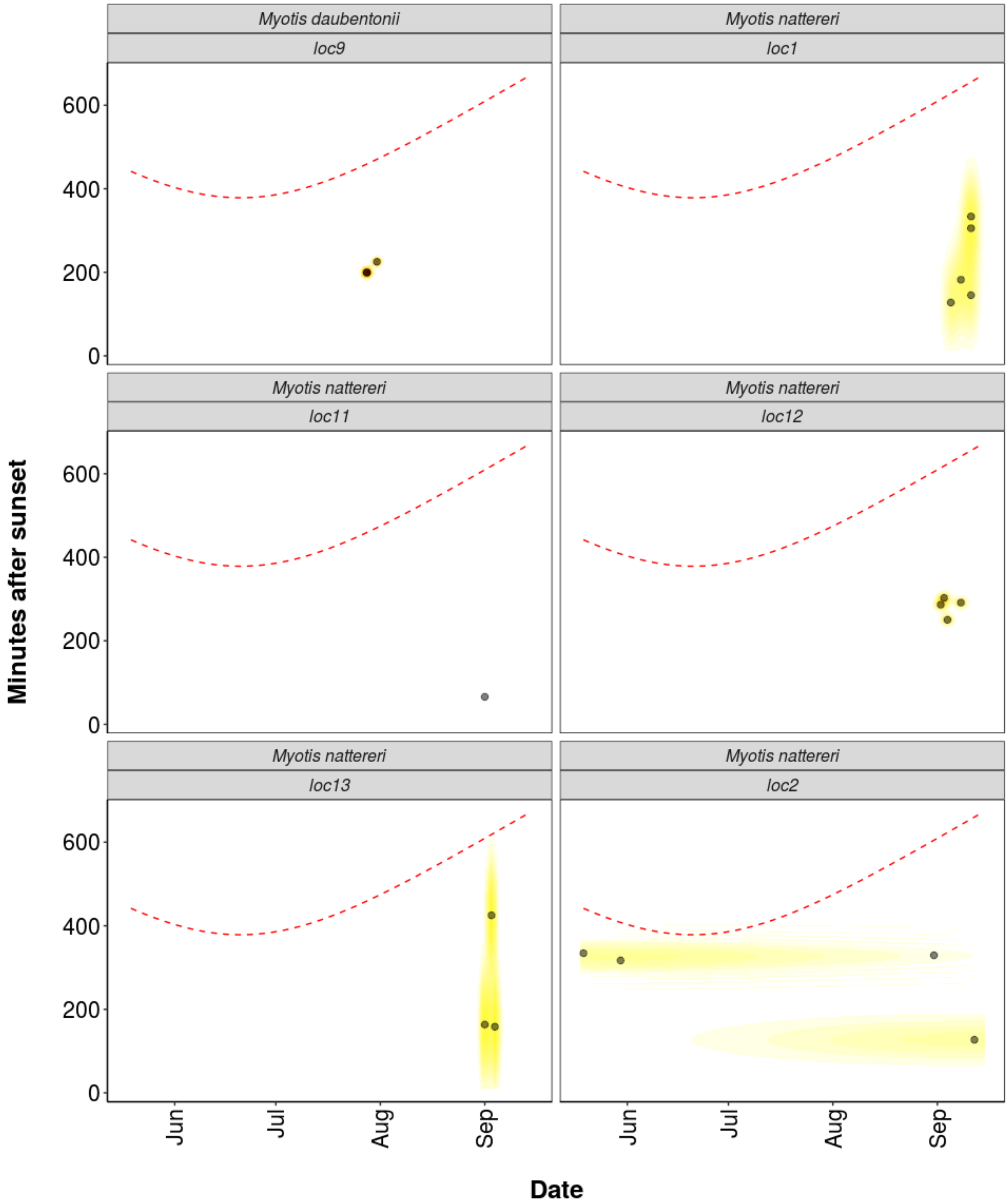
Figure 7. Timing of bat calls plotted as minutes before/after sunset, whereby 0 on the y axis represents sunset. Sunrise throughout the survey period is depicted as the red dashed line. Colours indicate kernel densities, with darkest colours showing peaks of activity. These colours are comparative only within each plot, and do not account for overall activity.



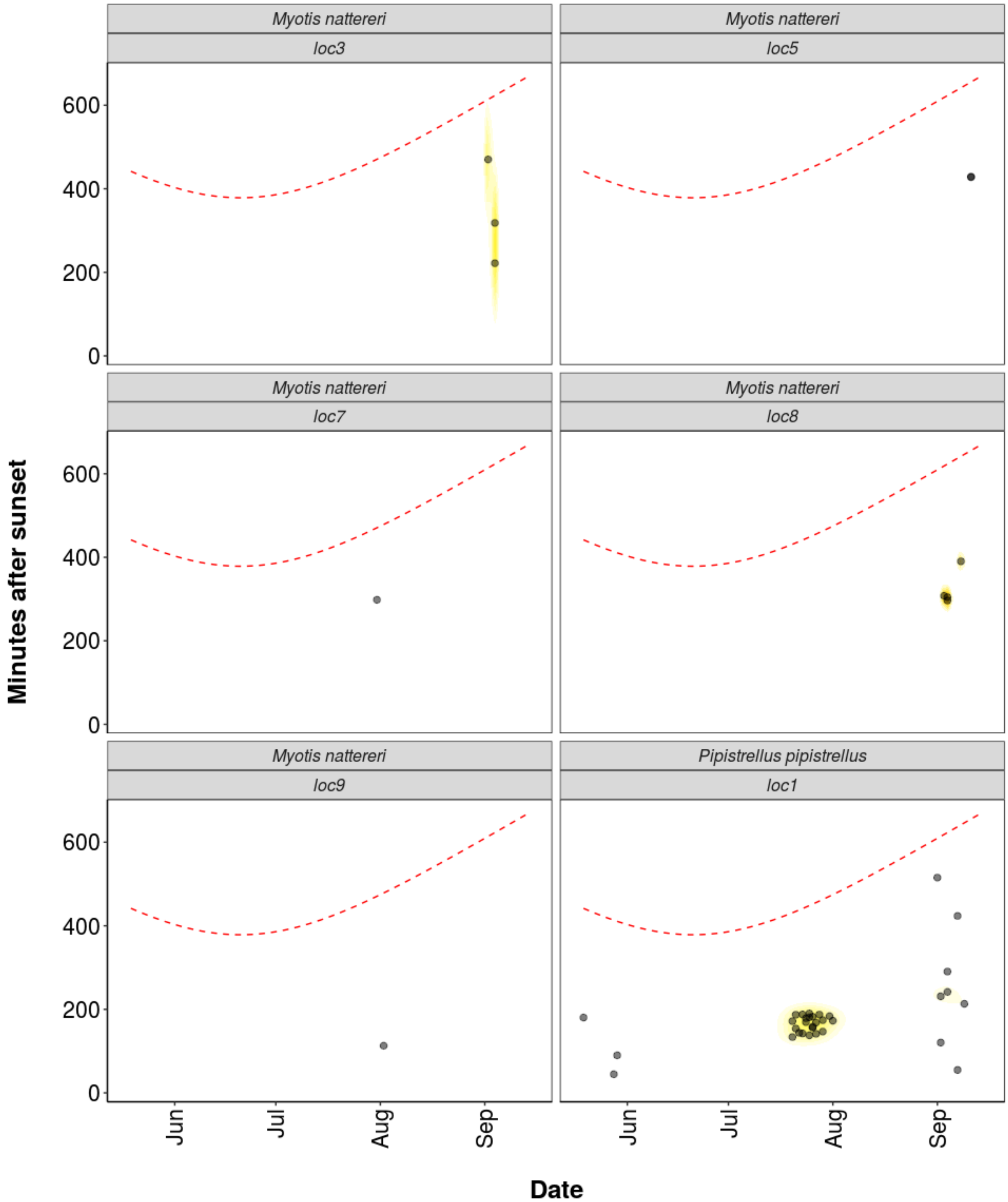
Myotis
loc13
Myotis
loc14
Myotis
loc2
Myotis
loc3
Myotis
loc7
Myotis
loc9
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Date

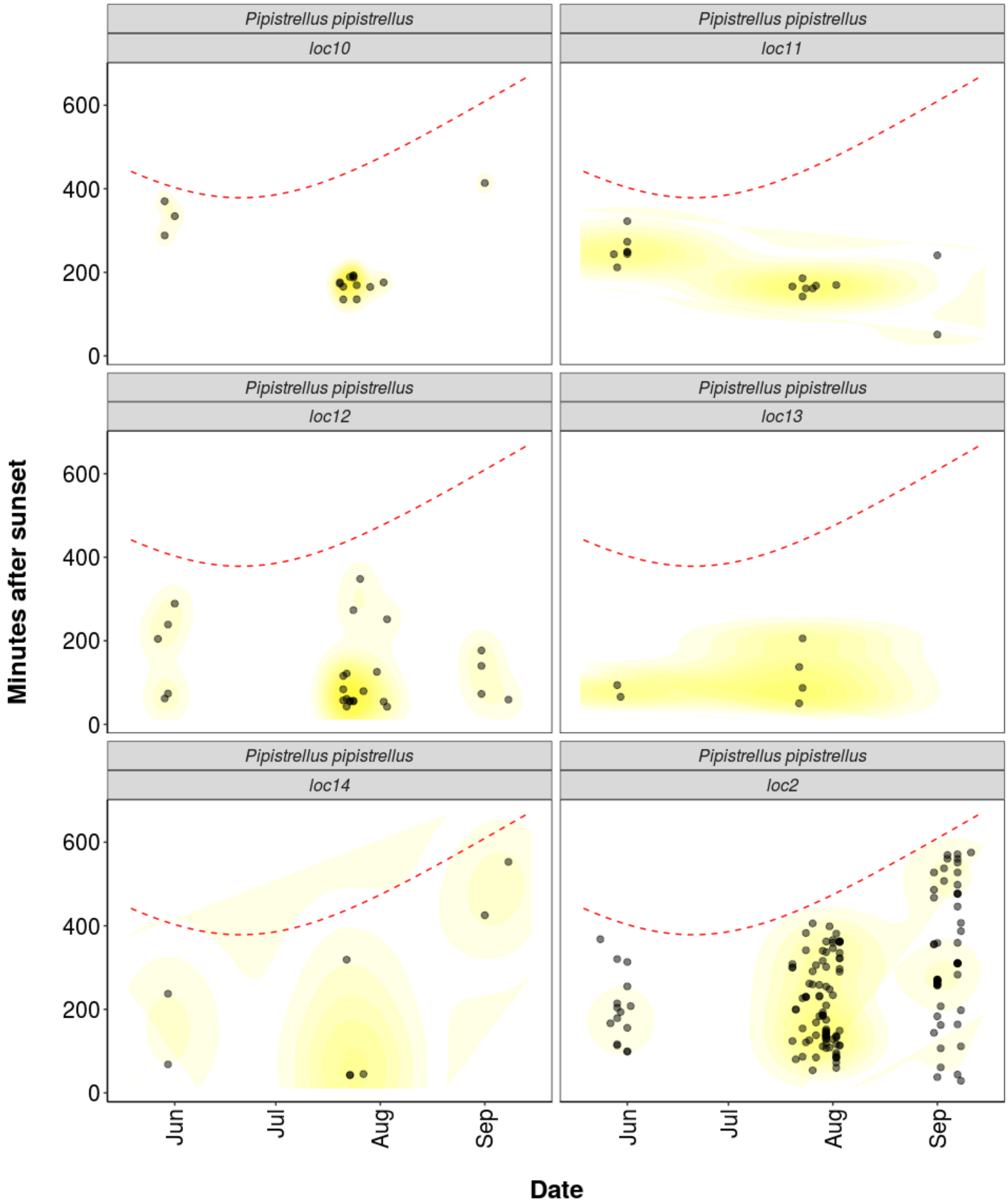

Myotis daubentonii
loc1
Myotis daubentonii
loc10
Myotis daubentonii
loc11
Myotis daubentonii
loc12
Myotis daubentonii
loc13
Myotis daubentonii
loc2
Minutes after sunset
600
400
200
0
Jun
Jul
Aug
Sep
Date


Myotis daubentonii
loc3
Myotis daubentonii
loc4
Myotis daubentonii
loc5
Myotis daubentonii
loc6
Myotis daubentonii
loc7
Myotis daubentonii
loc8
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Date

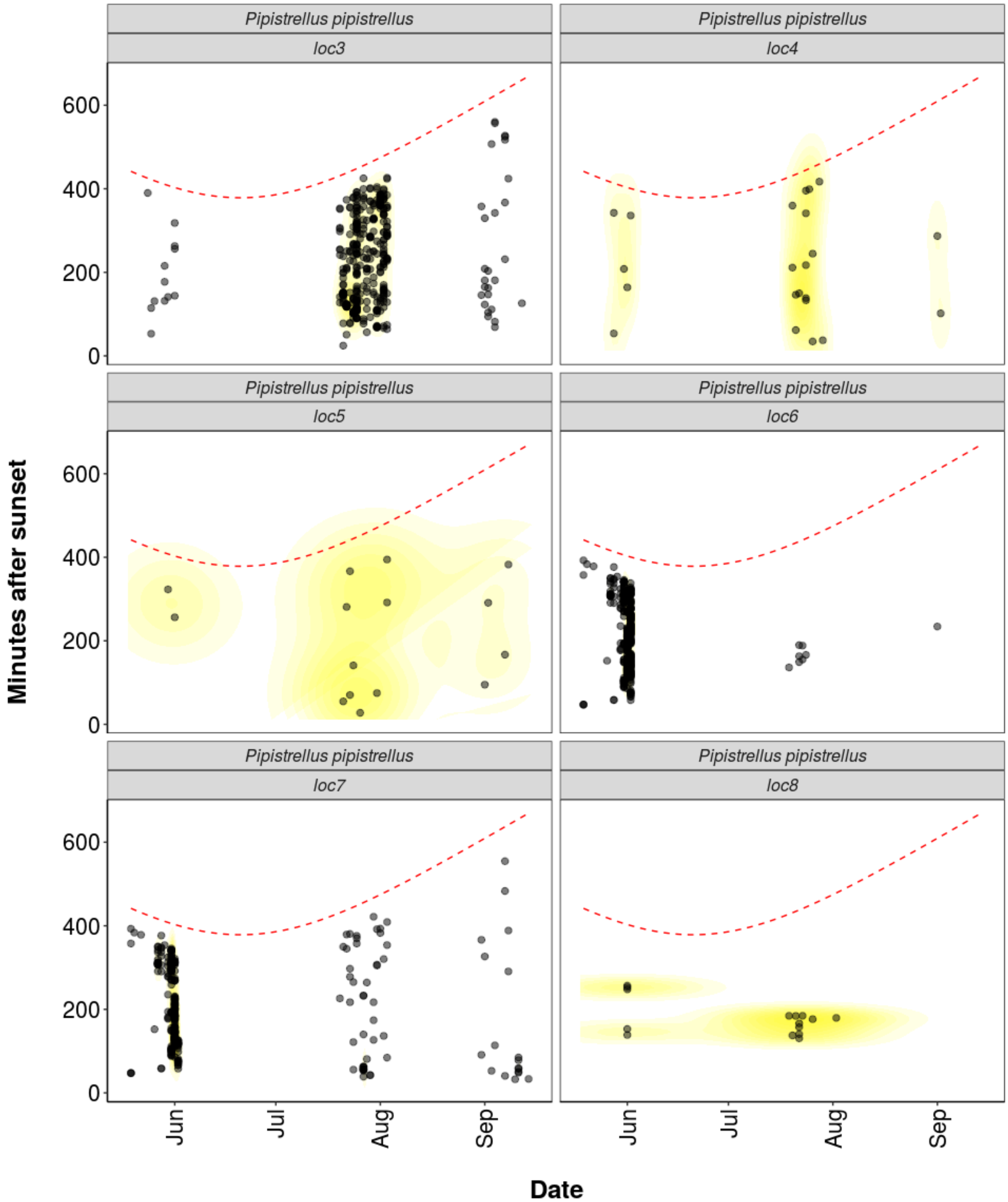


Myotis daubentonii
loc9
Myotis nattereri
loc1
Myotis nattereri
loc11
Myotis nattereri
loc12
Myotis nattereri
loc13
Myotis nattereri
loc2
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Date

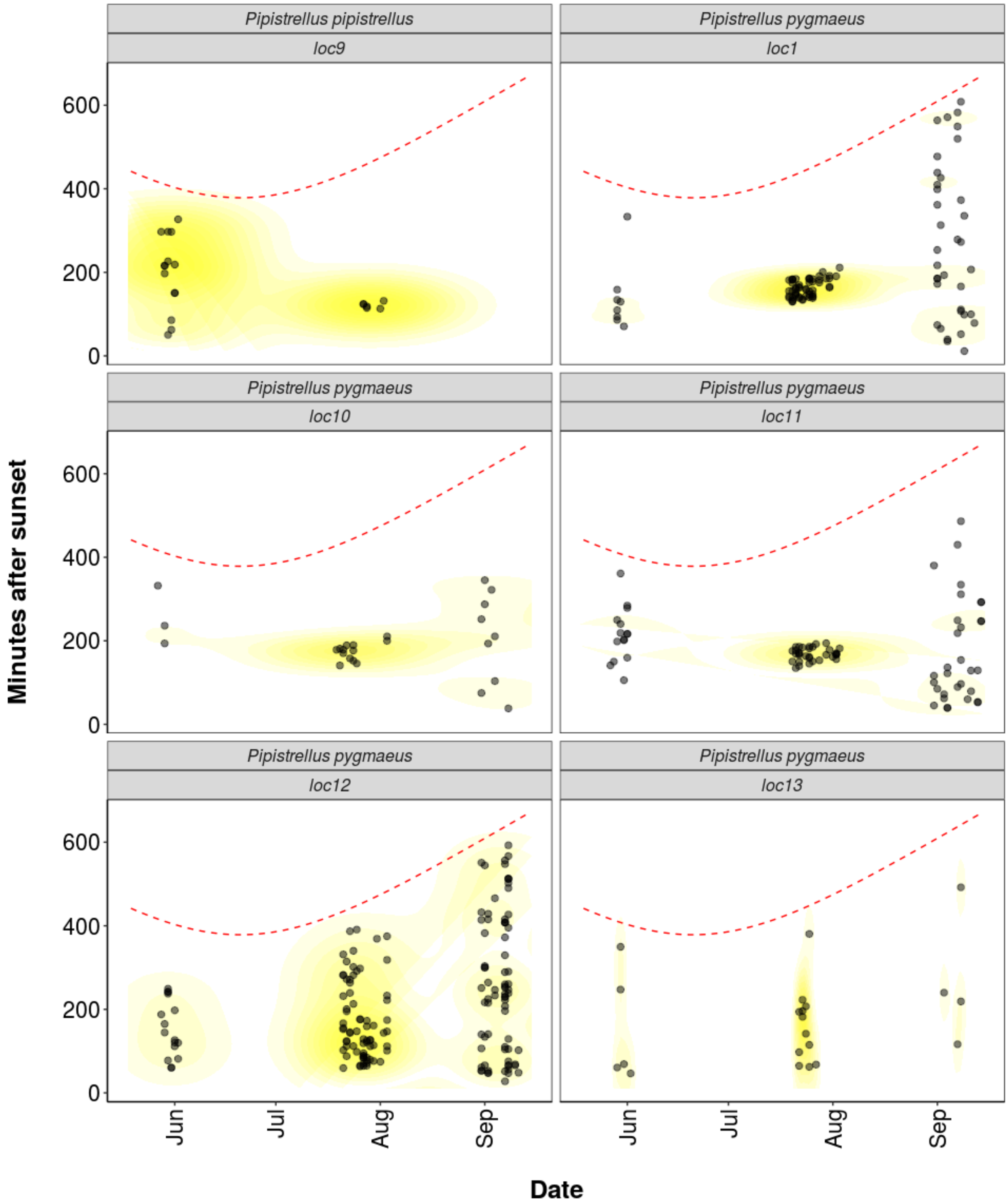

Myotis nattereri
loc3
Myotis nattereri
loc5
Myotis nattereri
loc7
Myotis nattereri
loc8
Myotis nattereri
loc9
Pipistrellus pipistrellus
loc1
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Date



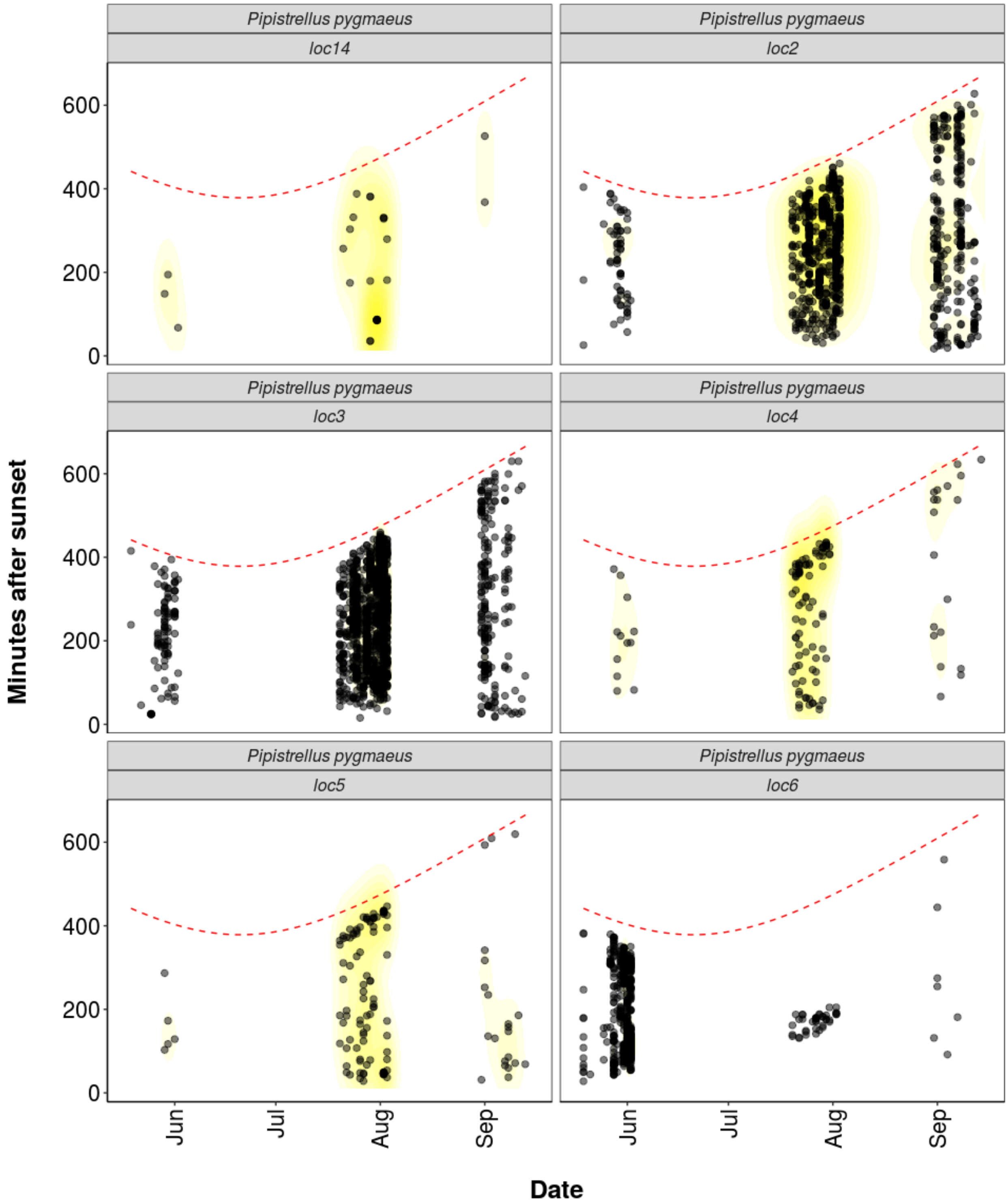
Pipistrellus pipistrellus
loc10
Pipistrellus pipistrellus
loc11
Pipistrellus pipistrellus
loc12
Pipistrellus pipistrellus
loc13
Pipistrellus pipistrellus
loc14
Pipistrellus pipistrellus
loc2
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Date

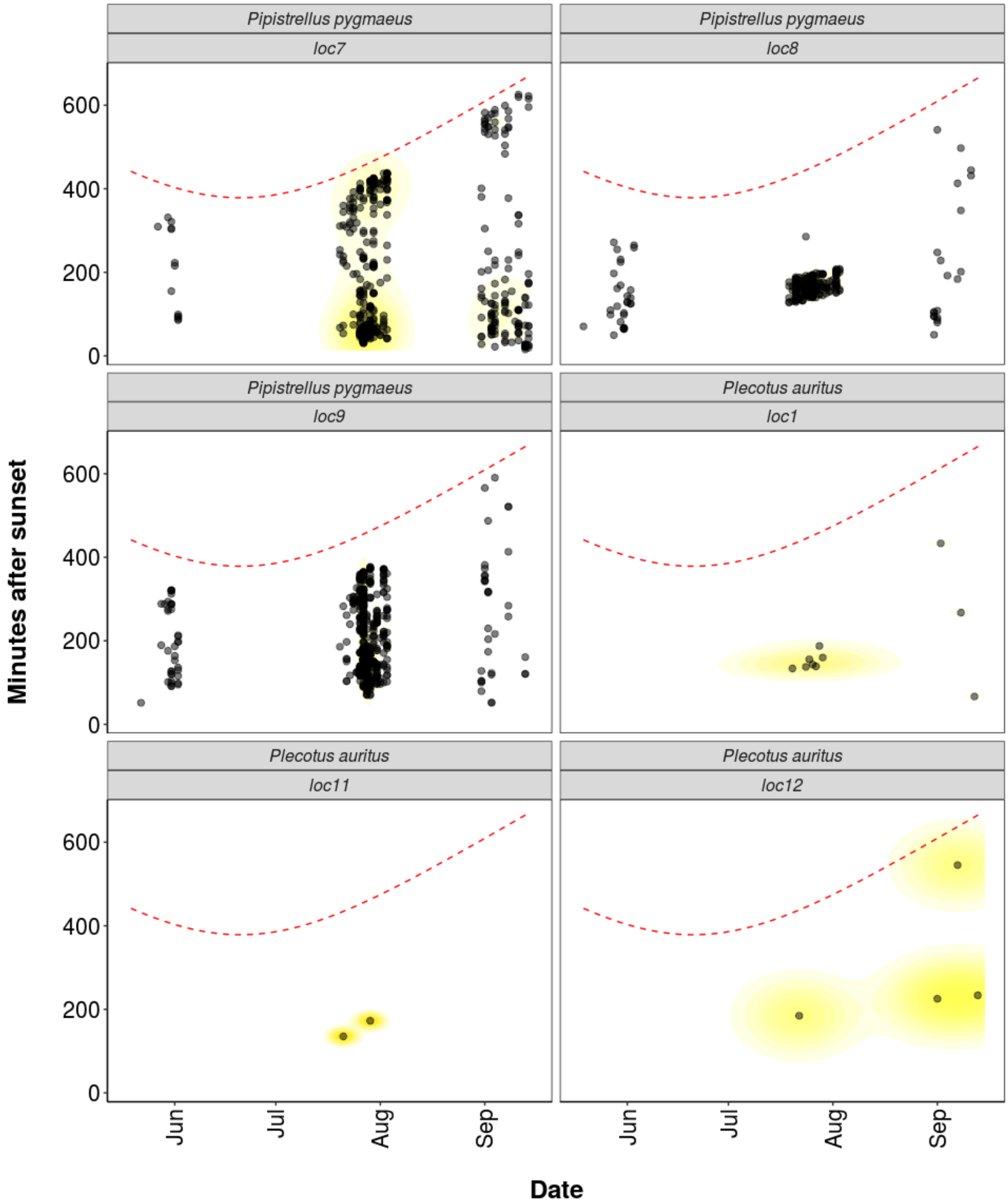


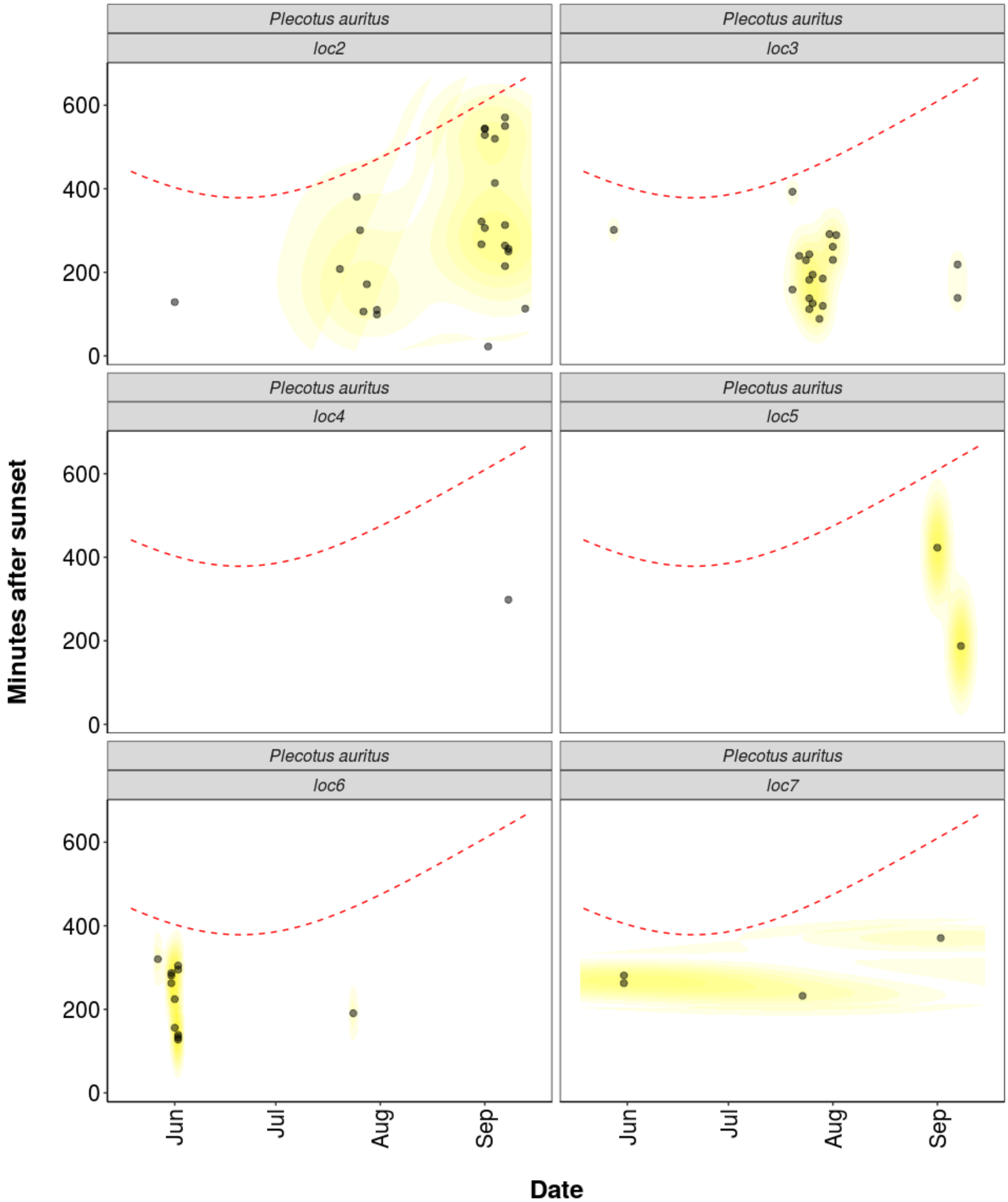
Pipistrellus pipistrellus
loc3
Pipistrellus pipistrellus
loc4
Pipistrellus pipistrellus
loc5
Pipistrellus pipistrellus
loc6
Pipistrellus pipistrellus
loc7
Pipistrellus pipistrellus
loc8
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Date

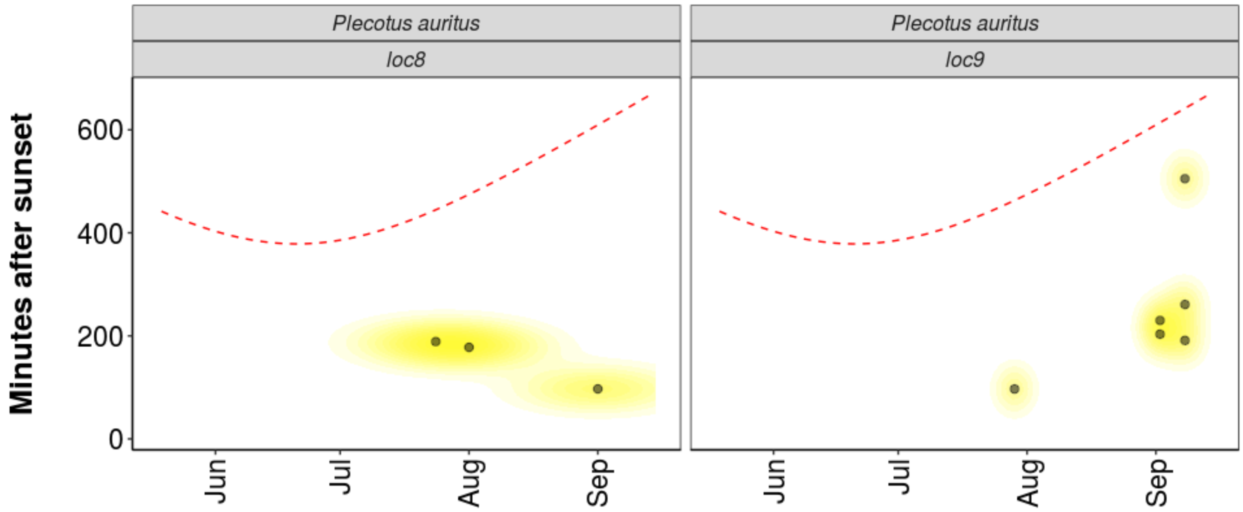


Pipistrellus pipistrellus
loc9
Pipistrellus pygmaeus
loc1
Pipistrellus pygmaeus
loc10
Pipistrellus pygmaeus
loc11
Pipistrellus pygmaeus
loc12
Pipistrellus pygmaeus
loc13
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Date


Pipistrellus pygmaeus
loc14
Pipistrellus pygmaeus
loc2
Pipistrellus pygmaeus
loc3
Pipistrellus pygmaeus
loc4
Pipistrellus pygmaeus
loc5
Pipistrellus pygmaeus
loc6
Minutes after sunset
0
200
400
600
Jun
Jul
Aug
Sep
Date


Pipistrellus pygmaeus
loc7
Pipistrellus pygmaeus
loc8
Pipistrellus pygmaeus
loc9
Plecotus auritus
loc1
Plecotus auritus
loc11
Plecotus auritus
loc12
Minutes after sunset
600
400
200
0
Jun
Jul
Aug
Sep
Date


Plecotus auritus
loc2
Plecotus auritus
loc3
Plecotus auritus
loc4
Plecotus auritus
loc5
Plecotus auritus
loc6
Plecotus auritus
loc7
Minutes after sunset
600
400
200
0
Jun
Jul
Aug
Sep
Date


Plecotus auritus
loc8
Plecotus auritus
loc9
Minutes after sunset
600
400
200
0
Jun
Jul
Aug
Sep
Jun
Jul
Aug
Sep

Date

Roost Emergence Time and Bat Observation

Based on: *Russ, Jon. 2012. British Bat Calls a Guide to species Identification. Pelagic Publishing.*

For more information see https://rbats-blog.updog.co/2018/05/29/bat-emergence/

Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Table

Table 12. Number of bat calls recorded before the upper time of the species-specific emergence time range, and which therefore may potentially indicate the presence of a nearby roost.

Table continues below

Species	Detector ID	2021-05-19	2021-05-25	2021-07-21	2021-07-26	2021-08-31
Common pipistrelle	loc2	0	0	0	0	0
Common pipistrelle	loc3	0	0	1	0	0
Common pipistrelle	loc5	0	0	0	1	0
Soprano pipistrelle	loc1	0	0	0	0	0
Soprano pipistrelle	loc12	0	0	0	0	0
Soprano pipistrelle	loc2	1	0	0	0	1
Soprano pipistrelle	loc3	0	7	0	1	2
Soprano pipistrelle	loc6	1	0	0	0	0
Soprano pipistrelle	loc7	0	0	0	0	1
Brown long-eared	loc2	0	0	0	0	0
Daubenton’s	loc2	0	0	0	0	0
Daubenton’s	loc8	0	0	0	0	0

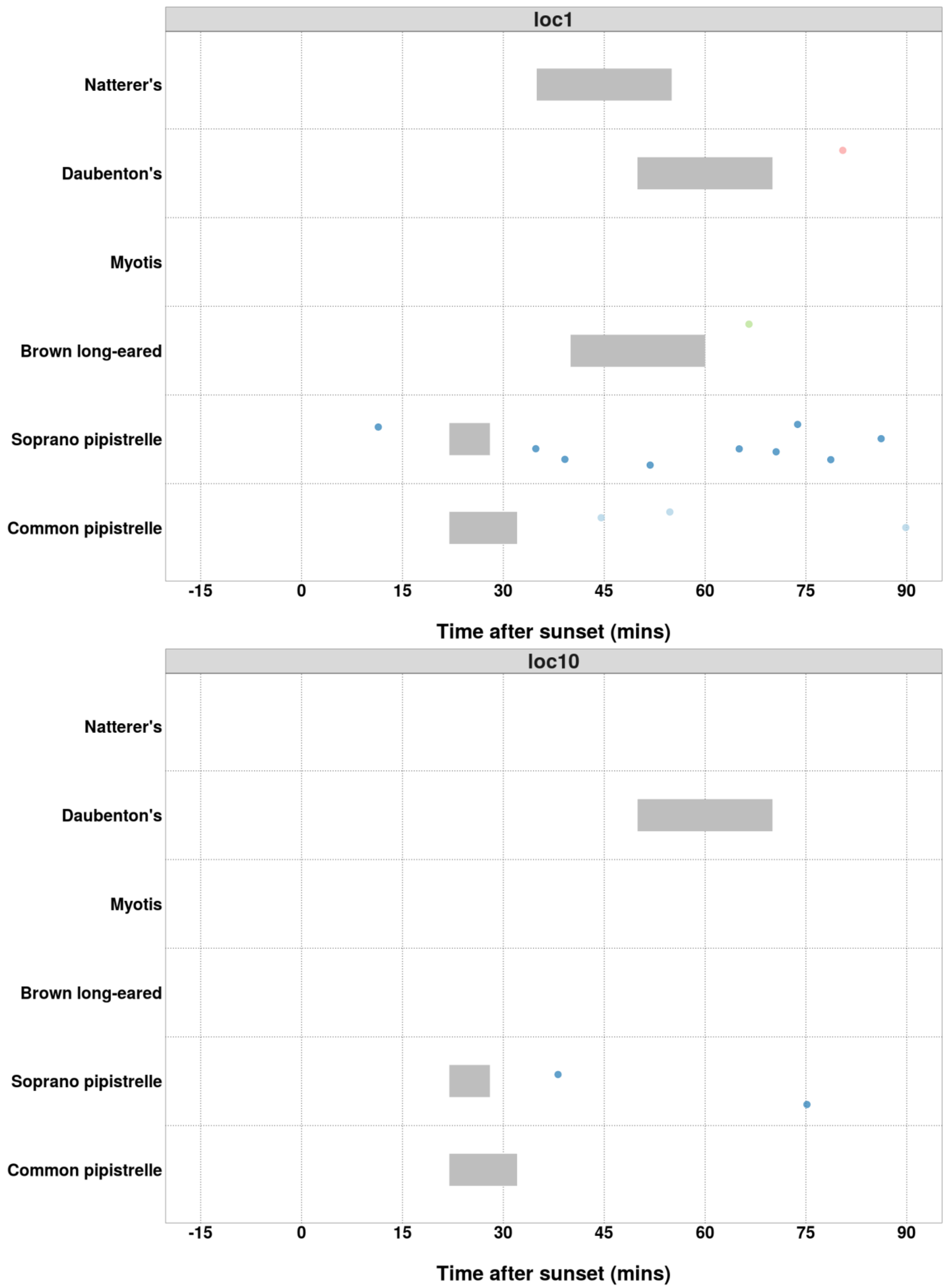
Table continues below

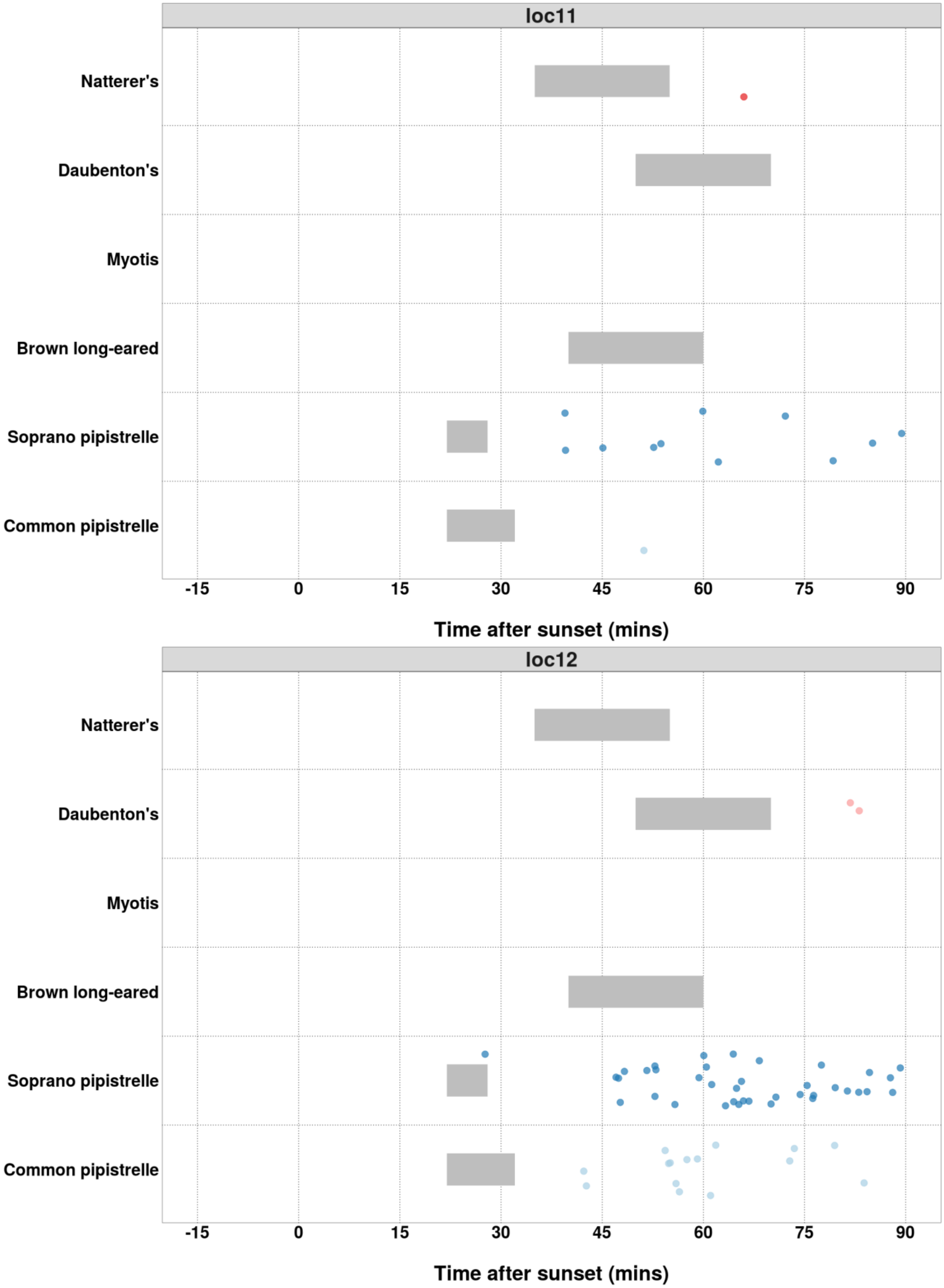
2021-09-01	2021-09-02	2021-09-04	2021-09-07	2021-09-08	2021-09-09	2021-09-10
0	0	0	0	1	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	1	0
0	0	0	1	0	0	0
1	1	1	0	5	0	1
0	0	2	0	0	1	0
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	0	0
0	0	0	0	1	0	0
0	0	1	0	0	0	0

2021-09-11	2021-09-13	2021-09-14
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0
1	0	0
0	0	0
0	11	3
0	0	0
0	0	0
0	0	0

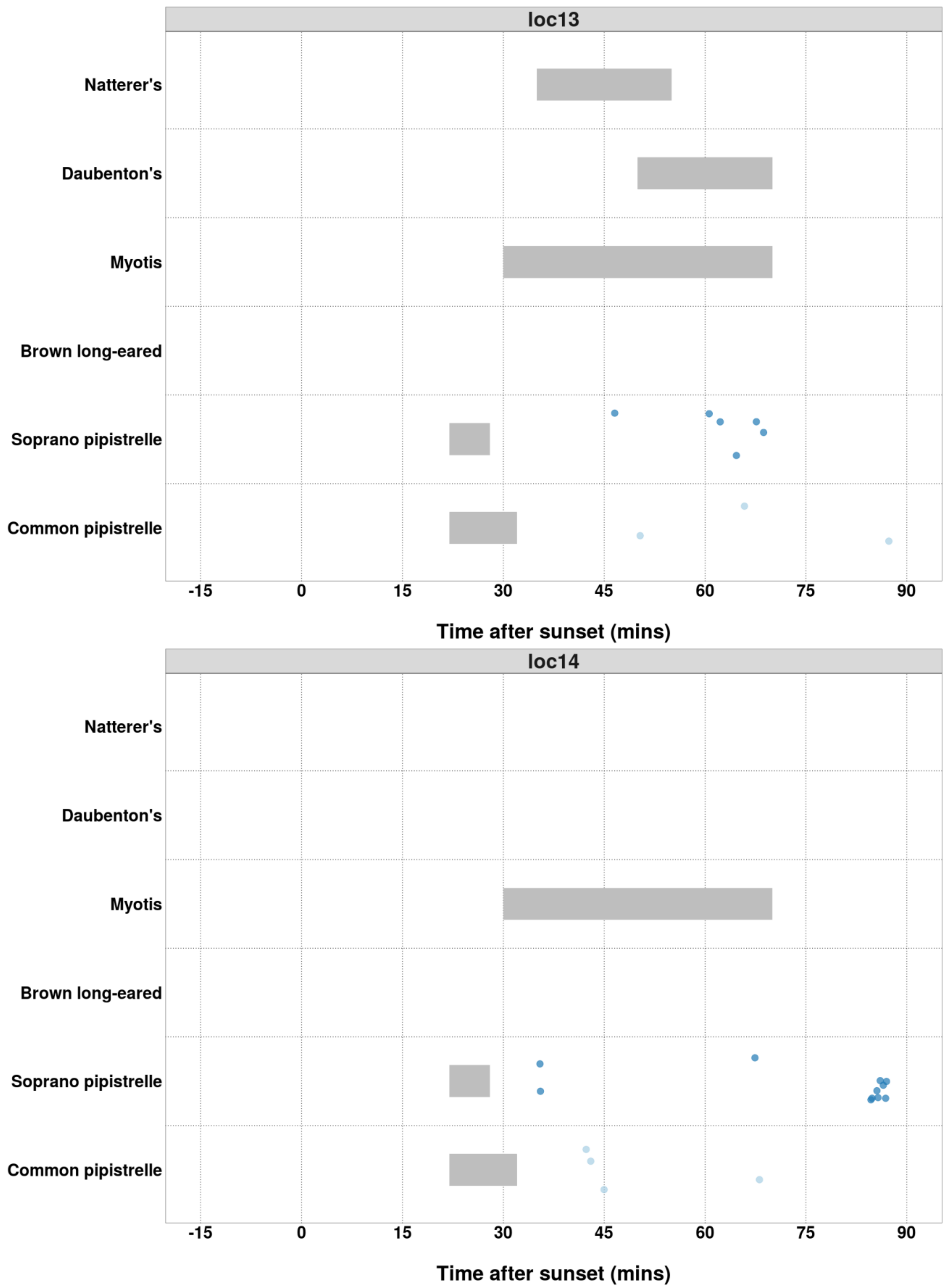
Bat Passes Potentially Indicating Close Proximity to a Roost (Russ 2012) - Figures

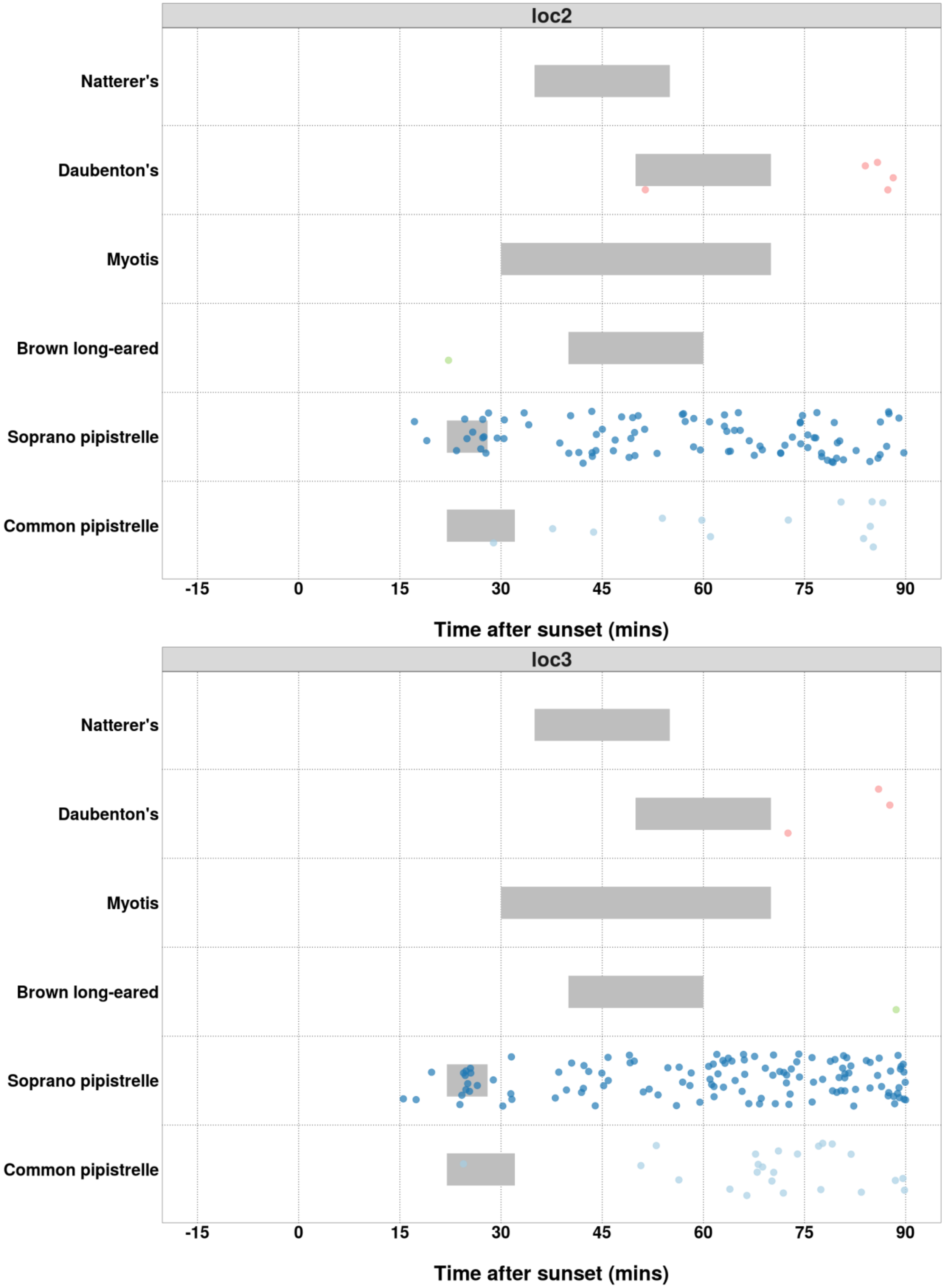
Figure 8. Time from 15 minutes before to 90 minutes after sunset. Species-specific emergence time ranges are shown as grey bars. Bat passes overlapping species-specific grey bars, or occuring earlier than this time range, may potentially indicate the presence of a nearby roost.


loc1
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)
loc10
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)

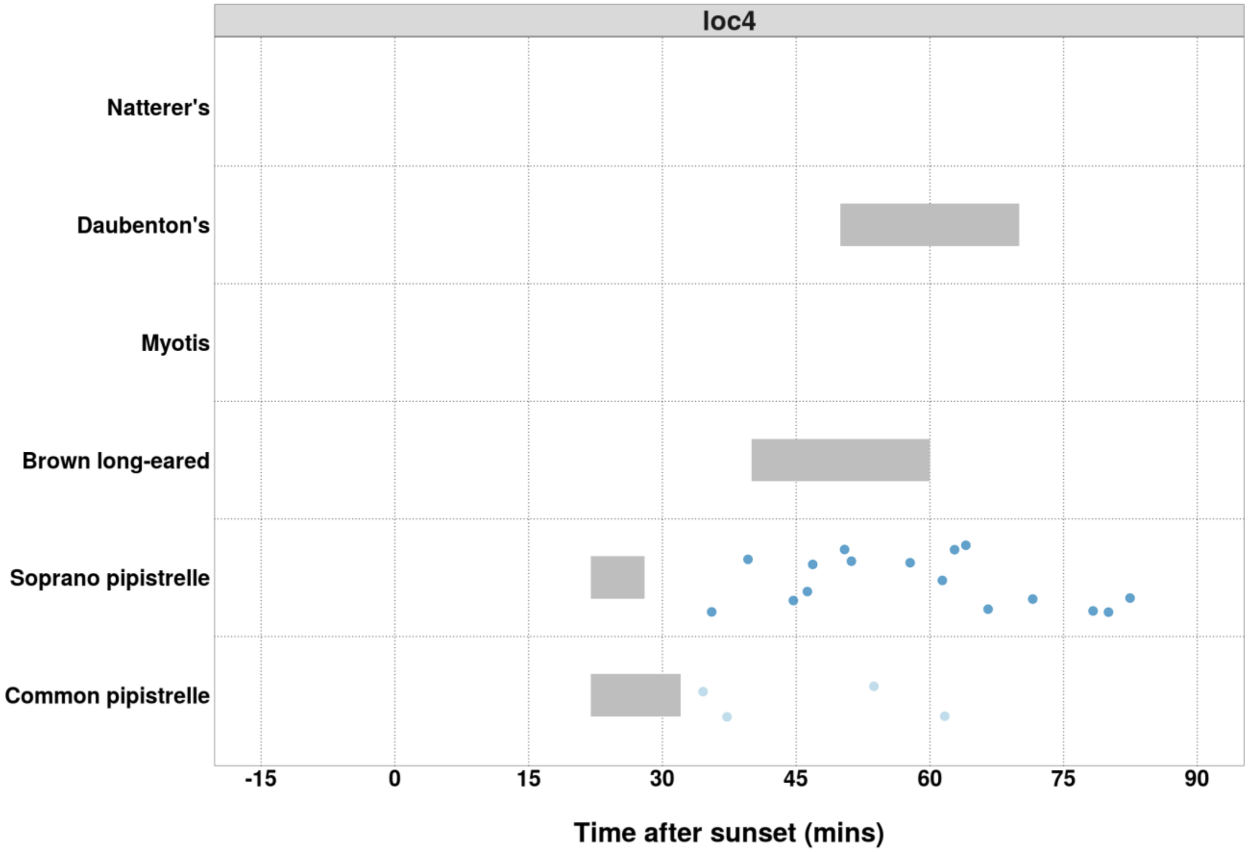


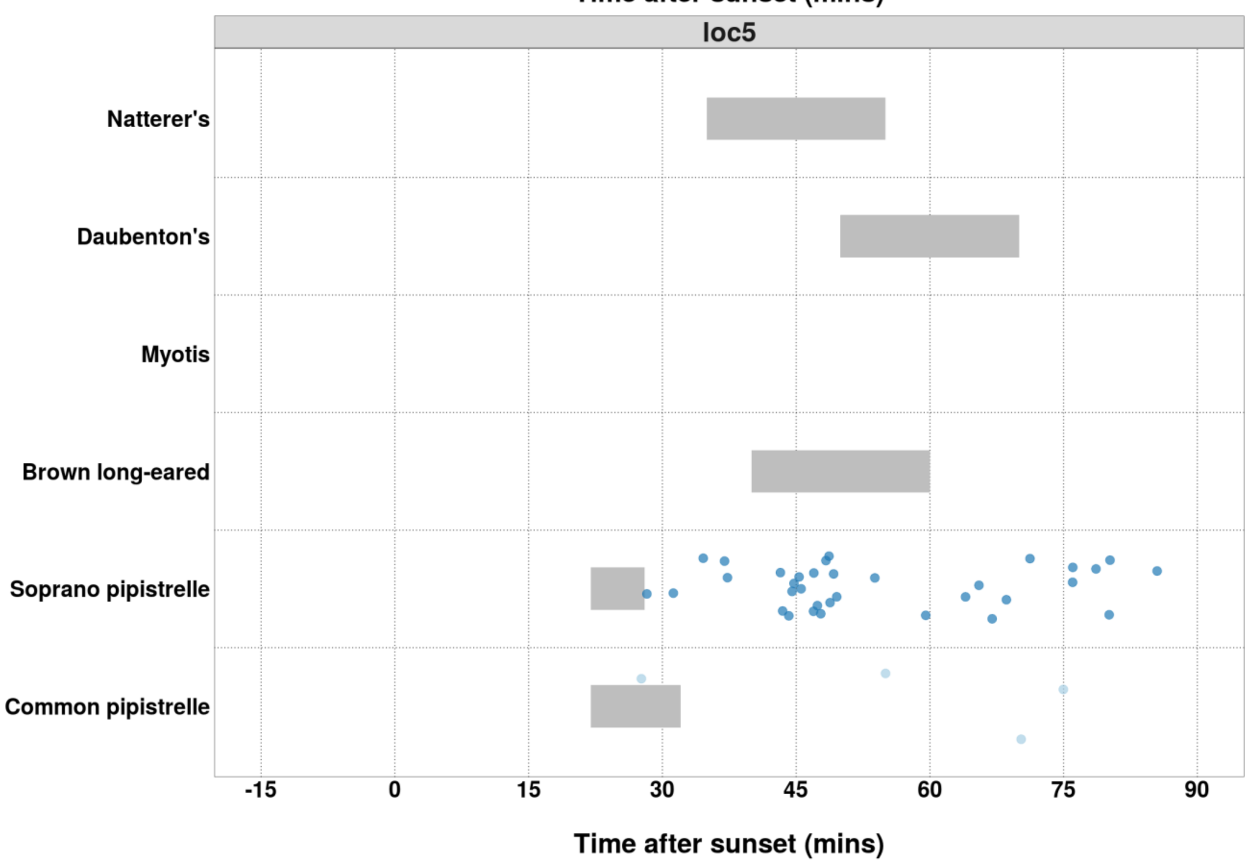
loc11
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)
loc12
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)

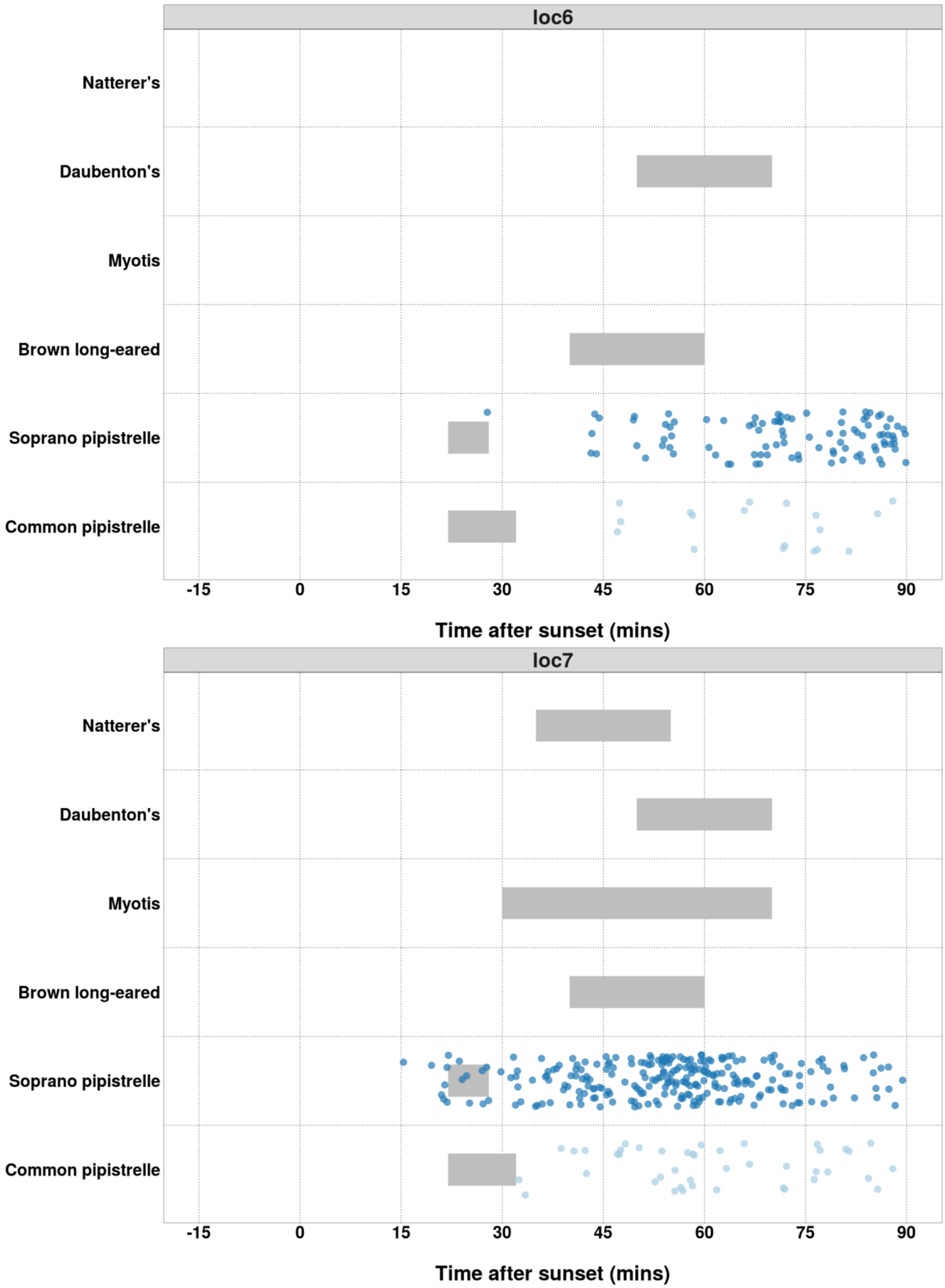

loc13
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)
loc14
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)

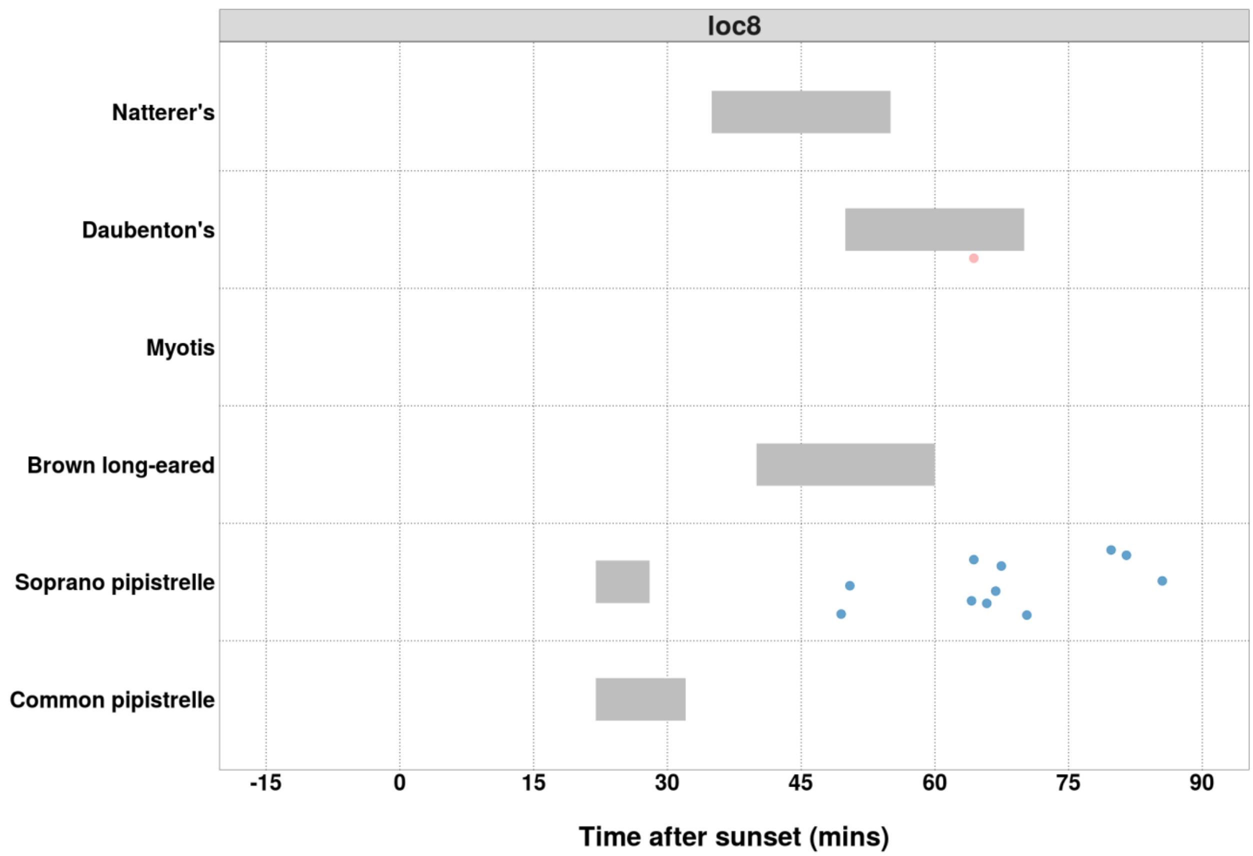


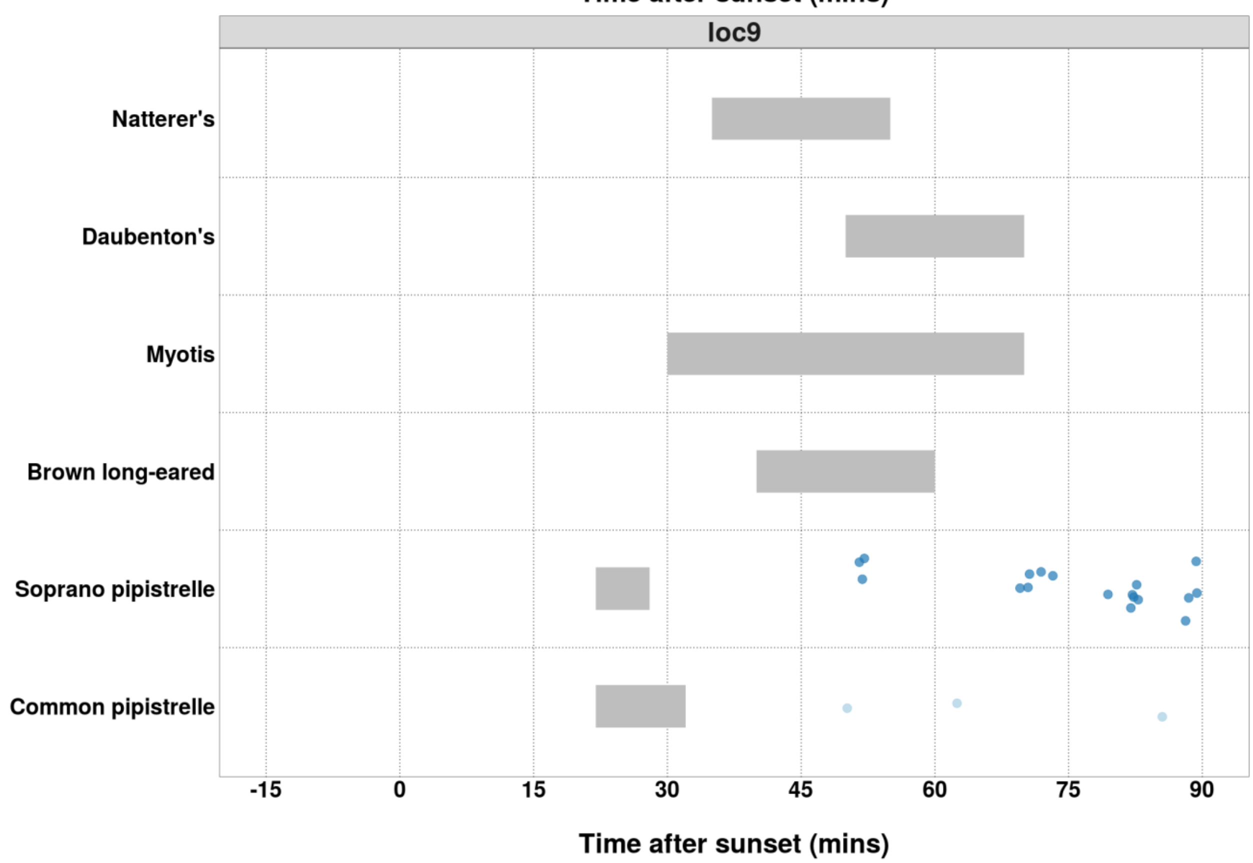
loc2
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)
loc3
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)


loc4
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)


loc5
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)


loc6
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)
loc7
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)


loc8
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)


loc9
Natterer's
Daubenton's
Myotis
Brown long-eared
Soprano pipistrelle
Common pipistrelle
-15
0
15
30
45
60
75
90
Time after sunset (mins)

Counts of Bat Passes

All detectors

Table 14. The total number of passes recorded for each species across all of the detectors. The 'Total' percentage may not be exactly 100% due to rounding of the percentages per species.

Species	Passes (No.)	Percentage of total (%)
Common pipistrelle	1551	20.0
Soprano pipistrelle	5722	74.0
Brown long-eared	89	1.2
Myotis	30	0.4
Daubenton's	317	4.1
Natterer's	28	0.4
Total	7737	100.1

Counts of Bat Passes

Per Detector

Table 15. The number of passes recorded for each species at each detector.

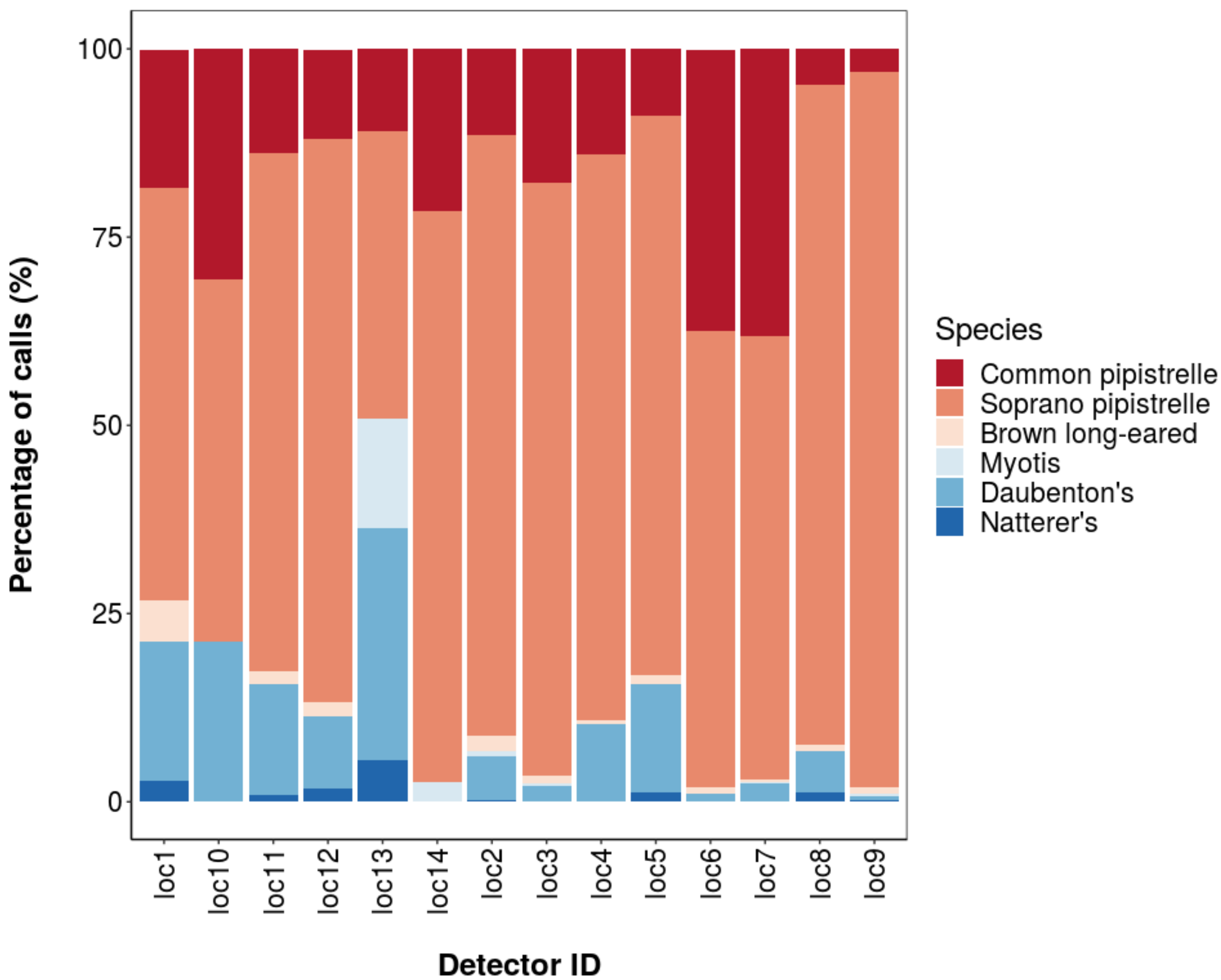
Species	Detector ID	Count (No)	Percentage by Detector (%)
Common pipistrelle	loc1	33	18.4
Common pipistrelle	loc10	16	30.8
Common pipistrelle	loc11	16	13.9
Common pipistrelle	loc12	26	11.9
Common pipistrelle	loc13	6	10.9
Common pipistrelle	loc14	8	21.6
Common pipistrelle	loc2	156	11.6
Common pipistrelle	loc3	404	17.7
Common pipistrelle	loc4	22	14.1
Common pipistrelle	loc5	15	9.0
Common pipistrelle	loc6	473	37.4
Common pipistrelle	loc7	341	38.2
Common pipistrelle	loc8	15	4.7
Common pipistrelle	loc9	20	3.1
Soprano pipistrelle	loc1	98	54.7
Soprano pipistrelle	loc10	25	48.1
Soprano pipistrelle	loc11	79	68.7
Soprano pipistrelle	loc12	163	74.8
Soprano pipistrelle	loc13	21	38.2
Soprano pipistrelle	loc14	28	75.7
Soprano pipistrelle	loc2	1076	79.8
Soprano pipistrelle	loc3	1804	78.9
Soprano pipistrelle	loc4	117	75.0
Soprano pipistrelle	loc5	124	74.3
Soprano pipistrelle	loc6	767	60.6
Soprano pipistrelle	loc7	525	58.8
Soprano pipistrelle	loc8	278	87.7
Soprano pipistrelle	loc9	617	95.1
Brown long-eared	loc1	10	5.6

Brown long-eared	loc11	2	1.7
Brown long-eared	loc12	4	1.8
Brown long-eared	loc2	25	1.9
Brown long-eared	loc3	20	0.9
Brown long-eared	loc4	1	0.6
Brown long-eared	loc5	2	1.2
Brown long-eared	loc6	12	0.9
Brown long-eared	loc7	4	0.4
Brown long-eared	loc8	3	0.9
Brown long-eared	loc9	6	0.9
Myotis	loc13	8	14.5
Myotis	loc14	1	2.7
Myotis	loc2	9	0.7
Myotis	loc3	9	0.4
Myotis	loc7	1	0.1
Myotis	loc9	2	0.3
Daubenton’s	loc1	33	18.4
Daubenton’s	loc10	11	21.2
Daubenton’s	loc11	17	14.8
Daubenton’s	loc12	21	9.6
Daubenton’s	loc13	17	30.9
Daubenton’s	loc2	78	5.8
Daubenton’s	loc3	46	2.0
Daubenton’s	loc4	16	10.3
Daubenton’s	loc5	24	14.4
Daubenton’s	loc6	13	1.0
Daubenton’s	loc7	21	2.4
Daubenton’s	loc8	17	5.4
Daubenton’s	loc9	3	0.5
Natterer’s	loc1	5	2.8
Natterer’s	loc11	1	0.9
Natterer’s	loc12	4	1.8
Natterer’s	loc13	3	5.5
Natterer’s	loc2	4	0.3
Natterer’s	loc3	3	0.1
Natterer’s	loc5	2	1.2

Natterer’s	loc7	1	0.1
Natterer’s	loc8	4	1.3
Natterer’s	loc9	1	0.2

Species Composition

Figure 10. Percentage species composition of passes at each detector.



PART 2a: Presence Only

THE NEXT SECTION OF THE REPORT FEATURES THE RAW DATA SUPPLIED TO ECOBAT AND ONLY TAKES INTO ACCOUNT THE PRESENCE, AND NOT THE ABSENCE, OF EACH BAT SPECIES. FOR EACH NIGHT, THERE IS NO 'ZERO DATA' FOR WHEN SPECIES WERE NOT DETECTED.

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

Table 16. The median Nightly Pass Rate (bat passes per hour, per night) of each species. If NA, then no bat passes.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean. For further information see: *Lintott, P. R., & Mathews, F. (2018). Basic mathematical errors may make ecological assessments unreliable. Biodiversity and Conservation, 27(1), 265-267.* https://doi.org/10.1007/s10531-017-1418-5

Species	Detector ID	Median Pass Rate
Common pipistrelle	loc1	0.2
Common pipistrelle	loc10	0.2
Common pipistrelle	loc11	0.1
Common pipistrelle	loc12	0.2
Common pipistrelle	loc13	0.2
Common pipistrelle	loc14	0.1
Common pipistrelle	loc2	0.5
Common pipistrelle	loc3	0.9
Common pipistrelle	loc4	0.2
Common pipistrelle	loc5	0.1
Common pipistrelle	loc6	0.3
Common pipistrelle	loc7	0.3
Common pipistrelle	loc8	0.1
Common pipistrelle	loc9	0.3
Soprano pipistrelle	loc1	0.3
Soprano pipistrelle	loc10	0.2
Soprano pipistrelle	loc11	0.3
Soprano pipistrelle	loc12	0.6
Soprano pipistrelle	loc13	0.2
Soprano pipistrelle	loc14	0.2
Soprano pipistrelle	loc2	2.2
Soprano pipistrelle	loc3	2.5
Soprano pipistrelle	loc4	0.4

Soprano pipistrelle	loc5	0.4
Soprano pipistrelle	loc6	0.4
Soprano pipistrelle	loc7	1.0
Soprano pipistrelle	loc8	0.6
Soprano pipistrelle	loc9	0.7
Brown long-eared	loc1	0.1
Brown long-eared	loc11	0.1
Brown long-eared	loc12	0.1
Brown long-eared	loc2	0.1
Brown long-eared	loc3	0.2
Brown long-eared	loc4	0.1
Brown long-eared	loc5	0.1
Brown long-eared	loc6	0.3
Brown long-eared	loc7	0.1
Brown long-eared	loc8	0.1
Brown long-eared	loc9	0.2
Myotis	loc13	0.6
Myotis	loc14	0.2
Myotis	loc2	0.3
Myotis	loc3	0.3
Myotis	loc7	0.2
Myotis	loc9	0.3
Daubenton’s	loc1	0.2
Daubenton’s	loc10	0.1
Daubenton’s	loc11	0.1
Daubenton’s	loc12	0.2
Daubenton’s	loc13	0.1
Daubenton’s	loc2	0.2
Daubenton’s	loc3	0.2
Daubenton’s	loc4	0.3
Daubenton’s	loc5	0.1
Daubenton’s	loc6	0.2
Daubenton’s	loc7	0.2
Daubenton’s	loc8	0.1
Daubenton’s	loc9	0.2
Natterer’s	loc1	0.1

Natterer’s	loc11	0.1
Natterer’s	loc12	0.1
Natterer’s	loc13	0.1
Natterer’s	loc2	0.1
Natterer’s	loc3	0.1
Natterer’s	loc5	0.2
Natterer’s	loc7	0.1
Natterer’s	loc8	0.1
Natterer’s	loc9	0.1

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

Table 17. The mean Nightly Pass Rate (bat passes per hour, per night) of each species at each detector. Values are given to 1 decimal place.

We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Mean Pass Rate
Common pipistrelle	loc1	0.2
Common pipistrelle	loc10	0.2
Common pipistrelle	loc11	0.2
Common pipistrelle	loc12	0.2
Common pipistrelle	loc13	0.2
Common pipistrelle	loc14	0.2
Common pipistrelle	loc2	0.7
Common pipistrelle	loc3	1.8
Common pipistrelle	loc4	0.2
Common pipistrelle	loc5	0.1
Common pipistrelle	loc6	4.4
Common pipistrelle	loc7	1.4
Common pipistrelle	loc8	0.3
Common pipistrelle	loc9	0.3
Soprano pipistrelle	loc1	0.4
Soprano pipistrelle	loc10	0.2
Soprano pipistrelle	loc11	0.3
Soprano pipistrelle	loc12	0.7
Soprano pipistrelle	loc13	0.2
Soprano pipistrelle	loc14	0.3
Soprano pipistrelle	loc2	3.7
Soprano pipistrelle	loc3	5.8
Soprano pipistrelle	loc4	0.6
Soprano pipistrelle	loc5	0.6
Soprano pipistrelle	loc6	4.0
Soprano pipistrelle	loc7	2.0

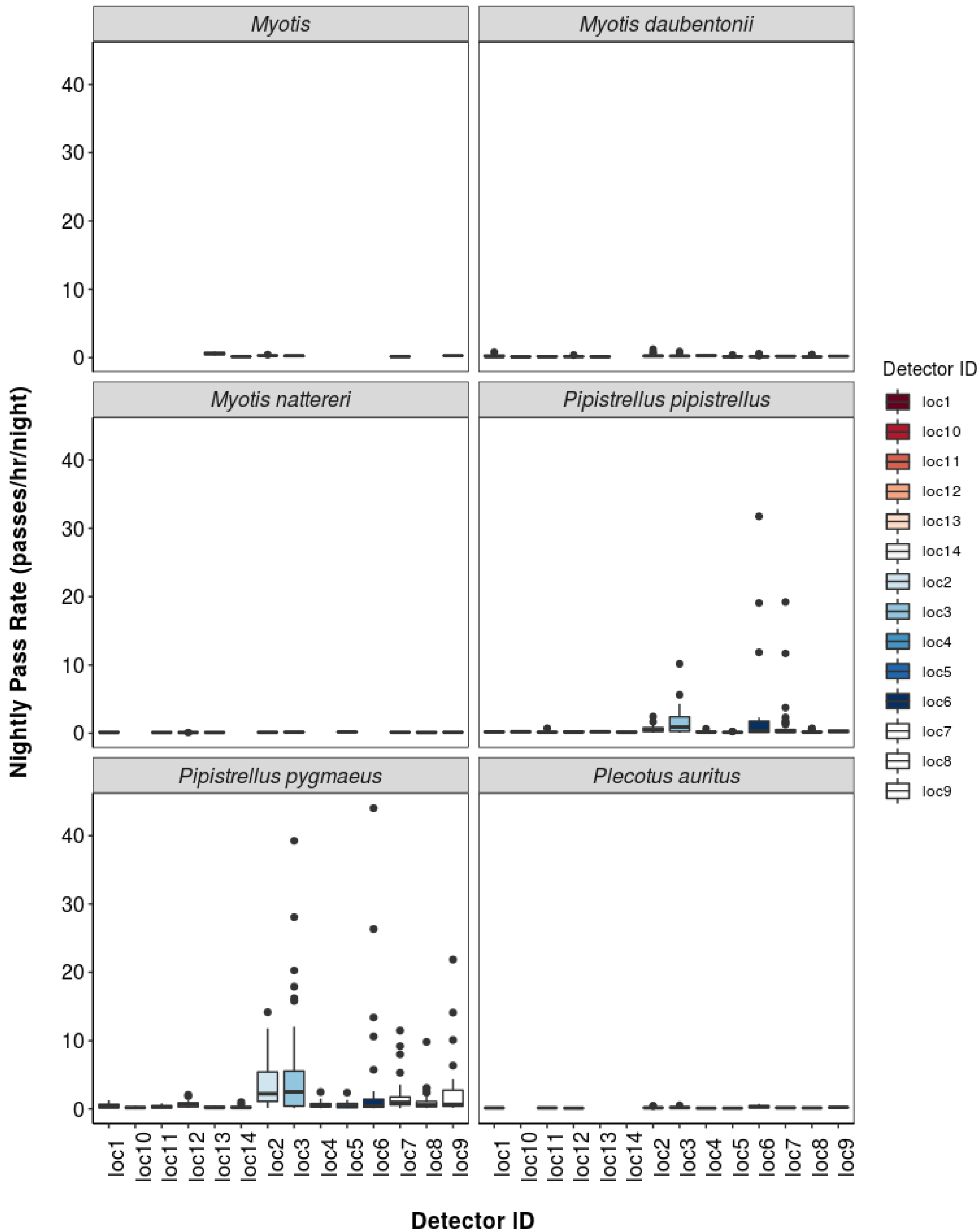
Soprano pipistrelle	loc8	1.1
Soprano pipistrelle	loc9	2.8
Brown long-eared	loc1	0.1
Brown long-eared	loc11	0.1
Brown long-eared	loc12	0.1
Brown long-eared	loc2	0.2
Brown long-eared	loc3	0.2
Brown long-eared	loc4	0.1
Brown long-eared	loc5	0.1
Brown long-eared	loc6	0.4
Brown long-eared	loc7	0.2
Brown long-eared	loc8	0.1
Brown long-eared	loc9	0.2
Myotis	loc13	0.6
Myotis	loc14	0.2
Myotis	loc2	0.3
Myotis	loc3	0.3
Myotis	loc7	0.2
Myotis	loc9	0.3
Daubenton’s	loc1	0.3
Daubenton’s	loc10	0.1
Daubenton’s	loc11	0.2
Daubenton’s	loc12	0.2
Daubenton’s	loc13	0.2
Daubenton’s	loc2	0.3
Daubenton’s	loc3	0.3
Daubenton’s	loc4	0.3
Daubenton’s	loc5	0.2
Daubenton’s	loc6	0.2
Daubenton’s	loc7	0.2
Daubenton’s	loc8	0.2
Daubenton’s	loc9	0.2
Natterer’s	loc1	0.2
Natterer’s	loc11	0.1
Natterer’s	loc12	0.1
Natterer’s	loc13	0.1

Natterer’s	loc2	0.1
Natterer’s	loc3	0.1
Natterer’s	loc5	0.2
Natterer’s	loc7	0.1
Natterer’s	loc8	0.1
Natterer’s	loc9	0.1

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 11. Boxplots for the number of bat passes per hour each night, for each detector. The ‘box’ shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The ‘whiskers’ extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.



Myotis
Myotis daubentonii
Myotis nattereri
Pipistrellus pipistrellus
Pipistrellus pygmaeus
Plecotus auritus
Nightly Pass Rate (passes/hr/night)
0
10
20
30
40
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID

SPLIT BY MONTH

Total Bat Passes per Detector, each Month

Per Detector

Table 18. The total number of bat passes of each species in each month at each detector. This table simply tells you how many bats of each species were recorded passing each detector during each month. These numbers are not standardised by the night length, or how many nights each detector was active for during each month.

Species	Detector ID	May	Jun	Jul	Aug	Sep
Common pipistrelle	loc1	3	0	21	1	8
Common pipistrelle	loc10	2	1	11	1	1
Common pipistrelle	loc11	2	5	6	1	2
Common pipistrelle	loc12	4	1	14	6	1
Common pipistrelle	loc13	2	0	4	0	0
Common pipistrelle	loc14	2	0	4	0	2
Common pipistrelle	loc2	9	6	59	36	46
Common pipistrelle	loc3	8	4	262	105	25
Common pipistrelle	loc4	3	2	15	0	2
Common pipistrelle	loc5	1	1	7	2	4
Common pipistrelle	loc6	125	340	7	0	1
Common pipistrelle	loc7	124	154	38	9	16
Common pipistrelle	loc8	0	5	9	1	0
Common pipistrelle	loc9	10	4	4	2	0
Soprano pipistrelle	loc1	7	1	52	2	36
Soprano pipistrelle	loc10	3	0	11	4	7
Soprano pipistrelle	loc11	10	5	26	11	27
Soprano pipistrelle	loc12	10	6	62	19	66
Soprano pipistrelle	loc13	4	1	12	0	4
Soprano pipistrelle	loc14	2	1	18	5	2
Soprano pipistrelle	loc2	49	12	440	312	263
Soprano pipistrelle	loc3	76	21	795	742	170
Soprano pipistrelle	loc4	7	5	86	6	13
Soprano pipistrelle	loc5	4	1	69	30	20

Soprano pipistrelle	loc6	334	384	37	6	6
Soprano pipistrelle	loc7	6	7	328	53	131
Soprano pipistrelle	loc8	20	9	198	36	15
Soprano pipistrelle	loc9	26	12	492	58	29
Brown long-eared	loc1	0	0	7	0	3
Brown long-eared	loc11	0	0	2	0	0
Brown long-eared	loc12	0	0	1	0	3
Brown long-eared	loc2	0	1	7	2	15
Brown long-eared	loc3	1	0	14	3	2
Brown long-eared	loc4	0	0	0	0	1
Brown long-eared	loc5	0	0	0	0	2
Brown long-eared	loc6	4	7	1	0	0
Brown long-eared	loc7	2	0	1	0	1
Brown long-eared	loc8	0	0	1	1	1
Brown long-eared	loc9	0	0	1	0	5
Myotis	loc13	6	2	0	0	0
Myotis	loc14	1	0	0	0	0
Myotis	loc2	7	2	0	0	0
Myotis	loc3	7	2	0	0	0
Myotis	loc7	1	0	0	0	0
Myotis	loc9	2	0	0	0	0
Daubenton’s	loc1	1	0	2	1	29
Daubenton’s	loc10	0	0	1	3	7
Daubenton’s	loc11	1	0	7	1	8
Daubenton’s	loc12	0	0	5	2	14
Daubenton’s	loc13	4	1	1	7	4
Daubenton’s	loc2	10	2	11	10	45
Daubenton’s	loc3	8	1	21	12	4
Daubenton’s	loc4	0	0	16	0	0
Daubenton’s	loc5	2	1	12	2	7
Daubenton’s	loc6	3	4	0	1	5
Daubenton’s	loc7	2	0	3	7	9
Daubenton’s	loc8	0	1	0	3	13
Daubenton’s	loc9	0	0	3	0	0
Natterer’s	loc1	0	0	0	0	5
Natterer’s	loc11	0	0	0	0	1

Natterer’s	loc12	0	0	0	0	4
Natterer’s	loc13	0	0	0	0	3
Natterer’s	loc2	2	0	0	1	1
Natterer’s	loc3	0	0	0	0	3
Natterer’s	loc5	0	0	0	0	2
Natterer’s	loc7	0	0	1	0	0
Natterer’s	loc8	0	0	0	0	4
Natterer’s	loc9	0	0	0	1	0

Survey Effort

Table 19. The number of survey nights per month per detector.

Month	Detector ID	No. of Survey Nights
May	loc1	5
May	loc10	2
May	loc11	6
May	loc12	5
May	loc13	4
May	loc14	2
May	loc2	9
May	loc3	10
May	loc4	4
May	loc5	3
May	loc6	11
May	loc7	9
May	loc8	6
May	loc9	6
Jun	loc1	1
Jun	loc10	1
Jun	loc11	1
Jun	loc12	2
Jun	loc13	2
Jun	loc14	1
Jun	loc2	2
Jun	loc3	2
Jun	loc4	3
Jun	loc5	1
Jun	loc6	2
Jun	loc7	2
Jun	loc8	3
Jun	loc9	2
Jul	loc1	13
Jul	loc10	8

Jul	loc11	12
Jul	loc12	11
Jul	loc13	5
Jul	loc14	8
Jul	loc2	12
Jul	loc3	12
Jul	loc4	12
Jul	loc5	12
Jul	loc6	12
Jul	loc7	12
Jul	loc8	13
Jul	loc9	12
Aug	loc1	3
Aug	loc10	3
Aug	loc11	4
Aug	loc12	4
Aug	loc13	4
Aug	loc14	2
Aug	loc2	4
Aug	loc3	4
Aug	loc4	1
Aug	loc5	4
Aug	loc6	3
Aug	loc7	4
Aug	loc8	4
Aug	loc9	4
Sep	loc1	11
Sep	loc10	6
Sep	loc11	9
Sep	loc12	10
Sep	loc13	6
Sep	loc14	2
Sep	loc2	10
Sep	loc3	12
Sep	loc4	6
Sep	loc5	9

Sep	loc6	5
Sep	loc7	11
Sep	loc8	8
Sep	loc9	6

Nightly Bat Pass Rate for each Month

Median Per Detector

Table 20. The median Nightly Pass Rate (bat passes per hour, per night) of each species throughout each month. If NA, then no bat passes.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean. For further information see: *Lintott, P. R., & Mathews, F. (2018). Basic mathematical errors may make ecological assessments unreliable. Biodiversity and Conservation, 27(1), 265-267.* https://doi.org/10.1007/s10531-017-1418-5

Species	Detector ID	May	Jun	Jul	Aug	Sep
Common pipistrelle	loc1	0.2	NA	0.3	0.1	0.2
Common pipistrelle	loc10	0.3	0.2	0.3	0.1	0.1
Common pipistrelle	loc11	0.2	0.7	0.1	0.1	0.2
Common pipistrelle	loc12	0.2	0.2	0.3	0.2	0.1
Common pipistrelle	loc13	0.2	NA	0.3	NA	NA
Common pipistrelle	loc14	0.3	NA	0.1	NA	0.1
Common pipistrelle	loc2	0.1	0.4	0.5	1.1	0.4
Common pipistrelle	loc3	0.2	0.6	2.0	3.6	0.5
Common pipistrelle	loc4	0.2	0.2	0.2	NA	0.1
Common pipistrelle	loc5	0.2	0.2	0.1	0.2	0.1
Common pipistrelle	loc6	0.7	25.4	0.2	NA	0.1
Common pipistrelle	loc7	0.7	11.5	0.4	0.2	0.1
Common pipistrelle	loc8	NA	0.7	0.1	0.1	NA
Common pipistrelle	loc9	0.4	0.3	0.3	0.1	NA
Soprano pipistrelle	loc1	0.2	0.2	0.5	0.1	0.3
Soprano pipistrelle	loc10	0.2	NA	0.1	0.2	0.1
Soprano pipistrelle	loc11	0.3	0.7	0.3	0.3	0.3
Soprano pipistrelle	loc12	0.3	0.4	0.7	0.5	0.8
Soprano pipistrelle	loc13	0.2	0.2	0.4	NA	0.1
Soprano pipistrelle	loc14	0.2	0.2	0.2	0.3	0.2
Soprano pipistrelle	loc2	0.4	0.9	3.6	10.3	1.7
Soprano pipistrelle	loc3	0.6	1.6	7.1	24.2	0.7
Soprano pipistrelle	loc4	0.3	0.3	0.8	0.6	0.2

Soprano pipistrelle	loc5	0.3	0.2	0.7	1.2	0.2
Soprano pipistrelle	loc6	1.8	28.7	0.4	0.4	0.1
Soprano pipistrelle	loc7	0.2	0.5	1.3	1.1	1.3
Soprano pipistrelle	loc8	0.4	0.4	1.2	0.6	0.2
Soprano pipistrelle	loc9	0.3	0.9	2.7	1.7	0.4
Brown long-eared	loc1	NA	NA	0.1	NA	0.1
Brown long-eared	loc11	NA	NA	0.1	NA	NA
Brown long-eared	loc12	NA	NA	0.1	NA	0.1
Brown long-eared	loc2	NA	0.2	0.1	0.2	0.2
Brown long-eared	loc3	0.2	NA	0.2	0.2	0.2
Brown long-eared	loc4	NA	NA	NA	NA	0.1
Brown long-eared	loc5	NA	NA	NA	NA	0.1
Brown long-eared	loc6	0.3	0.5	0.1	NA	NA
Brown long-eared	loc7	0.3	NA	0.1	NA	0.1
Brown long-eared	loc8	NA	NA	0.1	0.1	0.1
Brown long-eared	loc9	NA	NA	0.1	NA	0.2
Myotis	loc13	0.9	0.3	NA	NA	NA
Myotis	loc14	0.2	NA	NA	NA	NA
Myotis	loc2	0.3	0.3	NA	NA	NA
Myotis	loc3	0.2	0.3	NA	NA	NA
Myotis	loc7	0.2	NA	NA	NA	NA
Myotis	loc9	0.3	NA	NA	NA	NA
Daubenton’s	loc1	0.2	NA	0.1	0.1	0.3
Daubenton’s	loc10	NA	NA	0.1	0.2	0.1
Daubenton’s	loc11	0.1	NA	0.1	0.1	0.3
Daubenton’s	loc12	NA	NA	0.1	0.2	0.2
Daubenton’s	loc13	0.2	0.2	0.1	0.2	0.1
Daubenton’s	loc2	0.2	0.3	0.1	0.2	0.3
Daubenton’s	loc3	0.2	0.2	0.3	0.3	0.1
Daubenton’s	loc4	NA	NA	0.3	NA	NA
Daubenton’s	loc5	0.1	0.2	0.1	0.1	0.2
Daubenton’s	loc6	0.2	0.6	NA	0.1	0.1
Daubenton’s	loc7	0.2	NA	0.2	0.4	0.2
Daubenton’s	loc8	NA	0.2	NA	0.1	0.1
Daubenton’s	loc9	NA	NA	0.2	NA	NA
Natterer’s	loc1	NA	NA	NA	NA	0.1

Natterer’s	loc11	NA	NA	NA	NA	0.1
Natterer’s	loc12	NA	NA	NA	NA	0.1
Natterer’s	loc13	NA	NA	NA	NA	0.1
Natterer’s	loc2	0.1	NA	NA	0.1	0.1
Natterer’s	loc3	NA	NA	NA	NA	0.1
Natterer’s	loc5	NA	NA	NA	NA	0.2
Natterer’s	loc7	NA	NA	0.1	NA	NA
Natterer’s	loc8	NA	NA	NA	NA	0.1
Natterer’s	loc9	NA	NA	NA	0.1	NA

Nightly Bat Pass Rate for each Month

Mean per Detector

Table 21: The mean Nightly Pass Rate (bat passes per hour, per night) of each species throughout each month. Values are given to 1 decimal place.

We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	May	Jun	Jul	Aug	Sep
Common pipistrelle	loc1	0.1	NA	0.3	0.1	0.2
Common pipistrelle	loc10	0.3	0.2	0.2	0.1	0.1
Common pipistrelle	loc11	0.2	0.7	0.2	0.1	0.2
Common pipistrelle	loc12	0.2	0.2	0.3	0.2	0.1
Common pipistrelle	loc13	0.2	NA	0.3	NA	NA
Common pipistrelle	loc14	0.3	NA	0.2	NA	0.1
Common pipistrelle	loc2	0.3	0.4	0.7	1.1	0.6
Common pipistrelle	loc3	0.2	0.6	2.9	3.3	0.3
Common pipistrelle	loc4	0.2	0.2	0.3	NA	0.1
Common pipistrelle	loc5	0.2	0.2	0.2	0.2	0.1
Common pipistrelle	loc6	2.0	25.4	0.2	NA	0.1
Common pipistrelle	loc7	2.0	11.5	0.5	0.3	0.2
Common pipistrelle	loc8	NA	0.7	0.2	0.1	NA
Common pipistrelle	loc9	0.4	0.3	0.3	0.1	NA
Soprano pipistrelle	loc1	0.3	0.2	0.6	0.1	0.4
Soprano pipistrelle	loc10	0.2	NA	0.2	0.2	0.1
Soprano pipistrelle	loc11	0.3	0.7	0.3	0.3	0.3
Soprano pipistrelle	loc12	0.4	0.4	0.8	0.5	0.9
Soprano pipistrelle	loc13	0.2	0.2	0.3	NA	0.1
Soprano pipistrelle	loc14	0.2	0.2	0.4	0.3	0.2
Soprano pipistrelle	loc2	1.0	0.9	4.8	9.6	2.5
Soprano pipistrelle	loc3	1.2	1.6	8.7	23.0	1.4
Soprano pipistrelle	loc4	0.3	0.2	1.0	0.6	0.2
Soprano pipistrelle	loc5	0.3	0.2	0.8	1.2	0.2
Soprano pipistrelle	loc6	5.4	28.7	0.4	0.4	0.1
Soprano pipistrelle	loc7	0.3	0.5	3.6	1.6	1.1

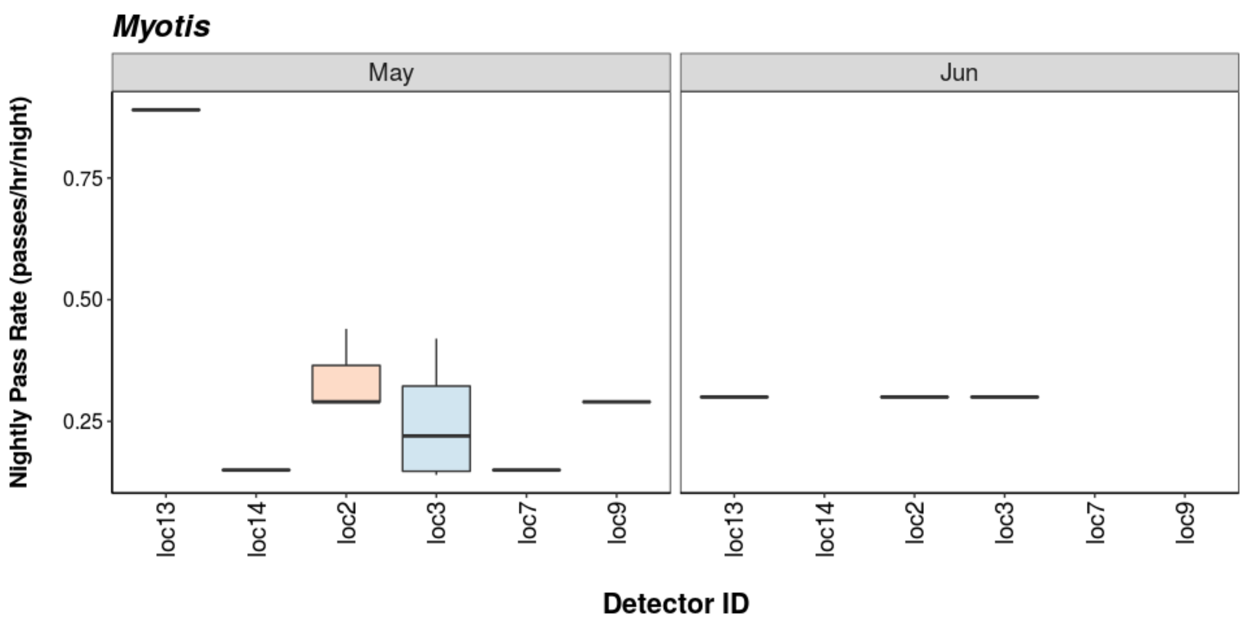
Soprano pipistrelle	loc8	0.5	0.4	2.0	1.1	0.2
Soprano pipistrelle	loc9	0.8	0.9	5.4	1.8	0.5
Brown long-eared	loc1	NA	NA	0.1	NA	0.1
Brown long-eared	loc11	NA	NA	0.1	NA	NA
Brown long-eared	loc12	NA	NA	0.1	NA	0.1
Brown long-eared	loc2	NA	0.2	0.2	0.2	0.2
Brown long-eared	loc3	0.2	NA	0.2	0.2	0.2
Brown long-eared	loc4	NA	NA	NA	NA	0.1
Brown long-eared	loc5	NA	NA	NA	NA	0.1
Brown long-eared	loc6	0.3	0.5	0.1	NA	NA
Brown long-eared	loc7	0.3	NA	0.1	NA	0.1
Brown long-eared	loc8	NA	NA	0.1	0.1	0.1
Brown long-eared	loc9	NA	NA	0.1	NA	0.2
Myotis	loc13	0.9	0.3	NA	NA	NA
Myotis	loc14	0.2	NA	NA	NA	NA
Myotis	loc2	0.3	0.3	NA	NA	NA
Myotis	loc3	0.2	0.3	NA	NA	NA
Myotis	loc7	0.2	NA	NA	NA	NA
Myotis	loc9	0.3	NA	NA	NA	NA
Daubenton’s	loc1	0.2	NA	0.1	0.1	0.4
Daubenton’s	loc10	NA	NA	0.1	0.2	0.1
Daubenton’s	loc11	0.1	NA	0.2	0.1	0.3
Daubenton’s	loc12	NA	NA	0.2	0.2	0.2
Daubenton’s	loc13	0.2	0.2	0.1	0.2	0.1
Daubenton’s	loc2	0.2	0.3	0.2	0.3	0.4
Daubenton’s	loc3	0.2	0.2	0.4	0.4	0.1
Daubenton’s	loc4	NA	NA	0.3	NA	NA
Daubenton’s	loc5	0.1	0.2	0.2	0.1	0.2
Daubenton’s	loc6	0.2	0.6	NA	0.1	0.2
Daubenton’s	loc7	0.2	NA	0.2	0.4	0.2
Daubenton’s	loc8	NA	0.2	NA	0.1	0.2
Daubenton’s	loc9	NA	NA	0.2	NA	NA
Natterer’s	loc1	NA	NA	NA	NA	0.2
Natterer’s	loc11	NA	NA	NA	NA	0.1
Natterer’s	loc12	NA	NA	NA	NA	0.1
Natterer’s	loc13	NA	NA	NA	NA	0.1

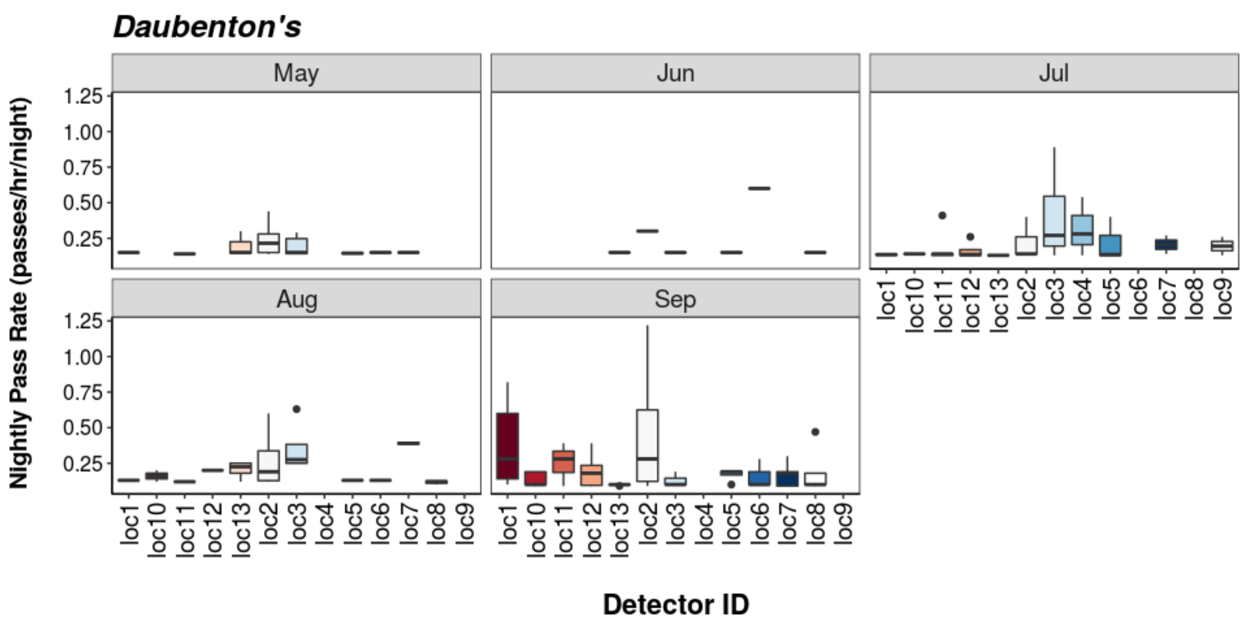
Natterer’s	loc2	0.1	NA	NA	0.1	0.1
Natterer’s	loc3	NA	NA	NA	NA	0.1
Natterer’s	loc5	NA	NA	NA	NA	0.2
Natterer’s	loc7	NA	NA	0.1	NA	NA
Natterer’s	loc8	NA	NA	NA	NA	0.1
Natterer’s	loc9	NA	NA	NA	0.1	NA

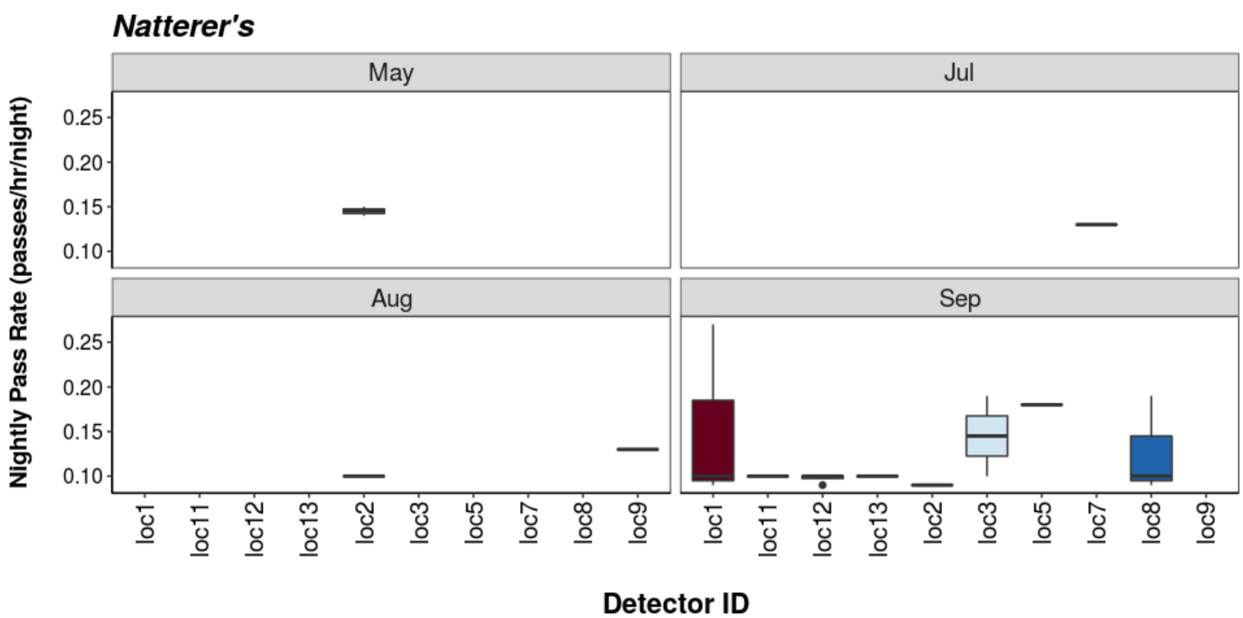
Nightly Bat Pass Rate for each Month

Per Detector - Figures

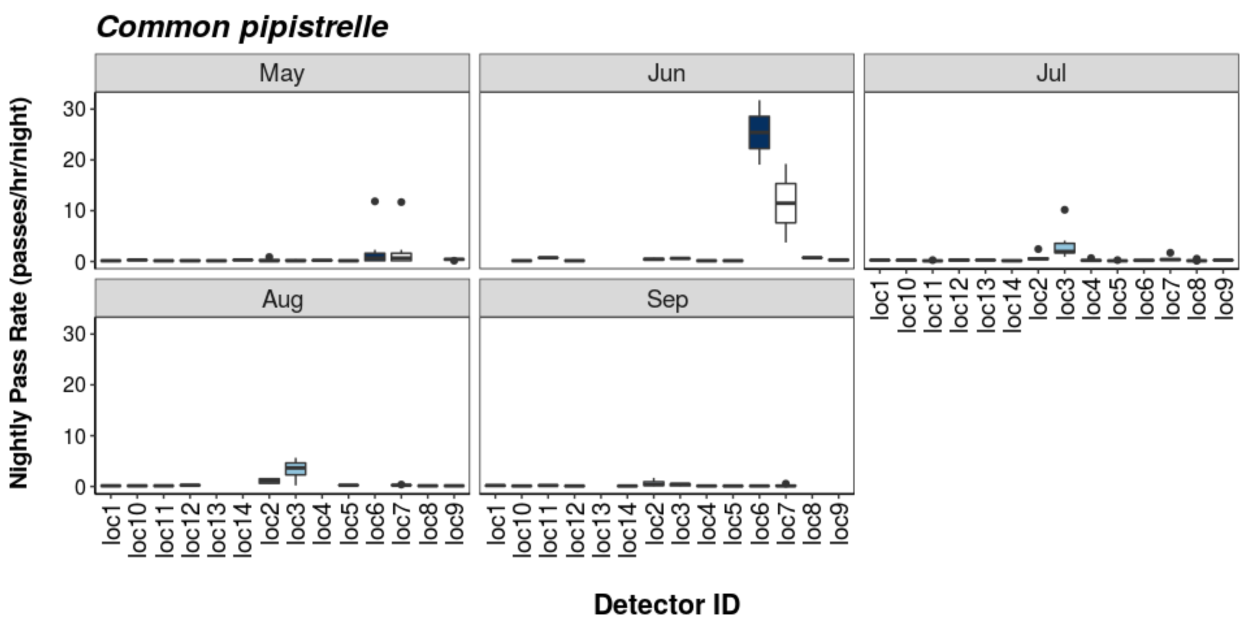
Figure 12. Figures show boxplots for the number of bat passes per hour by detector, for each month. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.


Myotis
May
Jun
Nightly Pass Rate (passes/hr/night)
0.75
0.50
0.25
loc13
loc14
loc2
loc3
loc7
loc9
Detector ID

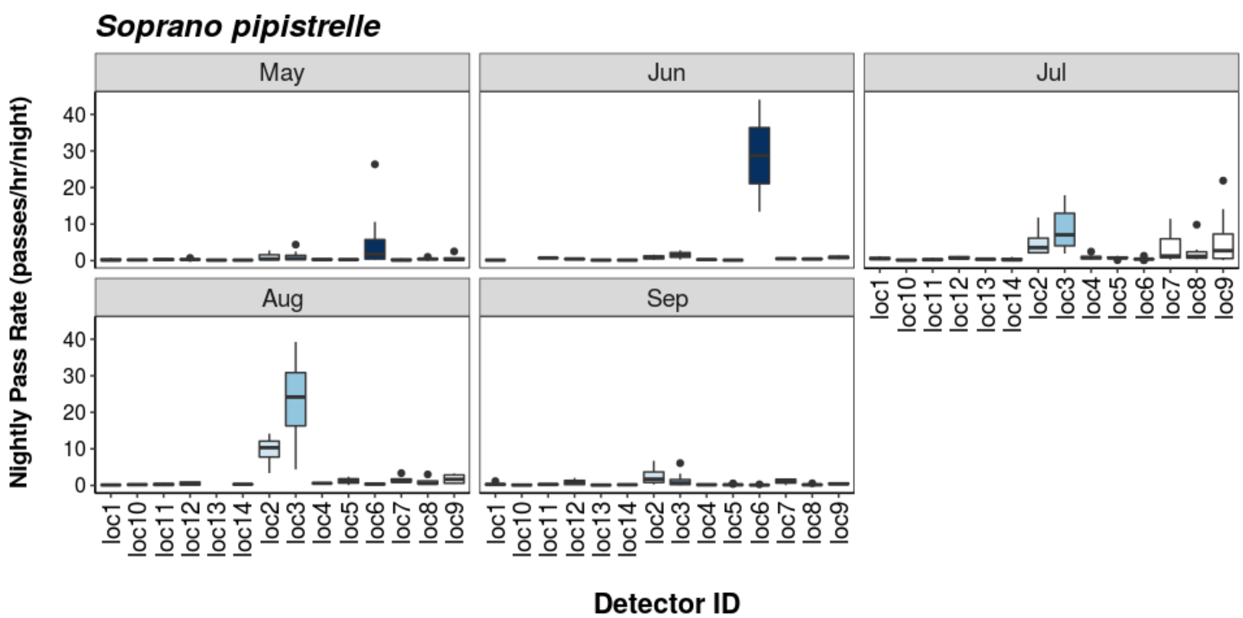

Daubenton's
May
Jun
Jul
Aug
Sep
Nightly Pass Rate (passes/hr/night)
1.25
1.00
0.75
0.50
0.25
loc1
loc10
loc11
loc12
loc13
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID



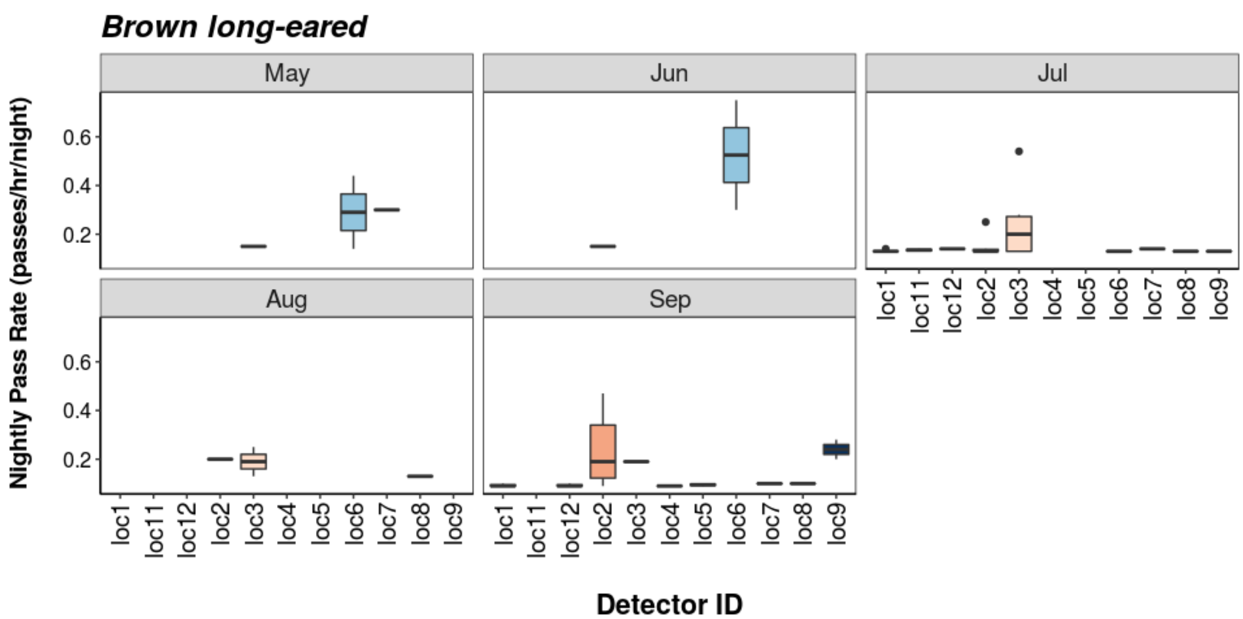
Natterer's
May
Jul
Aug
Sep
Nightly Pass Rate (passes/hr/night)
0.25
0.20
0.15
0.10
loc1
loc11
loc12
loc13
loc2
loc3
loc5
loc7
loc8
loc9
Detector ID



Common pipistrelle
May
Jun
Jul
Aug
Sep
Nightly Pass Rate (passes/hr/night)
30
20
10
0
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID



Soprano pipistrelle
May
Jun
Jul
Aug
Sep
Nightly Pass Rate (passes/hr/night)
0
10
20
30
40
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID



Brown long-eared
May
Jun
Jul
Aug
Sep
Nightly Pass Rate (passes/hr/night)
0.2
0.4
0.6
loc1
loc11
loc12
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID

Bat Activity per Detector Location

Figure 13. Detector ID reference:

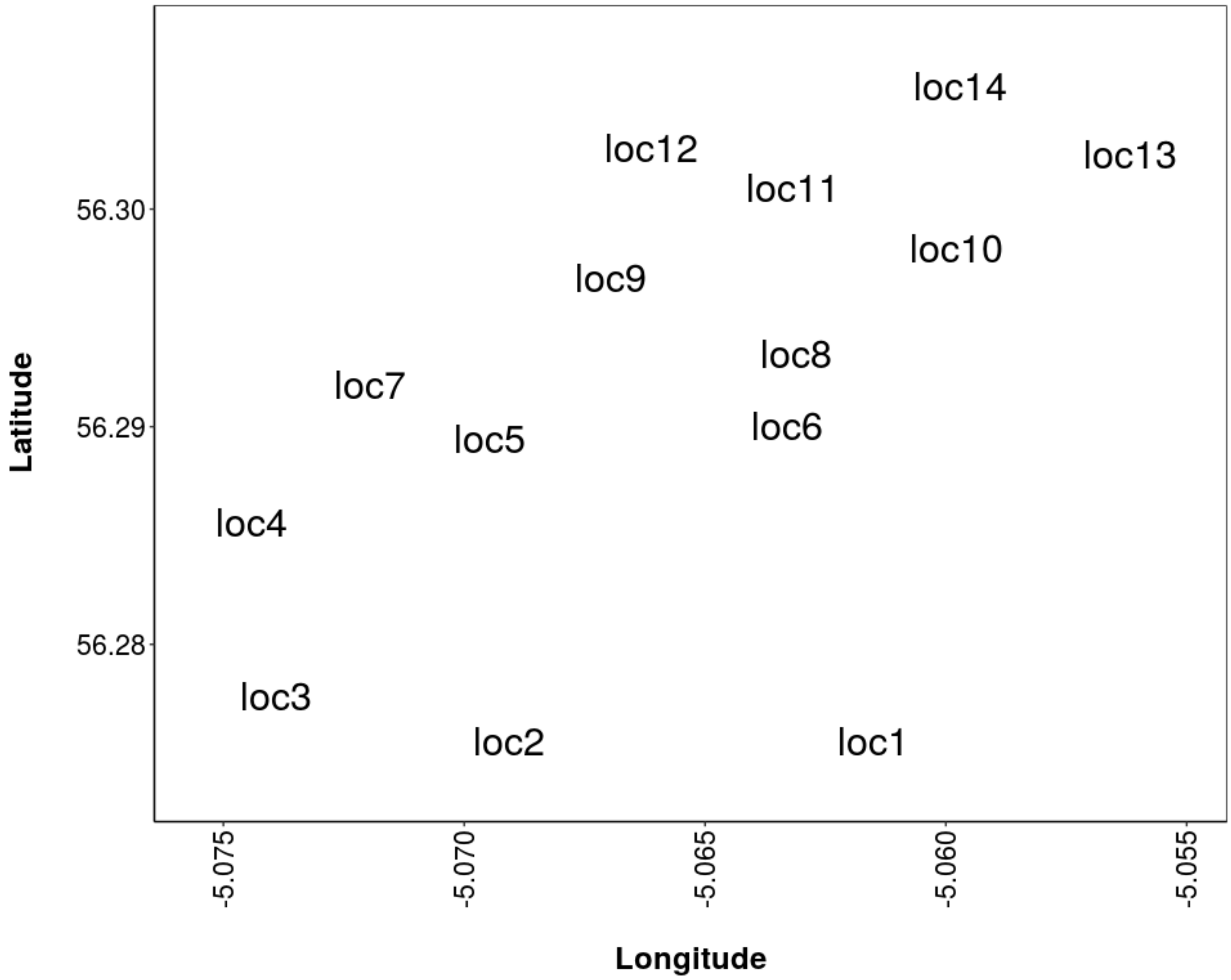


Figure 14. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

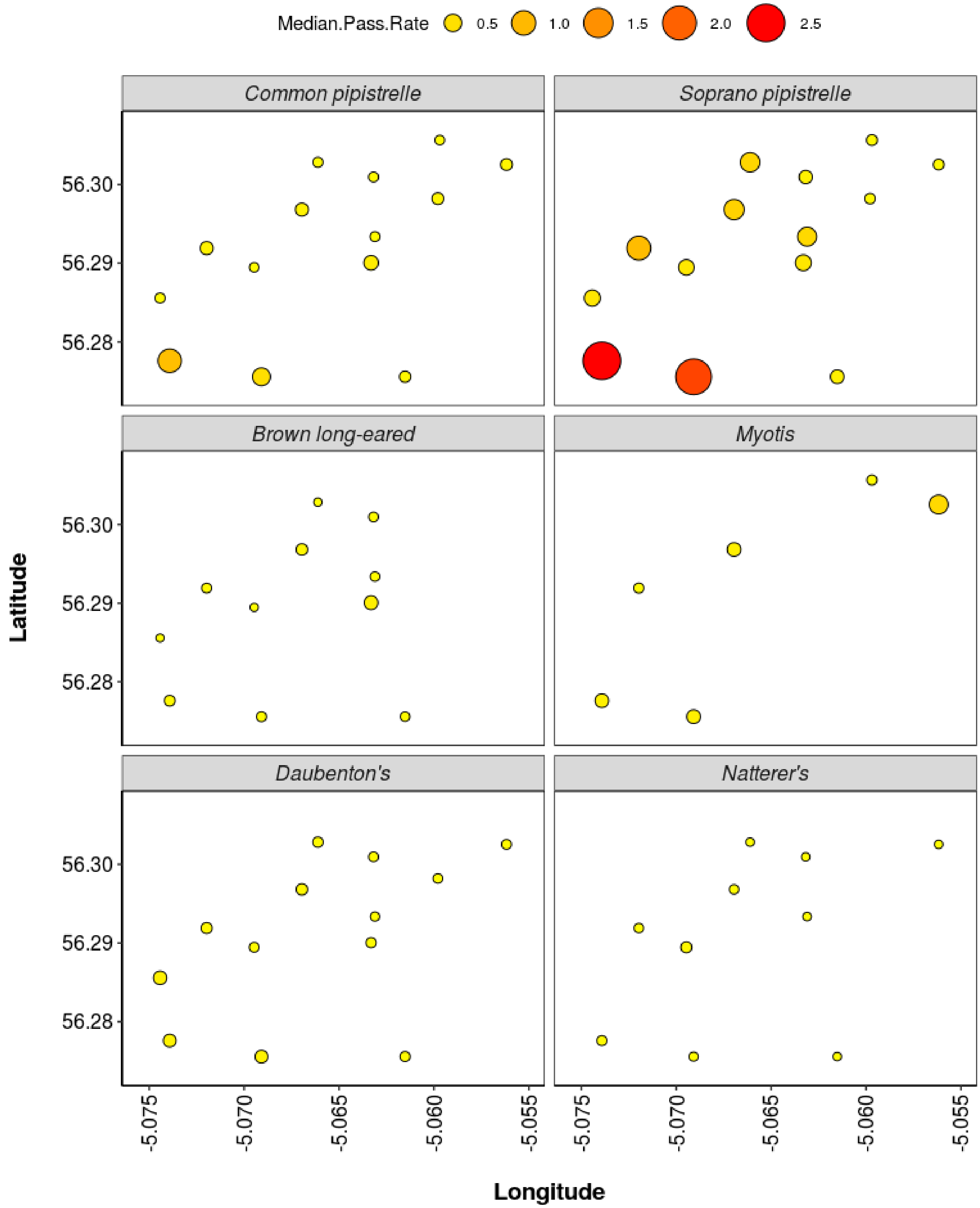
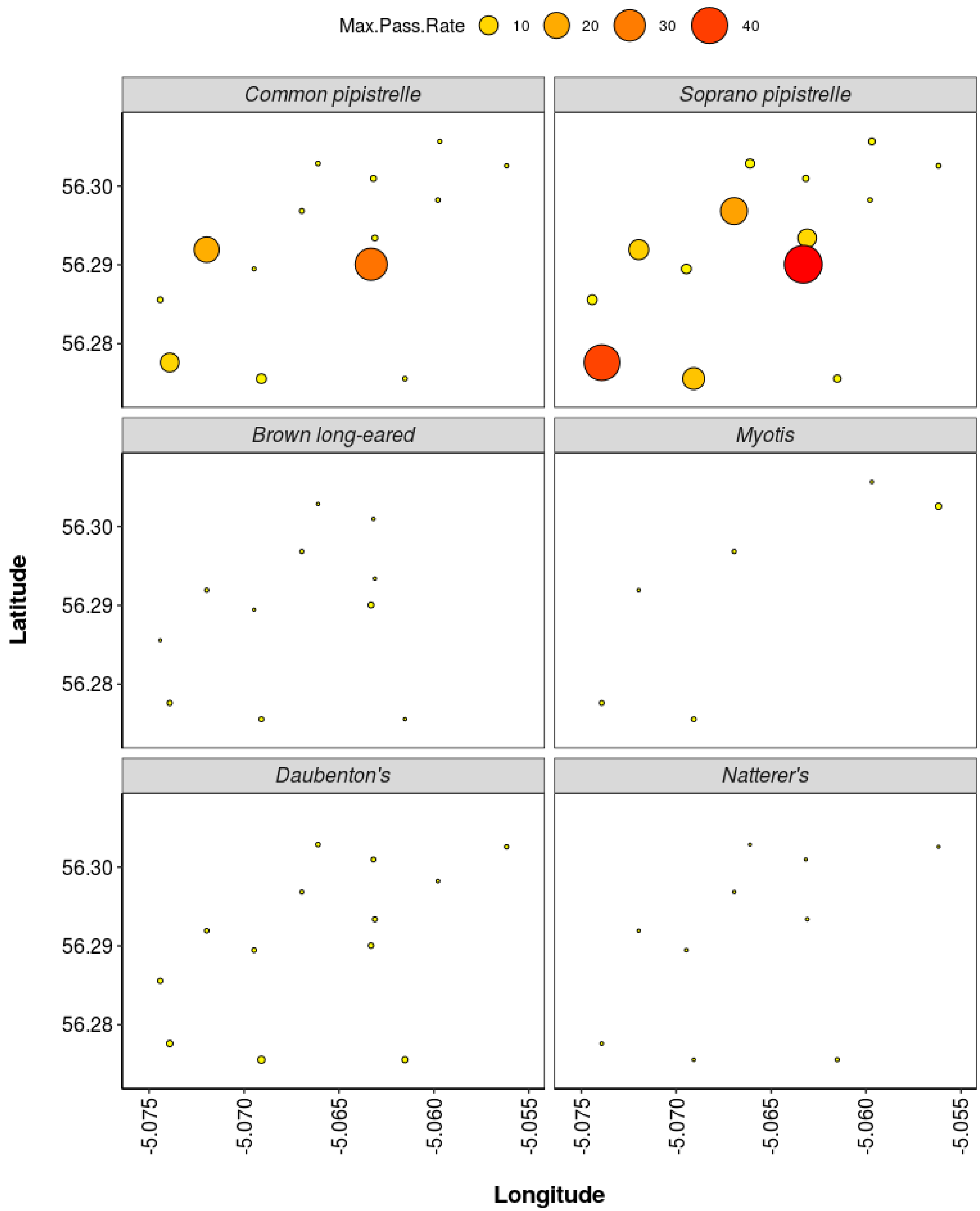


Figure 15. Maximum Nightly Pass Rate (bat passes/hr/night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location.



PART 2B: Includes absences

THE NEXT SECTION OF THE REPORT FEATURES THE DATA SUPPLIED TO ECOBAT BUT TAKES INTO ACCOUNT SPECIES ABSENCES, AND THEREFORE INCLUDES 'ZERO DATA' FOR WHEN SPECIES WERE NOT DETECTED AT EACH DETECTOR ON A NIGHT. THIS DRAMATICALLY LOWERS THE MEANS AND MEDIANS OF THE DATA PRESENTED.

Nightly Bat Pass Rate (Bat passes per hour)

Median Per Detector

Table 22. The median Nightly Pass Rate (bat passes per hour, per night) of each species. If NA, then no bat passes.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean. For further information see: *Lintott, P. R., & Mathews, F. (2018). Basic mathematical errors may make ecological assessments unreliable. Biodiversity and Conservation, 27(1), 265-267.* https://doi.org/10.1007/s10531-017-1418-5

Species	Detector ID	Median Pass Rate
Brown long-eared	loc1	0.0
Brown long-eared	loc10	0.0
Brown long-eared	loc11	0.0
Brown long-eared	loc12	0.0
Brown long-eared	loc13	0.0
Brown long-eared	loc14	0.0
Brown long-eared	loc2	0.0
Brown long-eared	loc3	0.0
Brown long-eared	loc4	0.0
Brown long-eared	loc5	0.0
Brown long-eared	loc6	0.0
Brown long-eared	loc7	0.0
Brown long-eared	loc8	0.0
Brown long-eared	loc9	0.0
Common pipistrelle	loc1	0.1
Common pipistrelle	loc10	0.0
Common pipistrelle	loc11	0.0
Common pipistrelle	loc12	0.0
Common pipistrelle	loc13	0.0
Common pipistrelle	loc14	0.0
Common pipistrelle	loc2	0.4
Common pipistrelle	loc3	0.5
Common pipistrelle	loc4	0.1

Common pipistrelle	loc5	0.0
Common pipistrelle	loc6	0.0
Common pipistrelle	loc7	0.3
Common pipistrelle	loc8	0.0
Common pipistrelle	loc9	0.0
Daubenton’s	loc1	0.0
Daubenton’s	loc10	0.0
Daubenton’s	loc11	0.0
Daubenton’s	loc12	0.0
Daubenton’s	loc13	0.1
Daubenton’s	loc14	0.0
Daubenton’s	loc2	0.1
Daubenton’s	loc3	0.1
Daubenton’s	loc4	0.0
Daubenton’s	loc5	0.1
Daubenton’s	loc6	0.0
Daubenton’s	loc7	0.0
Daubenton’s	loc8	0.0
Daubenton’s	loc9	0.0
Myotis	loc1	0.0
Myotis	loc10	0.0
Myotis	loc11	0.0
Myotis	loc12	0.0
Myotis	loc13	0.0
Myotis	loc14	0.0
Myotis	loc2	0.0
Myotis	loc3	0.0
Myotis	loc4	0.0
Myotis	loc5	0.0
Myotis	loc6	0.0
Myotis	loc7	0.0
Myotis	loc8	0.0
Myotis	loc9	0.0
Natterer’s	loc1	0.0
Natterer’s	loc10	0.0
Natterer’s	loc11	0.0

Natterer’s	loc12	0.0
Natterer’s	loc13	0.0
Natterer’s	loc14	0.0
Natterer’s	loc2	0.0
Natterer’s	loc3	0.0
Natterer’s	loc4	0.0
Natterer’s	loc5	0.0
Natterer’s	loc6	0.0
Natterer’s	loc7	0.0
Natterer’s	loc8	0.0
Natterer’s	loc9	0.0
Soprano pipistrelle	loc1	0.3
Soprano pipistrelle	loc10	0.1
Soprano pipistrelle	loc11	0.3
Soprano pipistrelle	loc12	0.5
Soprano pipistrelle	loc13	0.1
Soprano pipistrelle	loc14	0.2
Soprano pipistrelle	loc2	2.2
Soprano pipistrelle	loc3	2.2
Soprano pipistrelle	loc4	0.4
Soprano pipistrelle	loc5	0.3
Soprano pipistrelle	loc6	0.4
Soprano pipistrelle	loc7	0.8
Soprano pipistrelle	loc8	0.6
Soprano pipistrelle	loc9	0.7

Nightly Bat Pass Rate (Bat passes per hour)

Mean per Detector

Table 23. The mean Nightly Pass Rate (bat passes per hour, per night) of each species at each detector. Values are given to 1 decimal place.

We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Mean Pass Rate
Brown long-eared	loc1	0.0
Brown long-eared	loc10	0.0
Brown long-eared	loc11	0.0
Brown long-eared	loc12	0.0
Brown long-eared	loc13	0.0
Brown long-eared	loc14	0.0
Brown long-eared	loc2	0.1
Brown long-eared	loc3	0.1
Brown long-eared	loc4	0.0
Brown long-eared	loc5	0.0
Brown long-eared	loc6	0.1
Brown long-eared	loc7	0.0
Brown long-eared	loc8	0.0
Brown long-eared	loc9	0.0
Common pipistrelle	loc1	0.1
Common pipistrelle	loc10	0.1
Common pipistrelle	loc11	0.1
Common pipistrelle	loc12	0.1
Common pipistrelle	loc13	0.0
Common pipistrelle	loc14	0.1
Common pipistrelle	loc2	0.5
Common pipistrelle	loc3	1.3
Common pipistrelle	loc4	0.1
Common pipistrelle	loc5	0.1
Common pipistrelle	loc6	2.1
Common pipistrelle	loc7	1.3

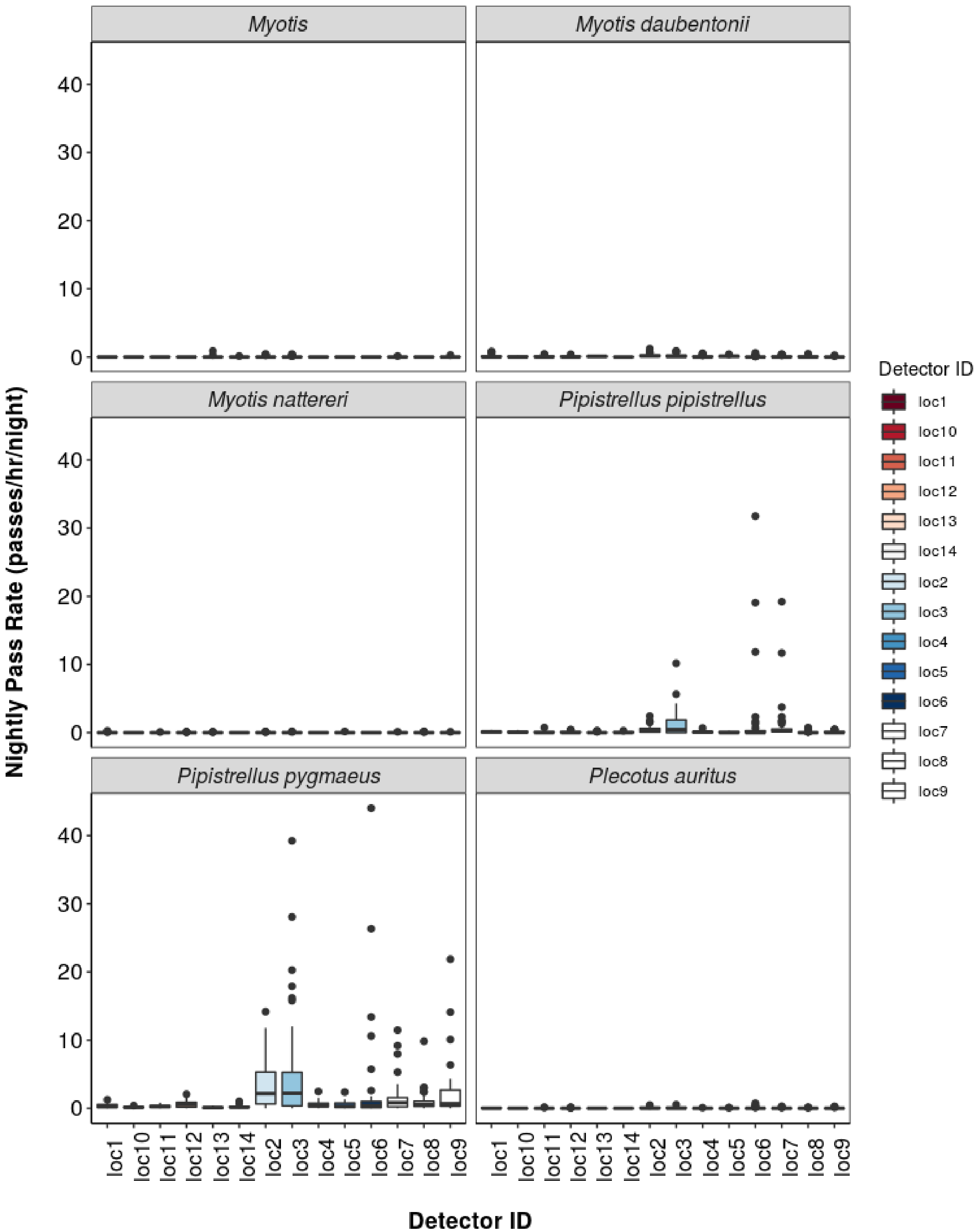
Common pipistrelle	loc8	0.1
Common pipistrelle	loc9	0.1
Daubenton's	loc1	0.1
Daubenton's	loc10	0.1
Daubenton's	loc11	0.1
Daubenton's	loc12	0.1
Daubenton's	loc13	0.1
Daubenton's	loc14	0.0
Daubenton's	loc2	0.2
Daubenton's	loc3	0.1
Daubenton's	loc4	0.1
Daubenton's	loc5	0.1
Daubenton's	loc6	0.1
Daubenton's	loc7	0.1
Daubenton's	loc8	0.1
Daubenton's	loc9	0.0
Myotis	loc1	0.0
Myotis	loc10	0.0
Myotis	loc11	0.0
Myotis	loc12	0.0
Myotis	loc13	0.1
Myotis	loc14	0.0
Myotis	loc2	0.0
Myotis	loc3	0.0
Myotis	loc4	0.0
Myotis	loc5	0.0
Myotis	loc6	0.0
Myotis	loc7	0.0
Myotis	loc8	0.0
Myotis	loc9	0.0
Natterer's	loc1	0.0
Natterer's	loc10	0.0
Natterer's	loc11	0.0
Natterer's	loc12	0.0
Natterer's	loc13	0.0
Natterer's	loc14	0.0

Natterer’s	loc2	0.0
Natterer’s	loc3	0.0
Natterer’s	loc4	0.0
Natterer’s	loc5	0.0
Natterer’s	loc6	0.0
Natterer’s	loc7	0.0
Natterer’s	loc8	0.0
Natterer’s	loc9	0.0
Soprano pipistrelle	loc1	0.4
Soprano pipistrelle	loc10	0.2
Soprano pipistrelle	loc11	0.3
Soprano pipistrelle	loc12	0.6
Soprano pipistrelle	loc13	0.1
Soprano pipistrelle	loc14	0.2
Soprano pipistrelle	loc2	3.5
Soprano pipistrelle	loc3	5.7
Soprano pipistrelle	loc4	0.6
Soprano pipistrelle	loc5	0.5
Soprano pipistrelle	loc6	3.4
Soprano pipistrelle	loc7	1.7
Soprano pipistrelle	loc8	1.1
Soprano pipistrelle	loc9	2.7

Nightly Bat Passes (Bat passes per hour)

Per Detector - Figures

Figure 16. Figures show boxplots for the number of bat passes per hour each night, for each detector. The 'box' shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The 'whiskers' extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.



Myotis
Myotis daubentonii
Myotis nattereri
Pipistrellus pipistrellus
Pipistrellus pygmaeus
Plecotus auritus
Nightly Pass Rate (passes/hr/night)
0
10
20
30
40
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID

Survey Effort

Table 24. The number of nights bats were detected per month per detector.

Month	Detector ID	No of Survey Nights
May	loc1	5
May	loc10	2
May	loc11	6
May	loc12	5
May	loc13	4
May	loc14	2
May	loc2	9
May	loc3	10
May	loc4	4
May	loc5	3
May	loc6	11
May	loc7	9
May	loc8	6
May	loc9	6
Jun	loc1	1
Jun	loc10	1
Jun	loc11	1
Jun	loc12	2
Jun	loc13	2
Jun	loc14	1
Jun	loc2	2
Jun	loc3	2
Jun	loc4	3
Jun	loc5	1
Jun	loc6	2
Jun	loc7	2
Jun	loc8	3
Jun	loc9	2
Jul	loc1	13
Jul	loc10	8
Jul	loc11	12

Jul	loc12	11
Jul	loc13	5
Jul	loc14	8
Jul	loc2	12
Jul	loc3	12
Jul	loc4	12
Jul	loc5	12
Jul	loc6	12
Jul	loc7	12
Jul	loc8	13
Jul	loc9	12
Aug	loc1	3
Aug	loc10	3
Aug	loc11	4
Aug	loc12	4
Aug	loc13	4
Aug	loc14	2
Aug	loc2	4
Aug	loc3	4
Aug	loc4	1
Aug	loc5	4
Aug	loc6	3
Aug	loc7	4
Aug	loc8	4
Aug	loc9	4
Sep	loc1	11
Sep	loc10	6
Sep	loc11	9
Sep	loc12	10
Sep	loc13	6
Sep	loc14	2
Sep	loc2	10
Sep	loc3	12
Sep	loc4	6
Sep	loc5	9
Sep	loc6	5

Sep	loc7	11
Sep	loc8	8
Sep	loc9	6

Nightly Bat Pass Rate for each Month

Median Per Detector

Table 25. The median Nightly Pass Rate (bat passes per hour, per night) of each species throughout each month. If NA, then no bat passes.

Bat pass rates are often highly variable between nights, with some nights having few or no passes and other nights having high activity. In these circumstances, the median is likely to be a more useful summary of the 'average' activity than is the mean. For further information see: *Lintott, P. R., & Mathews, F. (2018). Basic mathematical errors may make ecological assessments unreliable. Biodiversity and Conservation, 27(1), 265-267.* https://doi.org/10.1007/s10531-017-1418-5

Species	Detector ID	Aug	Jul	Jun	May	Sep
Brown long-eared	loc1	0.0	0.1	0.0	0.0	0.0
Brown long-eared	loc10	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc11	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc12	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc13	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc14	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc2	0.0	0.1	0.1	0.0	0.1
Brown long-eared	loc3	0.1	0.1	0.0	0.0	0.0
Brown long-eared	loc4	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc5	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc6	0.0	0.0	0.5	0.0	0.0
Brown long-eared	loc7	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc8	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc9	0.0	0.0	0.0	0.0	0.0
Common pipistrelle	loc1	0.0	0.3	0.0	0.1	0.0
Common pipistrelle	loc10	0.0	0.2	0.2	0.1	0.0
Common pipistrelle	loc11	0.0	0.0	0.7	0.0	0.0
Common pipistrelle	loc12	0.2	0.1	0.1	0.1	0.0
Common pipistrelle	loc13	0.0	0.0	0.0	0.1	0.0
Common pipistrelle	loc14	0.0	0.0	0.0	0.1	0.1
Common pipistrelle	loc2	1.1	0.5	0.4	0.0	0.2
Common pipistrelle	loc3	3.6	2.0	0.3	0.1	0.1
Common pipistrelle	loc4	0.0	0.1	0.2	0.1	0.0

Common pipistrelle	loc5	0.0	0.1	0.2	0.0	0.0
Common pipistrelle	loc6	0.0	0.0	25.4	0.2	0.0
Common pipistrelle	loc7	0.2	0.3	11.5	0.7	0.1
Common pipistrelle	loc8	0.0	0.0	0.0	0.0	0.0
Common pipistrelle	loc9	0.1	0.0	0.3	0.3	0.0
Daubenton’s	loc1	0.0	0.0	0.0	0.0	0.1
Daubenton’s	loc10	0.1	0.0	0.0	0.0	0.1
Daubenton’s	loc11	0.0	0.0	0.0	0.0	0.0
Daubenton’s	loc12	0.0	0.0	0.0	0.0	0.1
Daubenton’s	loc13	0.2	0.0	0.1	0.1	0.1
Daubenton’s	loc14	0.0	0.0	0.0	0.0	0.0
Daubenton’s	loc2	0.2	0.1	0.2	0.2	0.3
Daubenton’s	loc3	0.3	0.1	0.1	0.1	0.0
Daubenton’s	loc4	0.0	0.1	0.0	0.0	0.0
Daubenton’s	loc5	0.1	0.1	0.2	0.1	0.0
Daubenton’s	loc6	0.0	0.0	0.3	0.0	0.1
Daubenton’s	loc7	0.2	0.0	0.0	0.0	0.0
Daubenton’s	loc8	0.1	0.0	0.0	0.0	0.1
Daubenton’s	loc9	0.0	0.0	0.0	0.0	0.0
Myotis	loc1	0.0	0.0	0.0	0.0	0.0
Myotis	loc10	0.0	0.0	0.0	0.0	0.0
Myotis	loc11	0.0	0.0	0.0	0.0	0.0
Myotis	loc12	0.0	0.0	0.0	0.0	0.0
Myotis	loc13	0.0	0.0	0.2	0.0	0.0
Myotis	loc14	0.0	0.0	0.0	0.1	0.0
Myotis	loc2	0.0	0.0	0.2	0.0	0.0
Myotis	loc3	0.0	0.0	0.2	0.0	0.0
Myotis	loc4	0.0	0.0	0.0	0.0	0.0
Myotis	loc5	0.0	0.0	0.0	0.0	0.0
Myotis	loc6	0.0	0.0	0.0	0.0	0.0
Myotis	loc7	0.0	0.0	0.0	0.0	0.0
Myotis	loc8	0.0	0.0	0.0	0.0	0.0
Myotis	loc9	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc1	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc10	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc11	0.0	0.0	0.0	0.0	0.0

Natterer’s	loc12	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc13	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc14	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc2	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc3	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc4	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc5	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc6	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc7	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc8	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc9	0.0	0.0	0.0	0.0	0.0
Soprano pipistrelle	loc1	0.1	0.5	0.2	0.2	0.3
Soprano pipistrelle	loc10	0.2	0.1	0.0	0.2	0.1
Soprano pipistrelle	loc11	0.3	0.2	0.7	0.2	0.3
Soprano pipistrelle	loc12	0.5	0.7	0.4	0.3	0.2
Soprano pipistrelle	loc13	0.0	0.4	0.1	0.2	0.0
Soprano pipistrelle	loc14	0.3	0.1	0.2	0.2	0.1
Soprano pipistrelle	loc2	10.3	3.6	0.9	0.4	1.7
Soprano pipistrelle	loc3	24.2	7.1	1.6	0.5	0.7
Soprano pipistrelle	loc4	0.6	0.8	0.3	0.2	0.2
Soprano pipistrelle	loc5	0.7	0.7	0.2	0.3	0.2
Soprano pipistrelle	loc6	0.1	0.4	28.7	1.0	0.1
Soprano pipistrelle	loc7	1.1	1.3	0.5	0.0	1.3
Soprano pipistrelle	loc8	0.6	1.2	0.4	0.4	0.1
Soprano pipistrelle	loc9	1.7	2.7	0.9	0.2	0.4

Nightly Bat Pass Rate for each Month

Mean per Detector

Table 26. The mean Nightly Pass Rate (bat passes per hour, per night) of each species throughout each month. Values are given to 1 decimal place.

We recommend using the median values given above, for the reasons stated above, but provide the mean values in the table below.

Species	Detector ID	Aug	Jul	Jun	May	Sep
Brown long-eared	loc1	0.0	0.1	0.0	0.0	0.0
Brown long-eared	loc10	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc11	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc12	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc13	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc14	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc2	0.0	0.1	0.1	0.0	0.1
Brown long-eared	loc3	0.1	0.2	0.0	0.0	0.0
Brown long-eared	loc4	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc5	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc6	0.0	0.0	0.5	0.1	0.0
Brown long-eared	loc7	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc8	0.0	0.0	0.0	0.0	0.0
Brown long-eared	loc9	0.0	0.0	0.0	0.0	0.1
Common pipistrelle	loc1	0.0	0.2	0.0	0.1	0.1
Common pipistrelle	loc10	0.0	0.2	0.2	0.1	0.0
Common pipistrelle	loc11	0.0	0.1	0.7	0.0	0.0
Common pipistrelle	loc12	0.2	0.2	0.1	0.1	0.0
Common pipistrelle	loc13	0.0	0.1	0.0	0.1	0.0
Common pipistrelle	loc14	0.0	0.1	0.0	0.1	0.1
Common pipistrelle	loc2	1.1	0.6	0.4	0.1	0.4
Common pipistrelle	loc3	3.3	2.9	0.3	0.1	0.2
Common pipistrelle	loc4	0.0	0.2	0.1	0.1	0.0
Common pipistrelle	loc5	0.1	0.1	0.2	0.0	0.0
Common pipistrelle	loc6	0.0	0.1	25.4	1.7	0.0
Common pipistrelle	loc7	0.3	0.4	11.5	2.0	0.1

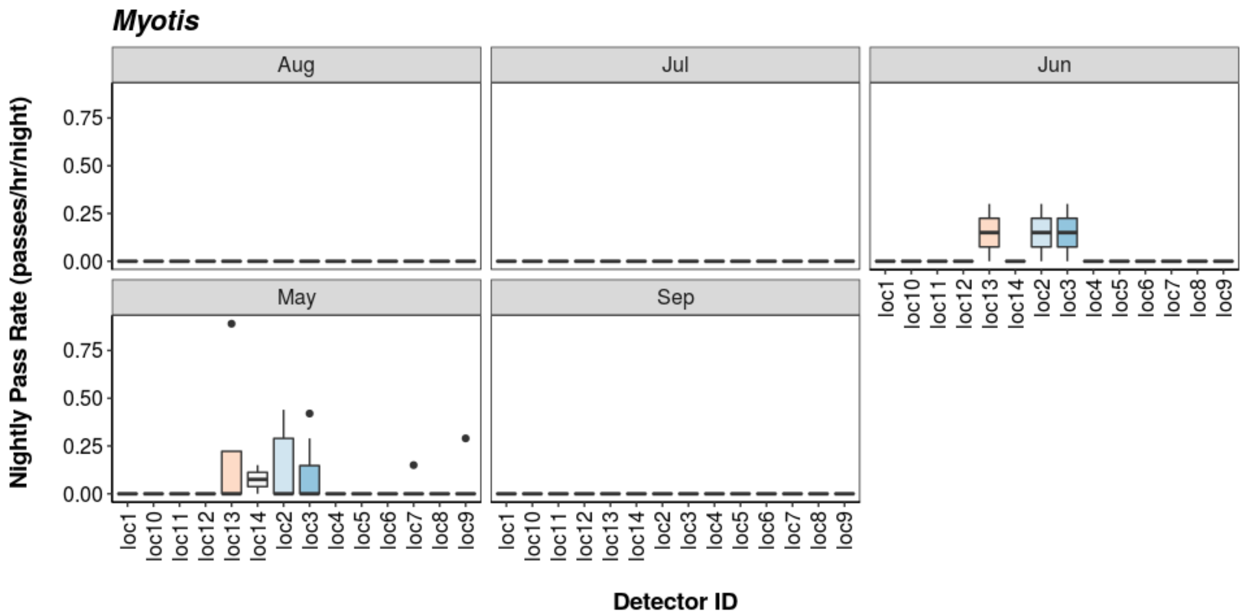
Common pipistrelle	loc8	0.0	0.1	0.2	0.0	0.0
Common pipistrelle	loc9	0.1	0.0	0.3	0.2	0.0
Daubenton’s	loc1	0.0	0.0	0.0	0.0	0.2
Daubenton’s	loc10	0.1	0.0	0.0	0.0	0.1
Daubenton’s	loc11	0.0	0.1	0.0	0.0	0.1
Daubenton’s	loc12	0.0	0.1	0.0	0.0	0.1
Daubenton’s	loc13	0.2	0.0	0.1	0.1	0.1
Daubenton’s	loc14	0.0	0.0	0.0	0.0	0.0
Daubenton’s	loc2	0.3	0.1	0.2	0.2	0.4
Daubenton’s	loc3	0.4	0.2	0.1	0.1	0.0
Daubenton’s	loc4	0.0	0.2	0.0	0.0	0.0
Daubenton’s	loc5	0.1	0.1	0.2	0.1	0.1
Daubenton’s	loc6	0.0	0.0	0.3	0.0	0.1
Daubenton’s	loc7	0.2	0.0	0.0	0.0	0.1
Daubenton’s	loc8	0.1	0.0	0.0	0.0	0.2
Daubenton’s	loc9	0.0	0.0	0.0	0.0	0.0
Myotis	loc1	0.0	0.0	0.0	0.0	0.0
Myotis	loc10	0.0	0.0	0.0	0.0	0.0
Myotis	loc11	0.0	0.0	0.0	0.0	0.0
Myotis	loc12	0.0	0.0	0.0	0.0	0.0
Myotis	loc13	0.0	0.0	0.2	0.2	0.0
Myotis	loc14	0.0	0.0	0.0	0.1	0.0
Myotis	loc2	0.0	0.0	0.2	0.1	0.0
Myotis	loc3	0.0	0.0	0.2	0.1	0.0
Myotis	loc4	0.0	0.0	0.0	0.0	0.0
Myotis	loc5	0.0	0.0	0.0	0.0	0.0
Myotis	loc6	0.0	0.0	0.0	0.0	0.0
Myotis	loc7	0.0	0.0	0.0	0.0	0.0
Myotis	loc8	0.0	0.0	0.0	0.0	0.0
Myotis	loc9	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc1	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc10	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc11	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc12	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc13	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc14	0.0	0.0	0.0	0.0	0.0

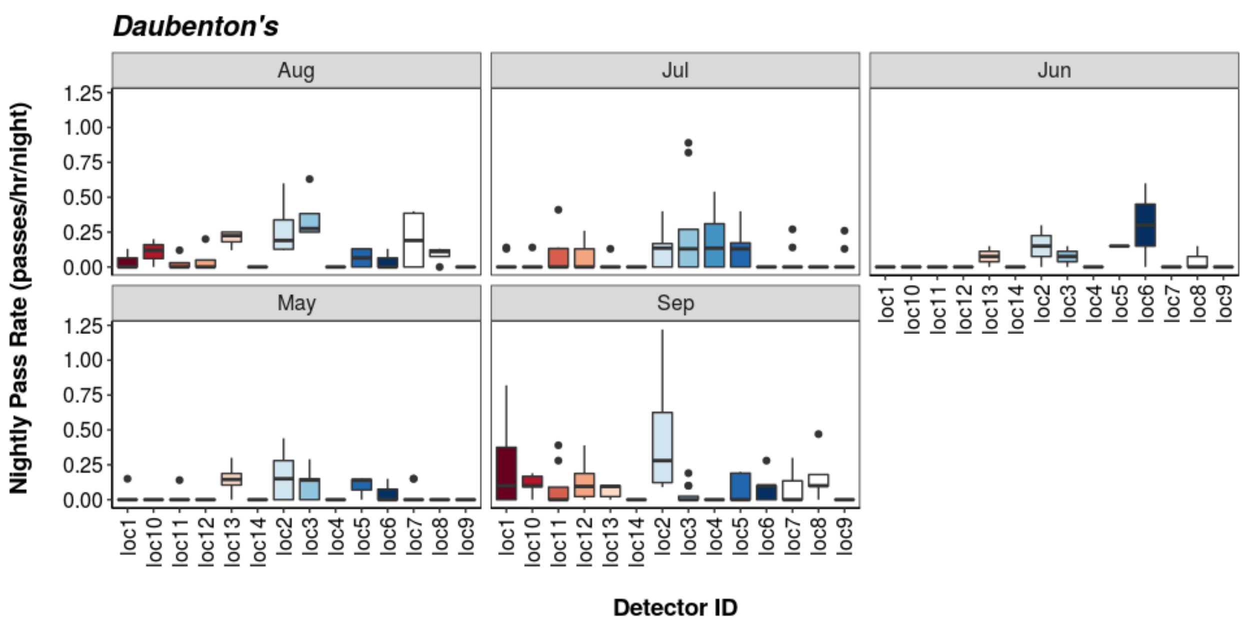
Natterer’s	loc2	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc3	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc4	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc5	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc6	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc7	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc8	0.0	0.0	0.0	0.0	0.0
Natterer’s	loc9	0.0	0.0	0.0	0.0	0.0
Soprano pipistrelle	loc1	0.1	0.5	0.2	0.2	0.3
Soprano pipistrelle	loc10	0.2	0.2	0.0	0.2	0.1
Soprano pipistrelle	loc11	0.3	0.3	0.7	0.2	0.3
Soprano pipistrelle	loc12	0.5	0.8	0.4	0.3	0.6
Soprano pipistrelle	loc13	0.0	0.3	0.1	0.1	0.1
Soprano pipistrelle	loc14	0.3	0.3	0.2	0.2	0.1
Soprano pipistrelle	loc2	9.6	4.8	0.9	0.8	2.5
Soprano pipistrelle	loc3	23.0	8.7	1.6	1.1	1.4
Soprano pipistrelle	loc4	0.6	1.0	0.2	0.3	0.2
Soprano pipistrelle	loc5	0.9	0.8	0.2	0.2	0.2
Soprano pipistrelle	loc6	0.2	0.4	28.7	4.4	0.1
Soprano pipistrelle	loc7	1.6	3.6	0.5	0.1	1.1
Soprano pipistrelle	loc8	1.1	2.0	0.4	0.5	0.2
Soprano pipistrelle	loc9	1.8	5.4	0.9	0.6	0.5

Nightly Bat Pass Rate for each Month

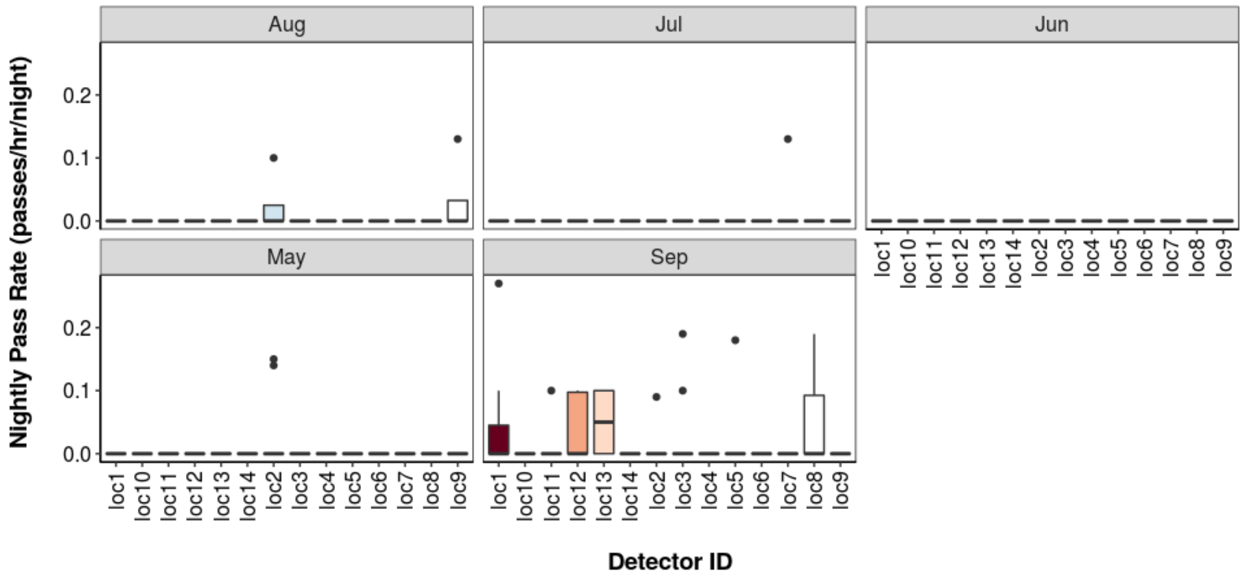
Per Detector - Figures

Figure 17. Figures show boxplots for the number of bat passes per hour by detector, for each month. The ‘box’ shows the interquartile range, which is where the middle 50% of the data lie. The line dividing the box is the median, the mid-point of the data. The ‘whiskers’ extend from the box and represent the ranges for the bottom 25% and the top 25% of the data values, excluding outliers. An outlier is any extreme value that lies further away from the box than 1.5 times the interquartile range. Outliers are shown as dots. Where very few passes are recorded it is not possible to produce the box, so the data are shown as a line.

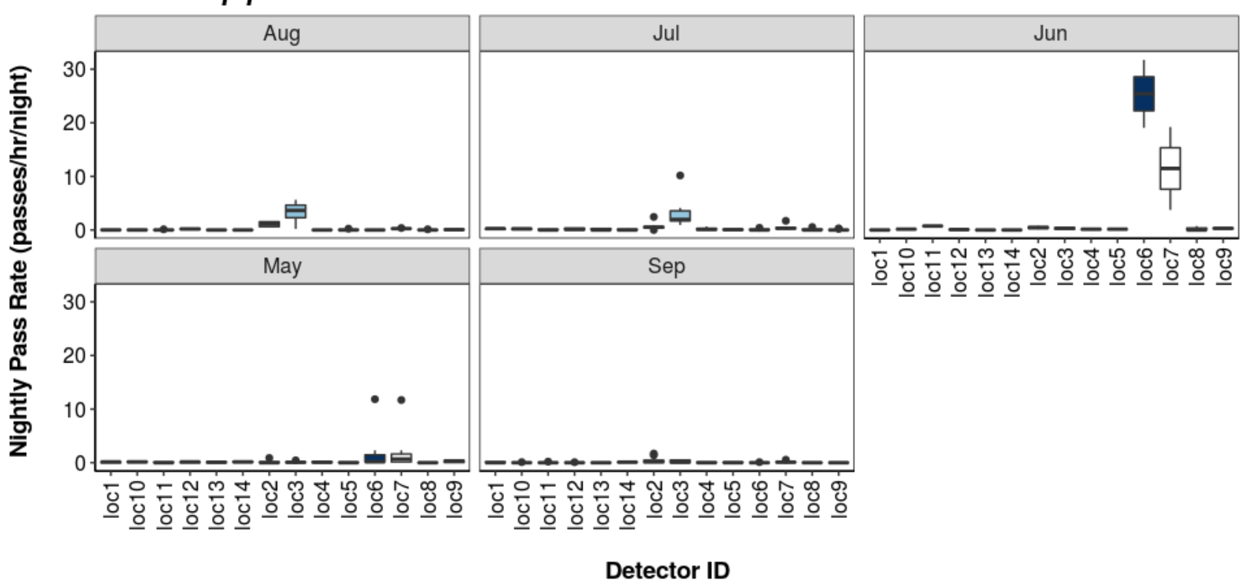

Myotis
Aug
Jul
Jun
May
Sep
Nightly Pass Rate (passes/hr/night)
0.00
0.25
0.50
0.75
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID

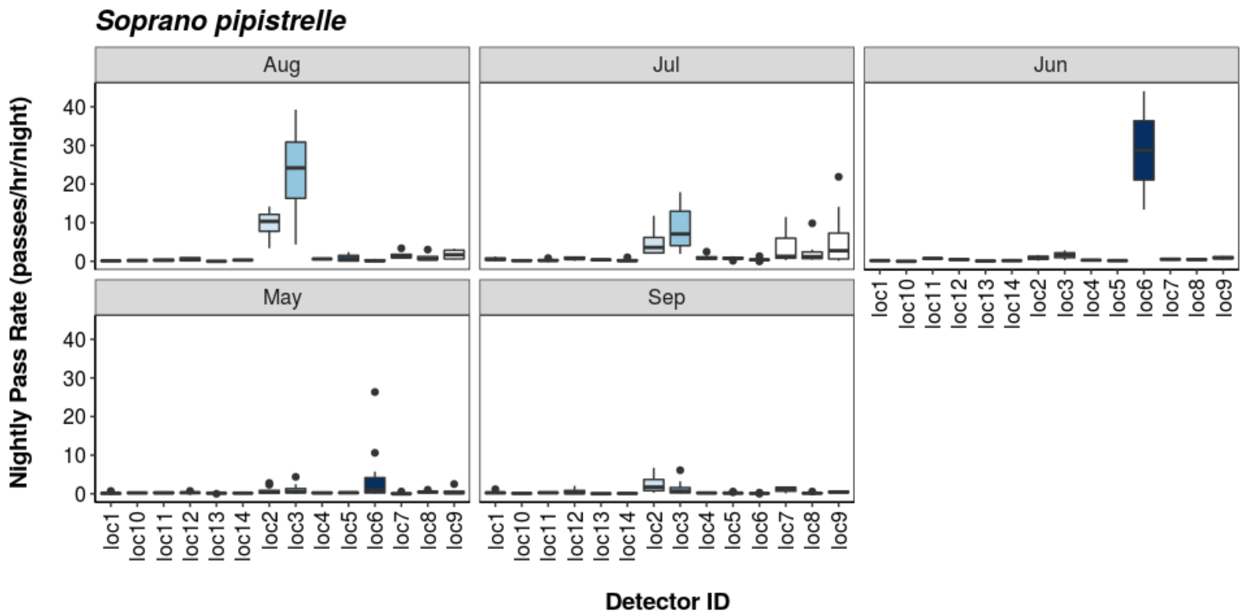

Daubenton's
Aug
Jul
Jun
May
Sep
Nightly Pass Rate (passes/hr/night)
0.00
0.25
0.50
0.75
1.00
1.25
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID

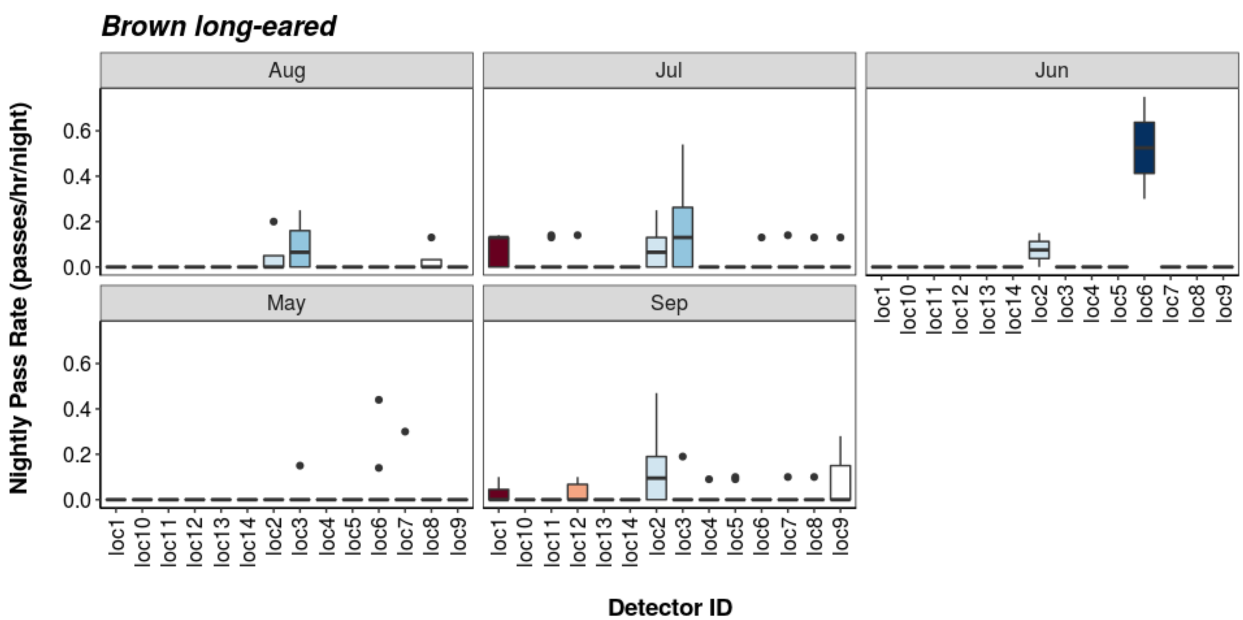
Natterer's



Common pipistrelle




Soprano pipistrelle
Aug
Jul
Jun
May
Sep
Nightly Pass Rate (passes/hr/night)
0
10
20
30
40
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID


Brown long-eared
Aug
Jul
Jun
May
Sep
Nightly Pass Rate (passes/hr/night)
0.0
0.2
0.4
0.6
loc1
loc10
loc11
loc12
loc13
loc14
loc2
loc3
loc4
loc5
loc6
loc7
loc8
loc9
Detector ID

Bat Activity per Detector Location

Figure 18. Detector ID reference:

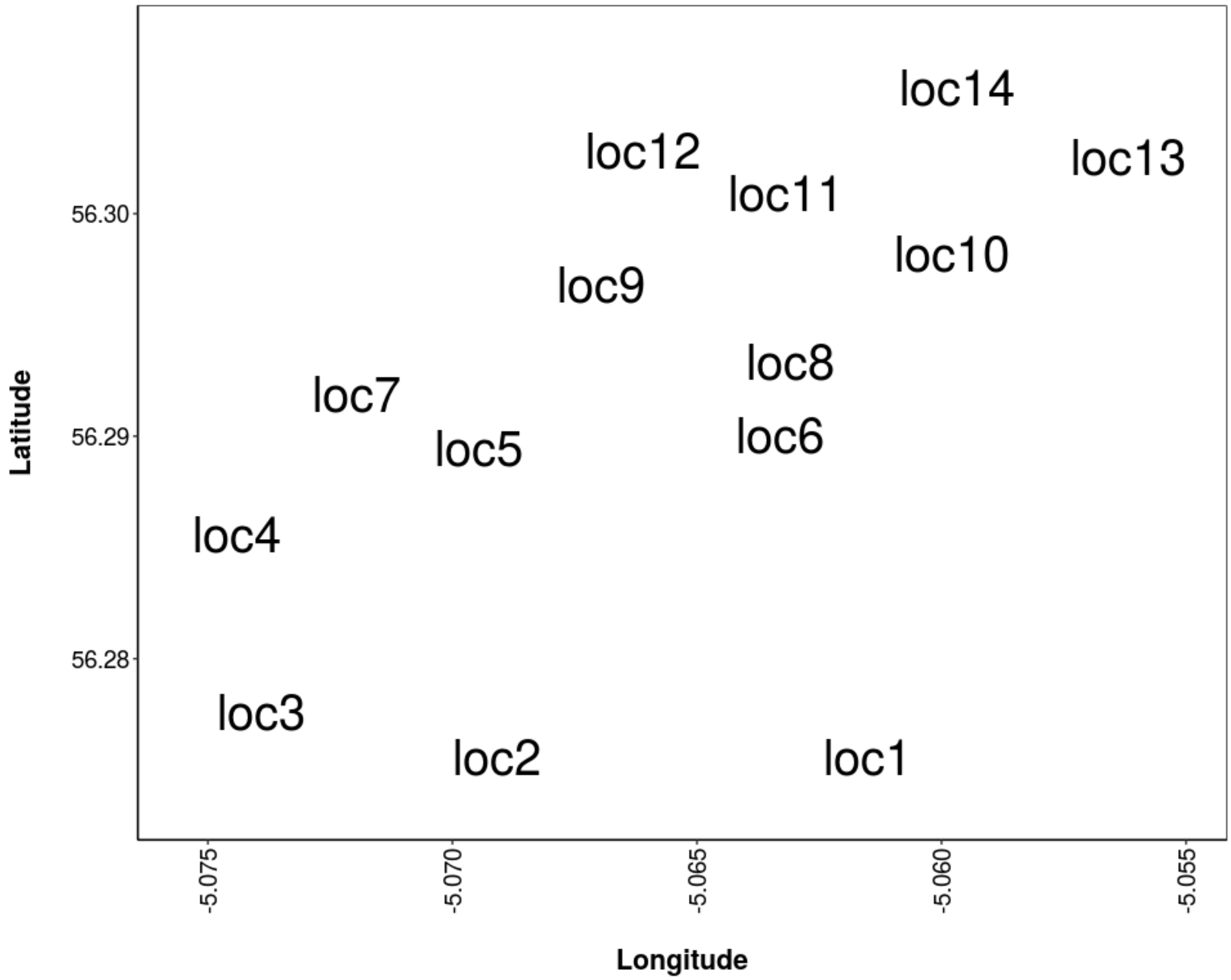


Figure 19. Median Nightly Pass Rate (bat passes/hr/night) throughout the survey period - represented by the size and colour of the point at each detector location.

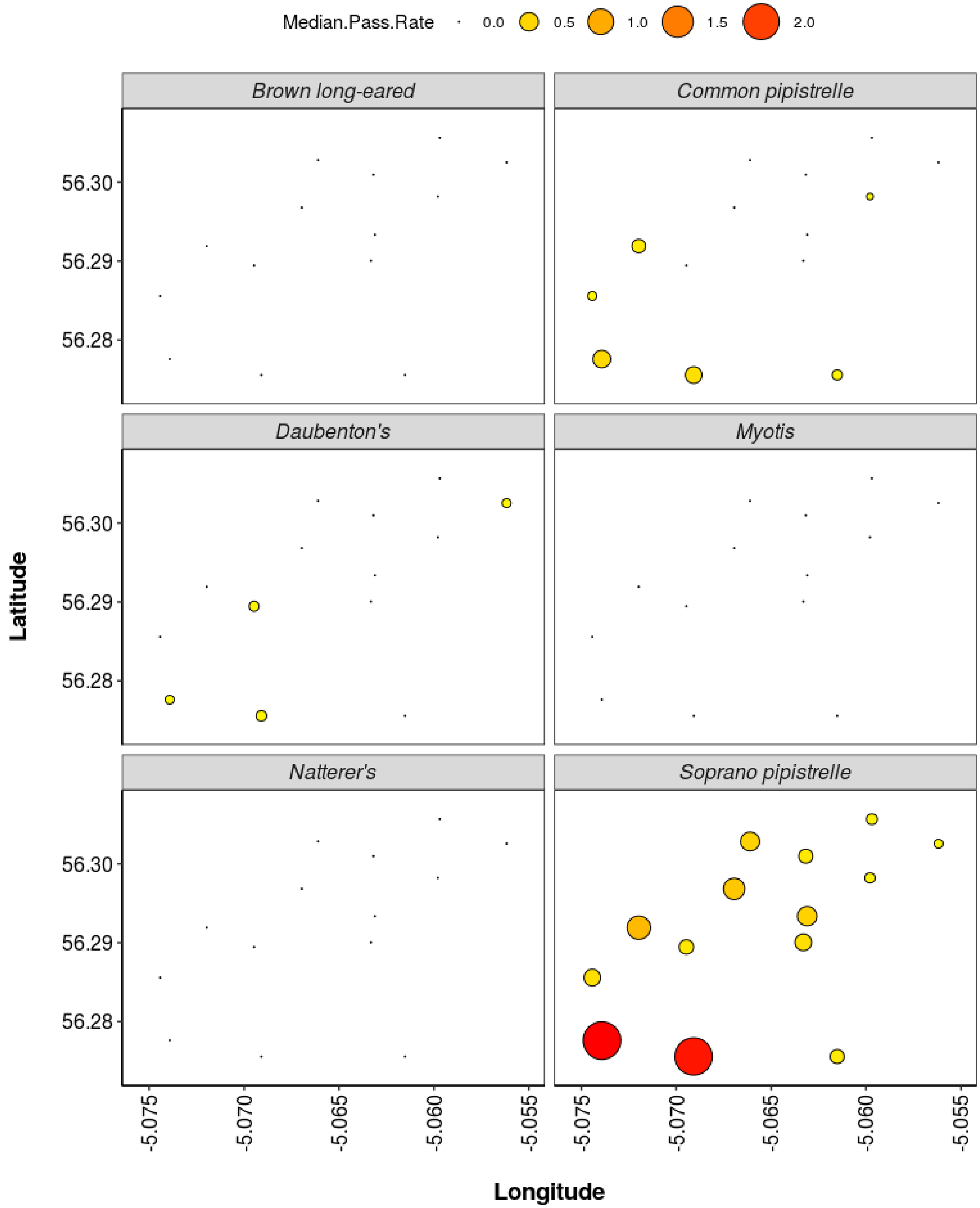
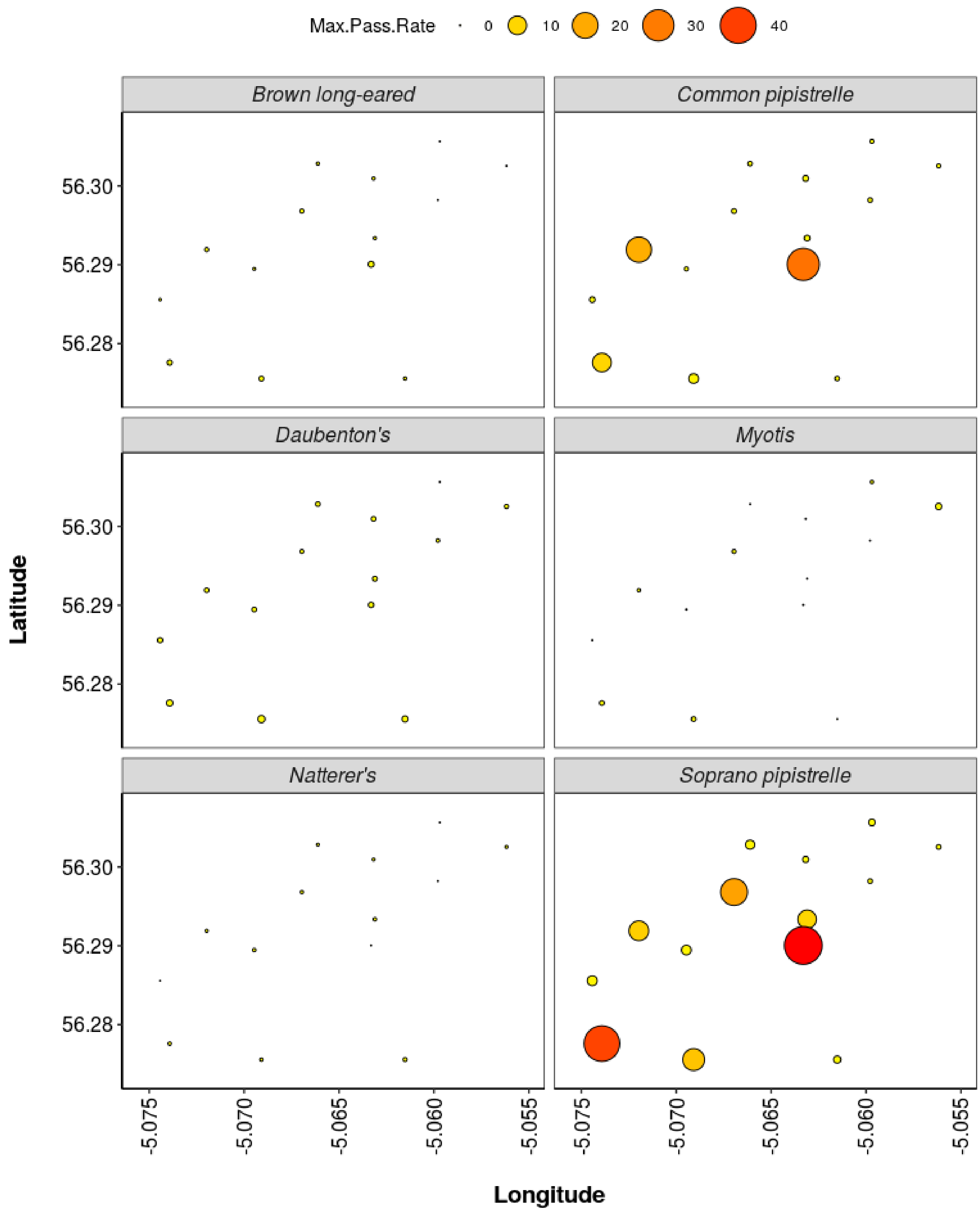


Figure 20. Maximum Nightly Pass Rate (bat passes/hr/night) recorded in a single night throughout the survey period - represented by the size and colour of the point at each detector location.



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Environmental Impact Assessment – Technical Appendix 8.4: Outline Biodiversity Enhancement Management Plan

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

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MacArthur Green

Ladyfield Renewable Energy Park

Appendix 8.4: Outline Biodiversity Enhancement Management Plan

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0.8	Updated	R. Dewar	22/09/2023

CONTENTS

1 INTRODUCTION

This Outline Biodiversity Enhancement Management Plan (OBEMP) presents an overview of the proposed conservation management, habitat restoration and enhancement measures which, subject to planning consent, would be associated with Ladyfield Renewable Energy Park (hereafter referred to as the 'Development'), proposed by Ladyfield Renewable Energy Park Ltd (the Applicant). The Development site ('the site') is located approximately 4.7 km north of Inveraray, Argyll & Bute.

In general, the OBEMP has been, and the final Biodiversity Enhancement Management Plan (BEMP) would be, designed to deliver focussed habitat enhancement to benefit key ornithological and ecological features and a substantial biodiversity benefit compared to current conditions within the site, whilst taking into consideration ongoing forestry and estate activities and conservation programmes.

The structure of this OBEMP is as follows:

- A site description, background ornithology, ecology, peat, soil and forestry information and summary of Environmental Impact Assessment (EIA) conclusions;
- The Biodiversity Management Group description;
- Biodiversity Net Gain;
- Aims, Objectives and Management Prescriptions of the BEMP;
- BEMP Search Area descriptions;
- Biodiversity Net Gain Assessment;
- Monitoring; and
- Reporting.

The focus on particular management for ornithology, ecology and general biodiversity enhancement recommended within this OBEMP follows relevant best practice guidance (e.g. SNH 2016[1]) and the recently adopted Scottish Government's National Planning Framework 4 (NPF4)[2], in particular policies related to biodiversity, natural places, trees and forestry. It is also based on consultation, existing and planned site management and the information presented in the Ladyfield Renewable Energy Park EIA Report, in particular **Chapter 7: Ornithology** and **Chapter 8: Ecology**.

Mitigation of potential impacts on ornithology and ecology due to construction activities would be dealt with separately in a detailed Construction Environmental Management Plan (CEMP) (see **Chapter 11: Geology, Soils and Peat** for outline CEMP), which would include a Species Protection Plan and Breeding Bird Protection Plan. Therefore, the scope of this OBEMP relates primarily to the operational period, albeit some management measures may commence during the

[1] Scottish Natural Heritage (2016). Planning for Development: What to consider and include in Habitat Management Plans. Guidance. Version 2. Available at: https://www.nature.scot/guidance-planning-development-what-consider-and-include-habitat-management-plans

[2] https://www.gov.scot/publications/national-planning-framework-4/documents/

felling/construction period, and continue through decommissioning, restoration and aftercare phases.

A final BEMP, which would include confirmed Management Units and detailed Management Prescriptions, would be prepared by the Applicant and agreed with Argyll & Bute Council and NatureScot, in consultation with landowners, prior to the commencement of the Development's construction period, should planning consent be granted.

2 BASELINE CONDITIONS AND EIA SUMMARY

2.1 Site Description

The Development would involve the construction and operation of a Renewable Energy Park on the site, which is approximately 790 ha and centred on National Grid Reference 210197, 715498.

The site largely consists of existing commercial forestry and rural upland farmland. It varies in elevation ranging from approximately 100m Above Ordnance Datum (AOD) in the west of the site, to approximately 470m AOD in the east of the site.

The site has several watercourses running through it, with the primary watercourse being the River Aray, running from north to south within, and adjacent to, the western extent of the site boundary. The remaining watercourses within the site, including Allt Sheileachan in the north and Allt a' Mhadaidh in the centre of the site are all tributaries of the River Aray and flow westwards down the slopes contained within the site.

The Glen Etive and Glen Fyne Special Protection Area (SPA), which is designated for its population of breeding golden eagle, abuts the northern and eastern site boundaries (see EIA Report, Figure 7.2).

2.2 Ornithology

Baseline ornithology surveys were carried out within the site from 2020 to 2022.

At least one active golden eagle territory is likely to overlap with the site, with all known nest sites located over 2 km from the site boundary (for locations see EIA Report Confidential Figure C7.1). The largest extent of territory overlap is likely to be with a breeding pair within the adjacent Glen Etive & Glen Fyne SPA to the east. This pair fledged one chick successfully in 2019 but failed in 2020 and 2021. The majority of recorded flight activity took place over the open moorland within the Glen Etive & Glen Fyne SPA to the north and east of the site, and during the design process, effort was made to locate proposed turbines in areas of lower habitat suitability for golden eagle, of sufficient distance from the SPA to avoid any effective loss of SPA habitat.

There are two main black grouse lekking areas within 1.5 km of the site Boundary: one approximately 500 m north of the site Boundary; and one to the south over 1 km from the site Boundary (EIA Report Figure 7.4). In the northern lekking area up to four males were in attendance at a lek at any one time during surveys in 2020 and 2021, and up to five females were recorded. To the south, the lekking area hosted four males in 2021, but no females were recorded. Within the site, two male black grouse were observed lekking on one occasion in April 2021, 450m west of the summit of Stùc Scardan.

Black grouse were recorded in flight, mainly in the areas surrounding lek sites, with a number directed towards the site, suggesting there may be some connectivity between the three lekking areas. Apart from the record of lekking birds near Stùc Scardan, no observations were made of black grouse utilising the site.

Hen harrier breeding took place at a nest location within 1km north of the site in 2020 and 2021. The majority of flight activity was recorded near the nest site, but occasional flights were also observed over open moorland within and adjacent to the site.

In 2020 a merlin breeding attempt took place at a nest located within conifers at the woodland edge of the northern site Boundary. This nest was vacant in 2021, but a breeding attempt did take place in moorland around 1 km to the north. All recorded merlin flight activity was within the moorland outside of the site boundary, near the two nest sites.

Evidence of roosting barn owl was recorded inside the chimneys of a ruined building within the site, near the River Aray, but there were no observations to confirm breeding.

2.3 Habitats

Detailed information on habitats is provided in EIA Report Appendix 8.1, and Figure 8.3.

In general, the majority of the site is made up of densely planted commercial coniferous plantation woodland, dominated by Sitka spruce (*Picea sitchensis*), integrated with the occasional scattered trees of Scots pine (*Pinus sylvestris*), with large extents of recent clear-felled forest and restock. Within areas where the canopy is more open, particularly to the east, the woodland can be found forming mosaics with mire communities.

The closed canopy plantation woodlands are of negligible botanical value due to over-shading and loss of the field flora; patchy areas of moss, cottongrass and/or purple moorgrass (*Molinia caerulea*) is therefore generally all that persists beneath the deep shade and the litter shed by the conifers. At the time of study, the field layer had not re-established itself within clear-felled areas which meant much of the site was devoid of a clear vegetation structure.

Towards the eastern half of the site on higher ground, the density of plantation coverage thins, likely due to underlying wetter peaty conditions (proposed infrastructure avoids areas of deeper peat), and heath and mire habitats are present, albeit mainly in a heavily modified and degraded state due to the historical commercial forestry. Outside of the forested areas there are extents of open moorland, comprising a mixture of wet heath on slopes and more rocky areas, and bog habitats on flatter ground.

Photo 1: example of checked Sitka spruce forest with surrounding mire/heath habitat, commonly found in the eastern half of the site on higher ground.

Wet modified bog encompasses National Vegetation Classification (NVC) M25 *Molinia caerulea* – *Potentilla erecta* mire and M20 *Eriophorum vaginatum* blanket mire. These habitats feature strongly within open areas, including those within the conifer plantation to the north and east.

Molinia overwhelmingly dominates the sward of the M25 communities and includes the M25a *Erica tetralix* sub-community and the M25b *Anthoxanthum odoratum* sub-community when categorised as wet modified bog. This flora can have much in common with M15 wet heath, and the M25a here might well be derived from previous wet heath as a result of grazing and burning, both of which can lead to increases of *Molinia* and corresponding decreases of dwarf shrubs.

The M25b was dominated by *Molinia* in at times a tussocky sward and was found to form mosaics with the other bog, marshy grassland and woodland communities. The M25b sub-community can be classified as marshy grassland where these areas are more dominated by grassland species. Within the study area, M20 wet modified bog is most abundant across level to gently sloping peat and was often found in mosaics with other bog communities. It appears to have been derived from blanket bog through grazing that has led to the scarcity or absence of heather (*Calluna vulgaris*) in the sward.

Wet dwarf shrub heath is found across the study area. It is entirely made up of the M15 *Trichophorum germanicum* – *Erica tetralix* wet heath NVC community, being recorded at community level along with all sub-communities. On several occasions the M15a sub-community appears within mosaics with other bog communities, often identified as an area subject to water run-off and containing a large proportion of sedges.

Semi-natural woodland on site is largely confined to watercourse margins, with a larger extent along the River Aray at the entrance of the southern access route. Some of this is designated as woodland of ancient origin under the Ancient Woodland Inventory of Scotland[3]. This habitat varies in nature, containing the following NVC communities; W4 *Betula pubescens* – *Molinia caerulea* woodland, W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetosella* woodland and W17 *Quercus petraea* – *Betula pubescens* – *Dicranum majus* woodland.

The W17 community was recorded adjacent to the southern access route along the River Aray, being the community most closely referrable to this mixed mature canopy of oak, birch, ash, alder,

[3] https://www.data.gov.uk/dataset/c2f57ed9-5601-4864-af5f-a6e73e977f54/ancient-woodland-inventory-scotland

rowan and occasional Scots pine. The ground layer is a combination of bramble, ferns, wood sorrel with some deadwood. This area is also categorised as ancient woodland (of semi-natural origin).

2.4 Protected Species

Watercourses on site are likely to be used at least on occasion by otter (*Lutra lutra*), and the forestry is likely to be used by pine marten (*Martes martes*) and red squirrel (*Sciurus vulgaris*) but no protected features (holts, dens etc) were confirmed during baseline surveys. The River Aray hosts salmonid species Atlantic salmon (*Salmo salar*) and trout (*Salmo trutta*) of various age classes, and it is possible that some small tributaries on site host small populations of brown trout, although most of the watercourses have impassable barriers in the form of culverts under forestry tracks and natural rocky outcrops.

Five bat species and one genus-level classification were recorded during static detector surveys within the site: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat (*Plecotus auratus*), *Myotis* spp., Daubenton's bat (*Myotis daubentonii*) and Natterer's bat (*Myotis nattereri*). No suitable roost features were found on site, but it is likely that roosting bats are present nearby and use the site for foraging.

2.5 Peat and Soils

The Carbon and Peatland Map 2016[4] was consulted to determine likely peatland classes present (see EIA Report, Figure 8.2). As much of the site is forested, it has been categorised as Class 5 (no peatland vegetation). However, as evidenced from baseline habitat surveys, peatland or peaty soils do exist within the site, and large extents of forest in the east appear checked, being planted over such conditions. Most of the area surrounding the site is classified as Class 2 peatland[5], and as such, this is also likely to be reflective of habitats within more open forested parts of the site.

The majority of the site comprises soils that are peaty gleys and peat with peaty podzols and peaty rankers on the steeper slopes. On the shoulder of Stùc Scardan, avoided by proposed infrastructure, there is an area of some 49ha that comprises peat, with subalpine and some alpine soils.

2.6 Forestry

The site is subject to the Argyll Estates' *Ladyfield Forest Management Plan 2014 to 2033* (the FMP). The forest's long term forest plan would be subject to change should the Development be consented.

The FMP shows that 66% of Ladyfield Forest comprises Sitka spruce, with 30% determined to be open ground, and the remainder mixed conifer/broadleaf. Planting commenced in the 1950s, but the majority of the forest was planted between 1973 and 1979.

[4] Scotland's Soil (2017). Carbon and peatland 2016 map. Available at: https://soils.environment.gov.scot/maps/thematic-maps/carbon-and-peatland-2016-map/. Accessed on: February 2023.

[5] Classified as "Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential".

Yield class varies (the higher the class, the higher the yield), with 15% of the forest at yield class 10, 26% at class 16 and 12% at class 18. Around 8% is at yield class 4 and 6 (c.30% being bare ground and yield class zero). In general, highest yields are found within the west of the site.

The FMP's restructuring program aims to diversify age class distribution, through the implementation of a sustainable harvesting plan. In order to achieve a more normalised forest structure, subsequent crop rotations will be diversified, whilst remaining viable for commercial timber production. It is planned to continue the use of silvicultural practices and systems that minimise damage caused by forest operations and exploit opportunities to enhance the forest environment.

Photo 2: eastern part of the site looking west and showing legacy furrows from forestry and checked trees likely over peat.

Across the eastern half of the site, a substantial area of poorly growing Sitka spruce in mixture with open ground, planted between 1977 and 1979, was planned to be retained as long-term retention during the FMP period (see Annex A, Figure A.1). The checked conifers would form a mosaic of age class within the areas of restocking, providing both diversity of tree height and habitat. These areas would be identified as harvesting operations progress and would break up the visual impact of felling the proposed coupes.

Selective felling of conifers will be carried out in areas where they form a matrix of conifer and broadleaf tree cover. Where these lie within areas identified as Ancient Woodland and the broadleaf trees form a significant part of the tree cover, it is envisaged that these areas will be restocked by natural regeneration, becoming predominantly broadleaf areas.

A biodiversity plan map identifying the areas of importance for biodiversity within the woodland is provided in the FMP (Annex A, Figure A2). This includes Ancient Woodland, natural reserves (existing native woodland and Plantations on Ancient Woodland sites, PAWS) and riparian open ground. There are also priority areas for deadwood management, comprising ancient semi-natural woodland, long-term retentions and riparian woodland.

2.7 Estate Conservation Management Plan

A Conservation Management Plan was prepared in 2004 for Argyll Estates, which includes Ladyfield Forest. This plan identified three key management objectives:

- The maintenance, enhancement and expansion of semi-natural woodland (see above for plans for Ladyfield Forest);
- The management of plantations to benefit black grouse; and
- Conservation and management of the estate woodlands to benefit red squirrel conservation.

2.7.1 Black Grouse

The transition of habitats along the upper margins of the Ladyfield Forest from upland moorland / grassland to commercial forest is potentially suitable black grouse habitat. As a species of the woodland edge, the ecotone between the forest and hill ground is of particular importance and has been identified in the FMP as a focus of conservation management during forest restructuring. Where possible, all the suitable black grouse habitat areas within the forest would be linked to the moorland areas outwith the site. Existing forest roads, rides and riparian zones can be used for this purpose.

Currently native broadleaves within the forest are mature canopy specimens of limited usage to black grouse. The browsing pressure that has been exerted on Ladyfield Forest by deer has meant that young cohorts of native species are missing from the ecosystem. This will be remedied by managing the deer on-site (see **section 2.8**), and it is anticipated that this, together with restoration of PAWS areas, will lead to the development of an improved ecosystem with natural regeneration and development of a mid- shrub layer which will be of benefit to black grouse.

2.7.2 Eredine Red Squirrel Stronghold

The site falls within the Eredine Red squirrel Stronghold[6]. Red squirrel strongholds across Scotland have been determined from the Scottish Red Squirrel Action Plan (2006-2011) that was developed by Scottish Forestry and NatureScot. Strongholds represent contiguous blocks of forest that may provide suitable habitat for native red squirrels to resist an influx of grey squirrels.

Management prescriptions have been issued to detail actions required in Scottish strongholds[7]. The management requirements encourage the diversification of the crop, but the FMP concluded that the opportunity for diversifying the conifers within Ladyfield Forest is limited. However, the maintenance, enhancement and expansion of semi-natural woodland is planned, and it is known that red squirrels use this habitat on other parts of the Estate. These habitats will not be managed for timber production but rather will be maintained as part of a red squirrel habitat network. As outlined above, opportunities for maintaining conifers as long-term retention will be identified during harvesting of the first rotation of planted conifers. Retained areas of checked conifers will improve structural and age class diversity and may also provide tree cover with heavier coning.

[6] https://forestry.gov.scot/publications/21-map-of-red-squirrel-stronghold-areas
[7] https://forestry.gov.scot/publications/22-managing-forests-as-red-squirrel-strongholds

The FMP takes into account the management requirement for woodland connectivity within the stronghold by ensuring that no substantial open areas are introduced that isolate the red squirrel habitat from adjacent core stronghold areas.

2.7.3 Open Ground

Following FMP harvesting the proportion of open ground is planned to increase with buffer zones being left unplanted with conifers along watercourses, forest road lines and around existing broadleaf areas, allowing the development of native flora in these areas, including broadleaf woodland where this is likely to regenerate. Open ground would also be preserved on rocky outcrops, at higher elevations that are unsuitable for growing commercial timber crops.

Tree planting has been carried out on the flood plain of the River Aray and care will have to be taken when these areas are felled under the FMP, including removal of the lop and top from the area that floods. These areas will only be replanted with suitable tree species if this is considered important from the point of view of riverbank stability and the fishing interest on the river.

It is expected that broadleaved regeneration will occur within some of the designed open ground areas. It is not expected that this will exceed 25% of the open area and wherever possible this regeneration will be retained unless it restricts access or interferes with effective deer control, historic sites, access or important views.

Mire sites have been identified within Ladyfield Forest (see **section 2.3** for description). Although the integrity of these mire sites has been compromised by previous forest operations, where they are identified as having a conservation value they would be retained as open ground.

2.8 Deer Management

Red, sika and roe deer are found in Ladyfield Forest. It is considered in the FMP that deer may impact upon the natural regeneration of broadleaves and more susceptible “soft” coniferous species such as Douglas fir. An annual cull is undertaken, and this is reviewed on an annual basis.

The Argyll Estates are part of the Inveraray & Tyndrum Deer Management Group. A Deer Management Plan (last updated in October 2022) has been developed with specific objectives on management, following best practice. Within the whole management area, the annual deer cull currently amounts to some 550 stags and approximately 1400 animals in total.

Actions of the Deer Management Plan include:

- delivering designated sites into favourable condition;
- managing deer to retain existing native woodland cover and improve woodland condition;
- monitoring and managing deer impacts on the wider countryside; and
- exploring peatland restoration opportunities.

3 BIODIVERSITY MANAGEMENT GROUP

The Applicant will invite Argyll Estates, the Planning Authority (Argyll & Bute Council), NatureScot, RSPB Scotland and SEPA to participate with them in a Biodiversity Management Group (BMG). The purpose of the BMG will be to oversee the delivery of the BEMP and to review and assess the results from ongoing monitoring. The BMG shall have the power to review the terms of the BEMP but changes to the BEMP shall only take effect once approved in writing by the Planning Authority.

4 BIODIVERSITY NET GAIN

Biodiversity Net Gain (BNG) is a process which follows the principle of biodiversity enhancement and leaves nature in a better state than before development work started.

Scottish & Southern Energy Renewables (SSER) has developed a BNG toolkit[8] based upon the Natural England Biodiversity Metric[9] which aims to quantify biodiversity based upon the value of habitats for nature. It is a method for demonstrating whether developments have been able to maintain or increase the biodiversity value of a development site after construction works. This SSER BNG toolkit has been utilised here to undertake a preliminary BNG assessment for the Development site and the enhancement measures proposed within this OBEMP. As the best methods for evaluating biodiversity become better understood by the industry, it is possible that a newly developed and more appropriate BNG toolkit may be available by the time of the final BEMP, and if endorsed by the BMG, this may be used to undertake revised BNG calculations.

The scope of the BNG assessment is to quantify the overall potential biodiversity impacts for the Development; this includes a biodiversity baseline assessment, analysis of habitat losses due to temporary works and permanent structures (e.g., tracks and hardstandings), and analysis of biodiversity gains following reinstatement of habitats in areas of temporary construction work and additional habitat enhancement and creation.

The BNG assessment is based upon NVC habitat surveys undertaken for the EIA Report (**Appendix 8.1** and **Figure 8.3**).

5 AIMS OF THE BEMP

The BEMP's Aims have been determined from:

- the results of baseline surveys and the Development's impact assessment (**EIA Report Chapter 7: Ornithology, Chapter 8: Ecology** and **Chapter 11: Geology, Soils and Peat**);
- current future management practices including the FMP, Estate Conservation Management Plan and Deer Management Plan; and
- consideration of relevant policies on conservation and biodiversity, e.g. NPF4.

The Aims of the BEMP are presented in Table 1 below.

[8] https://www.sserenewables.com/sustainability/biodiversity-net-gain/

[9] Natural England (2022) The Biodiversity Metric 3.1. https://nepubprod.appspot.com/publication/5850908674228224

Table 1: Aims of the BEMP

Aim 1	Maintain, restore and enhance the Annex I habitats (blanket bog and dwarf shrub heath) within the site.
Aim 2	Maintain or increase the productivity of locally breeding golden eagles.
Aim 3	Maintain or increase the local population of black grouse and increase connectivity between lek sites.
Aim 4	Maintain or increase the local population of breeding greenshank.
Aim 5	Enhance woodland habitats within the site to benefit protected species such as red squirrel, pine marten and bats.
Aim 6	Provide an overall increase in biodiversity and increased resilience to flooding, wildfires and adverse effects of climate change within the site.

6 BEMP SEARCH AREAS

The OBEMP has identified BEMP Search Areas within the site, the extent of which would be confirmed within the final BEMP, secured by way of a planning condition, and subject to further site visits and consultation (see **Figure 8.11**). Within final BEMP Areas the BEMP's Management Prescriptions (as outlined in **Section 7**) would be implemented to fulfil the Aims and Objectives. All eventual BEMP Areas would help contribute towards ecological improvements under Aim 6.

6.1 BEMP Search Area A: Mire and Heath Restoration

BEMP Search Area A, forming approximately 90 ha within Ladyfield Forest in the east of the site (**Figure 8.11**) has been selected for potential restoration, mainly of existing conifer forestry, to a more natural mix of mire and heath habitats. This is designed to address habitat loss, and meet the BEMP's Aims for the following reasons:

- Much of the Sitka spruce in this area has grown poorly due to underlying ground conditions, and any forestry in these areas will not be commercially viable;
- The ground is relatively open compared to other parts of Ladyfield Forest, and whilst the majority of it is heavily modified by legacy furrowing from forestry planting (see Photo 3), removal of trees would help create larger extents of more open mire and heath habitat, similar to that outside of the fenceline extent of Ladyfield Forest, and within some of the larger forest rides;
- Interpolated peat depth mapping suggests that there are large areas of degraded peat at depths over 0.5 m, with pockets where depths exceed 1.0 m (see **Chapter 11: Geology, Soils and Peat** and **Figure 11.1.4 – Interpolated Peat Depths**);
- It displays areas which have been subject to erosion of peat, with evidence of bare peat and hagging (see Photo 4);
- The restored area(s) may over time be used by various species, including golden eagle prey species (e.g., grouse, hares, waders), and this would enhance the local food resource within the breeding pair's foraging range, particularly those prey species that will range within the adjacent SPA; and
- Areas would become more suitable for nesting greenshank, e.g., beside rocky outcrops, remnant tree stumps.

The proximity of BEMP Search Area A to proposed infrastructure may offer opportunity for translocation of any excess peat as a result of the Development, which could be used as donor peat for restoration of eroded/hagged areas or drain blocking.

Photo 3 (left): example of furrows created over areas with peat.

Photo 4 (below): evidence of peat erosion.

Baseline bird surveys recorded lekking black grouse beyond the north of the site, and so habitat management within the final BEMP Area A will also aim to create more suitable habitat for breeding, roosting and foraging black grouse. This will also enhance connectivity through the site with other lekking areas, with management in BEMP Search Area B also providing suitable habitat.

To aid black grouse, planting of small, discrete coupes comprising native broadleaved tree species found locally, and/or Scots pine would be considered, depending on viability due to underlying conditions. Some mature conifers may be retained for usage by species such as merlin, red squirrel or pine marten.

6.2 BEMP Search Area B: Peatland Restoration

Within the 21 ha of BEMP Search Area B, comprising open moorland to the southeast of the site near the summit of Stùc Scardan, a total of c.11 ha of peatland >0.5 m deep and subject to erosion has been identified (**Figure 8.11**). Opportunity may therefore exist to restore peatland and overlying mire habitats using methods recommended by NatureScot's Peatland ACTION project[10] and IUCN (Thom *et al.* 2020[11]).

As this BEMP Search Area is outside of the area covered by baseline habitat surveys (due to planned infrastructure avoiding such areas), the exact extent and methods of restoration would be determined following a further site visit and detailed in the final BEMP.

6.3 BEMP Search Area C: Ancient Woodland Enhancement

At the entrance of the southern access route, an area of 0.13 ha of W17 woodland designated as of ancient woodland (of semi-natural origin) would be permanently lost due to construction of a bell-mouth junction, with an additional 0.20 ha felled due to the requirement of a temporary working area, which would be replanted where practicable. To address this, an adjacent 0.23 ha area of semi-natural woodland within the site would be restored and enhanced. This area is also categorised as ancient woodland and is contiguous with the larger extent of ancient woodland that follows the River Aray, but is in relatively poor condition, lacking veteran trees, and in general is dominated by thin birch, with a species-poor ground layer of bramble, ferns, wood sorrel with some deadwood. Opportunity therefore exists to enhance the woodland, so it reaches good condition.

6.4 BEMP Search Area D: Riparian Woodland Planting

To address the loss of semi-natural woodland at the southern access point (as described above), as well as further small losses of semi-natural woodland, an area of approximately 0.9 ha has been identified on the bank of the River Aray, for broadleaved woodland planting. This area is designated as remaining as open ground under the FMP, but adjacent to an area of ancient woodland on the opposite bank of the river, and contiguous with an area earmarked for mixed woodland planting, and a Plantation on Ancient Woodland Site (PAWS) earmarked for restoration (see Figure A.2).

6.5 Biodiversity Enhancement Areas

Within the site, best locations would be selected for other planned biodiversity enhancement measures, including erection of barn owl nest box(es) in areas of suitable habitat, e.g. broadleaved woodland or other structures where evidence of barn owl was recorded during surveys; and pine marten den boxes and red squirrel nest boxes in suitable woodland areas.

7 AIMS, OBJECTIVES AND MANAGEMENT PRESCRIPTIONS

Each of the six Aims described in **Section 5** require related Objectives which define quantifiable targets to fulfil the Aims, and act towards achieving an overall biodiversity gain. The Objectives

[10] https://www.nature.scot/climate-change/nature-based-solutions/peatland-action-project/peatland-action-project-resources

[11] Thom, T., Hanlon, A., Lindsay, R., Richards, J., Stoneman, R. & Brooks, S. (2020). Conserving Bogs: The Management Handbook. IUCN UK Peatland Programme. Available at: https://www.iucn-uk-peatlandprogramme.org/sites/default/files/header-images/Resources/Conserving%20Bogs%20The%20Management%20Handbook%202nd%20Edition.pdf

have associated Prescriptions which detail the indicative management works to be implemented to achieve these Aims and Objectives.

7.1 Objectives 1.1 to 1.2

Objective 1.1	Increase the abundance and distribution of peat-forming species, particularly key indicator bog species such as sphagnum mosses within BEMP Areas A and B. A particular focus of this Objective is to increase wetness of any peatland that has experienced drying effects from forestry and associated ditches/ drainage, or from overgrazing and erosion.
Objective 1.2	Increase the abundance and diversity of blanket bog and wet/dry heath indicator species within BEMP Areas A and B so that during the operational period the managed area(s) can achieve favourable condition, based on criteria in JNCC's (2009[12]) *Common Standards Monitoring*.
Prescription 1.1	Determine locations and extent of existing conifer trees that should be felled within BEMP Area A, which would allow mire and heath restoration. Determine which small extents of existing conifer plantation (if any) should be strategically retained to provide habitat for merlin, pine marten, red squirrel and black grouse.
Prescription 1.2	Restore to bog and heath (i) the modified habitat legacy of the conifer plantation within BEMP Area A, and (ii) the degraded bog in BEMP Area B to provide an overall biodiversity net gain (see **Section 8**). This would be in line with emerging best practice methods (e.g. see Short and Robson, 2016[13]; Campbell *et al.*, 2019[14]; NatureScot[10]; Thom *et al.* 2020[11]) through use of appropriate techniques (as identified after felling in BEMP Area A).
Prescription 1.3	Determine whether a modification to the grazing/deer management programme for Ladyfield Forest is required to achieve success in restoration.
Prescription 1.4	Monitor for any self-seeded exotic conifer saplings or trees within BEMP Area A and determine the best management practice for removal.
Prescription 1.5	The following activities would be prohibited within BEMP Areas A and B: • Clearing out of existing ditches; • Application of any insecticides, fungicides or molluscicides; • Application of lime or any other substance to alter the soil acidity; • Burning of vegetation or other materials; • Use of roll or chain-harrow; • Planting trees (excluding for BEMP purposes); • Carrying out any earth moving activities; • Use for off-road vehicle activities (with the exception of carcass removal); • Construction of tracks, roads, yards, hardstandings or any new structures; or • Storage of materials or machinery.
	Undertake a monitoring programme throughout the BEMP lifespan to determine whether Management Prescriptions have improved the condition of bog and heath habitats in BEMP Areas A and B, as well as checking the integrity and success of any peat dams installed (**Section 9**).

[12] JNCC (2009). Common Standards Monitoring Guidance for Upland Habitats. Joint Nature Conservation Committee.
[13] Short, R., and Robson, P. (2016). An Innovative Approach to Landscape-Scale Peatland Restoration. CIEEM In-Practice, Issue 93, September 2016.
[14] Campbell, D., Robson, P., Andersen, R., Anderson, R., Chapman, S., Cowie, N., Gregg, R., Hermans, R., Payne, R., Perks, M., West, V. (2019). Peatlands and Forestry. IUCN Peatland Programme UK. Available at: https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2020-01/CoI%20Forestry%20and%20Peatlands_reduced%20size.pdf

7.2 Objectives 2.1 to 2.3

Objective 2.1	Maintain or increase black grouse numbers and golden eagle prey.
Objective 2.2	Maintain, enhance or create a diverse mosaic habitat of heath, bog and woodland within BEMP Area A, suitable for black grouse, golden eagle prey and other species.
Objective 2.3	Enhance and increase the coverage of native woodland within the site (BEMP Areas A, C and D) to increase connectivity and provide benefit to bird and mammal species.
Prescription 2.1	If ground conditions are considered suitable (e.g. peat depth <0.5 m), plant area of low-density native woodland within BEMP Area A. This may include planting along fringes of existing conifer plantations to provide a feathered edge of decreasing density to the open hill.
Prescription 2.2	Following a site evaluation, enhance the condition of semi-natural woodland within BEMP Area C by suitable means, e.g. fencing, thinning of canopy, removal of invasive species, retaining standing deadwood, planting or protecting individual trees that could become veteran and ancient trees in future.
Prescription 2.3	Plant an area of broadleaved woodland of at least 0.9 ha within BEMP Area D, comprised of a mixture of species suitable for ground conditions and similar to composition of ancient origin woodland in the local area.
Prescription 2.4	If deer exclusion is required in any BEMP Areas wide mesh stock fencing would be used so that black grouse chicks are not trapped, and will be marked by suitable means, following guidance in Trout & Kortland (2012) to reduce potential collision risks. The fence would be checked annually to ensure the area remains intact with any fence breaches repaired. Any new fencing would be designed to follow contour lines as much as possible and be located downslope along watercourses, to minimise collision risk for black grouse. Fencing would be removed when BEMP monitoring identifies that trees and shrubs are established and that browsing no longer poses a risk for their survival.
Prescription 2.5	Undertake a monitoring programme throughout the BEMP lifespan to determine whether managed woodland habitats are in favourable condition and where applicable, meeting the suitability criteria for black grouse and/or other species (**Section 9**).

7.3 Objectives 3.1 to 3.2

Objective 3.1	Maintain or increase the local breeding barn owl population.
Objective 3.2	Maintain or increase the local populations of protected mammal species, including red squirrel, pine marten and bats.
Prescription 3.1	Identify suitable locations for erection of barn owl nest box(es) and erect prior to commencement of construction.
Prescription 3.2	Identify suitable locations for erection of red squirrel, pine marten and bat nest box(es) and erect prior to commencement of construction.

8 BIODIVERSITY NET GAIN ASSESSMENT

8.1 Overview

The SSER biodiversity toolkit[8] was used to quantify the biodiversity value of the Site based upon the habitats present and to demonstrate that the Development would achieve biodiversity enhancements in line with NPF4 Policy 3 requirements, due to the BEMP. The procedure involves:

- Quantitative assessment to determine the biodiversity baseline of the Site prior to construction based on the habitats data collected for the Development (**Appendix 8.1** and **Figure 8.3**);

- Assessing the loss of habitat due to the Development; and
- Analysis of the biodiversity value following works, with retention and creation/restoration/enhancement of habitats within the Site under the BEMP.

Habitat quality (distinctiveness, condition, strategic significance and connectivity) was determined for each Phase 1 habitat type by reviewing the habitats survey data and surveyor experience, and referring to the following guidance:

- SSER BNG Toolkit User Guide[8];
- Natural England Biodiversity Metric 4.0[15] – User Guide, Technical Supplements, and Habitat Condition Assessment; and
- JNCC Common Standards Monitoring[16] criteria (used to aid some habitat condition assessments).

8.2 Limitations to the BNG Assessment

The boundary for the baseline biodiversity assessment equates to the Site Boundary. It should be noted that the extents of baseline habitats quoted here may differ from those quoted in EIA Report Chapter 8: Ecology which refer to the area covered during field surveys. This extent was focussed around proposed infrastructure, and therefore did not cover some parts of the Site (see Figure 8.3 for survey extent). For the purposes of this BNG assessment, a desk study was undertaken to fill in any gaps within the Site, by determining likely habitat based on a combination of aerial imagery and adjacent surveyed habitats. The majority of the un-surveyed areas comprised conifer plantation or recent clearfell/ restock.

The post-development biodiversity unit calculations are based on the difficulty to create habitats (Delivery risk) and the time (in years) to reach their target condition (Temporal risk) which are based on the published BNG guidance and previous project experience, these are generally average values and as such there may be natural variation around the time to reach target condition. Here, surveyor and expert knowledge has been used to determine the most likely difficulty and timeframe values, based on the habitats found currently on Site.

The BNG assessment has been undertaken on the data currently available, the infrastructure layout and proposals for construction of the Development as set out in EIA Report **Chapter 2: Development Description**, and the biodiversity enhancement proposals outlined within this OBEMP. Should any of these elements change then there may be a change in the BNG calculations for the Development. Therefore, the BNG assessment would be refined/updated and detailed in the final BEMP post-consent/pre-construction, in line with the most up to date proposals for the Development, consultation feedback, and the final agreed BEMP, Management Areas and associated proposed creation/enhancement measures. Should a new, more applicable BNG tool be developed in the meantime, and endorsed by the BMG, this would be considered for use.

[15] https://publications.naturalengland.org.uk/publication/6049804846366720
[16] https://jncc.gov.uk/our-work/common-standards-monitoring-guidance/

8.3 BNG Assessment Results

8.3.1 Biodiversity Baseline

The biodiversity baseline for the Site covers 784 ha and is determined based upon the habitat quality scores (distinctiveness, condition, strategic significance and connectivity), the area of the habitats and the resulting number of Biodiversity Units (BU) each type of habitat contributes. **Figure 8.3** displays the habitats across the Site, which comprises the biodiversity baseline.

The main habitat types within the Site are conifer plantation and recent clearfell (72 %), wet modified bog (7.6 %), marshy grassland (6.0 %), blanket bog (5.7 %) and wet heath (4.2 %) (see **Appendix 8.1** for further details). Using the SSER BNG toolkit, the biodiversity value of the Site baseline was calculated to be 3,313 BUs.

8.3.2 Biodiversity Change during Construction

During the construction of the Development, habitats will be lost, either temporarily or permanently, to provide construction compounds and working areas, access roads, and the turbine/hardstandings infrastructure footprints. The majority of habitat, and biodiversity, under infrastructure footprint areas is therefore lost during works.

It was calculated that a total of 57 BUs would be removed within the Site to accommodate the Development, which results in an overall 1.7 % loss of biodiversity. The majority of BUs lost are from extensive conifer plantation and clearfell (which is of low distinctiveness and strategic significance), with smaller losses associated with poor condition bog, heath and marshy grassland habitats found within forest rides and more open areas of forestry. A small amount of semi-natural broadleaved woodland would also be removed due to access track construction.

Table 7-1: Biodiversity Unit Change at each Stage of Development

Stage	Biodiversity Units	Biodiversity Units Gained/Lost from Baseline
Baseline	3,313	N/A
During works	3,256	-57 (-1.7 %)
Following works	3,629	+316 (+10 %)

8.3.3 Following Works

At the end of construction any temporary working areas will be restored following best practice methods and guidance. The SSER BNG Metric user guide[8] states that in situations where habitats will be temporarily impacted by any works and will be fully restored to its baseline condition (or improved) within two years, it can be considered as retained habitat within the toolkit.

The small amount of temporary habitat loss (0.13 ha) associated with the temporary works compound area would be to conifer plantation woodland and therefore the reinstated habitats will be 'like for like, or better', compared to the baseline habitat and in line with guidance principles. This temporary loss is therefore considered as 'retained habitat'.

The small amount of temporary habitat loss associated with the working area for the bell-mouth junction and bridge at the southern access point (0.22 ha) would be partly to semi-natural woodland of sub-optimal quality, categorised as being of 'moderate' condition in the BNG calculations (this is considered to be precautionary based on actual conditions). It is assumed that replanting would result in like for like condition, but over a longer period of time than two years, and therefore this is included in the biodiversity enhancement calculations.

Biodiversity enhancement and an increase in BU would be delivered onsite through the enhancement/restoration and creation of habitat types, as outlined above and shown on **Figure 8.11**.

Although the exact extent of management would be confirmed for the final BEMP, for the purposes of this OBEMP it was assumed that the proposals would result in the creation of c. 40 ha of blanket bog from checked conifer plantation and enhancement of c.28 ha of wet modified bog and suboptimal blanket bog, within BEMP Search Areas A and B. All other wetland habitats within Areas A, B and D (e.g. wet heath, marshy grassland, acid flushes) would also be enhanced in condition due to management improvements (0.8 ha of native woodland planting on poor condition marshy grassland, in the case of Area D). It was also assumed that 14 ha of broadleaved woodland would be planted within BEMP Search Area A, with woodland increasing from 'moderate' to 'good' condition in Area C.

All of these measures would enhance flora and fauna biodiversity within and around the Site, and the increased biodiversity produced due to the enhancement and creation of habitats would be 316 BUs (+10 %).

9 MONITORING

Monitoring will establish whether the proposed Management Prescriptions are achieving the various Aims and Objectives and in turn will inform adaptive management to ensure the Aims and Objectives are achieved through the life of the BEMP.

9.1 Peat Erosion, Dam and Drain Monitoring

Any hagg or gully reprofiling, peat dams or blocked drains within BEMP Areas A and B would be inspected by a suitably qualified ecologist during installation and each year thereafter until Year 3 of operation, reducing to one inspection every five years during the remainder of the operational period.

Any leakage around dams or failing dams would be notified and remedial measures, such as extending dams or re-damming, would be considered.

After ten years an assessment should be made to identify whether further locations for restoration, additional dams or blocking of drains would provide further improvements to habitat quality.

9.2 Vegetation Monitoring

Vegetation monitoring within BEMP Areas A, B and C would evaluate the restoration, enhancement and management of bog, heath and woodland habitat types by recording changes to the structure and composition of the vegetation and species abundance, distribution, evenness and diversity. Recording impacts from grazing would also be included in the monitoring programme. Monitoring would be undertaken in years 1, 3, 5, 10 and 15 of the operational life of the Development. The frequency of monitoring thereafter would be agreed with the BMG.

Following monitoring, a review would be undertaken as to whether management prescriptions appear to be working, and whether a revision of methods, or additional management would be required to achieve the BEMP's Aims and Objectives.

A review of deer and livestock management will also be undertaken based on the findings of each vegetation monitoring round, and each tree monitoring round (see **Section 9.3** below). Recommendations to reduce impacts will be made to the BMG if grazing is found to be affecting the objectives.

Monitoring methods would be in line with JNCC (2009) common standards monitoring principles for each habitat type.

9.3 Tree Monitoring

Monitoring of any new native woodland planting within BEMP Areas A and D would be undertaken to ensure the establishment of the trees planted.

The planted areas would be monitored in years 1 to 5 following planting, to assess beat up requirements and to monitor damage (e.g. browsing), disease or weed suppression impacts on trees. Failed specimens should be replaced in the subsequent winter-spring (i.e. between November and June) and required maintenance measures identified (bracken cutting, weeding etc). If browsing and damage by herbivores becomes apparent, then additional measures would be identified to protect the trees. Any measures would be discussed and agreed with the BMG.

Trees will be monitored again in operational Year 10 to ensure that there are no issues with disease or invasive species and to determine if any thinning at this stage would be beneficial. Monitoring would be undertaken again in operational Year 20 when some thinning operations may be required in order to encourage growth of better trees and create more open woodland, further new planting may also be considered. This will aid regeneration of seedlings and begin the process of establishing a mixed age structure.

9.4 Ornithological Monitoring

Ornithological monitoring will take place during the first five years of operation and then in Year 10, and every five years for the remainder of the operational period. Surveys would follow relevant guidance (e.g. SNH 2017[17]).

Monthly survey visits will take place from April to July to record the presence of breeding birds (e.g. raptor prey species, greenshank) within BEMP Areas A and B and a buffer of up to 500 m in adjacent open moorland. Monitoring would also record any flight activity of target species e.g. golden eagle.

In order to determine whether management has had a positive effect on the local black grouse population, lek count surveys will be undertaken in April and May, following standard guidance in Gilbert *et al*. (1998[18]).

[17] Scottish Natural Heritage (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. SNH Guidance.
[18] Gilbert, G., Gibbons, D.W. and Evans, J. (1998). Bird Monitoring Methods. RSPB, Sandy, Beds.

A check of barn owl nest box occupation by a suitably licensed ornithologist would take place during each ornithological monitoring year.

9.5 Protected Species Monitoring

A check of any pine marten, red squirrel or bat boxes for occupancy would be undertaken by a suitably licensed ecologist during each monitoring year.

10 REPORTING

Reports would be submitted to the BMG in years 1 to 5, 10 and 15. The reports would detail management works completed to date and the results of monitoring. The works proposed over the next reporting period would also be discussed.

It should be noted that the BEMP is a live document and may require alteration based on the findings from the monitoring programme, unexpected events or evolving guidance. Any proposed amendments would be put to the BMG for approval, before implementation.

ANNEX A.

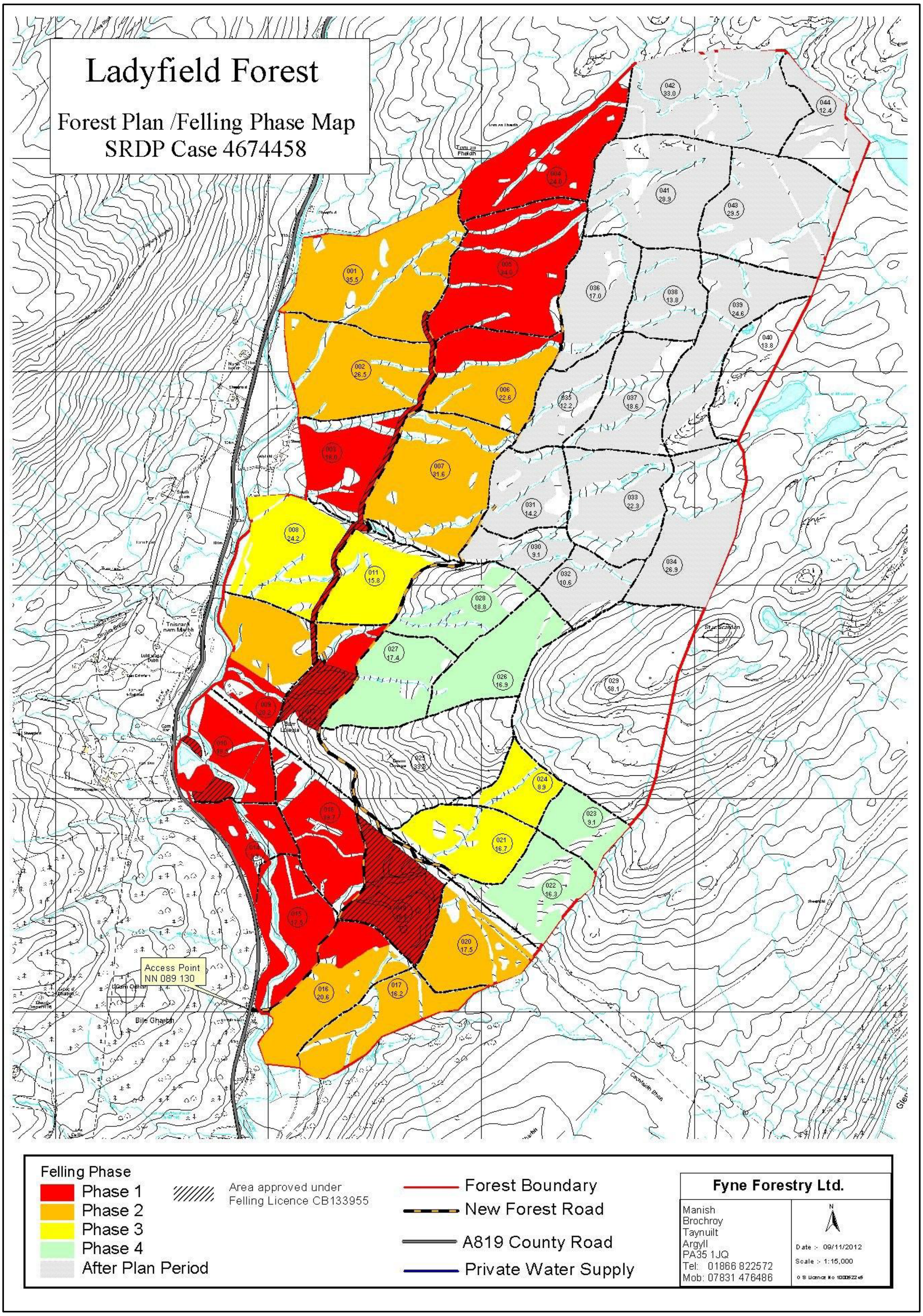

Figure A.1: Ladyfield Forest Plan/ Felling Phase Map

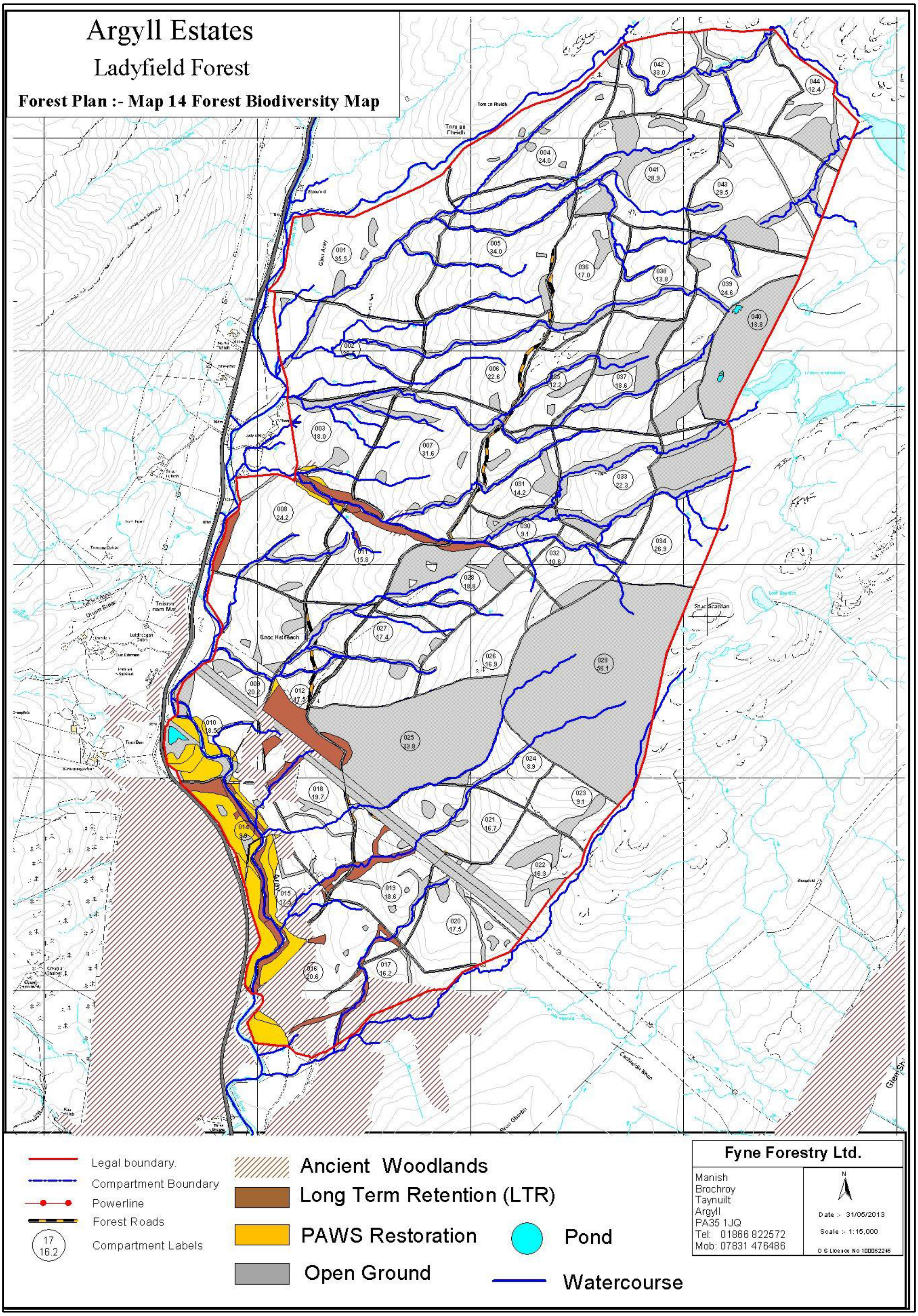

Figure A.2: Ladyfield Forest Plan Biodiversity Map

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Environmental Impact Assessment – Technical Appendix 9.1: Historic Environment Desk Based Assessment

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

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TABLE OF CONTENTS

DATA ENTRY FORM

PROJECT INFORMATION	
Project title	Ladyfield Renewable Energy Park
Description	Wind Farm, battery energy storage system and ancillary infrastructure
Report	Historic Environment Assessment and Walkover Survey
Contractor name	Environmental Resources Management Ltd
Client	Ladyfield Renewable Energy Park Ltd
SITE LOCATION INFORMATION	
Council	**Argyll and Bute Council**
Area	Approximately 790 ha
Grid References	NGR 210197, 715498
PROJECT BIBLIOGRAPHY	
Type of publication	Unpublished document/manuscript
Title	Ladyfield Renewable Energy Park Historic Environment Desk-Based Assessment
Author	David McCaughie/Chris Swales
Date	July 2023

SUMMARY

The purpose of this Historic Environment Desk-Based Assessment (DBA) is to establish the archaeological baseline and provide design advice for the proposed Ladyfield Renewable Energy Park (herein referred to as 'the Development'). The Environmental Impact Assessment (EIA) will utilise the baseline within this DBA to fully assess any potential effects to the heritage resource.

In order to assess the baseline heritage resource, two study areas were defined:

- The Core Study Area (CSA); and
- A 1 km Study Area.

The CSA is the Planning Red Line Boundary (RLB) and defined as the area in which Direct (Physical) Impacts may occur. A 1 km Study Area, which includes land within 1 km of the CSA, was used to aid the assessment of potential unknown archaeology.

There are no designated assets recorded within the CSA. There are seven non-designated assets recorded in national and local datasets, within the CSA. A further five assets were recorded through a review of historic mapping undertaken as part of the DBA. These assets date to the 18th century onwards, consisting of settlement sites, military roads, farmsteads and structures associated with rural settlement and the farming economy.

Within the 1 km Study Area a single Listed Building (LB11523: Glen Aray School And Outhouse) and Garden and Designed Landscape (GDL00223: Inveraray Castle) are recorded. A further 48 non-designated assets recorded within national and local datasets. Of these 48 assets, 2 are dated to the Late Prehistoric period, recorded as a cairn and gold armlet, both of which are no longer in situ. Non-designated assets are predominantly associated with Medieval to Post-Medieval rural settlement, roads and transport infrastructure as well as assets relating to the rural farming economy. These assets are chiefly located in lowland zones (below 200m AOD) along the route of the transport routes, the River Aray and the Inveraray Castle Garden and Designed Landscape.

Within the CSA, potential for buried archaeological remains of all periods is greatest along its southern boundary, in closest proximity to the policy of the Inveraray Castle designed landscape and the western boundary along the route of the River Aray and the late 18th century military road. These lowland zones would have been the main focus for settlement from the Medieval period onwards. The southern and western boundaries of the CSA are located away from major infrastructure, typically being used for access.

Upland areas (above 200m AOD) of the CSA, in which the majority of new infrastructure is located, is considered to have a low potential for assets predating the Post-Medieval period, being located away from known settlements and chiefly used for upland pasture and forestry plantation from the mid 20th century. The archaeological potential of upland zones, where turbines will be sited, is limited to Post-Medieval assets relating to field boundaries and assets such as shielings, field boundaries associated with the local farming economy.

A total of six known heritage assets, inclusive of a shieling hut, bridge, military road, field boundaries and an upstanding earthwork are located within 50 m of infrastructure associated with the Development, noting that a 50 m micro-siting tolerance is permitted in relation to turbines and all other infrastructure associated with the Development. These assets are located in both upland and lowland locations with associated infrastructure inclusive of access tracks and turbines.

The DBA does not attempt to assess the magnitude of impact or the significance of effects to heritage assets. Discussions around impact, effects as well as mitigation strategies are discussed within Chapter 9 of the EIA.

1 INTRODUCTION

A Historic Environment Desk-Based Assessment (DBA) has been undertaken by Environmental Resources Management Limited (ERM) on behalf of Ladyfield Renewable Energy Park Ltd (the Applicant) for the proposed Ladyfield Renewable Energy Park.

The purpose of this DBA was to establish the baseline cultural heritage resource within a Study Area consisting of the Planning Red Line Boundary RLB (to be hereafter known as the Core Study Area) and a buffer of land extending out 1 km from the limits of this Core Study Area (CSA).

The baseline was used to identify known heritage assets which may be at risk if Direct (Physical Impact) and to inform the potential for unknown (typically) below ground heritage assets to exist within the CSA.

An Environmental Impact Assessment (EIA) utilised the baseline within this DBA to fully assess the magnitude of any direct (physical) impacts and effect to the heritage resource within a separate EIA Report chapter.

1.1 The Core Study Area (CSA)

The CSA is situated approximately 4.7 km north of Inveraray, centred on National Grid References (NGR) 210197, 715498. The CSA covers an area of approximately 790 hectares (ha) with the extent and location shown on Figure 1. The CSA lies wholly within the administrative boundary of Argyll and Bute Council (the Council).

The predominant land use within the CSA consists of private forestry plantation used for commercial purposes with areas of upland moorland also present in the south and east of the Site.

There are no residential properties within the CSA.

1.2 The Development

The Development would comprise up to 13 three-bladed horizontal axis turbines up to 180 metres (m) tip height and all associated infrastructure, including:

- Substation Compound (comprising of Substation and Control Building, BESS and ancillary infrastructure);
- Anemometer mast;
- Crane hardstandings;
- Underground cabling;
- Temporary Construction Compounds (TCCs);
- An extension of one existing borrow pit; and
- Temporary laydown areas. (Figure 9.1.1).

2 LEGISLATION, POLICY AND GUIDANCE

The assessment has taken into account relevant heritage legislation, policy and guidance as outlined below.

2.1 Legislation

The assessment of impacts to the historic environment falls under the Electricity Works (Environmental Impact Assessment) Regulations 2017 as amended (the EIA Regulations) and this DBA forms the baseline against which this assessment will occur. This DBA is a technical appendix to the EIA Report that will accompany the application for consent.

Statutory protection for archaeology is principally outlined in the Ancient Monuments and Archaeological Areas Act (1979)[1], as amended by the National Heritage Act (1983),[2] and nationally important sites are listed in a Schedule of Monuments.

Listed Buildings and Conservation Areas receive protection under the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997[3], as amended by the Enterprise and Regulatory Reform Act (2013)[4]. The 1997 Act places a duty on the local planning authority with respect to Listed Buildings and Conservation Areas, and their settings. Section 59 of the 1997 Act states (in part):

"*In considering whether to grant planning permission for development which affects a listed building or its setting, a planning authority or the Secretary of State… shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses.*"

Section 64 states:

"In the exercise, with respect to any buildings or other land in a conservation area, of any powers under any of the provisions in subsection (2), special attention shall be paid to the desirability of preserving or enhancing the character or appearance of that area."

The Historic Environment Scotland Act 2014[5] defines the role of Historic Environment Scotland (HES) and the processes for the designation of heritage assets, consents and rights of appeal.

2.2 National Policy

National Planning Framework 4[6] (NPF4) is the national spatial strategy for Scotland. It sets out the Scottish Government's spatial principles, regional priorities, national developments, and national planning policy.

Policy 7 intends to *"protect and enhance historic environment assets and places, and to enable positive change as a catalyst for the regeneration of places."*

Policy outcomes:

"The historic environment is valued, protected, and enhanced, supporting the transition to net zero and ensuring assets are resilient to current and future impacts of climate change."

"Redundant or neglected historic buildings are brought back into sustainable and productive uses"; and

"Recognise the social, environmental and economic value of the historic environment, to our economy and cultural identity."

Regarding designated heritage assets, NPF4 states:

"Development proposals with a potentially significant impact on historic assets or places will be accompanied by an assessment which is based on an understanding of the cultural significance of the historic asset and/or place. The assessment should identify the likely visual or physical impact of any proposals for change, including cumulative effects and provide a sound basis for managing the impacts of change. Proposals should also be informed by national policy and

1 UK Government (1979) *Ancient Monuments and Archaeological Areas Act*. Available at https://www.legislation.gov.uk/ukpga/1979/46/2022-02-01 (Accessed 28.09.23)

2 UK Government (1983) *National Heritage Act.* Available at https://www.legislation.gov.uk/ukpga/1983/47/2021-02-11 (Accessed 28.09.23)

3 UK Government (1997) *(Listed Buildings and Conservation Areas) (Scotland) Act 1997*. Available at http://www.legislation.gov.uk/ukpga/1979/46/pdfs/ukpga_19790046_en.pdf (Accessed 28.09.23)

4 UK Government (2013) *Enterprise and Regulatory Reform Act 2013.* Available at https://www.legislation.gov.uk/ukpga/2013/24/schedule/17/enacted (Accessed 28.09.23)

5 Historic Environment Scotland Act 2014 https://www.legislation.gov.uk/asp/2014/19/contents (Accessed 28.023)

6 Scottish Government (2022) *Scottish Planning Policy.* Available at https://www.gov.scot/publications/national-planning-framework-4-revised-draft/pages/3/ (Accessed 28.09.23)

guidance on managing change in the historic environment, and information held within Historic Environment Records."

"Development proposals for the demolition of listed buildings will not be supported unless it has been demonstrated that there are exceptional circumstances and that all reasonable efforts have been made to retain, reuse and/or adapt the listed building."

"Development proposals for the reuse, alteration or extension of a listed building will only be supported where they will preserve its character, special architectural or historic interest and setting. Development proposals affecting the setting of a listed building should preserve its character, and its special architectural or historic interest."

"Development proposals in or affecting conservation areas will only be supported where the character and appearance of the conservation area and its setting is preserved or enhanced."

"Development proposals in conservation areas will ensure that existing natural and built features which contribute to the character of the conservation area and its setting, including structures, boundary walls, railings, trees and hedges, are retained."

"Demolition of buildings in a conservation area which make a positive contribution to its character will only be supported where it has been demonstrated that:

i. reasonable efforts have been made to retain, repair and reuse the building;

ii. the building is of little townscape value;

iii. the structural condition of the building prevents its retention at a reasonable cost; or

iv. the form or location of the building makes its reuse extremely difficult."

"Where demolition within a conservation area is to be followed by redevelopment, consent to demolish will only be supported when an acceptable design, layout and materials are being used for the replacement development."

"Development proposals affecting scheduled monuments will only be supported where:

i. direct impacts on the scheduled monument are avoided;

ii. significant adverse impacts on the integrity of the setting of a scheduled monument are avoided; or

iii. exceptional circumstances have been demonstrated to justify the impact on a scheduled monument and its setting and impacts on the monument or its setting have been minimised."

"Development proposals affecting nationally important Gardens and Designed Landscapes will be supported where they protect, preserve or enhance their cultural significance, character and integrity and where proposals will not significantly impact on important views to, from and within the site, or its setting."

"Development proposals affecting nationally important Historic Battlefields will only be supported where they protect and, where appropriate, enhance their cultural significance, key landscape characteristics, physical remains and special qualities."

"Development proposals at the coast edge or that extend offshore will only be supported where proposals do not significantly hinder the preservation objectives of Historic Marine Protected Areas."

"Development proposals affecting a World Heritage Site or its setting will only be supported where their Outstanding Universal Value is protected and preserved."

"Development proposals which sensitively repair, enhance and bring historic buildings, as identified as being at risk locally or on the national Buildings at Risk Register, back into beneficial use will be supported."

"Enabling development for historic environment assets or places that would otherwise be unacceptable in planning terms, will only be supported when it has been demonstrated that the enabling development proposed is:

i. essential to secure the future of an historic environment asset or place which is at risk of serious deterioration or loss; and

ii. the minimum necessary to secure the restoration, adaptation and long-term future of the historic environment asset or place."

NPF4 also states that:

"Non-designated historic environment assets, places and their setting should be protected and preserved in situ wherever feasible. Where there is potential for non-designated buried archaeological remains to exist below a site, developers will provide an evaluation of the archaeological resource at an early stage so that planning authorities can assess impacts. Historic buildings may also have archaeological significance which is not understood and may require assessment.

Where impacts cannot be avoided they should be minimised. Where it has been demonstrated that avoidance or retention is not possible, excavation, recording, analysis, archiving, publication and activities to provide public benefit may be required through the use of conditions or legal/planning obligations.

When new archaeological discoveries are made during the course of development works, they must be reported to the planning authority to enable agreement on appropriate inspection, recording and mitigation measures."

'Our Place in Time: The Historic Environment Strategy for Scotland'[7] presents the Scottish Government's strategy for the protection and promotion of the historic environment. The Historic Environment Policy for Scotland[8] (HEPS) and the Historic Environment Scotland Circular[9] complement the Scottish Planning Policy (SPP) and provide further policy direction. In particular, HEPS provides more detailed policy on historic environment designations and consents.

2.2.1 Local Policy

The Argyll and Bute Local Development Plan (ABLDP), adopted March 2015[10] and associated supplementary guidance (SG), adopted in March 2016[11] will inform this assessment.

The following policies are considered to be relevant to the Development:

- SG LDP ENV 15 – Development Impact on Historic Gardens and Designed Landscapes

"Where development would affect a heritage asset or its setting the developer will be expected to demonstrate that the impact of the development upon that asset has been assessed and that adequate measures will be taken to preserve and enhance the special interest of the asset. Measures of assessment will be expected to follow the principles set out in the joint guidance "New Design in Historic Settings" produced by Historic Environment Scotland, Architecture and Place, Architecture and Design Scotland. Guidance provided in Scottish Historic Environment Policy and

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7 Historic Environment Scotland (2014) *Our Place in Time: The Historic Environment Strategy for Scotland.* Available at https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=fa088e13-8781-4fd6-9ad2-a7af00f14e30 (Accessed 28.09.23)

8 Historic Environment Scotland (2019) *The Historic Environment Policy for Scotland.* Available at https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7 (Accessed 28.09.23)

9 Historic Environment Scotland (2019) *Historic Environment Scotland Circular: Regulations and Procedures.* Available at https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=a768f3cb-eb44-4473-be7b-aa2500e4892b (Accessed 28.09.23)

10 Argyll and Bute Local Development Plan (ABLDP) available at https://www.argyll-bute.gov.uk/ldp (Accessed 28.09.23)

11 Argyll and Bute Local Development Plan – Supplementary Guidance available at https://www.argyll-bute.gov.uk/planning-and-building/planning-policy/local-development-plan (Accessed 28.09.23)

Managing Change in the Historic Environment Guidance Notes, which are available to download from Historic Environment Scotland's website, is also expected to be followed. Measures to mitigate against impact are likely to include enhanced physical access, interpretation and the provision of an open space or landscaped buffer zone, as appropriate.

In assessing proposals for development in, or adjacent to, gardens or designed landscapes particular attention will be paid to the impact of the proposal on:

(A) The archaeological, historical or botanical interest of the site;

(B) The site's original design concept, overall quality and setting;

(C) Trees and Woodland and the site's contribution to local landscape character within the site including the boundary walls, pathways, garden terraces or water features; AND,

(D) Planned or significant historic views of, or from, the site or buildings within it."

- SG LDP ENV 16(a) – Development Impact on Listed Buildings

"Development affecting a listed building, or its setting shall preserve the building or its setting, and any features of special architectural or historic interest that it possesses. Where development would affect a heritage asset or its setting the developer will be expected to satisfactorily demonstrate that the impact of the development upon that asset has been assessed and that measures will be taken to preserve and enhance the special interest of the asset. The use of appropriate design statements and conservation plans are expected to facilitate this assessment. Where the development may have a significant impact, measures of assessment will be expected to follow, the principles set out in the joint guidance "New Design in Historic Settings" produced by Historic Environment Scotland, Architecture and Place, Architecture and Design Scotland."

- SG LDP ENV 19 – Development Impact on Scheduled Ancient Monuments

"There will be a presumption in favour of retaining, protecting and preserving Scheduled Monuments and the integrity of their settings. Developments that have an adverse impact on Scheduled Monuments and their settings will not be permitted unless there are exceptional circumstances. Where development could affect adversely a heritage asset or its setting, the developer will be expected to satisfactorily demonstrate that the impact of the Development upon that asset has been assessed and that measures will be taken to preserve and protect the special interest of the asset. The use of appropriate archaeological assessment, setting analysis, design statements, conservation plans, character appraisals etc. are expected facilitate this assessment."

- SG LDP ENV 20 – Development Impact on Sites of Archaeological Importance

"There is a presumption in favour of retaining, protecting, preserving and enhancing the existing archaeological heritage and any future discoveries found in Argyll and Bute. When development is proposed that would affect a site of archaeological significance."

2.3 Guidance

Planning Advice Note 2/2011: Planning and Archaeology[12] provides advice on dealing with archaeological remains. Whilst it covers a range of issues, of particular relevance is the planning balance associated with the preservation of archaeological remains and the benefits of development; the circumstances under which developers may be required to provide further information or field evaluation to inform decisions; and measures that can be taken to mitigate adverse effects.

[12] The Scottish Government (2011) Planning Advice Note 2/2011. Available at https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2011/07/pan-2-2011-planning-archaeology/documents/pan2_2011-planning-archaeology-pdf/pan2_2011-planning-archaeology-pdf/govscot%3Adocument/PAN2_2011%2BPlanning%2Band%2Barchaeology.pdf
(Accessed 28.09.23)

Designation Policy and Selection Guidance (DPSG, 2019) accompanies HEPS and details the policy and selection guidance used by Historic Environment Scotland when designating heritage assets of national importance.

Guidance on how to apply the policies set out in the SPP is set out in Historic Environment Scotland's 'Managing Change in the Historic Environment Series', of which their guidance on 'Setting'[13] is particularly relevant.

Standards and Guidance published by the Chartered Institute for Archaeologists (CIfA) have been followed in preparing this DBA, in particular the 'Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment[14]' and the 'Standard and guidance for historic environment desk-based assessment'[15].

The Environmental Impact Assessment Handbook (2018)[16] has also been used which provides guidance relating to the assessment of a proposal's impacts upon cultural heritage in the context of the EIA process.

3 AIMS, METHODOLOGY AND SOURCES

3.1 Aims

The aim of this DBA is to:

- Establish the baseline information regarding the heritage resource within the CSA and 1 km Study Areas;
- To establish the archaeological potential for unknown buried archaeology to survive within the CSA; and
- To identify heritage assets that may be impacted (physically) by the Development and for which further design consideration and assessment may be required.

3.2 Methodology

The baseline was used to identify known heritage assets and to inform the potential for unknown (typically) below ground heritage assets to exist within the CSA. In order to assess the potential for heritage assets within the Development site, two study areas are used within the DBA. These areas were selected at scoping as being proportionate to the potential significant effects upon archaeology and cultural heritage. The areas examined are:

- Core Study Area (CSA); and
- 1 km Buffer Area extending from the limits of the Core Study Area.

The CSA is the Planning Red Line Boundary (RLB) and defined as the area in which Direct Physical Impacts may occur. A 1 km study area, which takes in land within 1 km of the limits of the CSA, was used to establish the known heritage resource (both designated and non-designated) in order to inform the archaeological baseline and potential for unidentified heritage assets to be present within the CSA. The wider historic landscape is considered for specific historic periods, as pertinent to the Development.

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[13] Historic Environment Scotland, 2016 (updated 2020), *Managing Change in the Historic Environment: Setting*. [Online] Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549 (Accessed 28.09.23)

[14] Chartered Institute for Archaeologists (2014) *Standard and Guidance for Commissioning work or providing consultancy advice on archaeology and the historic environment*, Published December 2014 (updated October 2022), [Online] Available at: https://www.archaeologists.net/sites/default/files/Code%20of%20conduct%20revOct2022.pdf (Accessed 28.09.23)

[15] Chartered Institute for Archaeologists (2017) *Standard and Guidance for Historic Environment Desk-Based Assessment*, Published December 2014, Updated October 2020 [Online]Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf (Accessed 28.09.23)

[16] Scottish Natural Heritage and Historic Environment Scotland, *Environmental Impact Assessment Handbook*, (2018). Available at https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=6ed33b65-9df1-4a2f-acbb-a8e800a592c0 (Accessed 28.09.23)

This DBA comprises of a written description of the baseline heritage resource and archaeological potential of the Core Study Area, a description of the area's historic character, the archaeological and historical baseline's significance. The report is supported by Figures 9.1.1 to 9.1.5 detailing the location of the CSA, Study Areas and the location of heritage assets, as well as extracts from key historic mapping. A full list of known heritage assets within the CSA and 1 km Study Area is provided within Section 8: Gazetteer of Heritage Assets.

The following section outlines the methodology used to fulfil the aims of the assessment stated in Section 3.1 above.

3.2.1 Baseline data collection

In order to establish the historic environment baseline this DBA includes a comprehensive desk-based review of data from the following sources:

- Historic Environment Scotland (HES) Datasets including:
    - Canmore Archaeological Records;
    - Database of World Heritage Sites;
    - Database of Scheduled Monuments;
    - Database of Listed Buildings;
    - Database of Inventoried Garden and Designed Landscapes; and
    - Database of Inventoried Battlefields.
- Aerial Photography and Lidar;
- Cartographic evidence from the Ordnance Survey and historic maps;
- West of Scotland Archaeology Service (WoSAS) HER data AU1294 (28th March 2022);
- The Statistical Accounts for Scotland;
- The National Archives of Scotland;
- Archaeological Data Service (ADS) for heritage data including grey literature reports, archaeological journals, and the Excavation Index for Scotland;
- Regional and national research framework assessments and strategies; and
- Published and grey literature archaeological journals and monographs.

These resources have been collated and examined alongside the results of any fieldwork.

3.2.2 Site Visit

To accompany this consultation, a site walkover of the CSA was conducted on 9th and 10th March 2022 and again in February 2023.

The purpose of the walkover survey was to:

- Validate the baseline dataset within the CSA and to identify any other unrecorded archaeological remains that may exist within the CSA; and
- Identify unforeseen factors which may result in impacts to the historic environment as a result of the Development.

Any previously unknown heritage assets present within the CSA were located using ArcGIS Collector, and recorded by use of digital photography with an appropriate scale.

3.2.3 Assumptions and limitations

This baseline comprises a desk-based review of information taken from the HES datasets and data from the WoSAS HER, as well as a variety of secondary sources. Whilst this information is assumed to be accurate, it does not constitute a complete record of the historic environment and does not preclude the potential for hitherto unidentified archaeological remains or deposits to be encountered within the CSA.

The DBA has adhered to standard guidance and methodology (as detailed above) and has provided a robust assessment of the known heritage resource and potential for previously unknown heritage assets within the Development site.

4 HISTORIC BASELINE AND DBA RESULTS

4.1 Character, Geology and Topography

The predominant land use within the CSA consists of private forestry plantation used for commercial purposes with areas of upland moorland also present in the south and east of the Site. The topography of the CSA and immediate vicinity is complex and largely consists of existing commercial forestry and rural upland farmland. The CSA varies in elevation ranging from approximately 100 m Above Ordnance Datum (AOD) in the west of the Site, to approximately 470 m AOD in the east of the Site. There are a number of notable hilltops bordering the CSA including Stuc Scardan which borders the eastern boundary; however, there are no notable summits located within the Site.

There are a number of notable hilltops and ridges within and surrounding the CSA including:

- Ceann Chreagan, in the south of the Site;
- Stuc Scardan, directly east of the Site; and
- Tom an Fheidh, directly north to the Site.

There are a number of watercourses within the CSA that traverse the Development site, as well a number of small lochans within and surrounding the CSA. These include:

- River Aray, flowing north to south in the west of the Site;
- Lochan Mhadaidh, in the east of the Site; and
- Lochan Sheileachan, directly east of the northeast area of the Site.

There are also many unnamed burns draining into the River Aray, flowing east to west. The wider landscape can be characterised by a similar topography with further commercial forestry. Inveraray is the closest settlement to the Site, approximately 4.7 km to the south. The closest residential property is Ladyfield Farm situated approximately 1.1 km west of the closest indicative turbine location (T11). There are other residential properties situated nearby the Site, largely located intermittently within Glen Aray along the A819 to the west of the Site, and within Glen Shira to the east of the Site. Inveraray Castle is located just under 4km south of the southern edge of the CSA, with the associated estate and designed landscape extending to within 1 km of the CSA.

The underlying bedrock geology of the CSA comprises the Crinan Grit formation, composed of Quartzite with intrusions of the Dalradian Supergroup rocks of Metagabbro and Metamicrogabbro[17]. The major rock group within the south of the site is the Ardrishaig Phyllite Formation with Semipelite and Calcareousa with intrusions of Scottish Highland Siluro-Devonian calc-alkaline and Dalradian Supergroup - Metagabbro and Metamicrogabbro dykes. Superficial deposits are limited to glacial sands and gravels and alluvium along the western edge of the CSA, along the course of the A819 carriageway and River Aray. A small pocket of Devensian Till is located at the south-east corner of the CSA.

4.2 Baseline Context

The following section presents a summary of the known historical and archaeological baseline, with designated and non-designated assets identified by either their Historic Environment Scotland (HES) ID or WoSAS (HER) ID. Where no HER ID is allocated, the assets CANMORE ID is given. A full summary of these assets, and associated HER ID and CANMORE IDs, descriptions, and period are presented in Section 8.

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[17] British Geological Survey. Geological Index Map Viewer. https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.158009150.56077461.1684485160-97490219.1684485160 (Accessed 28.09.23)

Where possible, assets have been assigned to time periods as defined by the Scottish Archaeological Research Framework (ScARF) National Framework Panel Reports Chronology and Downloads[18] (Table 1).

Assets are located within Figures 9.1.2-3, with Figure 9.1.3 detailing assets by period.

Table 1: Period Definitions

Period name		**Date range**
Early Prehistory	Palaeolithic to Mesolithic	12,700 BC – 4,100 BC
	Neolithic	4,100 BC – 2,500 BC
Later Prehistory	Chalcolithic and Bronze Age	2,500 BC – 800 BC
	Iron Age	800 BC – AD 400
Medieval		AD 400 – 1500
Post-Medieval to Modern		AD 1500 - 1900
Modern		1900 - present AD

4.3 Designated Assets

There are no designated assets recorded within the CSA. Within the 1 km Study Area a single Listed Building (LB11523) and Garden and Designed Landscape (GDL00223):

Listed Building LB11523: Glen Aray School And Outhouse (Category B)

GDL00223: Inveraray Castle

No World Heritage Sites or Registered Battlefields are recorded within the CSA or 1 km Study Area. No Conservation Areas are recorded (Figure 9.1.2).

4.4 Non-Designated Heritage Assets

There are seven non-designated assets recorded in Canmore and HER data, within the CSA:

Table 2: Non-designated assets within the CSA

WoSAS Pin	**Canmore ID**	**Name**	**Asset type**	**Period**
44094	153703	Barr Loisgte / Upper Kennachregan	A farmstead, comprising two roofed buildings, one unroofed building and three enclosures	Post Medieval
44098	153699	Ladyfield	A single unroofed building	Post Medieval
44100	153697	Barr Loisgte	A single unroofed building	Post Medieval
44189	153559	Allt A' Mhadaidh	Two unroofed shieling-huts	Post Medieval
N/A	127139	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	Military Road	Post Medieval

[18] ScARF) National Framework Panel Reports Chronology and Downloads https://scarf.scot/national/panel-report-chronology-and-downloads/ (Accessed 28.09.23)

WoSAS Pin	Canmore ID	Name	Asset type	Period
N/A	126811	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	Military Road	Post Medieval
43519	150575	Linnieghluttain footbridge	This wooden bridge is currently unusable and cannot be classified as an antiquity.	Modern

These assets date to the 18th century onwards, consisting of military roads, farmsteads and structures associated with rural settlement and the farming economy. A further five assets have been identified through a review of historic mapping undertaken as part of this assessment consisting of Post-Medieval settlement, field boundaries and earthworks.

Within the 1km Study Area 48 non-designated assets are recorded within Canmore and HER data. These assets are predominantly associated with Medieval to Post-Medieval rural settlement, roads and transport infrastructure as well as assets relating to the rural farming economy.

Full details of all designated and non-designated assets these can be found in Section 8 Heritage Gazetteer, with assets discussed by period within Section 4.6 below and depicted on Figure 9.1.3.

4.5 Previous Archaeological Investigations

There have been no archaeological investigations within the CSA. Within the 1 km Study Area a single archaeological investigation has been undertaken, in which archaeological remains associated with the Drimfern Township were recorded, namely a ruin, field boundary and horse shoe shaped features. The report for these archaeological works is unavailable and as such the archaeological remains described are undated for the purposes of this DBA. Further details provided within Table 3 below and on Figure 9.1.2b.

These investigations do not constitute heritage assets in of themselves, but where archaeological remains, or potential archaeological remains, have been identified, these results have been considered within the DBA baseline.

Table 3: Previous Archaeological Investigations within the 1 km Study Area

WoSAS Event ID:	Event name	Event Year	Organisation	Results summary
3439	Archaeological Evaluation: Drimfern, Inveraray, Argyll and Bute	2006	Archaeology and Micromorphology	Archaeological evaluation comprising a measured survey, Level 1 Building Recording and Hand Excavated trial Trenching prior to development. The southern portion of the Township was surveyed using a total station. The WoSAS HER noted the survey and trial trenching revealed the extent, character, integrity, state of preservation and provided good dating evidence for an extant ruin plus a field boundary and two horse-shoe shaped features.

These investigations do not constitute heritage assets in of themselves, but where archaeological remains, or potential archaeological remains, have been identified, these results have been considered within the DBA baseline.

4.6 Historical and Archaeological Baseline Context

The following section gives a brief description of the wider area's archaeological and historical sites within the context of the area's background history, presented by period. The features referred to are detailed in the Heritage Gazetteer in Section 8 and shown by period within Figure 9.1.3.

4.6.1 Prehistoric Periods

4.6.1.1 Early Prehistory

There are no Mesolithic heritage assets or findspots within the CSA or 1 km Study Area. Neither Canmore nor the HER data identify any Mesolithic assets within 5 km of the CSA.

The limited number of early Prehistoric heritage assets or findspots is representative of a wider paucity of Palaeolithic evidence within Scotland. This scarcity is thought to be reflective of the landscape's periglacial conditions, with evidence of human occupation (albeit transient) increasing in visibility during the Mesolithic period, in line with early Holocene climatic amelioration and glacial retreat. Archaeological research to date, indicates that Mesolithic populations favoured island and coastal locations, where both terrestrial and coastal resources could be easily exploited. The absence of antler worked tools, microliths and shell middens, as well as localised site types including caves and rock shelters, is notably absent from the shores of Loch Fyne and the wider region as a whole.

Following a period of population decline, 7800-7000 cal BP, and re-colonisation, 7000-5800 cal BP, there emerged a shift from an itinerant hunter-gather population to a sedentary agrarian society. Whilst there is debate with regards to the mechanism for this change, the Neolithic can be predominately characterised by the appearance of pottery, funerary monumentality and early agricultural cultivation.

There are no confirmed Neolithic assets within the CSA or 1 km Study Area.

A Neolithic Cairn was thought to have identified in 1969 within the CSA (WoSAS Pin: 1582), described as being 150ft long and 30ft wide. However, in 1979, the feature was characterised as merely the result of dumping field-gathered stones on a natural ridge and contains no evidence to suggest it was once part of a chamber.

4.6.1.2 Later Prehistory

Chalcolithic and Bronze Age Scotland is traditionally defined by the introduction and use of copper and copper alloys for the manufacture of tools, ornaments and weapons. Bronze Age technology was reliant on supplies of copper and tin from a range of wider sources across Britain and Europe, meaning that the Bronze Age in Scotland saw the development of an international trade network. With the emergence of bronze as a technology, the complexity and ostentatiousness of material cultural and funerary/ritual monumentality increased, with selected ceramics, jewellery and funerary traditions from Ireland and northern England becoming visible within the archaeological record.

Several Bronze Age items are held within the Inveraray Castle Collection, including Late Bronze Age jewellery and ornaments that were discovered on the western edge of the 1km study site, close to North Tullich, Glen Aray (WoSAS Pin: 1570). Aside from this, no evidence for Bronze Age occupation has been identified within the 1 km Study Area, and whilst isolated finds have been recovered and mentioned above, the primary focus of regional activity is seemingly situated in Kilmartin Glen c. 30 km to the south-west. A cairn is recorded within the 1 km Study Area, (WoSAS Pin 1583), located immediately west of the River Aray, just outwith the CSA at its south-west edge. This likely funerary cairn is recorded on late 19th century mapping but no trace survives today. There are several additional cairns and one standing stone located within the designed landscape of Inveraray Castle to the south of the CSA, east of the CSA around the River Shira, west of the River Aray and north of the CSA in the uplands west of Loch Fyne which may date to this period.

In the wider landscape, there are two known examples of cup-and-ring marked rocks , the closest of which being Stronshira (WoSAS Pin: 1705), located 4.5 km south-east of the CSA. Kepochan Cup Marked Rock (SM4186) is located approximately 4.5km north of the CSA, comprising a large boulder with at least 24 plain cups, ranging from 30 to 100mm in diameter and from 5 to 40mm in depth. A boulder 'covered in cupmarks' was reported to Campbell and Sandeman at Erallich Water, approximately 2.5km west of the site boundary, however, efforts to locate the boulder have been unsuccessful (WoSAS Pin: 1585). These assets are all recorded within the HER, beyond the 1 km Study Area but within 5 km of the CSA, suggesting that the CSA sits within a wider Late Prehistoric landscape with ritual and funerary sites overlaying and interacting with everyday settlement and domestic life.

The 1st millennia BC saw a shift in bronze to iron technologies, and a decrease in the visibility of funerary/ritual traditions within the landscape, but with a perceptible increase in defensive and communal centres, including Duns, Forts and Crannogs. However, there is a paucity of Iron Age excavational data within the region, and subsequently a poor understanding as to the nature of occupation at this time. There are no assets recorded within the HER or on Canmore within 1km of the CSA. A review of the Canmore online database found no Late Prehistoric records or within the wider historic landscape out to 5 km from the CSA.

4.6.2 Romano-British

Roman legions first arrived in the territory of modern Scotland in the 1st century AD, establishing a series of forts and camps along a border first along the Gask Ridge, and later to the south along what became the Antonine Wall. Roman archaeology in Scotland is generally characterised by these military encampments and fortifications, usually sited within a single day's march from each other, and typically located along communication routes and at river crossings. These forts and camps were occupied, abandoned and rebuilt over several phases of military activity from the 1st to early 4th centuries.

Roman troops first ventured north of the Forth under Agricola in c. 79 AD, establishing the first Forts and Fortlets along the Gask Ridge, west and southwest of Perth. Forts were established at Ardoch, Strageath and Bertha adjacent to the Rivers Teith, Earn and Tay respectively before venturing north of the Tay to harry local tribes (the Venicones, Uacomagi, Boresti, Taxali and Decantae) along the north-east cost up to the Moray Firth. This campaign eventually culminating in the battle of Mons Graupius in 84 AD and Roman victory over a collection of Caledonian tribes[19]. The site of the battle is uncertain but the hills of the Cairnie Brae, below the Gask Ridge are a purported site with the Roman camp at Dunning housing troops prior to the conflict.

Documenting the campaigns leading to the battle of Mons Graupius, Ptolemy listed the various tribes of the British Isles. For the area north of the Forth Ptolemy describes the peoples as belonging to the 'Caledoni'. In reality, this broad characterisation likely took in a number of disparate Iron Age tribes, grouped together by the Romans under the name of the Caledoni to describe the peoples they fought against in the campaigns of the late 1st century AD.

The CSA is located at some considerable distance north-west of the known Roman military sites. A review of the Canmore online database found no Roman records within the wider historic landscape out to 5 km from the CSA.

4.6.3 Medieval Period

In the first half of the 1st Millenium AD a series of distinct kingdoms emerged from the Iron Age tribes of Scotland. The CSA was situated on the periphery of the Gaelic Kingdom Dál Riata and The Kingdom of Alt Clut, reaching peak of their influence in the 6th and 7th centuries AD, and subject to Norse settlement in the later centuries of the 1st Millenium AD, the region around the CSA would have been exposed to multiple early medieval influences.

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[19] Fraser, J. 2008. The Roman Conquest of Scotland. The Battle of Mons Graupius AD 84.

Place names with a possible Early Medieval root within the surrounding landscape and along the loch commonly contain the following elements[20]:

- *Abhainn* – Gaelic for River. An example from the surrounding landscape:
  - Gaerr Abhainn
- *Allt* – a place name associated with streams or burns, and derived from the Old Irish *alt*, meaning cliff or shore. Examples from the surrounding landscape include:
  - Allt Criche
  - Allt a' Mhadaidh
  - Allt Phàraig
- *Carn* – Gaelic for heap or pile of stones, rocky hill, or mountain. An example from the surrounding landscape:
  - Carn Odhar
- *Cnoc* – Gaelic for knoll, hillock, eminence. An example from the surrounding landscape:
  - Cnoc Raineach
- *Creag* – Gaelic for rock, cliff, rocky eminence. An example from the surrounding landscape:
  - Creag Dhubh
- *Dùn* – Gaelic for heap, hill, hillock mound, fortress, castle. An example from the surrounding landscape:
  - Dùn Còrr-Bhile
- *Meall* – Gaelic for lump, mass, great shapeless hill. An example from the surrounding landscape:
  - Meall Rèidh
- Mòr/mor– Gaelic for large/ great. An example from the surrounding landscape:
  - Seileach Mòr
- Sròn – Gaelic for nose. An example from the surrounding landscape:
  - Sròn-gharb
- Stùc – Gaelic for little hill jutting out from another, steep on one side and rounded on the other. An example from the surrounding landscape:
  - Stùc Scardan

It is important to note that the survival of place names, both within the landscape and written source, does not necessarily reflect continuous occupation of these locations, with limited medieval archaeological evidence within the record of the regions.

By the late 11th century Anglo-Norman political and cultural influence was on the rise, as demonstrated by the familial links between King Malcolm III (reigning between 1058 – 1093 AD) and the courts of England and France, King Henry I of England and Eustace III of Bologna both being sons in Laws. The introduction of a feudal system of governance with the creation of new titles in the form of Lords, Earls and Sherriffs, also saw religious changes associated with a move towards Rome and Catholicism. From the 11th century onwards, with the growing influence of the church, and changing secular political landscape, a more homogenised Gàidhlig culture emerged.

The Campbells, thought to originate from the Kingdom of Strathclyde, likely arrived in Argyll as part of a Royal expedition c. 1220 AD (under Alexander II), settling on Lochaweside where they

[20] Murray, J. 2019. Reading the Gaelic Landscape. Leughadh Aghaidh na Tìre. 2nd edition. Whittles Publishing;

were placed in charge of the King's lands in the area[21], with the head of the Clan taking on the gaelic title of MacCailein Mor (referring to Colin the Great). The head of the family adopted the title of Earl of Argyll from 1457AD and Duke of Argyll from 1658 AD.

The family seat of power was the castle (now a ruin) at Innischonnell on Loch Awe, and remained so until 1450 when Sir Duncan Campbell moved to Inveraray and built the first castle there as a simple defended tower house, laterly extended in the 17th century. The castle was located immediately north of the current 18th century castle and 300 m north of the associated Medieval village at Inveraray, which was established c. 1472AD, becoming a Royal Burgh in 1648AD and finally being demolished c. 1776AD. The old village of Inveraray was located on the banks of Loch Fyne where the River Aray drains into the Loch, some 500 m north-east of the present day settlement.

No Medieval heritage assets or findspots have been identified within the CSA. Within the 1 km Study Area there are seven assets which may have a Medieval origin, but are more securely dated to the Post-Medieval period. Located 500 m west of the CSA is 'Tom na Cuirte' (WoSAS Pin 1569). This asset is a court hill where criminals were tried and recorded as being visited by James IV in the late 15th century to hear the Captain of the Glen give justice. The remaining assets are associated with small scale settlement around the CSA, inclusive of a well (WoSAS Pin 1572), Pre-improvement settlement at Carness, located to the north of the CSA, township and chapel at Kilmun (Canmore ID 153701, WoSAS Pin 58759 and 58868), located south-west of the CSA and fragmentary field boundaries/rig and furrow located c. 950 km to the west.

The nearest clearly Medieval assets are the remnants of the deserted medieval settlement (WoSAS Pin: 1502) associated with Old Inveraray Castle (Canmore ID: 23367), both of which are outwith the 1 km Study Area. These remains have been levelled to their foundations after the present castle was completed.

4.6.4 Post-Medieval Period

The Post-Medieval period saw rapid changes to the regional and national socio-economic climate, culminating in the Act of Union in 1707 AD and rebellion. This period also witnessed extensive physical changes across the Scottish countryside and urban centres, characterised by a shift from dispersed rural populations, to larger villages and townships, as a direct result of the changes to land ownership, and a move from subsistence farming to homogenised agricultural practices.

In and around the CSA and 1 km Study Area these changes are most clearly demonstrated by the changes to settlement and land use driven by the creation of a designed landscape at Inveraray, inclusive of a new castle constructed in 1746AD[22], and new planned town at Inveraray, constructed between 1771 and 1792 and depicted on extracts from the 1st Edition OS below and Figure 9.1.4. The construction of the new Inveraray Estate and Town coincided with a period of military road building and the creation of new bridges to facilitate access into the area, following the rising of 1715AD when Inveraray saw conflict as part of the Jacobite uprising, with the 2nd Duke commanding the Government Army at the Battle of Sheriffmuir which put paid to the Jacobite Rebellion of 1715.

The Designed Landscape of Inveraray Castle (GDL00223) is located within the 1 km Study Area. Woodland plantations and processional avenues planted around the old medieval castle were created between 1650 and 1680. The lime kiln of Tom-breac (WoSAS 69708) is present within this Designed Landscape as well, located 1.8 km south-east of the CSA. This asset has been included due to it being raised during the early scoping process with WoSAS. The present day designed landscape draws its inspiration from plans drawn up by the 2nd Duke of Argyll from 1721AD onwards, by architects William and Robert Adam, Robert Mylne and Roger Morris. Roger Morris, all of whom had worked extensively throughout England. The design of the castle is principally led by Roger Morris, who against type produced a 'Gothick' style building, with the main entrance

[21] The Duchess of Argyll, 2018. Inveraray Castle and Gardens.

[22] Linday and Cosh, 1973. Inveraray and the Dukes of Argyll. Edinburgh University Press.

south-west centred on a formal walled garden and earlier lime avenue associated with the demolished Medieval castle. The redesigned Inveraray Castle is the focal point of the designed landscape and policy taking in parklands, garden buildings and vast woodland plantations, with the planned town of Inveraray providing a secondary focus to the policy. The designed landscape at Inveraray encompasses several associated structures of note, inclusive of the Watchtower on Dun na Cuaiche sited on hills 1 km to the north-east of the castle, Coach House and former Riding School located 900 m north-west of the Castle, as well Icehouse and Dovecot, located north-west of the castle. Several bridges were constructed to cross the various watercourses that run through the designed landscape. The Inveraray Castle designed landscape also takes in several cottages, lodges summer houses and fish houses within the wider policy.

The associated parklands are located across low-lying land at the foot of Glen Aray and neighbouring Glen Shira, and separated by the River Aray, which winds roughly north-westerly through the policy. The parklands also take in a tract of land to the southwest known as the 'Fisherlands'.

The woodlands of the policy are primarily located on the hillsides of Dun na Cuaiche, to the north of the castle, and it is these woodlands of the designed landscape that fall within the 1 km Study Area. A triangle of woodland to the north of the castle known as the Duchess Louise Wood is likely to have been planted in the late 17th or early 18th century. Further planting is recorded. The Statistical Account of 1845 notes that between 1832 and 1837, the 7th Duke planted over 400,000 trees including 170 000 oak, 10 000 plane and 5 000 laburnum. In the third quarter of the 19th century more than two million oak, larch, Scotch fir and spruce were planted and in 1888 Ballantyre Wood was planted with exotic conifers including Douglas fir and giant fir. The felling and management of this woodland became a crucial part of the local economy.

The planned town of Inveraray is one of Scotland's most well-conceived and delivered early model planned town. The town is aligned north-east to south-west along the principal Main Street, with a cluster of buildings between this and the shore of Loch Fyne and the pier at the northern limit of the town. Front Street runs perpendicular to the northern terminus of Main Street, ending to the west at the lodge/gate house leading into the Winterton Gate and the southern entrance to the castle, now serving as the main visitor entrance to Inveraray Castle. Some of the earliest buildings in the town are located on Front Street and include the former Town House and the Great Inn, both 1750 by John Adam. Robert Mylne's round-arched Screen Wall (1790) helps unify the town frontage as part of the wider setting of the castle.

The key processional ways and driveways around the policy include, Lime Avenue, the historic processional approach to the Medieval Castle, which runs from the rear of the present day Inveraray Castle, through the formal gardens to the south-west across Wintertown Park. This avenue is no longer used as an approach to the house but remains historically significant. The principal approach to the castle in the present designed landscape is from the Wintertown Gate, commencing at the north end of Inveraray town Front Street, westwards across the Wintertown Park. The Oak Walk avenue is the most prominent route northwards across the policies, extending from the northern frontage of the castle over the garden bridge through the Duchess Louise Wood towards Carloonan and the dovecot. An extended avenue of oak trees crossing the northern parkland leading to the dovecot, shown on various early plans, was probably removed at some point in the late 18th century. Extending from the western elevation of the castle to the west is a smaller tree lined walkway leading to the stables and ice house.

Within the CSA there are six HER and Canmore assets recorded. These assets consist of individual farmsteads (WoSAS Pin 44094), (WoSAS P in 44098, 44100) and shieling huts (WoSAS Pin 44189), all depicted on the 1st Edition Ordance Survey Map and associated with the local farming economy. The final pair of assets record the location of the Dumbarton – Tarbet – Inveraray – Tyndrum Military Road (Canmore ID 127139, 126811), running north to south to the west of the River Aray on the western edge of the CSA. This military road around Inveraray was constructed c. 1756 AD. Prior to the construction of the road, access to Inveraray castle and village was only easily achievable by boat. The road itself it depicted on Roys Military Map of Scotland 1747-1755[23], depicted below.

Within the 1 km Study Area, aside from DGL00223, there is a single other designated asset. The Category B Listed Glen Aray School And Outhouse (LB11523) is located within 80 m of the southern edge of the CSA, between the River Aray and the A819 public carriageway, just beyond the northern limit of the Inveraray Estate and policies. The school was constructed in the late 18th century in the same Gothic style as the estate buildings to the south. The school was constructed by the Dukes of Argyll for the benefit of educating the local children in the English language.

The remaining Post-Medieval assets are all undesignated, associated with townships, small settlements and cottages, transport infrastructure and assets associated with the rural economy. The township of Kilmun and associated Chapel (WoSAS Pin 44096 and 1581) are located c. 950 m south-west of the CSA on the western edge of forestry associated with the Inveraray Estate. A charcoal burning platform (WosAS Pin 59106) is also located around the settlement, providing key evidence for the later Post-Medieval economy. The township of Barr Loisgte / Lower Kennachregan (WoSAS Pin 44095), comprising of four structures is located, within 60 m of the CSA. The township of Drimfern (WoSAS Pin 44097), consisting of eight buildings, enclosures and associated charcoal platform (WoSAS Pin 61698) is recorded 420 m west of the CSA, to the north of the woodlands associated with the Inveraray Estate and just west of the 18th century military road. To the south of Drimfern a house at the small settlement of Stronmagchen is also recorded (Canmore ID 159028). The townships of North and South Tullich (WoSAS Pin 44186 and 44187), made up of ten buildings in total, are located c. 300 m west of the CSA and just west of the 18th century military road. Located within Bile Gharbh woods, 300 m south of the access road for the Proposed Development are a series of foundations and platforms interpreted as a possible township (WoSAS Pin 58994 and 15368). Also, associated with this cluster are a series of isolated buildings and farmsteads (WoSAS Pin 44101 and 44102. To the north of the CSA are the possible remains of a house (WoSAS Pin 57790), located 100 m beyond the CSA and 400 m east of the 18th century military road. Just to the north of the CSA, a group of sheep folds are also recorded (WoSAS Pin 57791, 57792 and 57789), in close association to this structure. A fourth sheep fold (WoSAS Pin 53148) is located to the west of this military road in close proximity to this group.

A series of charcoal burning platforms located within Blantyre Woods, at the southern limit for the 1 km Study Area and within the Inveraray Designed Landscape provide further evidence of woodland management to the local rural economy (WoSAS Pin 59476, 59478, 59479 and 59480).

The remaining Post-Medieval assets are associated with the local transport network, including three entries associated with the 18th century military road (Canmore ID 127139, 126811 and 127139) running to the west of Inveraray and through the designed landscape. Assets linked to the construction of the military road include a bridge fording a small watercourse and culvert (WoSAS Pin 43520 and 43521).National Archives of Scotland

A search of the national archives for the closest villages and place names to the Development was undertaken. This search included 'Stronmagachan', which revealed three records associated with the farm of Stronmagachan in Glen Aray (1767-1808), estate papers (1747-1909) and miscellaneous papers (1855-1863). A search of 'Ladyfield' revealed one record associated with requisitioning of 'Tullich Training Center (Ladyfield)' during WWII. Searches of 'Drimfern', 'Upper Kennachregan', 'Carnos', 'Kenchre', 'Lecknaban' and 'Leachnanban' revealed no records.

At present, and based on the national archive descriptions, it is not felt that access to these records would assist in the archaeological assessment of the CSA.

4.6.4.1 Cartographic Sources

The following section reviews the available historic mapping for the CSA and surrounding area. Heritage assets identified on historic mapping, but not recorded within HER and Canmore datasets

[23] Nationla Library of Scotland. Roys Militray Map of Scotland 1747-1755. https://maps.nls.uk/geo/explore/side-by-side/swipe/#zoom=14.2&lat=56.2580&lon=-5.0719&layers=3&right=5 (Accessed 28.09.23)

have been given a unique ID (HMXX). A full list of assets recorded through a review of historic mapping is provided within Table 4 below.

Whilst historic mapping is predominantly schematic, it can be a useful source in understanding historic settlement patters and land division. Pont's Maps of Scotland, ca. 1583-1614 (not reproduced) shows a series of settlements, including 'Kennachregan' within the CSA, as well as 'Tullich', 'Druymfairn' (presumed to be Drimfern), and 'Corlunnan' (presumed to be Carloonan) within the 1km study area. 'Druymfairn' appears to be the only settlement present in Blaeu's Atlas of Scotland, 1654 (*The Scotia regnum cum insulis adjacentibus / Robertus Gordonius a Straloch descripsit*) (Plate 1). However, these maps are not of sufficient detail to ascertain land use of the CSA, though it does not appear to have been subject to settlement.

Plate 1. Extract of Blaeu's Atlas of Scotland, 1654 (The Scotia regnum cum insulis adjacentibus / Robertus Gordonius a Straloch descripsit), the approximate location of the Development is highlighted in red.[24]

Following the risings of the early 18th century, an extensive programme of military road building was undertaken. The principal aim of this was the connectivity of British military outposts and garrisons, and precipitated one of the largest military cartographic surveys of the 18th century. Roy's military map of Scotland (1747-1752) is perhaps one of the earliest maps to show the CSA in detail, and would suggest it was a partially agricultural area with the settlement 'Leachnanban' appearing within the CSA in close proximity to the structure at Ladyfield (WoSAS Pin 44098) depicted in the later 1st Edition OS.. A second unnamed settlement is also depicted within the CSA, likely to be Upper Kennachregan (WoSAS Pin 44094). Plate 2, shows that the 1 km Study Area contained further settlement sites at 'Tulloch', 'Drunforn','Stronmacachan', 'Killmun' and 'Sallachary' to the west of the planned, but not yet completed military road. To the north of the CSA and east of the military road a settlement labelled as 'Carnos' is depicted. The 1 km Study

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[24] Blaeu's Atlas of Scotland, 1654 (The Scotia regnum cum insulis adjacentibus / Robertus Gordonius a Straloch descripsit) https://upload.wikimedia.org/wikipedia/commons/a/a9/Atlas_Van_der_Hagen-KW1049B11_038-SCOTIA_REGNUM_cum_insulis_adjacentibus.jpeg (Accessed 28.09.23)

Area also depicts sporadic agricultural activity and woodland, with the slopes of the hills to the east and west of the CSA seemingly limiting the extent of intensive agricultural activity.

Plate 2. Extract of Roy Military Survey of Scotland, 1747-1755, the approximate location of the Development's Area highlighted in red.[25]

A map of Argyllshire by Langlands in 1801[26] (not reproduced), annotates two structures at 'Kenchregan' (assumed to be Upper Kennachregan), aligned east-west and northwest-southeast. Moreover, a farmhouse surrounded by woodland is demarked at 'Leeknaban' (assumed to be 'Leachnanban'). The former is likely to correlate with the farmstead recorded in Pont's map as 'Kennachregan' and in later mapping as 'Upper Kennachregan', the presence of this and similar place name iterations in the CSA from older maps would indicate that agricultural activity has occurred in this area since the late 16th or early 17th century. The farmstead visible on site at present is likely to be of late 18th century origin, perhaps established at the site of an earlier settlement. While the remains at Upper Kennnachregan are visible today, no evidence of the farmhouse at Leachnanban was observed on site, although the presence of commercial forestry could have truncated any archaeological remains and obscured them from sight.

The 1st Edition OS depicts the CSA and surrounding area in sufficient detail to identify specific structures and identify land use and field divisions (Plate 3, Figure 9.1.4)

[25] Roy Military Survey of Scotland, 1747-1755 https://maps.nls.uk/roy/ (Accessed 28.09.23)

[26] The Map of Argyllshire North Easy Section View map: This map of Argyllshire - Counties of Scotland, 1580-1928 (nls.uk) (Accessed 28.09.23)

Plate 3. Extract of 1st Edition OS with the Development's Area highlighted in red[27]

The 1st Edition OS (Figure 9.1.4) depicts the settlement of Upper Kennnachregan (WoSAS Pin 44094) and associated field boundaries (HM4). The settlement of Ladyfield (WoSAS Pin 44098) is depicted just outwith the CSA, to the west of the Site and just east of the River Aray. A series of field boundaries (HM4) are depicted around the settlements of Upper Kennnachregan and Ladyfield, with additional boundaries depicted around a small area of plantation woodland (Barr Loisgte) at the southern limit of the CSA. The remaining land of the CSA appears to be rough upland pasture, with several burns shown draining from the uplands toward the River Aray. An unidentified earthwork (HM3) is drawn to the north of the Mhadaidh Burn, along the eastern edge of the CSA. This long curvilinear earthwork may be some sort of quarry feature but cannot clearly be characterised. No sheep folds or pens are recorded within on the 1st Edition within the CSA, although several are recorded to the north.

The settlements of North and South Tullich, Drimfern and Stronmagachan are recorded on to the west of the CSA. The cairn at Carn Ban, Stromagachan (WoSAS Pin 1583) is depicted between Drimfern and Stronmagachan, with the Glen Aray School And Outhouse (LB11523) drawn to the south of the CSA.

Table 4: Historic assets identified through a review of historic mapping

HM Asset	Asset description	Period	Location
HM1	Settlement of Leachnanban depicted on Roys Military Survey of Scotland	Post Medieval	208936, 715398
HM2	Unnamed settlement depicted on Roys Military Survey of Scotland	Post Medieval	208856, 714495

[27] National Library of Scotland. 1st Edition OS Map. https://maps.nls.uk/geo/explore/side-by-side/swipe/#zoom=13.2&lat=56.2991&lon=-5.0741&layers=3&right=5 (Accessed 28.09.23)

HM Asset	Asset description	Period	Location
HM3	Unidentified earthwork	Post Medieval	210898, 715696
HM4	Field boundaries	Post Medieval	Throughout CSA

4.6.4.2 Statistical Accounts

The Statistical Accounts for the CSA is found in the old county of Argyle, Parish of Inveraray.

Whilst there is no specific mention of the land associated with the CSA, or the placenames prevalent on the west of the 1km study area, the 1793 accounts do reference the etymology of Inveraray and agriculture in the surrounding area.

'It is probable, that agriculture was first attempted on such fertile spots as were thus situated. The name universally given in Gaelic to such pieces of ground, favours this idea. Ion-ar (or Inver) means, worthy of tillage, from Ion, deserving of, and Ar, to till. Ion-ar-ao-reidh, may therefore signify a piece of flat fertile ground at the mouth of a rapid rough river'[28]

The accounts indicate that the population of Inveraray considerable decreased in the 40 years leading up to 1793, with the cause of this attributed to the completion of Inveraray Castle and subsequent lack of requirement for workers to remain in the area. Corn, hay and potatoes are mentioned as the principal crops in the parish, with it being too wet for barley. A breed of the best Highland Cattle is also mentioned to be reared in the parish.

The 1845 accounts make mention to the topographical appearance of the parish

'The general appearance of the parish is mountainous, presenting that diversity of form which is always the result of the meeting and mingling together of two different mountain rocks…with its sloping sides clothed with heath and verdure…and sometimes in low and gentle hillocks, mantled with trees or covered with soft succulent herbage. The result of the whole is an out- line so diversified, so waving, and so beautiful, as is of itself sufficient to delight the eye, and to give noble and characteristic features to the scenery of the parish.'[29]

The accounts also state that agriculture has not made the progress which was expected. A reduction in soil fertility reportedly occurred as farmers attempted to grow as much crop as possible to support their families. Farmers, however, were encouraged to focus on hay crops as those are most suitable for the climate, furthermore, the importance of undertaking soil improvement practices was emphasised. It is noted that cattle breeds declined relative to the 1793 accounts and focus instead is placed on the rearing of black-faced sheep by careful management.

4.7 Modern Era

There are four HER assets recorded within the CSA and 1 km Study Area, all bridges associated with the transport network (WoSAS Pin 43519, 43523, 43524, 43525).

Analysis of the aerial photographic archive and satellite imagery (Plate 4), as well as modern OS mapping (Figure 9.1.5) indicate that the CSA and surrounding landscape was subject to phases of forestation throughout the 20th century.

[28] Inveraray 1793 Statistical Accounts Statistical Accounts of Scotland (edina.ac.uk) (Accessed 28.09.23)

[29] Inveraray 1845 Statistical Accounts Statistical Accounts of Scotland (edina.ac.uk) (Accessed 28.09.23)]

Plate 4. Location of the landscape surrounding the CSA in 1973.
MER/023/73, Meall Ridg, Inveraray, Argyll, Scotland

As a result, there are limited extant modern archaeological features in the CSA due to forestry coverage.

In addition to forestry limiting development, the use of Ladyfield plantation woodland in the 20th century as a firing range, further restricted modern development within the wider landscape. Post-medieval agricultural and fishing industries did not survive into the 20th century, preserving legibility of pre-modern practices within the landscape.

4.8 Walkover Survey

A walkover survey was undertaken on 9th March 2022. The weather was predominantly heavy rain and overcast; visibility was poor from the site, and commercial forestry extensively diminished visibility of ground features.

The sites of any known archaeological features in the CSA were visited in order to confirm the archaeological records and to determine and assess potential effects from the Development. Due to the extent of forestry cover, as well as active commercial forestry operations an extensive walkover of the CSA could not be undertaken.

Structural remains associated with the township of Upper Kennachregan (WoSAS Pin 44094) were observed on site from the access track (Plate 5).

Plate 5. View towards the remains of Upper Kennachregan from the site access track.

Although clear of forestry at present, evidence of past commercial forestry surrounding the township is clear from Plate 5 and reflected in aerial photography (Plate 6).

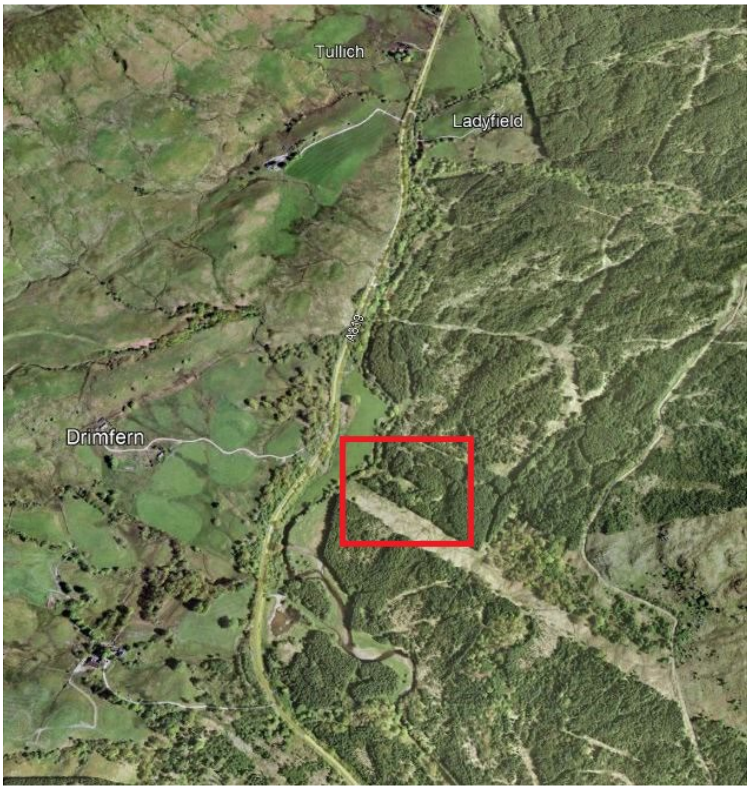


Plate 6. Location of Upper Kennachregan marked in red, surrounded by forestry (2004).

A boundary wall (WS1) was also identified on the site walkover at NGR: 209008, 713947 (Plate 7), between 0.75 and 1.5m in height 0.5m wide. Aligned approximately east west and located near to Barr Loisgte, which was identified on analysis of cartographic sources, and appears to have been associated with the township of Upper Kennachregan.

Plate 7. Location of boundary wall at 5.0711390°W 56.2764265°N. Associated with Upper Kennachregan and Barr Loisgte.

5 ARCHAEOLOGICAL AND HISTORICAL POTENTIAL

The following section summarises the potential for subsurface archaeological remains within the CSA.

There are no designated assets recorded within the CSA. There are seven non-designated assets recorded in Canmore and HER data, within the CSA. These assets date to the 18th century onwards, consisting of military roads, farmsteads and structures associated with rural settlement and the farming economy. A review of historic mapping and the walkover survey undertaken to inform the DBA identified a further five assets within the CSA, all likely related to Post-Medieval settlement and land division.

Within the 1 km Study Area a single Listed Building (LB11523) and Garden and Designed Landscape (GDL00223) are recorded. A further 48 non-designated assets recorded within Canmore and HER data. These assets are predominantly associated with Medieval to Post-Medieval rural settlement, roads and transport infrastructure as well as assets relating to the rural farming economy.

A summary of archaeological potential broken down by period is presented within Table 5 below.

Table 5: Summary of Archaeological Potential of the Site

Period name		Potential
Early Prehistory	Palaeolithic	Low
	Mesolithic	Low
	Neolithic	Low
Later Prehistory	Bronze Age	Moderate
	Iron Age	Moderate
Romano-British	Roman	Negligible
Medieval	Early Medieval	Low
	Later Medieval	Low
Post-Medieval		High – known evidence
Modern		Low

There are no Early Prehistoric Assets within the CSA or 1 km Study Area. Given the complete absence of Mesolithic finds and relative absence of Neolithic findspots or settlement from within 5 km of the CSA, the CSA is considered to have a low/negligible potential for unknown archaeological remains being present from the Early Prehistoric period.

There are no Late Prehistoric Assets within the CSA. Late Prehistoric assets within the 1 km Study Area are limited to a gold armlet, now removed, and a cairn (now destroyed).

Beyond the 1 km Study Area, there are five cairns and one standing stone located within the designed landscape of Inveraray Castle to the south of the CSA, east of the CSA around the River Shira, west of the River Aray and north of the CSA in the uplands west of Loch Fyne which may date to this period. In the wider landscape, there are two known examples of cup-and-ring marked rocks, the closest of which being Stronshira (WoSAS Pin: 1705), located 4.5 km south-east of the CSA. Kepochan Cup Marked Rock (SM4186) is located approximately 4.5km north of the CSA, comprising a large boulder with at least 24 plain cups, ranging from 30 to 100mm in diameter and from 5 to 40mm in depth. A boulder 'covered in cupmarks' was reported to Campbell and Sandeman at Erallich Water, approximately 2.5km west of the site boundary, however, efforts to locate the boulder have been unsuccessful (WoSAS Pin: 1585). These assets are all recorded within the HER data, beyond the 1 km Study Area but within 5 km of the CSA, suggesting that the CSA sits within a wider Late Prehistoric landscape with ritual and funerary sites overlaying and interacting with everyday settlement and domestic life. The known assets within 5 km of the CSA are chiefly positioned in lowland zones below 200 m AOD and are made up of readily identifiable stone monuments and rock art. No such assets are noted within the CSA or were identified during the site walkover survey. Should Late Prehistoric assets be located within the CSA, they would likely be sited along the southern and western edges of the CSA, within the lowland zones below 200 m AOD. Despite the limited evidence for in-situ Late Prehistoric assets within the 1 km Study Area, the presence of cairns, stone circles and rock art within the wider historic landscape suggests a moderate potential for hitherto unidentified archaeological evidence from the Late Prehistoric periods to present within the CSA.

Evidence of Early Medieval occupation is limited to Gaelic place names dotted around the Lochs and wider landscape. No Early Medieval heritage assets are however, recorded within the CSA or 1 km Study Area. The earliest clearly Medieval assets within the 1 km Study area are associated with the arrival of the Campbell's in the early 13th century, and include the old Medieval Castle at Inveraray (Canmore ID: 23367), and its associated deserted medieval settlement (WoSAS Pin: 1502). These remains have been levelled to their foundations after the present castle was completed. Based on the Medieval baseline, it is considered that there is a low potential for hitherto unidentified archaeological evidence from the Medieval period to be present within the CSA. The bulk of assets are associated with Medieval settlement and agriculture in lowland zones, and as such, should Medieval assets be present within the CSA, they are most likely to be found along the southern and western edges of the CSA, within the lowland zones below 200 m AOD.

The character of the Post-Medieval landscape and economy around the CSA is largely driven by the creation of a designed landscape at Inveraray, inclusive of a new castle constructed in 1746AD, and new planned town at Inveraray, constructed between 1771 and 1792AD. The construction of the new Inveraray Estate and Town coincided with a period of military road building and the creation of new bridges to facilitate access into the area. Within the CSA there are six HER and Canmore assets recorded. These assets consist of individual farmsteads (WoSAS Pin 44094), (WoSAS P in 44098, 44100) and shieling huts (WoSAS Pin 44189) associated with the local farming economy. The remaining assets record the location of the Dumbarton – Tarbet – Inveraray – Tyndrum Military Road (Canmore ID 127139, 126811), running north to south beside the River Aray on the western edge of the CSA. A review of historic mapping identified a further four assets, inclusive of two small settlements, an unidentified earthwork and former field boundaries.

Within the 1 km Study Area, aside from the designed landscape of Inveraray Castle (DGL002230, there is a single other designated asset. The Category B Listed 18th century Glen Aray School And Outhouse (LB11523) is located within 80 m of the southern edge of the CSA, between the River Aray and the A819 public carriageway, just beyond the northern limit of the Inveraray Estate and policies.

The remaining Post-Medieval assets are all undesignated, associated with the rural economy. consisting chiefly of townships, farmsteads, cottages, sheep folds and charcoal burning platforms indicative of a small scale rural economy dependant on animal husbandry and industries associated with the plantation forests around Inveraray Castle and Estate.

There is considered to be a high potential for further Post-medieval assets to be present within the CSA, both in upland and lowland zones. The lowland zones at the south and west of the CSA have a high to contain remains associated with settlement, farmsteads, associated field systems and agricultural economy. Upland zones, have a high potential for remains associated with working and use of the rough upland pasture, such as remains of shielings, field boundaries and animal enclosures.

Within the CSA, potential for buried archaeological remains of all periods is greatest along its southern boundary, in closest proximity to the policy of the Inveraray Designed Landscape and the western boundary along the route of the River Aray and the late 18th century military road. These lowland zones would have been the main focus for settlement from the Medieval period onwards. The archaeological potential of upland zones, where turbines will be sited, is limited to Post-Medieval assets relating to field boundaries and assets such as shielings, field boundaries associated with the local farming economy.

6 POTENTIAL DIRECT (PHYSICAL) IMPACTS FROM THE DEVELOPMENT

A full list of known heritage assets within the CSA is provided within Section 4 of the DBA and within Section 8: Gazetteer of Heritage Assets. There are seven non-designated assets recorded in Canmore and HER data, within the CSA. These assets date to the 18th century onwards, consisting of military roads, farmsteads and structures associated with rural settlement and the farming economy. A review of historic mapping and the walkover survey undertaken to inform the DBA identified a further five assets within the CSA, all likely related to Post-Medieval settlement and land division. For convenience, the assets within the CSA are listed within Table 6 below.

Table 6: Known assets within the CSA

WoSAS Pin	Canmore ID/ERM REF	Name	Asset type	Period	NGR
44094	153703	Barr Loisgte / Upper Kennachregan	A farmstead, comprising two roofed buildings, one unroofed building and three enclosures	Post Medieval	208860, 714510
44098	153699	Ladyfield	A single unroofed building	Post Medieval	208900, 715450
44100	153697	Barr Loisgte	A single unroofed building	Post Medieval	208900, 715450
44189	153559	Allt A' Mhadaidh	Two unroofed shieling-huts	Post Medieval	210430, 715380
N/A	127139	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	Military Road	Post Medieval	209230, 717000
N/A	126811	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	Military Road	Post Medieval	209000, 712000
43519	150575	Linnieghluttain footbridge	This wooden bridge is currently unusable and cannot be classified as an antiquity.	Modern	208976, 713005
N/A	HM1	Leachnanban	Settlement of Leachnanban depicted on Roys Military Survey of Scotland.	Post Medieval	208936, 915398
N/A	HM2	Unnamed settlement	Unnamed settlement depicted on Roys Military Survey of Scotland	Post Medieval	208856, 714495
N/A	HM3	Unnamed earthwork	Unidentified earthwork	Post Medieval	210898, 715696
N/A	HM4	Field boundaries	Field boundaries detailed on OS First Edition	Post Medieval	Various
N/A	WS1	Field boundary	Upstanding stone wall recorded on Walkover Survey	Post Medieval	209008, 713947

Direct (Physical) Impacts are limited to the Development footprint where associated deforestation, earthmoving and excavation occur. Direct (Physical) Impacts are not to be expected wholesale across the full extent of the CSA. Direct (Physical) Impacts are physical alterations which may affect either known sites or currently unknown buried and otherwise unrecorded archaeology. Direct (Physical) Impacts may damage or destroy archaeological features and are usually permanent and irreversible.

A list of known heritage assets, located within 50 m of infrastructure is provided below within Table 7, noting that a 50 m micro-siting tolerance is permitted in relation to turbines and all other infrastructure associated with the Development. The DBA does not attempt to assess the magnitude of impact or effects to these heritage assets. Discussions around magnitude of impact, effects as well as mitigation strategies are discussed within Chapter 9 of the EIA.

Table 7: Known assets within 50m of infrastructure

Infrastructure	WoSAS Pin	Canmore ID	Other Ref:	Asset type	Period	NGR
Existing access roads	43519			Aray Bridge	Post Medieval	208979, 712991
		126811		Late 18th military road	Post Medieval	208979, 713004
			HM4	Field boundary	Post Medieval	209229, 713234
			HM4	Field boundary	Post Medieval	209458, 713772
			HM4	Field boundary	Post Medieval	209418, 714607
			HM4	Field boundary	Post Medieval	209737, 714857
New access track	44189			Shieling huts	Post Medieval	210429, 715380
		127139		Late 18th military road	Post Medieval	209097, 716523
			HM4	Field boundary	Post Medieval	210536, 715432
			HM4	Field boundary	Post Medieval	210680, 715437
TB11			HM4	Field boundary	Post Medieval	209947, 714998
TB10			HM3	Earthwork	Post Medieval	210872, 715682

Some degree of Direct (Physical) Impact to both the known and any previously unknown heritage resource within the areas covered by 20th century forestry plantation is likely to already have occurred, with tree planting, rooting and felling likely to have disturbed heritage assets. The level of disturbance within these areas of forestation is unknown but below ground heritage assets, if still present will likely have suffered through bioturbation.

7 CONCLUSION

There are no designated assets recorded within the CSA. There are seven non-designated assets recorded in Canmore and HER data, within the CSA. These assets date to the 18th century onwards, consisting of military roads, farmsteads and structures associated with rural settlement and the farming economy. A review of historic mapping undertaken to inform the DBA identified a further five assets within the CSA, all likely related to Post-Medieval to Modern settlement and land division.

Within the 1 km Study Area a single Listed Building (LB11523) and Garden and Designed Landscape (GDL00223) are recorded. A further 48 non-designated assets recorded within Canmore and HER datasets. Of these 48 assets, 2 are dated to the Late Prehistoric period, recorded as a cairn and gold armlet, both of which are no longer in situ. Non-designated assets are predominantly associated with Medieval to Post-Medieval rural settlement, roads and transport infrastructure as well as assets relating to the rural farming economy. These assets are chiefly located in lowland zones (below 200m AOD) along the route of the transport routes, the River Aray and the Inveraray Castle Garden and Designed Landscape.

Within the CSA, potential for subsurface archaeological remains of all periods is greatest along its southern boundary, in closest proximity to the policy of the Inveraray Designed Landscape and the western boundary along the route of the River Aray and the late 18th century military road. These lowland zones would have been the main focus for settlement and movement of people from the Late Prehistoric period onwards. The southern and western boundaries of the CSA are located away from major infrastructure, being used for access.

Upland areas (above 200m AOD) of the CSA, in which the majority of new infrastructure is located, is considered to have a low potential for assets predating the Post-Medieval period, being located away from known settlements and chiefly used for upland pasture and forestry plantation from the mid 20th century. The archaeological potential of upland zones, where turbines will be sited, is limited to Post-Medieval assets relating to field boundaries and assets such as shielings, field boundaries associated with the local farming economy.

A total of six heritage assets are located within 50 m of groundworks associated with the Development and could be at risk of Direct (Physical) Impact. These assets are all Post-Medieval, with the route of old and new access roads and two turbines located in close proximity to the known heritage resource.

Direct (Physical) Impacts to both the known and any previously unknown heritage resource within the areas covered by 20th century forestry plantation are likely to already have occurred, with tree planting, rooting and felling likely to have disturbed any below ground heritage assets. The level of disturbance within these areas is unknown but below ground heritage assets, if still present are likely to have suffered through bioturbation. In conclusion, it is considered likely that any groundworks within lowland zones (below 200m AOD) have the potential to physically impact previously unknown buried archaeological remains, with the greatest potential along the southern and western edges of the CSA, noting that the southern and western boundaries of the CSA are located away from major infrastructure, being used for access. A review of infrastructure suggests that six known heritage assets are located within 50 m of groundworks, noting that a 50 m micro-siting tolerance is permitted in relation to turbines and all other infrastructure associated with the Development.

The DBA does not attempt to assess the magnitude of impact or the significance of effects to heritage assets. Discussions around magnitude of impact, effects as well as mitigation strategies are discussed within Chapter 9 of the EIA

8 GAZETTEER OF HERITAGE ASSETS

8.1 Heritage Assets within the CSA and 1 km Study Area

The following gazetteer summarises the results of the desk-based assessment and includes designated and non-designated heritage assets within the CSA and 1km study area. Assets are listed by period for ease of reference with the main report text.

Table 8: Heritage assets within CSA and 1 km Study Area

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
Undesignated	N/A	N/A	1570	23415	Tullich, Glen Aray	Gold Armlet; Gold Ornaments. An Irish-type penannular armlet and two cup-ended ornaments, all Late Bronze Age and of gold were found at Tullich, Glen Aray, and are preserved at Inveraray Castle.	Late Prehistoric	208900	716080	1 km
Undesignated	N/A	N/A	1583	23428	Carn Ban, Stromagachan	Cairn. There is now no trace of the cairn that was situated on a small knoll about 400m NE Stronmagachan.	Late Prehistoric	208540	714350	1 km
Undesignated	N/A	N/A	1569	23414	Tom na Cuirte	A court-hill, well known locally, which lies at the top of a long green ridge and consists of a flat-topped kerbed mound, roughly pentagonal, 40' x 50' maximum and about 5' high. There is a possible stone setting near the centre. A natural amphitheatre in the bank to the north is said to be where the jury sat. Criminals are said to have been buried at Toiseach nam Marbh (NN 0855 1490) a patch of marsh ground. James IV is traditionally said to have come	Medieval to Post Medieval	208300	715040	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						here to hear the captain of the glen giving justice (MacIntyre 1909)				
Undesignated	N/A	N/A	1572	23417	Bishop's Well, Glen Aray / Tobar an Easbuig	Either the 'Spring at NN 0900 1622 or the 'Public Trough' at NN 0913 1667 is 'Tobar an Easbuig' or 'Bishop's Well'. It is said to be the best water in Glen Aray, but there is no tradition to explain the name.	Medieval to Post Medieval	209000	716220	1 km
Undesignated	N/A	N/A	1568	23413	Carness	Pre-Improvements settlement, now covered by a small pine plantation. About 20 houses are surrounded by a very massive and spread drystone wall. Some houses are rectangular, but overlie round-ended foundations while others are sub-rectangular, or oval. A kiln measuring 20' by 17' externally by 5' high has its flue facing north; an upper stone of a quern lies on the upper surface of one of the kiln walls. There are small patches of old cultivation all around, and there may be two cairns between the wood and the river.	Medieval to Post Medieval	209350	717470	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
Undesignated				153701	Kilmun	A township of two foci, comprising three roofed, three unroofed buildings, one unroofed structure and one enclosure is depicted on the 1st edition of the OS 6-inch map (Argyllshire 1874, cxxv). Two roofed buildings, one unroofed building and one enclosure are shown on the current edition of the OS 1:10000 map (1990).	Medieval to Post Medieval	208000	712660	1 km
Undesignated				311282	Creag Bhalgach	There are fragmentary field boundaries and patches of rig and furrow (RCAHMSAP 2011) to the N of the Allt Barain.	Medieval to Post Medieval	207800	715090	1 km
Undesignated	N/A	N/A	58759		Kilmun	Chapel; Burial Ground. Site identified by staff from West Argyll Forest District during operations in the Three Bridges forest area.	Medieval to Post Medieval	207935	713065	1 km
Undesignated	N/A	N/A	58868		Kilmun	Settlement. Site identified by staff from West Argyll Forest District during operations in the Three Bridges forest area.	Medieval to Post Medieval	208059	712638	1 km
Garden and Designated Landscape	GDL00223	N/A	N/A	N/A	Inveraray Castle	Reflects over 300 years of landscape intervention and evolution, one of the most grandly conceived and culturally significant designated landscapes in Scotland. Of outstanding artistic, architectural, scenic, nature conservation and	Post Medieval	210080	710417	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						historical value, high horticultural and archaeological value				
Listed Building	LB11523	B	1588	23433	Glen Aray School And Outhouse	Built for the Society for Propagation of Christian Knowledge, this is a gothic schoolhouse on the southern bank of a burn just outside the Inveraray Castle Estate, its design mimics that of the estate lodges. The original and main building consists of 2 storeys and would have housed the schoolroom on the ground floor and accommodation above. This became too small for the number of students, and a larger schoolhouse was built to the east. The site also contains a small outhouse with rubble walls and corrugated iron roof.	Post Medieval	208774	713954	1 km
Undesignated	N/A	N/A	44094	153703	Barr Loisgte / Upper Kennachregan	A farmstead, comprising two roofed buildings, one unroofed building and three enclosures is depicted on the 1st edition of the OS 6-inch map. One roofed, one unroofed building and one enclosure are shown on the OS 1:10000 map (1990).	Post Medieval	208860	714510	CSA
Undesignated	N/A	N/A	44098	153699	Ladyfield	A single unroofed building is depicted on the 1st edition of the OS 6-inch map, but it is	Post Medieval	208900	715450	CSA

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						not shown on the OS 1:10000 map (1990)				
Undesignated	N/A	N/A	44100	153697	Barr Loisgte	A single unroofed building is depicted on the 1st edition of the OS 6-inch map, and on the OS 1:10000 map (1990)	Post Medieval	208900	715450	CSA
Undesignated	N/A	N/A	44189	153559	Allt A' Mhadaidh	What may be two unroofed shieling-huts are depicted on the 1st edition of the OS 6-inch map, but they are not shown on the OS 1:10000 map (1976).	Post Medieval	210430	715380	CSA
Undesignated	N/A	N/A	N/A	127139	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	General line of road taken from Roy's map (W Roy 1747-55) but since no detailed description has been found there may be minor divergences	Post Medieval	209230	717000	CSA
Undesignated	N/A	N/A	N/A	126811	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	There are discrepancies in the routes recorded for the military road on this map sheet. RCAHMS (1992) show the line of the military road as keeping to the W bank of the River Aray, whereas that recorded by the OS (WDJ) in November 1969 displays a route on the E bank of the River Aray between NN 0907 1000 and NN 0896 1299. It is probable that this was an earlier alignment, in existence prior to 1751, and that this was shown by Roy (1747-55), whose map may have pre-	Post Medieval	209000	712000	CSA

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						dated the military road. Taylor and Skinner (1776) may have taken the line from the pre-military road shown by Roy, and Taylor (1976) may hav ebased his observations on this.				
Undesignated	N/A	N/A	N/A	HM1	Leachnanban	Settlement of Leachnanban depicted on Roys Military Survey of Scotland.	Post Medieval	208936	915398	CSA
Undesignated	N/A	N/A	N/A	HM2	Unnamed settlement	Unnamed settlement depicted on Roys Military Survey of Scotland	Post Medieval	208856	714495	CSA
Undesignated	N/A	N/A	N/A	HM3	Unnamed earthwork	Unidentified earthwork	Post Medieval	210898	715696	CSA
Undesignated	N/A	N/A	N/A	HM4	Field boundaries	Field boundaries detailed on OS First Edition	Post Medieval			CSA
Undesignated	N/A	N/A	N/A	WS1	Field boundary	Upstanding stone wall recorded on Walkover Survey	Post Medieval	209008	713947	CSA
Undesignated	N/A	N/A	1581	23426	Kilmun, Glen Aray / St Mundu's Chapel	Chapel; Burial-ground. A small ruined chapel, whose walls stood 2' high in 1870, and its burial ground which was still in use for the burial of children and infants in the 18th century, the whole enclosed by a low turf dyke.	Post Medieval	207930	713065	1 km
Undesignated	N/A	N/A	43520	150575	Allt Pharuig Bridge	This is a shallow arched bridge, 5.2m wide.	Post Medieval	209140	712600	1 km
Undesignated	N/A	N/A	43521	150573	Glen Aray Culvert	This is a stone box culvert.	Post Medieval	209040	712390	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
Undesignated	N/A	N/A	44095	153702	Barr Loisgte / Lower Kennachregan	What may be a township, comprising four unroofed buildings, three enclosures and a head-dyke is depicted on the 1st edition of the OS 6-inch map (Argyllshire 1874, cxxv) and on the current edition of the OS 1:10000 map (1990).	Post Medieval	209270	713510	1 km
Undesignated	N/A	N/A	44096	153701	Kilmun	A township of two foci, comprising three roofed, three unroofed buildings, one unroofed structure and one enclosure is depicted on the 1st edition of the OS 6-inch map (Argyllshire 1874, cxxv). Two roofed buildings, one unroofed building and one enclosure are shown on the current edition of the OS 1:10000 map (1990).	Post Medieval	208000	712660	1 km
Undesignated	N/A	N/A	44097	153700	Drimfern	A township, comprising eight roofed buildings, one unroofed building, six enclosures, a field-system and a head-dyke is depicted on the 1st edition of the OS 6-inch map (Argyllshire 1874, cxxv). Three roofed, five unroofed buildings and two enclosures are shown on the current edition of the OS 1:10000 map (1990).	Post Medieval	208250	714600	1 km
Undesignated	N/A	N/A	44101	153696	Sron-gharbh / Dalchruinnich	A single unroofed building is depicted on the 1st edition of the OS 6-inch map (Argyllshire 1874, cxxv), but it is not	Post Medieval	208960	712530	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						shown on the current edition of the OS 1:10000 map (1990).				
Undesignated	N/A	N/A	44102	153695	Bile Gharbh / Dalchlachan	A farmstead, comprising one unroofed building and one enclosure is depicted on the 1st edition of the OS 6-inch map (Argyllshire 1874, cxxv), but it is not shown on the current edition of the OS 1:10000 map (1990).	Post Medieval	208970	712670	1 km
Undesignated	N/A	N/A	44186	153568 153566	North Tullich	A township, comprising four roofed, three unroofed buildings and three enclosures is depicted on the 1st edition of the OS 6-inch map (Argyllshire 1875, sheet ci). Five roofed buildings, one of which is annotated 'Saw Mill' are shown on the current edition of the OS 1:10000 map (1977).	Post Medieval	208850	716000	1 km
Undesignated	N/A	N/A	44187	153565	South Tullich	A township, comprising six roofed buildings, one unroofed building, three enclosures, a field-system and a head-dyke is depicted on the 1st edition of the OS 6-inch map (Argyllshire 1874, cxxv). Six roofed buildings, one unroofed building and four enclosures are shown on the current edition of the OS 1:10000 map (1990).	Post Medieval	208530	715450	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
Undesignated	N/A	N/A	53148		Allt an Buidhe / Carness	Sheepold; farmstead. A single roofed building with attached enclosure is marked on the OS first edition map (dated c.1860) and annotated as a sheepfold. An altered, unroofed, layout is marked on the modern map. The roofed building may originally have formed a small farmstead.	Post Medieval	209082	717265	1 km
Undesignated	N/A	N/A	57789		Carness	Stone structure, possible sheep shelter. A roughly rectangular stone built structure was identified on an MSN Live Map aerial photograph in the course of assessment of an application for forestry grant. The structure has three sides and may be a sheep shelter.	Post Medieval	209747	717898	1 km
Undesignated	N/A	N/A	57790		Tom an Feidh	Rectangular structure, possible house. A rectangular turf walled structure was identified on an MSN Live Map aerial photograph in the course of assessment of an application for forestry grant. The structure is a four sided, turf walled enclosure, which appears to be a possible house. It may lie on the southern side of a small circular enclosure.	Post Medieval	209619	716836	1 km
Undesignated	N/A	N/A	57791		Tom an Feidh	Sheepfold. A rectangular stone built sheepfold is visible on a	Post Medieval	209196	716767	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						Live Map aerial photograph. The sheepfold is also depicted on the OS Landplan 1:10,000 map. The site was identified in the course of an assessment for an SRDP forestry grant.				
Undesignated	N/A	N/A	57792		Carness	Sheepfold. A rectangular stone built sheepfold is visible on a Live Map aerial photograph. The sheepfold is also depicted on the OS Landplan 1:10,000 map. The site was identified in the course of an assessment for an SRDP forestry grant.	Post Medieval	209702	717186	1 km
Undesignated	N/A	N/A	59476		Blantyre Wood	Charcoal Burning Platform. Site identified by staff from West Argyll Forest District during operations in the Three Bidges forest area: WAFD Site ID 1319: Charcoal Platform Information from West Argyll Forest District	Post Medieval	208740	712015	1 km
Undesignated	N/A	N/A	59478		Blantyre Wood	Charcoal Burning Platform. Site identified by staff from West Argyll Forest District during operations in the Three Bidges forest area: WAFD Site ID 1321: Charcoal Platform	Post Medieval	208747	712097	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
Undesignated	N/A	N/A	59479		Blantyre Wood	Charcoal Burning Platform. Site identified by staff from West Argyll Forest District during operations in the Three Bidges forest area: WAFD Site ID 1322: Charcoal Platform Information from West Argyll Forest District	Post Medieval	208695	712051	1 km
Undesignated	N/A	N/A	59480		Blantyre Wood	Charcoal Burning Platform. Site identified by staff from West Argyll Forest District during operations in the Three Bidges forest area:	Post Medieval	208783	712135	1 km
Undesignated	N/A	N/A	61968	296886	Drimfern	WAFD Site ID 1323: Charcoal Platform	Post Medieval	208100	714614	1 km
Undesignated	N/A	N/A		127139	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	The construction of the road N from Inveraray to Dalmally and Tyndrum was approved by the military authorities in1757, the year in which the 'King's Bridge' (No. 255) was begun to link the new road with the existing road from Dumbarton (No. 264). However, sketch-maps and estate plans show that the line of the road through the extended Inveraray Castle policies (No. 185) had already been fixed by 1752, and apparently partly constructed by 1756 (en.1*). A force of 220 soldiers was still employed on the road in 1761, but the Mid Argyll section,	Post Medieval	209230	717000	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						some 11.5km in length, had probably been completed before Pococke used it in the previous year (en.2). Considerable alterations were made in the 19th century, especially in the S part where about 4km of the old line is preserved as estate-tracks or footpaths, and in the 1980s there has been extensive re-alignment and upgrading of the road as the A819.				
Undesignated	N/A	N/A		126811	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	The construction of the road N from Inveraray to Dalmally and Tyndrum was approved by the military authorities in1757, the year in which the 'King's Bridge' (No. 255) was begun to link the new road with the existing road from Dumbarton (No. 264). However, sketch-maps and estate plans show that the line of the road through the extended Inveraray Castle policies (No. 185) had already been fixed by 1752, and apparently partly constructed by 1756 (en.1*). A force of 220 soldiers was still employed on the road in 1761, but the Mid Argyll section, some 11.5km in length, had probably been completed before Pococke used it in the previous year (en.2).	Post Medieval	209000	712000	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						Considerable alterations were made in the 19th century, especially in the S part where about 4km of the old line is preserved as estate-tracks or footpaths, and in the 1980s there has been extensive re-alignment and upgrading of the road as the A819.				
Undesignated				127139	Dumbarton - Tarbet - Inveraray - Tyndrum Military Road	The construction of the road N from Inveraray to Dalmally and Tyndrum was approved by the military authorities in1757, the year in which the 'King's Bridge' (No. 255) was begun to link the new road with the existing road from Dumbarton (No. 264). However, sketch-maps and estate plans show that the line of the road through the extended Inveraray Castle policies (No. 185) had already been fixed by 1752, and apparently partly constructed by 1756 (en.1*). A force of 220 soldiers was still employed on the road in 1761, but the Mid Argyll section, some 11.5km in length, had probably been completed before Pococke used it in the previous year (en.2). Considerable alterations were made in the 19th century, especially in the S part where about 4km of the old line is	Post Medieval	209230	717000	1 km

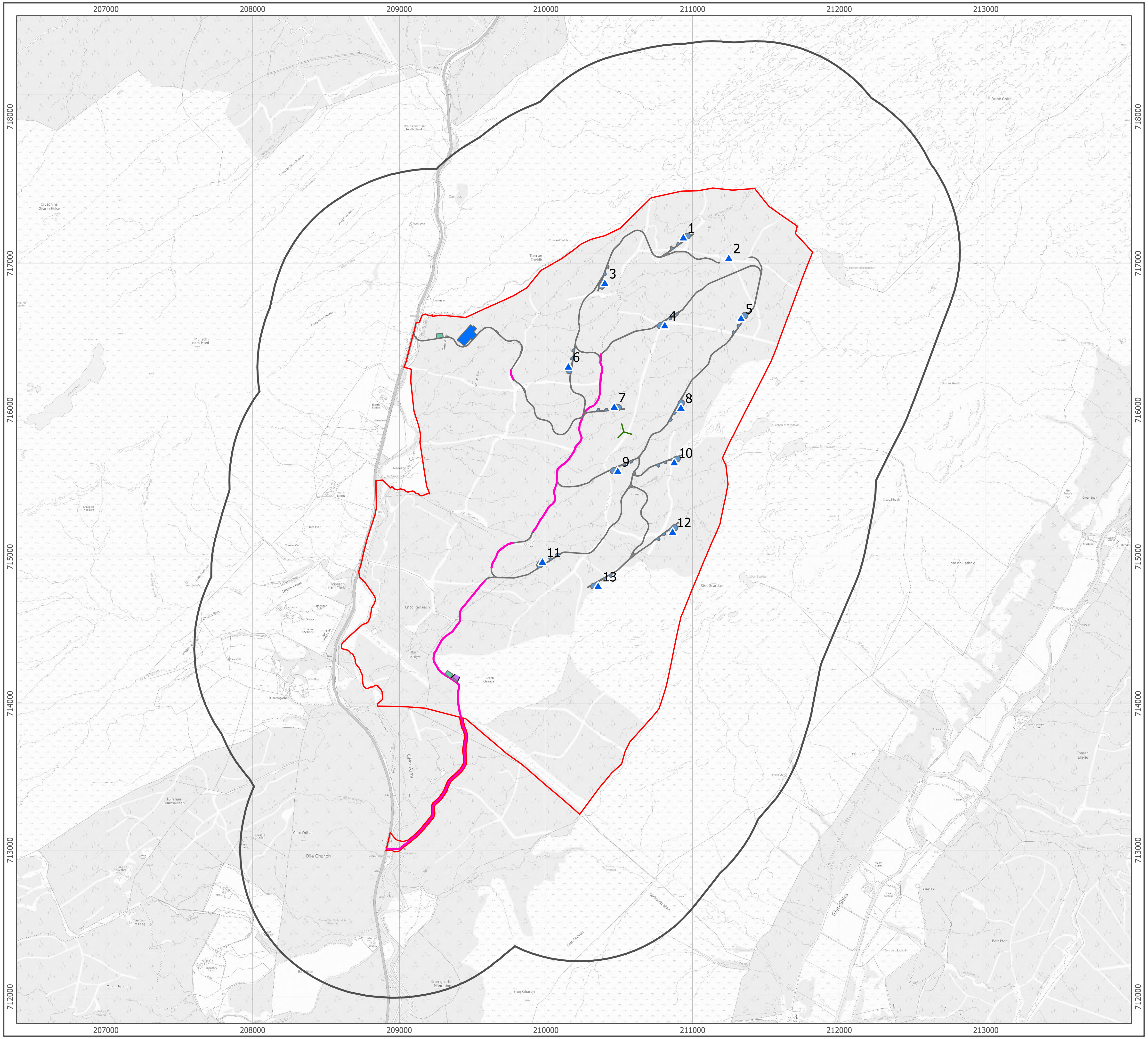
Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						preserved as estate-tracks or footpaths, and in the 1980s there has been extensive re-alignment and upgrading of the road as the A819.				
Undesignated	N/A	N/A		159028	Stronmagachan House	This house is situated on the W side of Glen Aray at an elevation of about 120m OD. It was built for the Inveraray lawyer Duncan Campbell (later 'of Ross') who in 1781 was granted a tack of the township by the Argyll estate on condition that he built a farmhouse measuring 40 feet by 24 feet (12.2m by 7.3m) over walls, and erected new head- and march-dykes.	Post Medieval	208280	714100	1 km
Undesignated	N/A	N/A	69708		Tom-breac	Limekiln	Post-Medieval	209563	711327	1.8 km
Undesignated	N/A	N/A	58994		Bile Gharbh	WAFD Site ID 701: Building foundations, township.	Unknown	208707	712703	1 km
Undesignated	N/A	N/A	59106		Kilmun	Charcoal Burning Platform. Site identified by staff from West Argyll Forest District during operations in the Three Bridges forest area:	Unknown/Likely Post-Medieval	207990	713011	1 km
Undesignated	N/A	N/A	15368	87734	Glen Aray	Platforms were reported as having been seen in the Balantyre Woods in Glen Aray, on the W side of the A819, 3 miles N of Inveraray. A quick survey found eight platforms all above the road to the NE	Unknown/Likely Post-Medieval	208700	712700	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						side of the wood. Those reported are said to be on the SE side of the wood therefore it is possible the platforms cover an area of 800m. These seen were in a mixed wood of oak and coniferous trees. The size ranged from 8m diameter to 13m diameter; they were all stone banked with vertical front faces and lay between the 50m and the 100m contour.				
Undesignated	N/A	N/A	1582	23427	Drimfern	Possible Long-cairn. An elongated pile of stones situated in a field 500m E of Drimfern has been interpreted as a long cairn, (Campbell and Sandeman 1964; Henshall 1972) but it is more likely that it is merely the result of the dumping of field-gathered stones on to a natural ridge. Aligned NNE and SSW, it is 58.5m long and up to 10.3m broad at its S end; 23.6m from the S end a transverse slab protrudes from the stones, but there is no evidence to suggest that it ever formed part of a chamber. An elongated pile of stones situated in a field 500m E of Drimfern has been interpreted as a long cairn, (Campbell and Sandeman 1964; Henshall	Unknown	208735	714720	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
						1972) but it is more likely that it is merely the result of the dumping of field-gathered stones on to a natural ridge. Aligned NNE and SSW, it is 58.5m long and up to 10.3m broad at its S end; 23.6m from the S end a transverse slab protrudes from the stones, but there is no evidence to suggest that it ever formed part of a chamber.				
Undesignated	N/A	N/A	1584	23429	Tom Ban 'mound'	The site described by Campbell and Sandeman refers to a natural mound at NM 0843 1421 which is enclosed by the remains of a stone plantation ring and surmounted by a number of mature trees. 'Tom Ban' is an entirely natural knoll with no traces of artificial features.	Unknown	208430	714210	1 km
Undesignated	N/A	N/A	43519	150575	Linnieghluttain footbridge	This wooden bridge is currently unusable and cannot be classified as an antiquity.	Modern	208976	713005	CSA
Undesignated	N/A	N/A	43523	150571	Toiseach Nam Marbh Bridge	Toiseach nam Marbh Bridge is a modern bridge on the route of the military road.	Modern	208700	714900	1 km
Undesignated	N/A	N/A	43524	150570	Carn Ban Bridge	Carn Ban Bridge is a modern bridge on the route of the military road.	Modern	208550	714290	1 km

Asset Status	Designation Reference	LB Grade	WoSAS Pin	Canmore ID/ERM REF	Name	Description of Asset	Period	Easting	Northing	Location
Undesignated	N/A	N/A	43525	150569	Stronmagachan Bridge	Stronmagachan Bridge is a military bridge, 4.2m wide.	Modern	208700	713950	1 km

FIGURES



RIDGE CLEAN ENERGY

ERM

Core Study Area
1 km Study Area
Proposed Turbine Location
Infrastructure Type
BESS and Substation Compound
Upgraded Track
Hardstandings
New Road
Existing Quarry
Quarry Extension
Temporary Construction Compound
Guy Lines (Existing Met Mast)

1:25,000 Scale @ A3

0 0.5 1 km

NORTH

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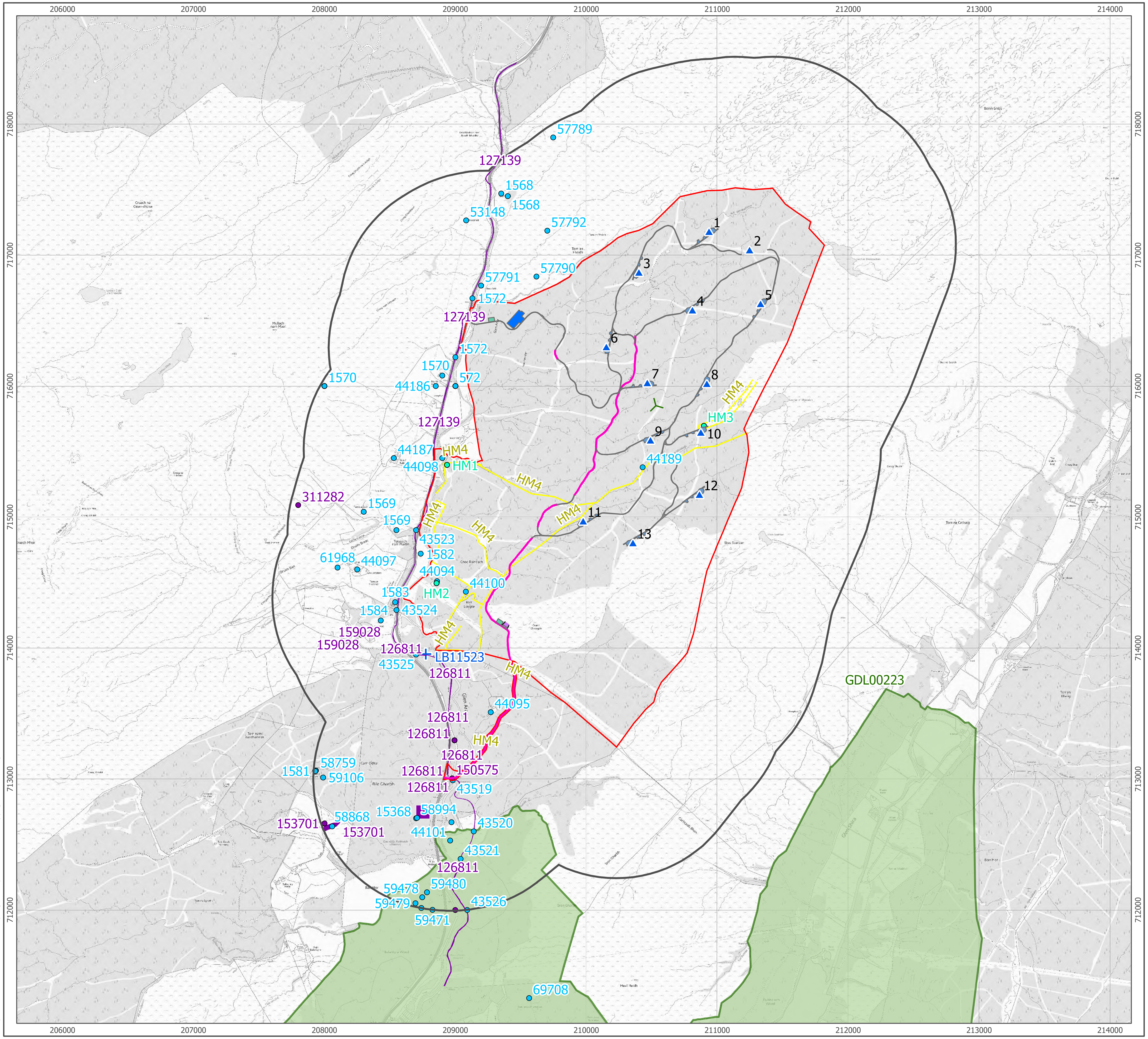
Checked By: KR	Date: 20/09/2023

Site location and Proposed Infrastructure
Figure 9.1.1

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Cultural Heritage\4378 Ladyfield Wind Farm Scoping\4378 Ladyfield Wind Farm Scoping.aprx\4378-REP-053 Fig 9.1.1 Site Location and Proposed Infrastructure



RIDGE CLEAN ENERGY

ERM

- Core Study Area
- 1 km Study Area
- Proposed Turbine Location

Infrastructure Type
- BESS and Substation Compound
- Upgraded Track
- Hardstandings
- New Road
- Existing Quarry
- Quarry Extension
- Temporary Construction Compound
- Guy Lines (Existing Met Mast)

Designated Heritage Assets
- Gardens and Designed Landscapes

Listed Buildings

Category
- Grade B

Non-Designated Assets
- Canmore Site
- Canmore Point
- WoSAS Point
- Historical Map Assets
- Historic Field Boundaries

1:28,000 Scale @ A3

0 0.5 1 km

NORTH

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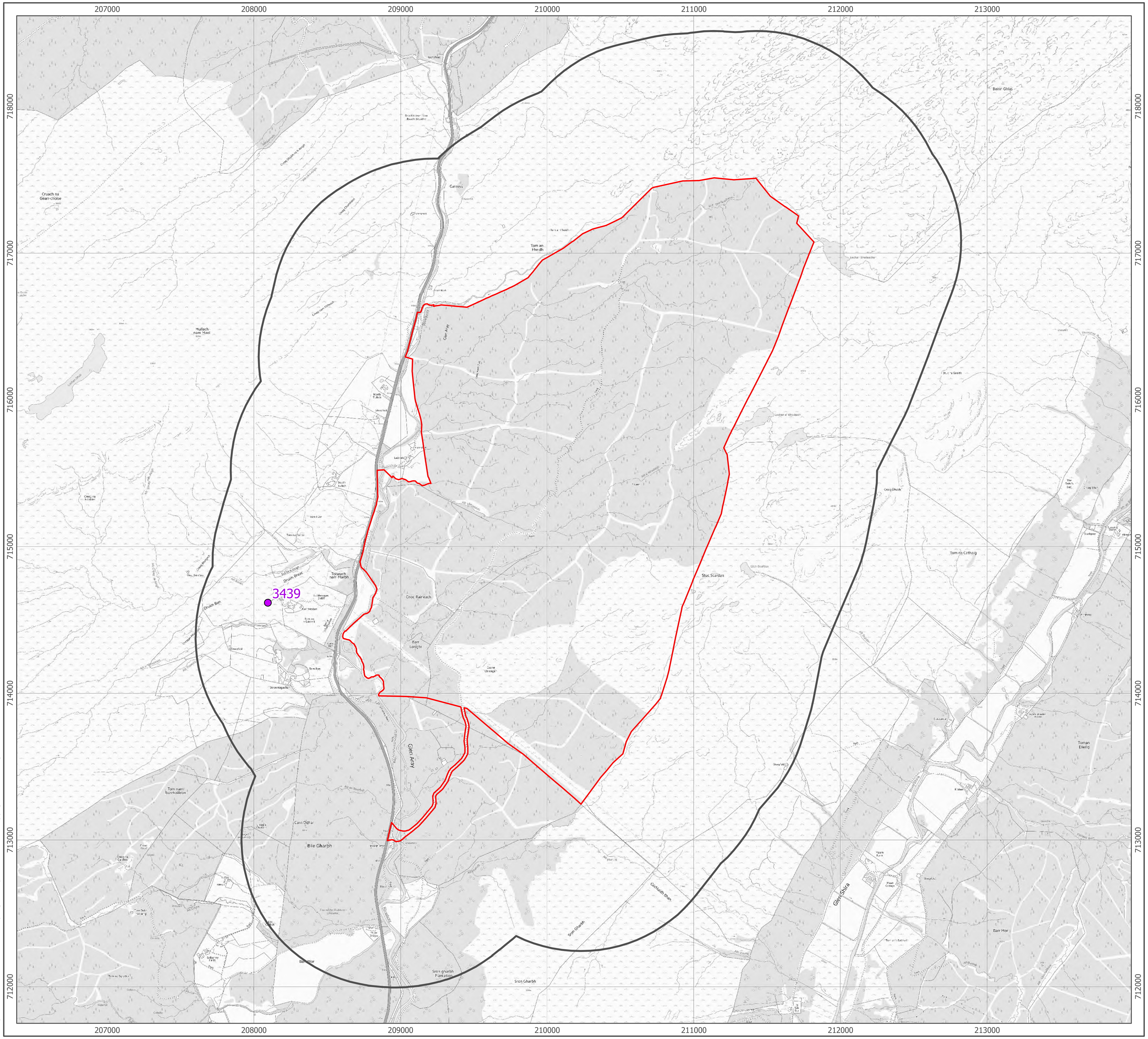
Checked By: KR	Date: 20/09/2023

Designated and Non-Designated Assets within the CSA and 1 km Study Area
Figure 9.1.2a

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Cultural Heritage\4378 Ladyfield Wind Farm Scoping\4378 Ladyfield Wind Farm Scoping.aprx\4378-REP-054 Fig 9.1.2a Designated and Non-Designated Assets within the CSA and 1 km Study Area



RIDGE CLEAN ENERGY

ERM

Core Study Area

1 km Study Area

Previous Archaeological Event

1:25,000 Scale @ A3

0 0.5 1 km

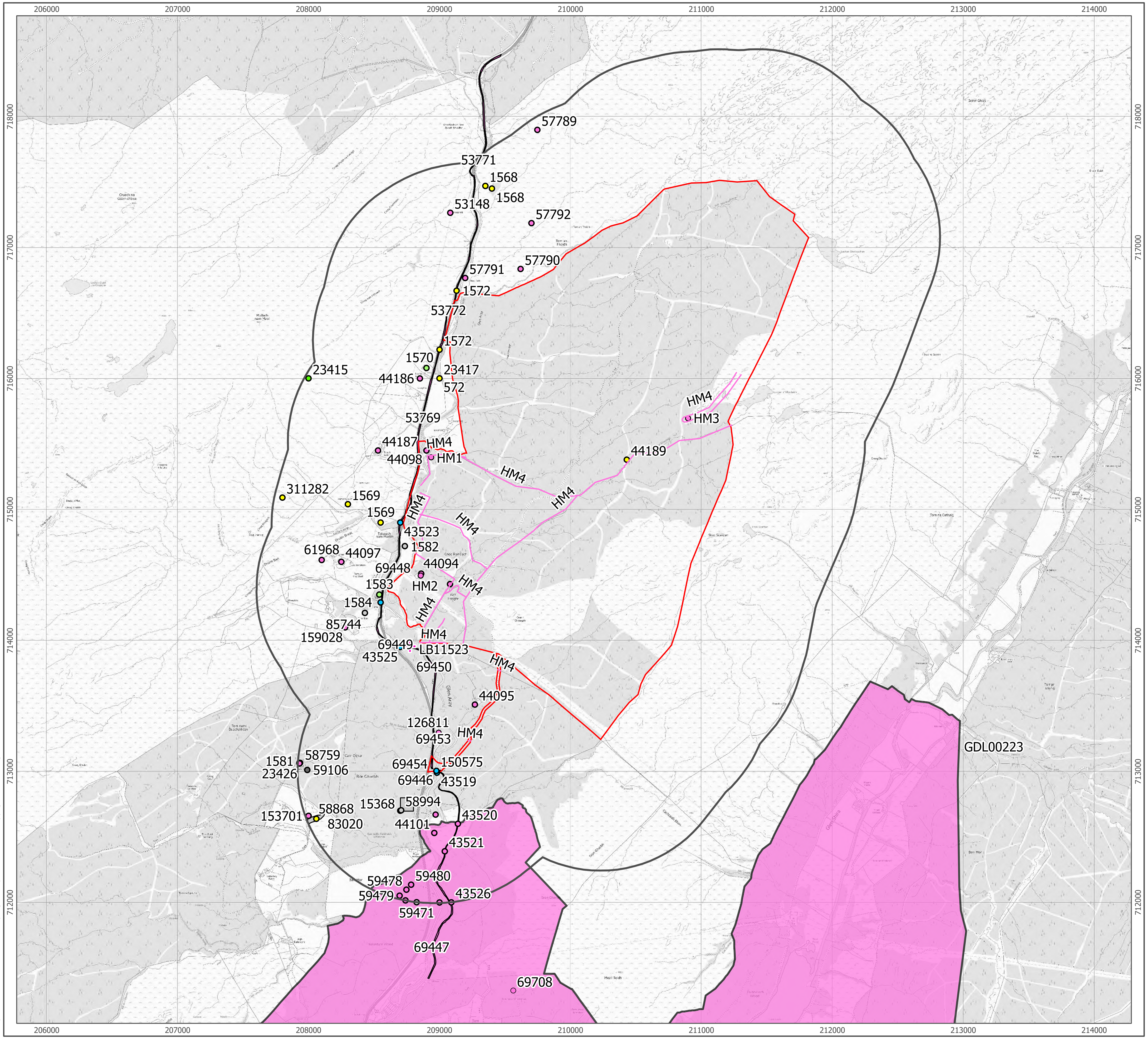
NORTH

Produced By: EL	Ref: 4378-REP-055
Checked By: KR	Date: 20/09/2023

Previous Archaeological Events
Figure 9.1.2b

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Cultural Heritage\4378 Ladyfield Wind Farm Scoping\4378 Ladyfield Wind Farm Scoping.aprx\4378-REP-055 Fig 9.1.2b Previous Archaeological Event



RIDGE CLEAN ENERGY

ERM

- Core Study Area
- 1 km Study Area
- Late Prehistoric
- Modern
- Post Medieval
- Medieval
- Unknown
- Unknown (likely Post Medieval)
- Heritage Feature Points

1:28,000 Scale @ A3

0 0.5 1 km

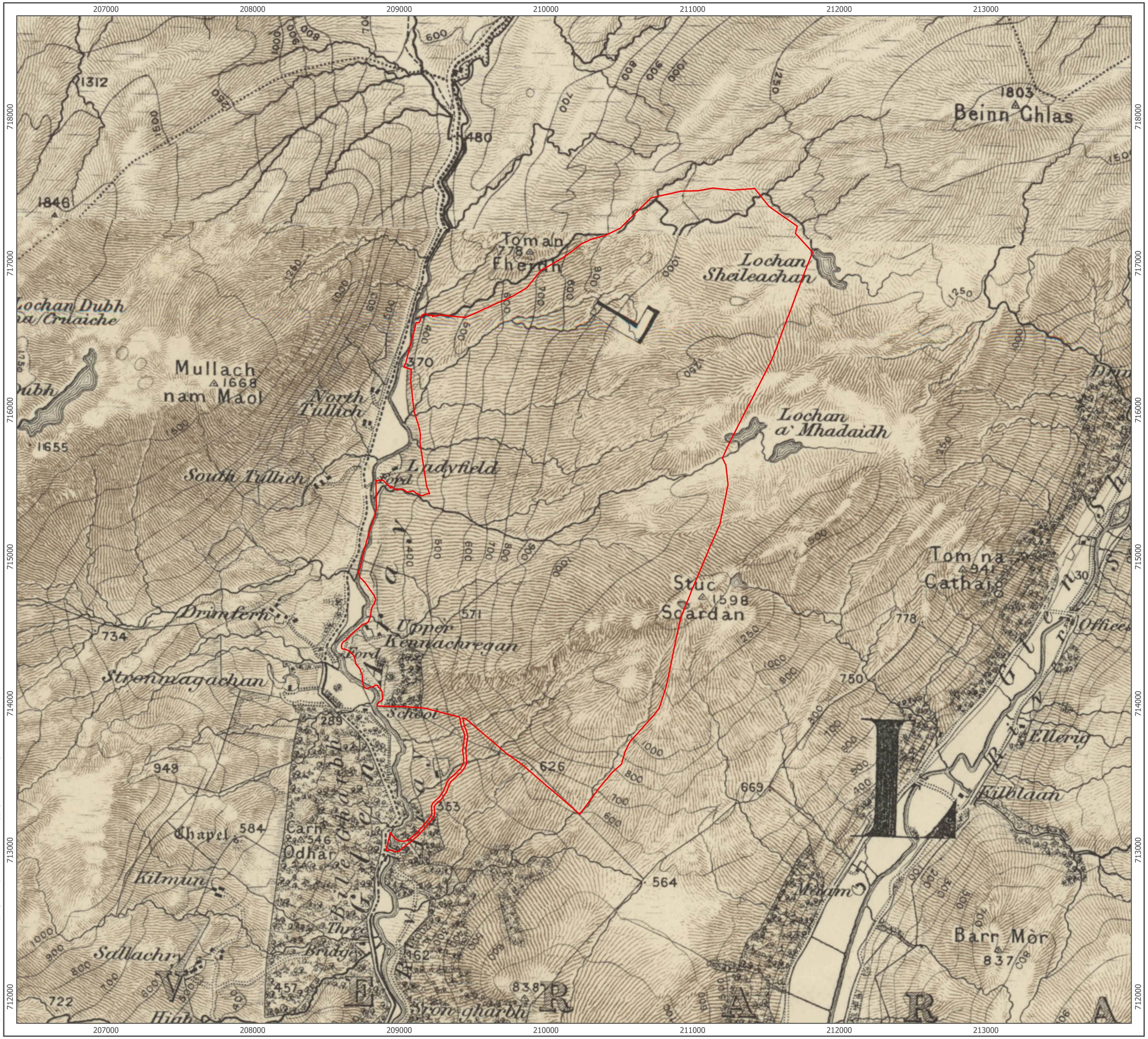
NORTH

Produced By: RJ	Ref: 4378-REP-055
Checked By: KR	Date: 20/09/2023

Assets Defined by Period
Figure 9.1.3

Ladyfield Renewable Energy Park
EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Cultural Heritage\4378 Ladyfield Wind Farm Scoping\4378 Ladyfield Wind Farm Scoping.aprx\4378-REP-056 Fig 9.1.3 Assets Defined by Period



Core Study Area

1:25,000 Scale @ A3

0 0.5 1 km

NORTH

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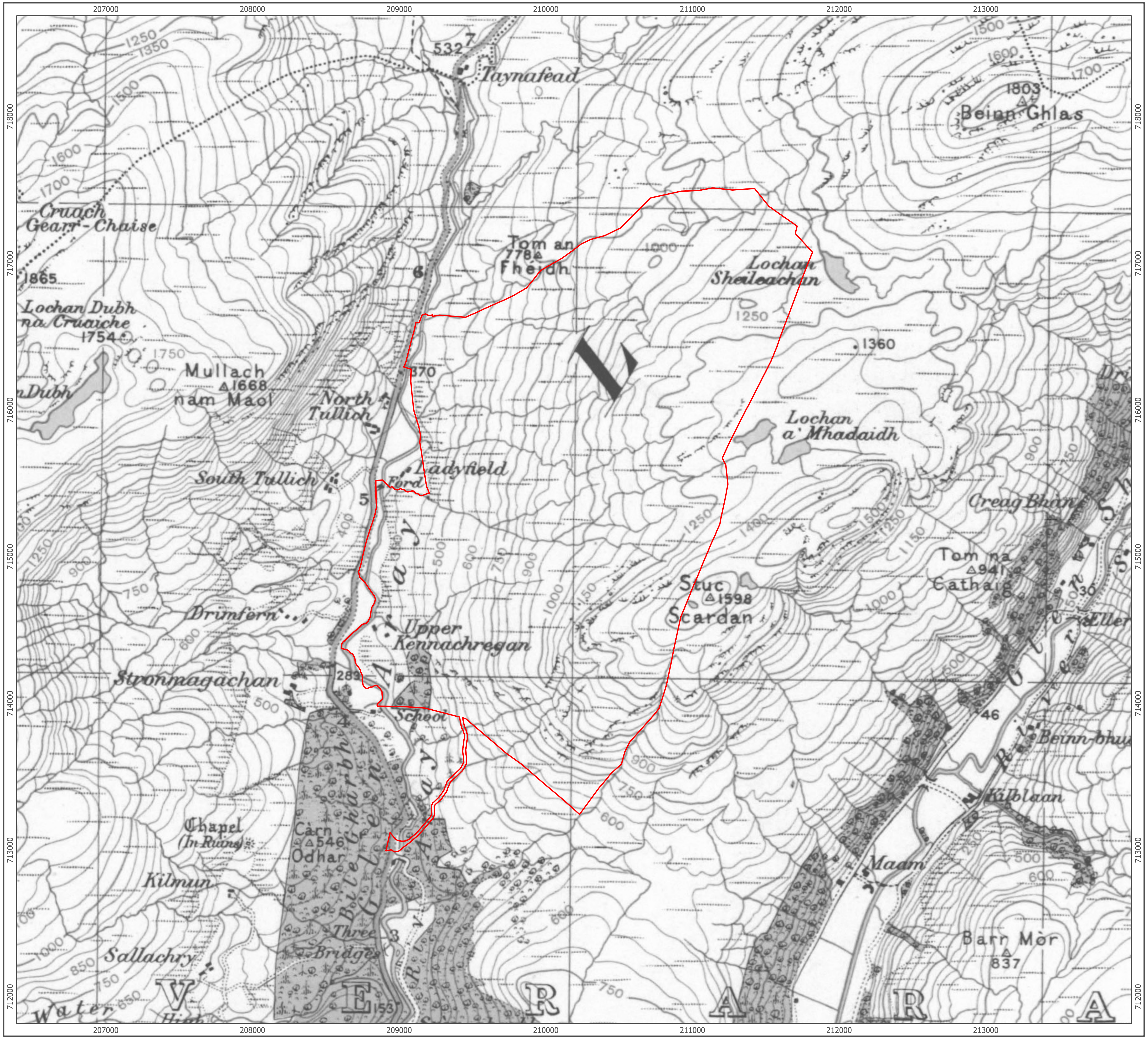
CSA Overlain on 1st Edition OS
Figure 9.1.4

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Cultural Heritage\4378 Ladyfield Wind Farm Scoping\4378 Ladyfield Wind Farm Scoping.aprx\4378-REP-058 Fig 9.1.4 CSA Overlain on 1st Edition OS



RIDGE CLEAN ENERGY

ERM

Core Study Area

1:25,000 Scale @ A3

0 0.5 1 km

NORTH

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CSA Overlain on Late 20th Century Map
Figure 9.1.5

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Cultural Heritage\4378 Ladyfield Wind Farm Scoping\4378 Ladyfield Wind Farm Scoping.aprx\4378-REP-059 Fig 9.1.5 CSA Overlain on Late 20th Century Map

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Environmental Impact Assessment – Technical Appendix 9.2: Historic Environment Settings Assessment

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

ERM

The business of sustainability

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Project background

This Historic Environment Settings Assessment has been undertaken by Wessex Archaeology on behalf of Ladyfield Renewable Energy Park Ltd (the Applicant) for the proposed Ladyfield Renewable Energy Park (the Development).

This study has been produced in support of an Environmental Impact Assessment Report (EIAR) and has been included as a technical appendix.

1.2 The Site

The Development is situated approximately 4.7 kilometres (km) north of Inveraray, centred on National Grid References (NGR) 210197, 715498. The Site covers an area of approximately 790 hectares (ha) (Figure 9.1) and lies wholly within the administrative boundary of Argyll and Bute Council (the Council).

The predominant land use within the Site consists of private forestry plantation used for commercial purposes with areas of upland moorland also present in the south and east of the Site.

1.3 The Development

The Development would comprise up to 13 three-bladed horizontal axis wind turbines with a maximum tip height of 180 metres (m). The V136 has been chosen as the candidate turbine for the Development.

Additional infrastructure and site works include:

- Crane hardstandings;
- Access tracks of 5.5 m width, linking the turbine locations and comprising of a combination of new and upgraded tracks including watercourse crossings;
- Network of underground cabling, laid where possible alongside the access tracks;
- A substation and control building located within a compound measuring just under 1ha, which will also include any external electrical infrastructure and vehicle parking.
- A Battery Energy Storage System also located in the substation compound;
- Two Temporary construction compounds;
- a 50m x 40m extension to the existing quarry;
- Upgraded site access from the A819; and
- Felling of forestry.

2 SCOPE

2.1 General

The purpose of this assessment is to identify designated and non-designated heritage assets which have the potential to be impacted through a change in setting from the construction of the Development.

This document uses a number of refinement steps ensure only those assets which have the potential to be affected by the Development are reported in detail within the EIAR. This process is based upon the guidance set out by Historic Environment Scotland in 'Managing Change in the Historic Environment: Setting' (2016) and is set out in detail within Section 5.

While only those assets which have the potential to be affected by the Development are discussed within the EIAR, this document provides sufficient detail.

2.2 Aims

The specific aims of this assessment are to:

- establish the presence of heritage assets which may be sensitive to change through development within their setting;
- assess the significance of those identified assets through consideration of their valued components; and
- assess the potential impact of development or associated land changes on the significance of the heritage assets and their setting.

3 PLANNING BACKGROUND

3.1 Introduction

The following section summarises the main components of the national and local planning and legislative framework governing the treatment of the historic environment within the planning process.

There is national legislation relating to the protection of, and proposed development on or near, important archaeological sites or historical buildings within planning regulations as defined under the provisions of the following:

- Ancient Monuments and Archaeological Areas Act, 1979 as amended by the Historic Environment (Amendment)(Scotland) Act, 2011; and
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act, 1997 as amended by the Historic Environment (Amendment)(Scotland) Act, 2011;
- The Historic Environment Scotland Act, 2014; and
- Protection of Military Remains Act, 1989.

National policy support is found in:

- National Planning Framework (NPF) 4 (LGCD 2023);

In addition, local authorities are responsible for the protection of the historic environment within the planning system, in this case the following policies of the Argyll and Bute Local Development Plan (Adopted March 2015) and Supplementary Guidance document adopted in March 2016 are relevant to the assessment:

LDP 3 – supporting the Protection, Conservation and Enhancement of Our Environment;
SG LDP ENV 15 - Development Impact on Historic Gardens and Designed Landscapes;
SG LDP ENV 16(a)– Development Impact on Listed Buildings;
SG LDP ENV 17 – Development in Conservation Areas and Special Built Environment Areas; and
SG LDP ENV 19 – Development Impact on Scheduled Monuments

This assessment has been carried out in line with industry standard guidance and best practice set out within the documents listed below:

- Scottish Natural Heritage (now known as NatureScot) and Historic Environment Scotland (HES) EIA Handbook;
- Historic Environment Policy for Scotland (HEPS);
- Our Place in Time: The Historic Environment Strategy for Scotland;
- CIfA Standards and Guidance for Desk-based Assessment; and
- HES (2016) Managing Change in the Historic Environment Series, specifically 'Managing Change in the Historic Environment: Setting.

4 METHODOLOGY

4.1 Introduction

The methodology for this assessment was based upon relevant professional guidance, including the Chartered Institute for Archaeologists' Standard and guidance for historic environment desk-based assessment (CIfA 2020)[1] and from Managing Change in the Historic Environment: Setting (HES 2016)[2].

4.2 Study Area

To account for the height and vertical scale of the Development and to ensure that a proportionate assessment was undertaken which encompassed, in so far as is reasonably possible, those assets which have a potential to affected, a Study Area was established at 15 km radius from the Site boundary.

4.3 Sources Consulted

The following sources were consulted for this assessment:

Designated heritage assets received in digital format from the Historic Environment Scotland Portal (HESP);
The West of Scotland Archaeology Service Historic Environment Record (WoSAS);
Historic maps provided via online search and held online by the National Library Scotland;
Historic Environment Scotland's National Record of the Historic Environment (Canmore);
Records at the National Archives of Scotland; and
Online resources including British Geological Survey map viewer.

4.4 Cultural Significance

Cultural Significance is defined in national planning policy[3] as:

"…aesthetic, historic, scientific or social value for past, present or future generations. Cultural significance can be embodied in a place itself, its fabric, setting, use, associations, meanings, records, related places and related objects.'

4.5 Setting assessment

The setting of a heritage asset is defined as:

…the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced.'

The assessment of the setting of identified heritage assets and the contribution that setting makes to its cultural significance was guided by the staged approach set out in Managing Change in the Historic Environment: Setting (Historic Environment Scotland 2016)[4]:

Stage 1: identify the historic assets that might be affected by the Proposed Development;
Stage 2: define and analyse the setting by establishing how the surroundings contribute to the ways in which the historic asset or place is understood, appreciated and experienced; and
Stage 3: evaluate the potential impact of the proposed changes on the setting, and the extent to which any negative impacts can be mitigated.

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[1] https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf (Accessed 28.09.23)

[2] https://www.historicenvironment.scot/archives-and-research/publications/ (Accessed 28.09.23)

[3] https://historicengland.org.uk/images-books/publications/statements-heritage-significance-advice-note-12 (Accessed 28.09.23)

[4] https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationid=80b7c0a0-584b-4625-b1fd-a60b009c2549 (Accessed 28.09.23)

4.6 Reporting of effects

The assessment uses the same methodology as set out within Chapter 9, Section 9.3.7 of the EIAR report in determining the significance of a potential effect on the cultural significance of an asset to maintain continuity across the EIAR and the supporting Technical Appendices.

4.7 Site Visit

A site visit was undertaken in March 2022, in June 2022 with HES and on the 3rd, 4th and 5th May 2023. The aim of the site visit was to identify any additional heritage assets within the Site and to understand and experience how the site is situated within landscape and how it interacts with the designated heritage assets which may potentially be affected by the Development.

4.8 Assumptions and Limitations

Data used to compile this report consists of secondary information derived from a variety of sources, only some of which have been directly examined for the purposes of this study. The assumption is made that this data, as well as that derived from other secondary sources, is reasonably accurate.

The records held by WoSAS[5] are not a record of all surviving heritage assets, but a record of the discovery of a wide range of archaeological and historical components of the historic environment. The information held within it is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown.

While there are limitations in the data derived from some sources, these limitations have been managed through the interrogation of information from other sources alongside the application professional judgement and experience allowing for a robust assessment.

5 DESIGNATED HERITAGE ASSETS – REFINEMENT

5.1 Introduction

This refinement exercise is guided by Stage 1 of the approach set out in Managing Change in the Historic Environment: Setting (Historic Environment Scotland 2016).

In order to adequately identify those heritage assets which have the potential to be harmed by the Development, a combination of methods has been employed to create a list of heritage assets, which includes the use of a ZTV.

While a ZTV is often employed to identify assets which may be sensitive to harm from a development, setting is not dependent on views or intervisibility. When undertaking settings assessment, intervisibility between the development and a heritage asset does not, in and of itself, constitute an adverse effect to significance. A specific adverse effect on the significance of an asset, occurring as a result of changes within its setting, must be identified in order for 'harm' to be deemed to occur.

5.2 Assets for assessment

Within the 15 km Study Area, the following assets were identified (Figure 9.1):

- 190 Listed Buildings (of which 45 are Category A listed, 95 are Category B Listed and 50 are Category C Listed);
- Three Gardens and Designed Landscapes;
- 51 Scheduled Monuments;
- Two Conservation Areas;
- 17 non-designated heritage assets with non-statutory register (NSR) codes C and V.

[5] https://www.wosas.net/index.html (Accessed 28.09.23)

Using the ZTV the assets for assessment were refined down to (Figure 9.2):

- 60 Listed Buildings (of which 14 are Category A listed, 21 are Category B listed and 25 are Category C listed);
- Two Gardens and Designed Landscapes;
- 13 Scheduled Monuments;
- One Conservation Area; and
- Six assets with non-statutory register (NSR) codes C and V.

Using the information collected from the above refinement exercise, and following a number of site visits and consultation with Historic Environment Scotland including an on-site visit on the 8th June 2022, a series of initial wireframes from specific assets were produced to assist in determining whether or not the Development will lead to an effect on the cultural significance of a heritage asset through a change in setting.

No wireframes have been produced for assets on the non-statutory register. Those assets identified on the ZTV above have been included in the assessment below.

Table 1.1: Assets selected for analysis

Asset Name	Designation Number	Designation
Inveraray Castle	GDL00223	Garden and Designed Landscape
Inveraray Castle	LB11552	Category A Listed Building
Watch Tower, Dun na Cuaiche	LB11543	Category A Listed Building
Carloon, Doocot	LB11540	Category A Listed Building
Inveraray Pier	LB35044	Category B Listed Building
Inveraray Cross	SM254	Scheduled Monument
Inveraray	N/A	Conservation Area
Maam Steading (Inveraray Great Farm)	LB11518	Category A Listed Building
Asset Group comprising: **Stables, Malt Land Inveraray Castle Policies;** **Saw Mill and house (Old Barracks), Malt Land Inveraray Castle Policies;** **Cottages, Inveraray Castle Policies;** **Bothy (Old Groom's House), Malt Land Inveraray Castle Policies;** **Maltland Cottage (Formerly Head Gardener's Cottage), Malt Land Inveraray Castle Policies**	LB11536, LB11535, LB11534, LB11533, LB11532	Category B Listed Building

Asset Name	Designation Number	Designation
Garden Bridge, River Aray	LB11544	Category A Listed Building
Aray Bridge, Mouth of River Aray, Arrochar Road	LB11545	Category A Listed Building
Loch Awe House	LB4701	Category C Listed Building
St Conan's Church of Scotland,	LB4700	Category A Listed Building
Society School, Glen Aray	LB11523	Category B Listed Building
Carn Dubh, crannog E of Inverinan	SM4175	Scheduled Monument
Loch Awe, Carn an Roin, Crannog	SM4193	Scheduled Monument
Carn Ban, cairn, 200m S of	SM4048	Scheduled Monument
Kilchurn Castle	SM90179	Scheduled Monument
Garron Bridge (Drochaid Geart-Abhainn), Mouth of River Shire, Arrochar Road	LB11550	Category A Listed Building
Duncan Ban McIntyre Monument, Beacon Hill	LB12167	Category B Listed Building
Ardkinglas House	LB13786	Category A Listed Building
Turbine Hall, Ben Cruachan Hydro Electric Scheme	LB51688	Category A Listed Building
Ardanaiseig House	GDL00018	Garden and Designed Landscape
Fraoch Eilean, Castle	SM2219	Scheduled Monument
Tom nan Clach, cup & ring marked rock 560m ENE of Hazelbank	SM3426	Scheduled Monument
Cup marked stone 600m ESE of Keppochan	SM4186	Scheduled Monument
Caisteal Suidhe Cheannaidh, dun 470m NW of Achnacraobh	SM4120	Scheduled Monument

Asset Name	Designation Number	Designation
Tinkers' Heart, Scottish Travellers' commemorative monument 820m E of Ardno	SM13615	Scheduled Monument

Table 1.2 briefly sets out each asset selected for assessment (Figure 9.3), its setting, cultural significance, whether setting contributes to cultural significance and whether the Site lies within that setting.

The final column indicates whether a potential for an impact to the cultural significance of the asset exists through the change brought about by the Development within the asset's setting.

Where there is a potential for an impact, those assets are considered for further, more detailed assessment within Section 6 of this report.

Where assets have been assessed as receiving an effect from the Development, either significant or not significant, these have been taken forward into the EIAR.

The assessments and comments provided are based on professional judgement, founded on experience and the application of the relevant guidance and legislation.

Table 1.2: Designated Heritage Assets - Refinement

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
St Conan's Church of Scotland,	LB4700	Category A Listed Building	A late 19th century church designed by the architect William Campbell featuring unique architectural details located on the western banks of Loch Awe. Primarily derives its cultural significance from both the internal and external architectural elements and its historic interest through its association with Campbell and his family. Some cultural significance is drawn from its setting.	Yes	No	See detailed assessment below
Society School, Glen Aray	LB11523	Category B Listed Building	Carried forward to EIAR	Yes	Yes	Carried forward to EIAR
Inveraray Castle Policies Asset Group	LB11532 LB11533 LB11534 LB11535 LB11536	Category B Listed Building	See detailed assessment below	Yes	No	While the Site does not lie within this asset's setting which contributes to its significance, it has been carried forward for detailed assessment below on the basis of consultation comments from HES which specifically requested a 'robust assessment' as to how it would not be impacted.
Carloon, Doocot	LB11540	Category A Listed Building	See detailed assessment below	Yes	No	While the Site does not lie within this asset's setting which contributes to its significance, it has been carried forward for detailed assessment below on the basis of consultation comments from HES which specifically requested a 'robust

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
						assessment' as to how it would not be impacted.
Watch Tower, Dun na Cuaiche	LB11543	Category A Listed Building	Carried forward to EIAR	Yes	Yes	Carried forward to EIAR
Garden Bridge, River Aray	LB11544	Category A Listed Building	A mid-18th century bridge designed by the architect John Adam which sits within the Inveraray Estate, spanning the River Aray and providing access from Inveraray Castle to Oak Walk and the estate grounds beyond. The asset is constructed from ashlar and feature a number of ornate architectural details. Its setting is defined by its spatial and historic relationship with the Inveraray Estate and its consistent elements, its cultural significance is defined primarily by its architectural interest and by its historic associations, which also forms its setting.	Yes	No	The Development is located to the north of the asset with the closest turbine approximately 5.3 km from the asset. The Development does not lie within an area of the asset's setting which contributes to its significance. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.
Aray Bridge, Mouth of River Aray, Arrochar Road	LB11545	Category A Listed Building	A late-18th century bridge spanning the River Aray which replaced an earlier Military bridge which was destroyed in a flood in 1772. The bridge was designed by the Architect Robert Mylne and is constructed from rubble with dressed face work. The asset features a number of ornate architectural details along with a series of now weathered approach walls. Its setting is defined by its spatial and historic relationship with the Inveraray Estate and its consistent elements, its cultural significance is defined primarily by	Yes	No	The Development is located to the north of the asset with the closest turbine approximately 5.7 km from the asset. The Development does not lie within an area of the asset's setting which contributes to its significance. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
			its architectural interest and by its historic associations, which also forms its setting.			
Garron Bridge (Drochaid Geart-Abhainn), Mouth of River Shire, Arrochar Road	LB11550	Category A Listed Building	A mid-18th century bridge designed by the architect Robert Morris and constructed by Master of Works, John Adam. The bridge is constructed from rubble with dressed face work and features a balustraded parapet and a series of now weathered approach walls. Its setting is defined by its spatial and historic relationship with the Inveraray Estate and its consistent elements, its cultural significance is defined primarily by its architectural interest and by its historic associations, which also forms its setting.	Yes	No	The Development is located to the north-west of the asset with the closest turbine approximately 4.8 km from the asset. The Development does not lie within an area of the asset's setting which contributes to its significance. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR
Inveraray Castle	LB11552	Category A Listed Building	See detailed assessment below	Yes	Yes	See detailed assessment below
Duncan Ban McIntyre Monument, Beacon Hill	LB12167	Category B Listed Building	See detailed assessment below	Yes	Yes	See detailed assessment below
Ardkinglas House	LB13786	Category A Listed Building	The asset comprises an early 20th century mansion in a Scottish stye arranged around an open court. The house was designed by Sir Roger Lorimer for Sir Andrew Noble of Ardmore. The building is constructed from coarse rubble with dressed face-work while internally there are a number of rooms which have retained a number of their original features.	Yes	No	The Development is located to the north-west of the asset with the closest turbine approximately 8.4 km from the asset. The Development does not lie within the setting of the asset which contributes to its significance. There will therefore be no alteration to its cultural

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
			The setting of the asset is defined by the surrounding designed landscape within which it is located. The cultural significance of the asset is defined by its architectural quality and through its setting.			significance and no effect reported within the EIAR.
Inveraray Pier	LB35044	Category B Listed Building	The asset comprises a pier stretching out into Loch Fyne from the town of Inveraray. Initially constructed from timber in 1761, it was improved and enlarged in 1809 and extended in 1836. The setting of the asset is defined by its location at the Loch side, adjacent to the town. The cultural significance of the asset defined by its historic association with the town and wider estate of Inveraray	Yes	No	The Development is located to the north of the asset with the closest turbine approximately 6.2 km from the asset. The Development does not lie within the setting of the asset which contributes to its significance. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.
Turbine Hall, Ben Cruachan Hydro Electric Scheme	LB51688	Category A Listed Building	The asset comprises a substantial underground vaulted chamber constructed in the late 1950s and early 1960s. The hall was formed out of solid bedrock and accessed by a 1 km long tunnel. The hall houses four turbines with a generating capacity of 440MW and was pioneering in its approach, scale and construction. The asset's cultural significance is defined by its historic importance as a ground-breaking piece of sustainable energy generation.	No	No	While the Development will be visible from the asset's location, the asset is underground and its setting does not make a contribution to its significance.
Ardanaiseig House	GDL00018	Garden and Designed Landscape	Carried forward to EIAR	Yes	Yes	Carried forward to EIAR

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
Inveraray Castle	GDL00223	Garden and Designed Landscape	See detailed assessment below	Yes	Yes	See detailed assessment below
Fraoch Eilean, Castle	SM2219	Scheduled Monument	See detailed assessment below	Yes	No	While the Site does not lie within this asset's setting which contributes to its significance, it has been carried forward for detailed assessment below on the basis of consultation comments from HES which specifically requested a 'robust assessment' as to how it would not be impacted.
Tom nan Clach, cup & ring marked rock 560m ENE of Hazelbank	SM3426	Scheduled Monument	See detailed assessment below	Yes	No	While the Site does not lie within this asset's setting which contributes to its significance, it has been carried forward for detailed assessment below on the basis of consultation comments from HES which specifically requested a 'robust assessment' as to how it would not be impacted.
Caisteal Suidhe Cheannaidh, dun 470m NW of Achnacraobh	SM4120	Scheduled Monument	See detailed assessment below	Yes	No	While the Site does not lie within this asset's setting which contributes to its significance, it has been carried forward for detailed assessment below on the basis of consultation comments from HES which specifically requested a 'robust

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
						assessment' as to how it would not be impacted.
Tinkers' Heart, Scottish Travellers' commemorative monument 820m E of Ardno	SM13615	Scheduled Monument	A heart shaped setting of quartz pebbles around the perimeter embedded into tarmac at a former road junction which oral traditions link to the stories of Scottish Travellers who died in the Jacobite uprising. Until 1928, the site is thought to have been marked by a heart shaped piece of grass in the road which was restored following resurfacing using quartz. The heart has been the location for weddings and ceremonies for Scottish Travelers since at least 1872. Its setting is defined by its location at a significance route junction which held high spiritual meaning to Scottish Traveller communities. The significance of the asset is through its historic association with the Traveller community and the importance of its longevity as a place of spiritual meaning.	No	No	The Development is located to the north-west of the asset with the closest turbine approximately 7.5 km from the asset. The asset does not draw any cultural significance from its setting. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.
Inveraray Town	N/A	Conservation Area	A conservation area which encompasses the town of Inveraray which was constructed between 1750 and 1790 and has been described as 'Scotland's most ambitious and distinguished early model planned town'. The town follows a central axial plan with prominent buildings on Front Street and Main Street. The earliest buildings are located along Front Street and are less architecturally homogeneous than those along Main Street, however,	Yes	No	The Development is located to the north-west of the asset with the closest turbine approximately 5.7 km from the asset and will not be visible. The asset does not draw any cultural significance from its setting. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
			both the former Town House and the Great Inn were designed in 1770 by John Adam. The setting of the asset is defined by its historic and spatial association with the Inveraray Estate and the adjacent Loch Fyne which makes a positive contribution to its cultural significance. In particular, views from Front Street towards the castle and the estate beyond are of particular importance as are views to the north-east towards Garron Bridge and those across Loch Fyne. The cultural significance of the asset is defined by its character and appearance which is principally derived from the excellent architectural qualities of the constituent buildings, the regular and well laid out streets, the loch side location with the Glens and uplands beyond and the association with the Inveraray Estate and its castle.			
Cairn, Inveraray, Newtown	WOSASPIN 1519	NSR C	The asset comprises the remains of a probable cairn measuring approximately 14.5 m by 11 m and 0.5 m in height. The WoSAS record indicates it has been subject to a number of phases of disturbance and alteration which appears to have removed its surrounding kerb and added more recent clearance material. Its setting is defined by its proximity to two similar assets (WOSASPIN 1519 and WOSASPIN 1509) and the spatial relationship they share with each other as broadly similar and likely contemporary	Yes	No	The Development is located to the north of the asset with the closest turbine approximately 7 km from the asset. The Development does not lie within the setting of the asset which contributes to its significance. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
			assets. This relationship does make a small contribution to the asset's cultural significance. Their wider setting of the asset is defined by their location within woodland within the Inveraray Estate which makes no contribution to its cultural significance. The cultural significance of the asset is determined by the archaeological information the cairn may hold about past land use and through its spatial connection with the nearby cluster of cairns.			
Chapel; Burial-ground, Kilmun, Glen Aray / St Mundu's Chapel	WOSASPIN 1581	NSR C	A small, ruined chapel surrounding by its burial ground which was still in use for the interment of children and infants in the 18th century. The chapel is dedicated to St Mundu and is associated with the nearby settlement at Kilmun. The setting of the asset is defined by its proximity to the Kilmun Farm and the former settlement which is characterised through the HER entries nearby to the asset (WOSASPIN 44096, 58759, 58866, 58868, 59106). This relationship makes a positive contribution to the asset's cultural significance as it enhances the appreciation and understanding of the chapel within its original context. The wider setting of the asset comprises the uplands and lowlands of the surrounding Glens which provide an aesthetic backdrop, but make no contribution to the asset's cultural significance.	Yes	No	The Development is located to the north- east of the asset with the closest turbine approximately 3 km from the asset. The Development does not lie within the setting of the asset which contributes to its significance. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
			The cultural significance of the asset is determined by its historic association with the now deserted settlement of Kilmun and through the relationship with the recorded remnants which lie in close proximity. It also holds some archaeological interest through the information it could yield into population density and health in this area up to the 18th century.			
'Long-Cairn', Drimfern	WOSASPIN 1582	NSR V	The asset comprises what was originally thought to have been a long cairn, which has been reassessed as the results of dumping field gathered stones on a natural ridge. The setting of the asset is defined by its location on the valley bottom and is incidental, based on convenience. The wider setting of the asset comprises the uplands and lowlands of the surrounding Glens which provide an aesthetic backdrop but make no contribution to the asset's cultural significance. The cultural significance of the asset is defined by its historic association with the improvement of the land for farming practices.	No	No	The asset's setting makes no contribution to its significance. There will be no alteration to that cultural significance from the Development.
Fort, Dun na Cuaiche	WOSASPIN 1735	NSR V	See detailed assessment below	Yes	Yes	See detailed assessment below
Township, 'Blarowin', Glen Shira	WOSASPIN 1739	NSR V	The remains of a small township which was cleared as part of a phase of agricultural improvement within the Argyll Estate. The settlement is bounded by a large wall	Yes	No	The Development is located to the north- west of the asset with the closest turbine approximately 3.7 km from the asset. The

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
			enclosing buildings and smaller enclosures which comprise two main groups. The settlement is noted as 'Blairowin' in historic documents and is visible on Roy's Map in around 1750. By 1751, documentary evidence indicates that no rents had been paid marking the end of the township's lifespan. The setting of the asset is defined by its location along the Glen Shira valley and principally through the spatial and historic relationship between the constituent elements which allow for the layout and form of the settlement to be appreciated and experienced in a surrounding close to that of when it was originally occupied. The wider setting of the asset comprises the uplands and lowlands of the surrounding Glens which provide an aesthetic backdrop but make no contribution to the asset's cultural significance. The cultural significance of the asset is determined by the archaeological information that could be uncovered relating to the occupation of the settlement and information about its occupants.			Development does not lie within the setting of the asset which contributes to its significance. There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.
Chambered Cairn, Cladich	WOSASPIN 1778	NSR V	A probably Clyde-type chambered cairn which is situated on a slight knoll in a now cultivated field. The original outline cannot be determined due to stone robbing and ploughing, however, it was likely oval in shape and measured at least 25 m by 21 m. At the North Eastern end, a burial	Yes	No	The Development is located to the north- west of the asset with the closest turbine approximately 5.1 km from the asset. The Development does not lie within the setting of the asset which contributes to its significance.

Asset Name	Designation Number	Designation	Cultural Significance	Does setting contribute to significance?	Does the Site lie within that setting?	Impact to cultural significance from the Development?
			chamber is visible defined by two adjacent on side slabs. The setting of the asset is defined by its location overlooking Loch Awe and the settlement at Cladich. There is no indication as to whether the asset had any defined or deliberate views, although it is likely the Loch played an important role in its siting and as such, its setting makes a contribution to its cultural significance. The asset's cultural significance is principally defined by its archaeological interest and the information it could yield about prehistoric burial practices in the area.			There will therefore be no alteration to its cultural significance and no effect reported within the EIAR.

6 DETAILED ASSESSMENT

LB11552: Inveraray Castle		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Category A Listed Building	**High**	**9.5km north**

Summary of Asset and Cultural Significance	The asset comprises the seat of the Dukes of Argyll with the foundation stone for the castle laid in 1746, replacing the old castle which was built for Sir Colin Campbell of Glenorch in 1450. The Argylls were powerful political and military figures serving as the heads of government and advisors to the crown both before and after the 1707 Act of Union. The construction of the castle required the demolition of the old castle and of the former village which was relocated to the current town which was itself subject to careful planning. The castle was designed by the architect Roger Morris with William and John Adam acting as Masters of Works. The castle was completed between 1772 and 1785 by the Architect Robert Mylne. The castle's 'Gothick' architectural design was an early and influential example of its kind which also features some later 19th century additions and alterations by the architect Anthony Slavin. Internally, the interiors were designed in a 'Splendid Georgian' style by Mylne with those in the Drawing Room, Dining Room and Saloon remain largely unaltered. The cultural significance of the asset is principally derived from its historic importance as the seat of the Dukes of Argyll, through its architectural quality, the association with important Scottish architects and through its importance as part of the overall estate which is a masterpiece of designed landscaping.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its surrounding designed gardens and landscape. The castle is the principal focus of the landscape with a series of key views both to and from the asset from various parts of the wider gardens. In particular, views from the castle to the Garden Bridge and the Dun na Cruiche watch tower are crucial to the understanding and appreciation of the asset, as are the reciprocal views from the bridge and the watch tower toward the castle. As the centrepiece, the routes to the castle through the designed landscape (and beyond) form an important element of the experience of its cultural significance. The principal entry route, as designed in the mid-18th century, began at the Garron lodge and meandered for approximately two kilometres around the lower elevation of Dun na Cuaiche where views of the castle were carefully managed. Presently, the main approach to the castle is directed along Wintertown Gate, from the Castle Lode at the northern end of Front Street in Inveraray. Beyond the location of the asset within its designed landscape, the sense of arrival is therefore critical to understanding and appreciating the cultural significance of the asset whether using the 18th century planned route through the landscape, or using the modern approaches defined through the requirements of the tourist industry. The setting of the asset makes a significant contribution to the cultural significance of the asset.
Magnitude of Change to Cultural Significance	The wireframes (Figure 9.12b) confirm there will be no visibility of the Development from the entrance to Inveraray Castle (Plate 1), nor will there be any visibility of the Development within views from the castle towards the watch tower at Dun na Cuaiche (Plate 2). Views from the castle towards the Carloon Doocot will also remain unaltered as will those from the Garden Bridge with the large areas of plantation either side of Oak Walk screening views of the landscape beyond (Plate 3). Views towards the castle from Inveraray are equally preserved (Plate 4; Figure 9.8d), with the substantial existing mature vegetation on the eastern edge of the designed landscape preventing any views from Front Street to directly to the

LB11552: Inveraray Castle		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Category A Listed Building	**High**	**9.5km north**

	castle, while simultaneously preventing any views of the Development in the background as is shown in both the wireframes and photomontages. The castle is visible in views with the Development from the south and south-east as shown in Figure 6.29c and 6.30e. However, in both instances, the primary relationship of the castle to its setting where that setting contributes to its cultural significance remains unaltered and unaffected. The relationship of the castle to the Town and the Dun na Cuaiche watchtower is still prominent, which is particularly true from Figure 6.30e which offers an expansive view of the castle and its associated surroundings. The Development is located within the wider landscape which comprises the uplands and lowlands of the surrounding Glens which provide an aesthetic backdrop but in this instance, makes no contribution to the asset's cultural significance. There will therefore be no change from the Development to the setting of the asset, it will not alter any of the key elements of its setting, of any movement into or out of the castle or feature in any key views.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA.

GDL00223: Inveraray Castle		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Garden and Designed Landscape	**High**	**2.1km north-west**

Summary of Asset and Cultural Significance	The asset comprises a substantial designed landscape which evolved over 300 years under the direction of the Earls and Dukes of Argyll. The designs take advantage of the naturally rugged topography and inland sea location through the placement of woodland plantations and buildings in key locations to maximise the natural landscape. The landscape includes the town of Inveraray which is a critical element to the overall aesthetic and experience of the asset as a whole. The landscape was largely established between 1750 and 1800 and is among the earliest examples of town planning using the ideals of the Scottish Enlightenment. The Earls and Dukes of Argyll were assisted in their work by a number of important contemporary designers including Robert Adam and Robert Mylne which led to the creation of a much celebrated landscape. The landscape contains over 100 listed buildings, forming an important part of their setting which includes the Category A Listed Inveraray Castle and the Category A Listed Watchtower on Dun na Cuaiche which are both assessed elsewhere in this report. The asset derives its cultural significance from its historic importance, through the integrity of the historic landscape elements, through its direct association with the town of Inveraray and through its historic associations with the Earls and Dukes of Argyll and the Scottish Enlightenment.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its location at the mouth of the River Aray where it meets Loch Fyne, and by the mixture of low-lying land towards Glen Aray, Glen Shira and the Fisherlands alongside the upland landscape of Dun na Cuaiche which offers impressive, wide ranging views across the immediate area. While much of this setting makes a contribution to its significance, there are a number of specific viewpoints which have been identified as key including the view of the town from Garron Bridge when moving into the landscape from Glen Shira, views from the summit of Dun na Cuaiche, views south over the castle, the town and Loch Fyne, long range views towards the hills of Strachur and Cruch-nan-Capill and towards the opposite side of Loch Fyne. There are some elements of modern infrastructure visible within the wider landscape including electricity pylons to the south/south-west on the elevated land above Inveraray, and wind turbines to the north-west (approximately 5 km to the northwest on Clachan Hill; Plate 5). However, these are generally not prominent when viewed as part of the landscape as a whole. As a designed landscape, external setting is generally of less importance than movement through the landscape taking in the elements as they were intended to be experienced. While not strictly an element of 'setting' this experience of the landscape does make a contribution to the asset's cultural significance and as such is considered in conjunction with external views. The main approach to the castle was designed to be from the south-west along Lime Avenue and although no longer in use, still forms a key element of the designed landscape. The other drives and approaches generally run in a similar alignment (south-west/north-east) including the Avenue through Inveraray. By the late 18th century, the establishment of the Grand Approach moved away from the straight, axial roads to a more meandering approach starting some 2 km away at Garron Lodge and allowing arranged glimpses of the town and the castle at various stages. Beyond the approach roads, Oak Walk takes a co-axial route to the north-west from the castle passing over the Garden Bridge and into a large area of woodland, emerging at a clearing where clear views are afforded across a managed agricultural landscape towards a Doocot at its terminus. This vista takes in not only the edge of the designed landscape, but the uplands beyond.

<table>
<tr><td colspan="3">GDL00223: Inveraray Castle</td></tr>
<tr><td>Designation</td><td>Sensitivity (Value)</td><td>Distance and Direction to Nearest Turbine</td></tr>
<tr><td>Garden and Designed Landscape</td><td>High</td><td>2.1km north-west</td></tr>
<tr><td>Magnitude of Change to Cultural Significance</td><td colspan="2">The Development will be located to the north/north-west of the asset at its closest point where the turbines will be visible beyond the extent of the designated area (Figure 9.11a) and will be visible from the higher elevations of Dun na Cuaiche. Where the asset stretches along Glen Shira, the existing topography prevents any invisibility between here and the Development. Likewise, there will be no visibility from Inveraray, Inveraray Castle or any views of important assets in conjunction with the Development from the majority of the area covered by the designation. The Development will not lead to a change in any of the identified key views, aside from the higher elevations of Dun na Cuaiche, and will not be visible in combination with the watchtower or from any point within the town of Inveraray.

The Development will not intrude on any of the identified drives or approaches, nor will it be visible along any of the main access routes into the landscape. There will be some visibility at the northern end of the Oak Walk, however, much of this view is dominated by the strategically placed Doocot and by intervening vegetation at the limits of the estate (Plate 6).

This assessment must therefore consider the magnitude of change to the asset within this context, taking into account there is no visibility across the majority of the designated area but tempering that with the clear visibility in these identified locations.

This must also be tempered against the clear prominence of the aesthetic of the landscape and its historic associations which constitute the largest parts of its cultural significance and will remain unaffected.

The hub from turbine 11 and blades from turbine 13 from the Development are shown in the wireframes to be visible from within the Designed Landscape (Figure 9.11c), although the accompanying photomontage indicates that visibility will be entirely screened by the existing vegetation (Figure 9.11d).

The hubs of turbines 11 and 13 and the blades of turbines 5, 6, 7, 8, 9, 10 and 12 (Figure 9.8f) from the Development will be visible from the higher elevations of Dun na Cuaiche and will be a noticeable modern addition into what remains an overwhelming rural landscape. In that sense, there will be some reduction in the appreciation and experience of the northern edge of the designed landscape and of how that interacts with the unmanaged landscape beyond.

The Designed Landscape will also be visible in views from the south and south-east in conjunction with the Development. The understanding of the asset is primarily drawn from the internal aesthetic and relationship with its constituent elements, from the strong relationships between the landscape, the town and Dun na Cuaiche watchtower and from the various designed entrances and route through. The presence of turbines in the wider landscape is incidental and understood as part of an evolving area which includes some existing modern infrastructure, including electricity pylons which are of greater intrusion when viewing the asset from the south-east. The Development will not change the understanding of the asset, nor does not alter the ability to appreciate or experience the cultural significance of the asset.

Taking these separate elements into consideration, the Development will lead to an impact on the cultural significance of the designed landscape, albeit in a minor way. Their presence will not fundamentally alter the appreciation of the substantial landscape, nor will they detract from an understanding of its development, its design or of its historical importance.</td></tr>
<tr><td>Statement of Significance of Effect</td><td colspan="2">The Development will result in a Limited magnitude of change to an asset of High cultural significance which will result in a Minor Adverse effect, which is not significant for the purposes of EIA and reported within the EIAR.</td></tr>
</table>

Inveraray Castle Policies Asset Group comprising:

LB11536: Stables, Malt Land Inveraray Castle Policies;

LB11535 Saw Mill and house (Old Barracks), Malt Land Inveraray Castle Policies;

LB11534 Cottages, Inveraray Castle Policies;

LB11533 Bothy (Old Groom's House), Malt Land Inveraray Castle Policies;

LB11532 Maltland Cottage (Formerly Head Gardener's Cottage), Malt Land Inveraray Castle Policies

Designation	Sensitivity (Value)	Distance and Direction to Nearest Turbine
Category B and C Listed Buildings	**High**	**5km north**

Summary of Asset and Cultural Significance	The asset group comprises five broadly contemporary buildings which date to the late 18th century which include: • an 18th century stable consisting of two parallel oblong blocks with five segmental arches at the ends; • A late 18th century cottage which housed the head gardener and features a gabled and piended slate roof; • An 18th century, 2 storey former barracks with 5 high round-arched recesses on both sides and featuring substantial internal stone piers which support the first floor; • A late 18th century traditional, 1 storey bothy which dressed face work; and • A late 18th century row of cottages to the west of the Bothy The cultural significance of the assets is defined by their remaining architectural detailing, through their close association with each other as elements of a former working estate and through their long historic association with the Inveraray Estate.
Definition of Setting and Contribution to Cultural Significance	The setting of the assets are principally defined by their spatial and historic relationship with each other, forming a cluster of working buildings associated with the Inveraray Estate. The historic and spatial relationship between the buildings is a crucial element in understanding and appreciating their cultural significance. They are located beyond the main axial route of the designed landscape and are generally tucked away from view, especially at the end of Oak Walk where despite their importance to maintaining the agricultural land, are hidden from view (Plate 7). There are no defined visual links, although the buildings are discernible along the winding path to the watch tower on Dun na Cuaiche (Plate 8). Beyond this relationship, the setting of the asset is defined by the Inveraray Estate from which it derives cultural significance through its association with the operation of the estate. The wider setting of the asset comprises the uplands and lowlands of the surrounding Glens which provide an aesthetic backdrop, but make no contribution to the asset's cultural significance.
Magnitude of Change to Cultural Significance	The Development will be located approximately 3 km north of the assets with the closest turbine approximately 5 km away. The bare earth wireframes (Figure 9.11c) show the hub from turbine 11 and blades from turbine 13 from the Development will be visible from the asset to the north. Their presence in this view will not alter the principal elements of the asset's cultural significance nor in the appreciation or experience of that cultural significance. The relationship between the asset and those contemporary buildings in close proximity will not be affected, nor will the wider setting of the assets' association with and location within the Inveraray Castle Designed Landscape. The highlighted view will also be entirely screened by mature vegetation contained within the designed landscape (as shown on the accompanying photomontage in Figure 9.11d). Given the designation and importance of these

Inveraray Castle Policies Asset Group comprising:

LB11536: Stables, Malt Land Inveraray Castle Policies;

LB11535 Saw Mill and house (Old Barracks), Malt Land Inveraray Castle Policies;

LB11534 Cottages, Inveraray Castle Policies;

LB11533 Bothy (Old Groom's House), Malt Land Inveraray Castle Policies;

LB11532 Maltland Cottage (Formerly Head Gardener's Cottage), Malt Land Inveraray Castle Policies

Designation	Sensitivity (Value)	Distance and Direction to Nearest Turbine
Category B and C Listed Buildings	**High**	**5km north**

	trees to the integrity of the landscape, it can confidently be asserted there will be no visibility of the Development from the asset.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA.

LB11543: Watch Tower, Dun na Cuaiche		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Category A Listed Building	**High**	**4.6km north**

Summary of Asset and Cultural Significance	The asset comprises a square folly in a 'Gothick' architectural style, designed by Roger Morris with masonry by William Douglas. The asset sits on top of Dun na Cuaiche and is accessed via a winding path through the Inveraray designed estate for which there are generally limited views until the asset reveals itself at the summit of the climb from the castle. The asset derives its cultural significance principally from its historic association with the Inveraray Estate which forms a key element of that cultural significance, and its primary setting, and from its architectural quality.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is principally defined by its relationship with the surrounding Inveraray Castle Estate, its constituent historic structures and with the town of Inveraray over which it has extensive and impressive views (Plate 9). Of these views, there is a heavy primacy on the view from the asset to the south and south-west, across the Inveraray Estate and Castle towards Inveraray and Loch Fyne in the distance (Plate 10). This view, and the reciprocating views from the estate, the castle and the town, are crucial to understanding the asset's cultural significance and appreciating the intention of its design to provide a building to be looked at, and looked out from, in a prescriptive and 'stage-managed' way. Beyond the relationship with the estate, castle, town and the loch, the wider setting of the landscape comprises the uplands and lowlands of the surrounding Glens which provide an aesthetic backdrop, but make no contribution to the asset's cultural significance. This wider landscape also contains existing turbines at Clachan Hill, An Suidhe, the consented development at Blarghour and overhead cables to the south of the asset.
Magnitude of Change to Cultural Significance	While a number of the turbines will be visible from the asset, namely the hubs of turbines 11 and 13 and the blades of turbines 5, 6, 7, 8, 9, 10 and 12 (Figure 9.8f), this will not alter the key elements of the asset's cultural significance. The visibility of modern infrastructure, while noticeable, will not distract from the principal views from the folly south/south-east to Inveraray and across Loch Fyne nor will they compete with the prominence of the folly when viewed from the designed landscape, from Inveraray Castle or from Inveraray town. These are the fundamental components of the asset's setting which contribute to its significance. Figure 6.27c indicates the hubs of turbines 11 and 13 and the tips of the blades of turbines 6, 7, 9 and 12 will be visible in combination with the asset from the south along what is noted on mid-19th century mapping as 'Great Avenue to Inveraray Castle'. While the wireframes indicate relatively clear visibility, the photomontage shows the existing vegetation located within the Inveraray Castle Designed Landscape which significantly reduces how visible the Development will be. This view is not one which contributes greatly to the asset's significance, although it does add to the wider appreciation of the watch tower's prominence within the landscape. Wirelines (Figure 6.29d) show the hub for turbines 11 and 13 and the blades from turbines 8, 10 and 12 from the Development will be visible from the south-east at St Catherines. The accompanying photomontage (Figure 6.29e) indicates the existing vegetation will limit that visibility to the hub of turbine 13, the blades of turbine 11 and the tip of the blades of turbine 12. The view from St Catherines includes the asset and Inveraray Castle, but also includes existing power lines and the Development would be neither a prominent nor dominant introduction in this view, rather an incidental inclusion which does not detract from the appreciation of the asset's location or its relationship with the wider landscape including Inveraray and Inveraray Castle.

LB11543: Watch Tower, Dun na Cuaiche		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Category A Listed Building	**High**	**4.6km north**

	From the south, on the south side of Loch Fyne, there may be some limited visibility of the Development as the wireframes from Figure 6.30d indicates the blades of turbines 8, 10 and 12 will be visible with Figure 6.30e showing a photomontage of that visibility. The Development is located beyond the horizon line away from the asset and does not detract from the views of the asset in combination with Inveraray Castle and Inveraray town which remains the most prominent visual element within this view. The presence of the extensive and mature vegetation which are located within the Inveraray Castle Gardens reduces substantially views of the Development Although the Development will be visible, albeit in a very limited way, it will not lead to any alteration of the appreciation of the cultural significance of the watch tower as they will be barely noticeable in the distant background that the prominence and importance of the tower and its position overlooking the castle and town at Inveraray will remain unaltered. Views within which the turbines will be visible from the asset are principally focused to the north-west and comprise general landscape views beyond the estate boundaries. There will be some additional visibility of the Development in conjunction with the asset from the south and south-east. This will not interrupt nor alter the key elements of the asset's cultural significance which are focussed on the relationship between the asset, Inveraray Castle, Inveraray town and the Inveraray Castle Designed Landscape. The Development is neither a new or novel introduction into the wider landscape of the asset which does not contribute to its cultural significance. The Development will not alter the key elements of the asset's setting, nor the appreciation and experience of the constituent elements of its cultural significance.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA.

LB11540: Carloon, Doocot

Designation	Sensitivity (Value)	Distance and Direction to Nearest Turbine
Category A Listed Building	**High**	**4.4km north-east**

Summary of Asset and Cultural Significance	The asset comprises a circular dovecot constructed in the mid-18th century as part of the designed landscape of the Inveraray Estate. The conical structure comprises two storeys and a basement and was designed by the architect Roger Morris with the stonework carved by the Mason, William Douglas. The cultural significance of the asset is derived from its architectural quality and historic association with the Inveraray Estate, and from its prominent position at the end of a defined walk through the estate's designed landscapes.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its location within the Inveraray Estate, and in particular its location as the terminus feature of Oak Walk. The asset is best appreciated from the end of the walk where a small section of very managed agricultural land, associated with the estate, along with mature vegetation to the rear, provides an effective frame for the asset (Plate 3). Within that view, a number of modern buildings are visible but do not detract from the appreciation of the Dovecot in its original context. Beyond the immediate setting of the estate, the wider landscape is characterised by the uplands and lowlands of Glen Aray which contains large areas of woodland plantation, open ground and some elements of modern infrastructure in the form of overhead electricity pylons. This wider landscape makes no contribution to the asset's cultural significance.
Magnitude of Change to Cultural Significance	The bare earth wireframes (Figure 9.10c) show the blades of turbines 11 and 13 from the Development will be visible from the asset to the north, however, as photographs from the site visit show (Plate 10), and the associated photomontage, this view will be entirely screened by mature vegetation contained within the designed landscape. Given the designation and importance of these trees to the integrity of the landscape, it can confidently be asserted there will be no visibility of the Development from the asset. The asset has been designed, constructed and the landscape around it managed to be seen in a very prescribed manner. The view from Oak Walk is critical to understanding and appreciating the asset and despite modern development behind, this remains highly legible and appreciable. As the photomontage from the Inveraray Policy Asset Group (located close to the end of Oak Walk with the viewpoint looking towards the Development; Figure 9.11d), there will be no real visibility of turbines in the far distance from the end of Oak Walk due to the presence of the existing vegetation, this will not detract from the key elements of the asset's cultural significance.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA.

LB4700: St Conan's Church of Scotland		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Category A Listed Building	**High**	**9.5km north**

Summary of Asset and Cultural Significance	The asset comprises a late 19th century church designed by the architect Walter Campbell of Innis Chonain and funded by his mother, Mrs Campbell of Blythwood. The church is constructed from ashlar and rubble with a slated roof and features a very elaborate southern side including a number of interesting effigies, which overlooks Loch Awe (Plate 11). Internally, the Church contains effigies of King Robert I, Walter Campbell (architect) and the 4th Lord Blythwood who continued work on the church following Campbell's death in 1914. The church continued to be added to until 1930. The asset derives its cultural significance primarily from the unique architectural designs both internally and externally which are unlike any other in Scotland and is best appreciated in close proximity (externally) and within the church interior. It is in this close proximity that the detail of architectural items can be seen, while the eclectic nature of the church is best experienced moving from the entrance off the A85, through the cloisters and into the church building. That appreciation continues when moving from the church to the outside and the southern elevation which contains the most interesting effigies and the best appreciation of the loch side locale. The asset also derives cultural significance from the historic associations of the architect, William Campbell, and his family (the Douglas Campbells of Blythwood) attesting to their societal status in the late 19th century.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its loch-side location where the principal views of the surrounding landscape are present within approximately 110 compass degrees from the north-east to the south-east. Within these views, the setting of the asset can be experienced in much the same way as it was intended. This element of the asset's setting makes a contribution to the cultural significance of the asset through enhancing the appreciation and experience of the architectural details and historic associations set out above. With no attached graveyard, the southern side of the church does not hold any particular association with quiet contemplation or with reverence to past generations, rather is a place to enjoy the architecture in conjunction with the surrounding landscape. Beyond these views and the spatial relationship with Loch Awe, the wider setting of the asset comprises views within the remaining 250 compass degrees which are curtailed by either topography (to the south-west through to the north) or by extant, mature vegetation to the south.
Magnitude of Change to Cultural Significance	The wireframes and photomontages (Figures 9.13c and 9.13d) indicate the hubs of 10 turbines excluding turbines 7, 9 and 13 from the Development will be visible in long range views to the south over the horizon line. As noted above, the southern views from the asset do not form part of the asset's setting from which any contribution is made to its significance. Rather, it forms part of the wider setting which does not have any real association with the asset beyond a general background landscape. There will therefore be no change to the cultural significance through a change in setting, or experience of that cultural significance, through the construction of the Development.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA and reported within the EIAR.

<table>
<tr><th colspan="3">LB11523: Society School, Glen Aray</th></tr>
<tr><th>Designation</th><th>Sensitivity (Value)</th><th>Distance and Direction to Nearest Turbine</th></tr>
<tr><td>Category B Listed Building</td><td>High</td><td>1.5km North-east</td></tr>
<tr><td>Summary of Asset and Cultural Significance</td><td colspan="2">The asset comprises the ruins of a late 18th century ‘Gothick’ style school founded by the Society in Scotland for Propagation of Christian Knowledge (SSPCK). The main building is two storeys in height with some architectural detailing remaining while the associated outhouse is a single storey structure (Plate 12).

The cultural significance of the asset is through its historic association with the SSPCK and the Anglicisation of the Highlands in the 18th century which had over 175 schools across Scotland by the time of the construction of this school. The school is a physical reminder of the substantial effect the drive to purge the Gaelic Language and culture from the Highlands.</td></tr>
<tr><td>Definition of Setting and Contribution to Cultural Significance</td><td colspan="2">The setting of the asset is defined by its location adjacent to the River Aray and the course of one of George Wade’s Military Roads. Beyond these two immediate associations, the general surrounding landscape is characterised by the river valley with hills to the east and west.

The immediate setting of the asset makes a positive contribution to the cultural significance of the asset as it allows for an appreciation of the historic importance of the school within its original context as a tool of control and subjugation. The relationship with Wade’s Road, which was established to assert control in a different way, also enhances the understanding and appreciation of this period of history in the Highlands.

While the rural landscape does not add any additional historic context to the understanding of the school’s role, it does allow for an appreciation of the context in which the school was constructed i.e. in a relatively remote area to affect the local population situated within the dispersed settlements in the surrounding glens and uplands. This wider setting then does make a contribution to the understanding of this element of its cultural significance, however, the degree to which that relates to the overall understanding of the asset is limited in comparison to the primary elements discussed above.</td></tr>
<tr><td>Magnitude of Change to Cultural Significance</td><td colspan="2">The bare earth wireframes (Figure 9.7c) indicate the Development will be visible to the north-west of the asset with all but four of the turbine hubs (1, 2, 5 and 9) discernible over the horizon line. As Plate 13 and the photomontage from Figure 9.7d shows, this view contains some mature vegetation which will limit, almost entirely, the visual alteration caused by the presence of the Development.

The Development will not alter the relationship between the school and the military road, nor will it alter the understanding of how these were used in the 18th century to try and assert control over the Highlands and supress the local population. These critical elements of cultural significance will be unaffected.

The turbines will, however, represent a change in the understanding of the remote upland context in which the asset was established and the appreciation of its use to control the population.

In this respect, the Development will not fundamentally affect the cultural significance of the asset, nor of the appreciation of that cultural significance, but will result in a small reduction in some of the understanding of its surrounding context .</td></tr>
<tr><td>Statement of Significance of Effect</td><td colspan="2">The Development will result in a Limited magnitude of change to an asset of High cultural significance which will result in a Minor Adverse effect, which is not significant for the purposes of EIA and reported within the EIAR.</td></tr>
</table>

LB12167: Duncan Ban McIntyre Monument, Beacon Hill		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Category A Listed Building	**High**	**9.5km north-east**

Summary of Asset and Cultural Significance	The asset comprises a monument to the Gaelic poet who born in the parish of Glenorchy and Inishail within which the moment is located. Ban MacIntyre is one of the most renowned of the Scottish Gaelic poets. The monument was designed by J T Rochead of Glasgow and features a series of columns forming a circle set upon a square base. The cultural significance of the asset is derived from its historic association with Ban MacIntyre, from its simplistic yet strong architectural design and from its position of prominence over the immediate landscape.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset comprises the lowlands surrounding its elevated topography with a particular focus towards the parish of Glenorchy and Inishail where Ban MacIntyre was born and includes a large portion of Loch Awe (Plate 14). Beyond the immediate association with the parish, the setting of the asset comprises the uplands and lowlands of Glen Orchy and Glen Strae with wide ranging views afforded by its topographic prominence.
Magnitude of Change to Cultural Significance	There will be some slight visibility of the Development from the asset although this will not reduce its prominence as a landscape feature, it will not interrupt any views from the monument across the parish of Glenorchy and Inishail through which Ban Macintyre has the strongest association nor will it affect the appreciation or understanding of the historic importance of Ban MacIntyre or his works.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA and reported within the EIAR.

GDL00018: Ardanaiseig House		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Garden and Designed Landscape	**High**	**7.9km north-west**

Summary of Asset and Cultural Significance	The asset comprises a 19th century deigned landscape which forms the estate for the contemporary, Baronial style mansion. The landscape primarily comprises woodland, gardens, parkland and architectural features which are arranged around the house. The landscape was commissioned by William Burn Campbell who primarily had various species of hardwoods planted which was expanded upon in the early 20th century by the new owner John Aisnworth who purchased the estate following Campbells Death in 1879. Ainsworth planted rhododendrons and azaleas while his son, Thomas, created the gardens in the form they are today. The cultural significance of the asset is derived from its high artistic, horticultural and scenic interests which contributes to the overall aesthetic of the shoreline scenery from the A85 along the northern shore of Loch Awe.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its position beside the River Awe where it joins the Loch and is surrounded by the uplands and lowland landscape of the Glens with Ben Cruachan to the north a key aesthetic focus. The house faces towards the Loch with the most easterly section of the gardens seeming left deliberately open to afford the best views of the Loch. This makes a contribution to the cultural significance of the asset as it represents key view identified within the listing text and an important element in the appreciation of the landscape. The wider setting of the asset comprises the uplands and lowlands of the surrounding Glens which provide an aesthetic backdrop, but make no contribution to the asset’s cultural significance.
Magnitude of Change to Cultural Significance	The Development will be visible from the eastern edge of the asset as shown on the viewpoint from Ben Cruchan , beyond the eastern shores of Loch Awe along the ridgeline of the higher elevations near Cladich. This has been identified as a key view which contributes to the cultural significance of the asset through the experience of the surrounding rural landscape it affords. While some of their visual presence may be tempered by intervening vegetation, the Development will be noticeable though the presence of the turbines along the ridgeline. The principal landscape features to be appreciated from this viewpoint are the Loch, its eastern bank and the islands in between with the Development leading to a change in the wider aspect of this view. The change in this view will be small and distant beyond the most important elements, which when considering the complete setting of the asset and that there will be no alteration to the relationship of the asset to Ben Cruchan, will not fundamentally alter the cultural significance of the asset nor of the experience or appreciation of that cultural significance.
Statement of Significance of Effect	The Development will result in a Limited magnitude of change to an asset of High cultural significance which will result in a Minor Adverse effect, which is not significant for the purposes of EIA.

SM2219: Fraoch Eilean, Castle		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Scheduled Monument	**High**	**7.8km north**

Summary of Asset and Cultural Significance	The asset comprises the remains of a medieval castle which was given to the Clan Macnaghten by Alexander III in the mid-13th century situated on a small island at the northern end of Loch Awe. The castle is thought to have been one of the oldest stone fortifications in Scotland, a stone hall house located on the eastern side of the island, which was supplemented by wooden and turf out buildings. The entire castle was later enclosed by a substantial stone curtain wall with a tower and gateway. The castle had been abandoned before the start of the 17th century within which a smaller structure was constructed, using the hall as an inner courtyard. The cultural significance of the asset is derived through the archaeological interest of the castle remains and any information it may yield relating to the construction, occupation and abandonment of the castle. It also derives cultural significance from its historic association with the Clan Macnaghten and the Clan Campbell who eventually took ownership.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its island location in the middle of Loch Awe, opposite the mouth of the River Awe. Undoubtedly a strategically important location, the island allows 360 degree views of the area including Kilchurn Castle to the north-east which was the seat of the Campbells of Glenchory. This is an important historic relationship which adds to the understanding and appreciation of the asset's historic importance and the role it played in the development of the area through the medieval period, encompassing the Battle of Bannockburn and through into the Jacobite Risings and how allegiances were set out, and in some cases changed. This makes a positive contribution to its significance. The wider setting of the asset comprises the uplands and lowlands of the surrounding Glens which provide an aesthetic backdrop, but make no contribution to the asset's cultural significance.
Magnitude of Change to Cultural Significance	The Development will be visible from the monument in the far distance to the south-east, however, this will not lead to a change in the fundamental elements of the cultural significance of the asset. It will not alter the immediate setting comprising the asset's location within Loch Awe and its strategic position, nor will it alter the spatial, historic or visual relationship with Kilchurn Castle.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA and reported within the EIAR.

SM3426: Tom nan Clach, cup & ring marked rock 560m ENE of Hazelbank		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Scheduled Monument	**High**	**10.1km south**

Summary of Asset and Cultural Significance	The asset comprises prehistoric rock art carved on an outcrop of bedrock. The art comprises two cups with two rings, eight cups with one right and over 20 other cups which likely dates to between 3500 BC and 1800 BC. The cultural significance of the asset is defined by the information it can yield in relation to our understanding of the prehistoric period in this area, and in particular how art relates to other prehistoric monuments.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its spatial location and through the intervisibility between it and a group of chambered cairns on the other side of Loch Fyne. This relationship makes a positive contribution to its cultural significance. The wider setting is comprised of the lowlands and uplands along with Loch Fyne and contributes little to the cultural significance of the asset, rather forming an aesthetic surrounding landscape.
Magnitude of Change to Cultural Significance	The Development will be visible from the monument in the far distance to the west/north-west, however, as the asset’s primary setting will be unaltered and the wider landscape makes no contribution to its cultural significance, there will be no alteration to the appreciation and experience of the asset.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA and reported within the EIAR.

SM4120: Caisteal Suidhe Cheannaidh, dun 470m NW of Achnacraobh		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
Scheduled Monument	**High**	**10.6km north-west**

Summary of Asset and Cultural Significance	The asset comprises a prehistoric dun which may have been an important fort, sear or resting place given the association of its name. The dun is almost circular in place with some upstanding elements of the surrounding walls up to over 2m. Duns are generally thought to have been the living spaces of small groups or families, however this example may have been more substantial and important. The scale and prominence of the asset within the immediate landscape may be an indication that more labour than usual was required, and as such a more high-profile site. The asset's cultural significance is determined through the preserved archaeological remains protected by the designation and the information they could yield in contributing to our understanding of later prehistoric defended settlements in Western Scotland. There is a high potential for these remains to be well preserved within, and potentially immediately outside, the scheduled area which could include features, finds or environmental evidence associated with the people who built and lived in these areas.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its prominent location overlooking the valley running between Taynuilt and Kilchrenan where it sits at a position of strategic importance overlooking the natural junction between Loch Awe and the River Awe with a key view noted to the north-east toward Ben Cruachan. This makes a positive contribution to its cultural significance as it allows the asset to be understood an appreciated with regard to its prominence and likely high status. The wider setting is comprised of the lowlands and uplands along with Loch Awe and contributes little to the cultural significance of the asset, rather forming an aesthetic surrounding landscape.
Magnitude of Change to Cultural Significance	The bare earth wireframe (Figure 9.6d) shows the hubs from turbines 1, 2, 3, 4, 5, 8, 9, 10 and 12 along with the blades from turbines 6, 7 and 13 from the Development will be visible from the monument in the far distance to the south-east, however, as the asset's primary setting will be unaltered and the wider landscape makes no contribution to its cultural significance, there will be no alteration to the appreciation and experience of the asset.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA.

WOSASPIN 1735: Fort, Dun na Cuaiche		
Designation	**Sensitivity (Value)**	**Distance and Direction to Nearest Turbine**
NSR V	**Medium**	**4.6km north**

Summary of Asset and Cultural Significance	The asset comprises a fort represented by rectangular area measuring approximately 78 m by 40 m surrounded by a large turf and stone wall. The fort is noted to be best preserved in its western section with an entrance likely to have been on the north-western edge. Withing the surrounding earthwork, there are several levels of platforms and a possible sub-rectangular foundation. The asset derives its cultural significance from the information the archaeological remains could yield in relation to the provenance and use of the fort, and of its occupants.
Definition of Setting and Contribution to Cultural Significance	The setting of the asset is defined by its prominent position of high elevation and strategic importance overlooking the junction of Glen and Loch Shira and the wider Loch Fyne. This makes a positive contribution to its cultural significance as it allows the asset to be understood and appreciated with regard to its prominence and likely high status. The wider setting is comprised of the lowlands and uplands along with Loch Awe and contributes little to the cultural significance of the asset, rather forming an aesthetic surrounding landscape.
Magnitude of Change to Cultural Significance	The wireframe and photomontage show the hubs of turbines 11 and 13 and the blades of turbines 5, 6, 7, 8, 9, 10 and 12 (Figure 9.8f) of the Development will be visible from the monument to the north. While there will be visibility of the Development, this will not alter the cultural significance of the asset through a change in setting. The appreciation and understanding of the asset's prominence and strategic location will not be changed or diminished and there will be no alteration to how the asset is experienced in that prominent location. There will be no alteration of the visual and spatial connection between Glen and Loch Shira or of the wider association with Loch Fyne.
Statement of Significance of Effect	The Development will result in a Negligible magnitude of change to an asset of High cultural significance which will result in a Negligible effect, which is not significant for the purposes of EIA.

7 CONCLUSIONS

This assessment has established the Development will not result in any effects considered to be significant for the purposes of EIA.

The assessment has concluded that the Development will result in a Minor Adverse effect, which is not significant for the purposes of EIA, to the cultural significance of the following heritage assets:

- GDL00223 Inveraray Castle Garden and Designed Landscape;
- GDL00018 Ardanaiseig House Garden and Designed Landscape; and
- LB11523 Category A Listed Society School.

The remaining assets included within the assessment which were identified during the refined process as having the potential to receive a likely significant effect have been determined as not affected by the Development. This is either due to the assets setting not contributing to its significance, or the Development not lying within an element of its setting which contributes to its significance.

PLATES

Plate 1) View from Inveraray Castle towards the Development

Plate 2) View from Inveraray Castle towards the watch tower at Dun Na Cuaiche

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Scale:	N/A	Illustrator:	Andy_R
Path:	277671\GIS\Graphics\Plates\MXD		

Plates 1 - 2

Plate 3) View from the Garden Bridge towards the Carloon Doocot beyond which lies the Development

Plate 4) View from Inveraray towards Inveraray Castle

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Plate 5) View of turbines visible to the northwest of Inveraray Castle GDL on Clachan Hill

Plate 6) View from the south-east at the end of Oak walk towards the Carloon Doocot

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Plate 7) View of the Inveraray Castle Policies Asset Group from the end of Oak Walk

Plate 8) View of the Inveraray Castle Policies Asset Group from the path to the Dun Na Cuiache watch tower

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Plate 9) View towards the watch tower on Dun Na Cuaiche from the south side of Loch Fyne

Plate 10) View of the Carloon Doocot and the wider landscape to the rear where the Development will be located

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Plate 11) View from St Conan's Church towards the Development

Plate 12) The Society School, Glen Aray

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Plate 13) View from the Society School towards the Development

Plate 14) View from the Duncan Ban McIntyre Monument to the south-west

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Plate 15) View from the Duncan Ban McIntyre Monument to the north

Plate 16) View from Dun Na Cuaiche towards Glen Shira

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Scale:	N/A	Illustrator:	Andy_R
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Environmental Impact Assessment – Technical Appendix 10.1: Private Water Supply Risk Assessment

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

ERM

TABLE OF CONTENTS

1. INTRODUCTION AND BACKGROUND

1.1 Overview

Environmental Resources Management Ltd (ERM), on behalf of Ladyfield Renewable Energy Park Ltd (the Applicant), have produced this Private Water Supply Risk Assessment (PWSRA) which contains an assessment relating to properties with Private Water Supplies (PWS) within the area surrounding the proposed Ladyfield Renewable Energy Park (the Development).

The Development is situated approximately 4.7 km north of Inveraray, centred on National Grid References (NGR) 210197, 715498. The Development covers an area of approximately 790 hectares (ha). The Development lies wholly within the administrative boundary of Argyll and Bute Council (the Council).

This PWSRA is included alongside EIA Chapter 10: Hydrology and Hydrogeology.

1.2 Development Description

The Applicant proposes to construct up to 13 three-bladed horizontal axis turbines up to 180 metres (m) tip height and all associated infrastructure, including Substation Compound (comprising of Substation and Control Building, Battery Energy Storage System (BESS) and ancillary infrastructure), underground cabling and an extension of one existing borrow pit. Also included in the proposal is the upgrade of 10 watercourse crossings and the construction of 20 new crossings. Most of proposed crossings will span minor watercourses, with the exception of two crossings proposed spanning the River Aray. The proposal also includes all temporary infrastructure including two Temporary Construction Compound (TCC's), crane hardstandings, and temporary laydown areas.

1.3 Scope of Assessment

The assessment of potential hydrological effects relating to PWS include short-term (construction and decommission) and long-term (operation) in terms of water quantity, quality, and continuity.

2. PRIVATE WATER SUPPLY ASSESSMENT

2.1 Methodology

The ERM methodology for this PWSRA has been developed historically in conjunction with Scottish Environment Protection Agency (SEPA) and reviewed by several Scottish local authorities. This includes:

- Identification of PWS through consultation with the Council within 2 km of the Private Water Supply Study Area and review of other potential PWS identified using Ordnance Survey (OS) 1:25,000 raster mapping;
- Resident or property owner consultation via letter to those properties identified to be supplied by a PWS;
- A site walkover to verify location and type of PWS;
- Identify the source of water feeding the water supply and its catchment;
- Identify proposed infrastructure and construction activities within the catchment or in proximity to the water supply and its infrastructure (*e.g.*, pipes) if required;
- Identify the potential effect on the water supply *i.e.*, whether construction of the Development has the potential to change the quality and/or quantity of water at the receptor;
- Determine whether the PWS is at risk; and
- Outline mitigation techniques that will be implemented to minimise any potential impact of construction and operation on drinking water quality, if required.

Where conflicting information has been provided by the supply owner and local authority, information provided by the supply owner has been used. For the properties where no consultation response was received to verify the presence of a PWS a conservative approach has been taken to assume the property is served by a PWS sourced by an uphill surface water abstraction – as this is the PWS source type most sensitive to construction of the Development.

2.1.1 Legislation and Guidance

The procedure for identifying and risk assessing PWS is based on the following legislation and guidance:

- The Water Quality (Scotland) Regulations 2010[1] (WQ Regulations);
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 ('the Regulations')[2];
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 - Guidance for Local Authorities (v4.0)[3];
- Water Environment (Controlled Activities) (Scotland) Regulations 2011[4]; and
- Scottish Environment Protection Agency (SEPA) Land Use Planning System Guidance Note 31 2017 v3.0 (LUPS-GU31)[5].
- Scottish Environment Protection Agency (SEPA) Land Use Planning System Guidance Note 4 2017 v9.0 (LUPS-GU4)[6].
- NatureScot Guidance – Good practice during Wind Farm construction[7].

The PWSRA will assess the risk for all PWS which are located within the following categories outlined by SEPA LUPS-GU31 guidance:

- Groundwater abstractions within 100 m radius of all excavations less than 1 m in depth; and
- Groundwater abstractions within 250 m of all excavations deeper than 1 m.

2.2 Consultation

2.2.1 Identification of Private Water Supplies through Consultation

On 24th September 2021, a Freedom of Information (FoI) request was submitted to the Council to acquire information on registered PWS located within a 2 km radius of the Development, shown in Figure 10.1.1.

The FoI response from the Council provided data on all PWS located within the Council area. The data was georeferenced by an ERM Hydrologist using ArcGIS Pro to identify those located within a 2 km buffer ('the Study Area') of the Development. This process identified 21 PWS's to be located within the Study Area, shown in Figure 10.1.2. The 21 properties identified through this consultation are:

- West Drimfern
- The Byre Sallachry

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[1] The Water Quality (Scotland) Regulations 2010 [Online] Available at: http://www.legislation.gov.uk/ssi/2010/95/contents/made [Accessed 02.10.23].

[2] UK Government (2017) *The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017.* [online] available at: http://www.legislation.gov.uk/ssi/2017/282/contents/made [Accessed 02.10.23].

[3] DWQR (2019) *The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017: Guidance for Local Authorities Ver 4.0.* [online] available at: https://dwqr.scot/private-water-supplies/regulatory-guidance-and-information/guidance-on-the-water-intended-for-human-consumption-private-supplies-scotland-regulations-2017/ [Accessed 02.10.23].

[4] UK Government (2011) *The Water Environment (Controlled Activities) (Scotland) Regulations 2011.* [online] available at: http://www.legislation.gov.uk/ssi/2011/209/contents/made Accessed on: Accessed on: [Accessed 02.10.23].

[5] SEPA (2017) *Land Use Planning System (LUPS) SEPA Guidance Note 31 v3.0.* [online] available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf [Accessed 02.10.23].

[6] SEPA (2017) *Land Use Planning System (LUPS) SEPA Guidance Note 4 v9.0.* [online] available at: https://www.sepa.org.uk/media/136117/planning-guidance-on-on-shore-windfarms-developments.pdf [Accessed 02.10.23].

[7] NatureScot (2019) *Guidance – Good practice during Wind Farm construction.* [online] available at: https://www.nature.scot/doc/guidance-good-practice-during-wind-farm-construction [Accessed 02.10.23].

- Drimfern
- Low Balantyre
- Easachleibh
- Stronmagachan
- Three Bridges
- Low Balantyre Cottage
- Stronmagachan Steading
- Linnieghluttain
- Sallachry East
- Sallachry West
- Kilmun
- Dalbhuie
- Druim Breac
- The Byre, North Tullich
- South Tullich
- Ladyfield Farm
- Stucscardan
- Maan House
- Ballintyre

Consultation with residents and landowners of the aforementioned properties with PWS was conducted on 29th October 2021. The consultation process was conducted by posting a letter and questionnaire to residents to obtain further information on the PWS supplying their property, as well as a corresponding map indicating the location of each PWS supply. The questionnaire and reasoning for each of the questions are outlined in Table 2.1.

Table 2.1 Resident Consultation Questionnaire and Reasoning

Question	Reasoning
Type of supply (with list of options)	Allows for identification of the likely PWS source water and provide an understanding of its potential connectivity to the Development and developing a source-pathway-receptor model. This allows for an initial level of sensitivity to be applied to the PWS source as part of the final risk assessment.
Use of supply	Aids in developing the source-pathway-receptor model and conceptual site model. Also to attribute sensitivity for the final risk assessment. Also provides information on the likely volumes of water abstracted at the PWS.
Type of water treatment	Understanding of the baseline vulnerability of the source and existing protection measures in place.
Number of people supplied	Provides information on the likely volumes of water abstracted at the PWS. Also helps to attribute sensitivity for the final risk assessment. It is acknowledged that this number can vary, particularly if the PWS supplies a commercial property.
Number of livestock supplied	Provides information on the likely volumes of water abstracted at the PWS. Also to attribute sensitivity for the final risk assessment. It is acknowledged that this number can vary seasonally.
Volume of water abstracted (m^3)	Allows for initial assessment on the catchment or 'zone of influence' of the water supply. This is the likely area the supply is draining water from. This informs an understanding of the PWS potential connectivity to the Development. For example, a large groundwater abstraction further from the Development may be hydrologically connected due to its larger zone of influence. A smaller

Question	Reasoning
	abstraction, closer to the Development, may not be hydrologically connected because it has a very small zone of influence. It is acknowledged that this is often unknown or estimated by residents.
Any comment of the condition of your water supply	This informs an understanding of the existing level of vulnerability of the PWS and potential need for additional protection measures. For example, PWS that have previously been influenced by quantity reductions during drought periods may be more vulnerable than those who have not experienced this. Any information regarding previous water quality issues or quantity issues can inform an understanding of where the water is likely to be sourced from and the pathway it takes to get to the property.

2.3 Review of Properties Consulted

Table 2.2 below outlines the 21 properties consulted by letter.

Table 2.2 Properties with potential PWS within PWS Study Area

Property	Grid Reference	Distance from Development	Supply present?	Comment on supply type and hydrological connectivity
West Drimfern	208188 714660	512 m west of the main Development location on opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected by topography.
The Byre Sallachry	207679 712249	2.04 km west of the Development access track on opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Drimfern	208317 714594	367 m west of the main Development location on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Easachleibh	208886 711654	700 m west of the Development access track on opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Stronmagachan	208280 714111	434 m west of the main Development location on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Stronmagachan Steading	208235 714085	485 m west of the main Development on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Three Bridges	208804 712398	1.18 km west of the Development access track on opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Low Balantyre Cottage	208483 711150	1.07 km west of the Development access track on opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to separation by River Aray and distance to Development.

Property	Grid Reference	Distance from Development	Supply present?	Comment on supply type and hydrological connectivity
Low Balantyre	208481 711141	1.08 km west of the main Development location on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to separation by River Aray and distance to Development.
Linnieghluttain	208935 712955	952 m south-west of the main Development location on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to separation by River Aray.
Sallachry East	207640 712217	2.04 km west of the main Development location on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Sallachry West	207663 712214	2.07 km west of the main Development location on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Kilmun	207883 712729	1.62 km west of the main Development location on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.
Dalbhuie	209089 711409	628 m west and downslope of the Development access track.	Assumed – surface water abstraction.	Hydrologically disconnected by topography.
Druim Breac	208097 714610	573 m west of the main Development location on the opposite bank of River Aray.	Yes – surface watercourse.	Hydrologically disconnected due to topography and separation by River Aray.
The Byre, North Tullich	209233 715179	218 m west of the main Development location on the opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to separation by the River Aray and the A819.
South Tullich	208499 715431	356 m of the main Development location on the opposite bank of River Aray.	Yes – surface watercourse.	Hydrologically disconnected due to topography and separation by River Aray.
Ladyfield Farm	209034 715606	138 m west and immediately downslope of the main Development location.	Yes – surface watercourse.	Hydrologically connected by a watercourse which flows from east to west through the Development. Domestic and Agricultural use.
Stucscardan	212756 713823	1.98 km south-east of the main Development location.	Assumed – surface water abstraction.	Hydrologically disconnected. Located in separate hydrological catchment.
Maan House	212195 712860	1.78 km south-east of the main Development location.	Yes – surface watercourse.	Hydrologically disconnected. Located in Separate hydrological catchment.

Property	Grid Reference	Distance from Development	Supply present?	Comment on supply type and hydrological connectivity
Ballintyre	207860 711725	1.71 km west of the Development access track on opposite bank of River Aray.	Assumed – surface water abstraction.	Hydrologically disconnected due to topography and separation by River Aray.

Of these 21 properties, 20 are considered to be hydrologically disconnected from the Development and so have been scoped out of further assessment.

2.4 Site Visit

Following consultation with the Council and the Applicant, a hydrological site walkover focusing on properties that may have potential hydrological connectivity to the Development was carried out from 29th November 2021 to 2nd December 2021 to verify the source locations for each supply. One property was identified (Ladyfield Farm) as hydrologically connected to the Development. The location of these PWS can been seen in Section 3.3.

3. RISK ASSESSMENT

3.1 Introduction

A PWSRA was undertaken in accordance with 'Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems'[8].

The risk assessment reviewed desk-based information associated with PWS, including geological maps, historical maps, and surface water catchments. Where locations of the PWS water source are provided, this detail was overlain with mapped infrastructure associated with the Development to inform an initial source-pathway-receptor model.

Following the initial desk-based review, PWS and associated properties are identified as potentially 'at-risk' or 'not at-risk' from the Development. The level of risk is attributed to each of the PWS based on the sensitivity level of the receptor (source water, distribution infrastructure and point of supply), the criteria of which is outlined in Table 3.1, combined with the level of magnitude of change, for which the criteria is outlined in Table 3.2.

Table 3.1 Estimating the Sensitivity of Receptors

Sensitivity of Receptor	Definition
High	The hydrological receptor will support abstractions for public water supply, or private water abstractions which supply more than 25 people and / or 100 livestock (at any given point in the year) and/ or is used for the mass-production of food and drinks.
Medium	Hydrological receptor supports abstractions for PWS for limited agricultural use (at any given point in the year), or where mains water supply is available.
Low	The hydrological receptor does not support abstractions for public water supply or private water abstractions
Negligible	The receptor is resistant to change and is of little environmental value.

[8] SEPA (2014) *Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems* [online] available at: http://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf [Accessed 07/04/2023].

Table 3.2 Magnitude of Potential Impacts

Magnitude of Change	Definition
High	A major permanent or long-term negative change to quality or available yield.
Medium	The yield of existing supplies may be reduced or quality slightly deteriorated.
Low	Any changes to quality, quantity or continuity do not result in a perceptible alteration to baseline conditions.
Negligible	No effect from Development to water quality, quantity, or continuity based on non-existent pathway in the 'source-pathway-receptor' model (this may be determined following avoidance and / or mitigation measures).

Effects predicted to be of major or moderate significance are 'significant' in the context of the EIA Regulations and are shaded in light grey in Table 3.3.

Table 3.3 Framework for Assessment of Significance of Effects

Magnitude of Effect	Sensitivity of Resource or Receptor			
	High	**Medium**	**Low**	**Negligible**
High	Major	Moderate	Moderate	Minor
Medium	Moderate	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

3.2 Identification of PWS

The details of the identified PWS and their hydrological connectivity to the Development are outlined in Table 6 below, based upon a desk-based risk assessment, letter, and questionnaire (consultation) responses and the site walkover.

Table 3.4 Confirmed Private Water Supplies

Grid Reference (of supply)	Distance to Supply	Distance to Source(s)	Source of supply (type)	Use(s)	Superficial Deposits	Hydrogeology	Groundwater Classification
PWS Ladyfield Farm (Surface water)	138 m downhill to the west of the Development boundary.	- Within western edge of Development boundary. - 683 m north-west of existing access track. - 886 m west of existing access track.	Surface water burn/stream.	Domestic / Agricultural	Crinan Grit Formation – Quartzite.	Glacial Deposits - Diamicton, sand and gravel.	Low productivity aquifer. Small amounts of groundwater in near surface weathered zone and secondary fractures.

3.3 Potential Hydrogeological connectivity

This section below provides a review of potential hydrogeological connectivity between the Development and each supply. The conceptual site model – source, pathway, receptor (SPR) – approach is outlined below:

- Source – pollutants or sediment from the Development during construction or during operation phases (should drainage system fail);
- Pathway – as the Development includes a drainage system, any run-off would capture, treat, and discharge run-off to the nearest watercourse. However, this assessment considers the construction phase and if this would fail for any reason. Therefore, these pathways would consider the following:
  - Run-off via overland flow; and
  - Infiltration into the underlying superficial and bedrock aquifers.
- Receptor – each private water supply is considered as a receptor within this assessment.

3.3.1 PWS Ladyfield Farm

Information provided by the Environmental Health Office (EHO) of Argyll and Bute Council stated that there is a PWS present with a single intake source and provided an approximate location. The intake itself lies within the Development boundary and draws from the watercourse Allt à Mhadaidh that runs from Loch Mhadaidh through the Development from east to west.

The nearest Development infrastructure is the existing access track 683 m south-east from the PWS source. However, this access track lies on the opposite side of a small watercourse running south-west from the access track away from the PWS source, providing a hydrological disconnection. The next nearest Development infrastructure is the existing access track 886 m east of the PWS source location. This existing track lies immediately next to the Allt à Mhadaidh watercourse and a new access track and turbine hardstanding are proposed to be constructed immediately adjacent to this watercourse – hydrological buffers included. Several other watercourses feed into Allt à Mhadaidh further upstream than the PWS source that are immediately adjacent to new proposed tracks and hardstanding – hydrological buffers included. This is likely to provide a hydrological connection between Development infrastructure and the PWS source.

Figure 10.1.3 presents the location of source and its catchment area as well as the supply point for Ladyfield Farm.

3.4 Impact Assessment

Following a review of the survey information and potential for supplies to be impacted, Table 3.5 provides a review of each supply and the potential risk to each. The assessment of impacts considers the embedded mitigation outlined within Chapter 10: Hydrology and Hydrogeology, and Technical Appendix 11.4: outline Construction Environmental Management Plan (oCEMP).

Table 3.5 Properties with PWS Connected to Development

PWS	Sensitivity	SPR link present	Magnitude	Significance	Additional Mitigation	Post embedded mitigation significance
PWS Ladyfield Farm (Surface water)	High	Yes	Medium	Moderate (significant under EIA Regulations)	Monitoring of the supply will be implemented to check the quality, quantity, and continuity of the PWS. Following any adverse change in quantity or quality of the water, an investigation into the source of the problem and, if it is the responsibility of the Development, to address the cause and to remove the effect.	Minor

4. PROVISION OF MEASURES TO MINIMISE THE IMPACT ON DRINKING WATER QUALITY DURING CONSTRUCTION

4.1 Embedded Mitigation

The desk-based PWSRA has identified potentially sensitive drinking water receptors within 2 km of the Development, as the supply at the property identified is hydrologically connected to the Development and has the potential to be impacted. Industry good practice measures will be implemented at the Development to protect the water environment and any additional drinking water supplies identified during the pre-construction phase.

To address potential impacts of construction and ongoing impacts of the Development infrastructure on the PWS, construction intends to follow guidance laid out in SEPA LUPS-4[9] and NatureScot Guidance - Good practice during Wind Farm construction[10]. Potential effects from construction include the spillage or leakage of chemicals, fresh concrete, foul water, fuel, or oil, during use or storage on-site. These pollutants have the potential to adversely affect surface water quality and hence effects on the PWS of this receiving watercourse. Therefore, buffer distances between proposed construction works and watercourses have been maximised to reduce the potential for chemical pollutants to be transferred to the water environment. A 50m buffer zone between watercourses and infrastructure (excluding watercourse crossings) has been adopted.

Further best practice embedded construction methods, as outlined in Technical Appendix A11.4 oCEMP, relied upon at various stages of development include:

- Drainage measures installed prior to earthwork activities:
  - Cut-off/ diversion ditches;
  - Temporary interception bunds;
  - Swales; and
  - Retention ponds.
- Drainage measures for permanent or semi-permanent earthworks:
  - Drainage ditches;
  - Sumps; and
  - Culverts.
- Sediment pollution prevention:
  - Silt traps and silt matting;
  - Silt fencing;
  - Check damns; and
- Settlement lagoons.
- Chemical pollution prevention:
- Safe storage methods of chemicals and oils; and
- Chemical spill response measures.

Routine training practices such as staff inductions and toolbox talks will also be conducted.

4.2 Additional Mitigation

Good practice drainage mitigation will be installed as well as a PWS water quality monitoring program with the intention to provide potable water should potential effects be noted by monitoring results. Furthermore, should any adverse change in quantity or quality of the water be detected, an investigation into the problem and, if it is the responsibility of the Development, the cause will be addressed to remove the affect.

[9] SEPA (2017*) Land Use Planning System (LUPS) SEPA Guidance Note 4 v9.0* [online] available at: https://www.sepa.org.uk/library/content-search/?q=LUPS-GU4&LibGo=Search&page=1 [Accessed 05/04/2023]

[10] NatureScot (2019) *Guidance – Good practice during Wind Farm construction* [online] available at: https://www.nature.scot/doc/guidance-good-practice-during-wind-farm-construction [Accessed 12/04/2023]

If any additional supplies are identified in future, full details of water management measures and mitigation will be provided in a Construction and Environmental Management Plan (CEMP) for the Development. A further detailed drainage layout will be provided prior to construction after the Development has been consented.

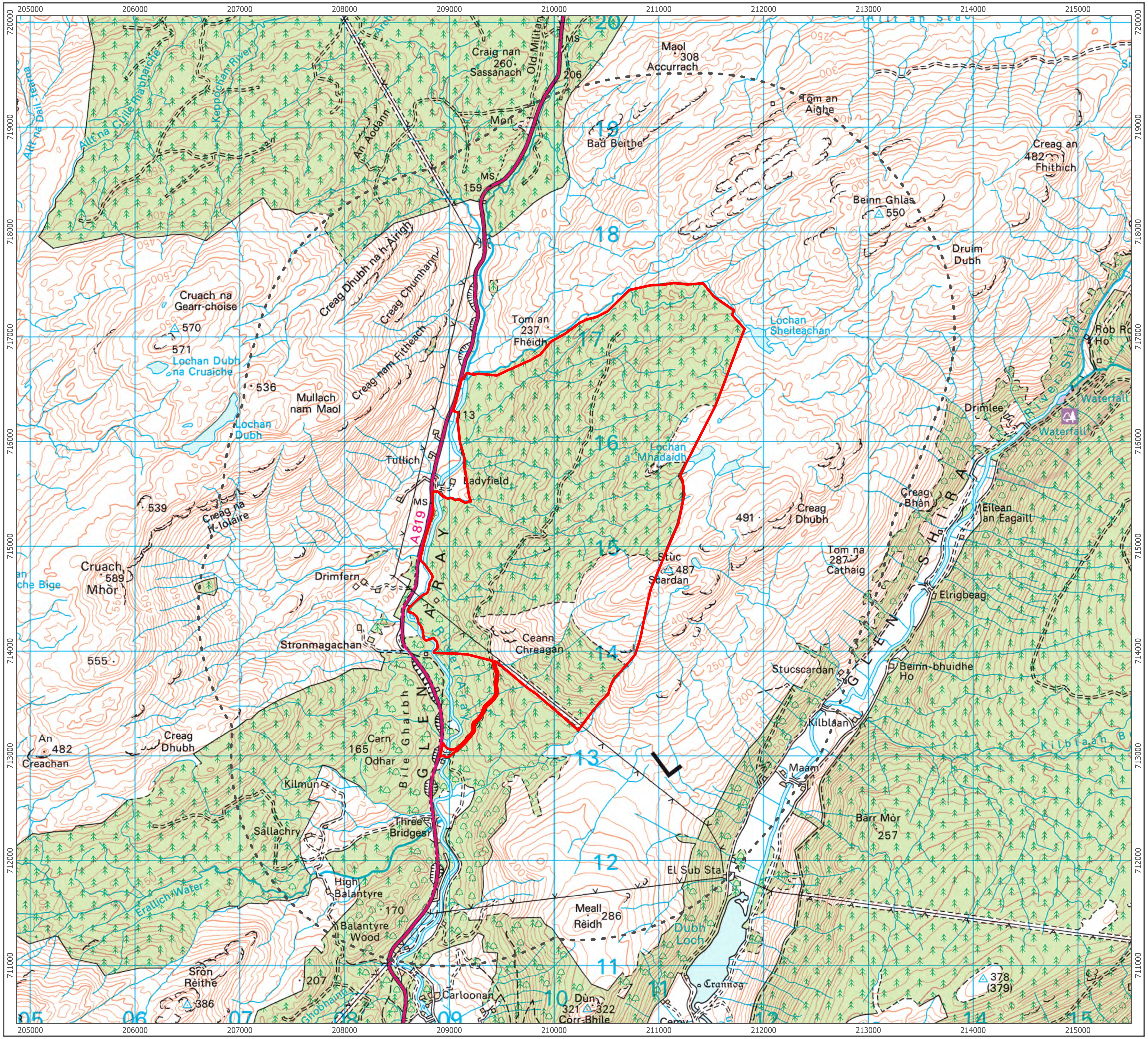
5. SUMMARY

The PWSRA identified 21 properties within 2 km which may have a PWS – 21 identified by the Council consultation process. However, 20 properties were scoped out of further assessment during the resident consultation stage of the PWSRA.

The PWSRA concludes that the PWS at Ladyfield Farm is hydrologically connected to the Development. The embedded mitigation measures summarised in this document and detailed in Technical Appendix 11.4: oCEMP result in the post mitigation significance being minor (high sensitivity, negligible magnitude of effect). Additionally, a monitoring programme of the Ladyfield Farm PWS will be implemented to assess the ongoing water quality, quantity, and continuity of the PWS.

Following any adverse change in quantity or quality of the water, an investigation into the source of the problem will be conducted and, if it is due to the Development, the cause will be addressed and the effect removed. During the investigation, a drinking water bowser would be provided to maintain suitable potable water supply.

FIGURES



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RIDGE CLEAN ENERGY

ERM

Development Boundary

PWS Study Area

1:35,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: IC	Ref: 4378-REP-060
Checked By: GB	Date: 09/09/2023

Private Water Supply Data Request

Figure 10.1.1

Ladyfield Renewable Energy Park EIA Report

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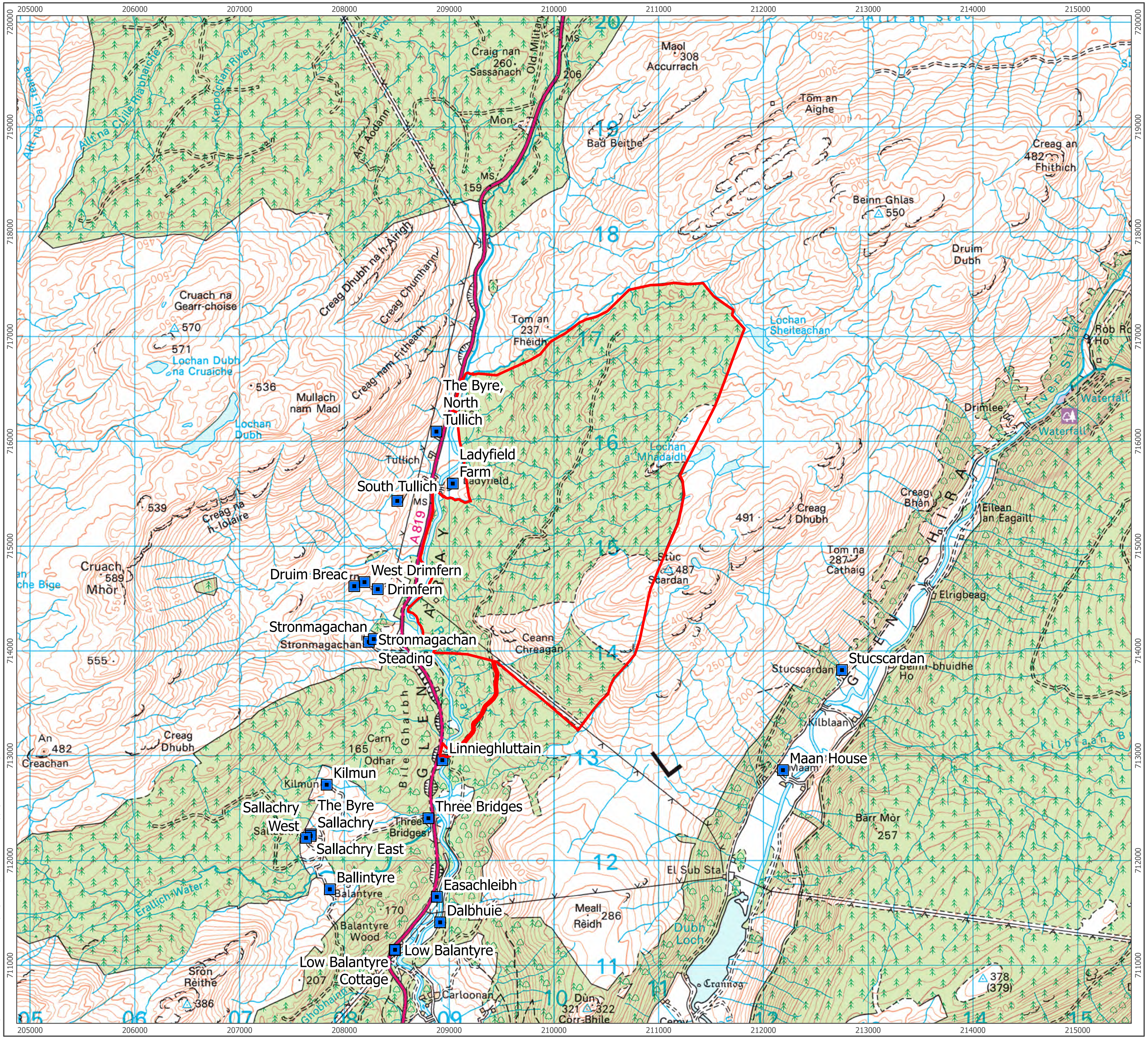

RIDGE CLEAN ENERGY

ERM

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Private Water Supplies
Figure 10.1.2

Ladyfield Renewable Energy Park
EIA Report

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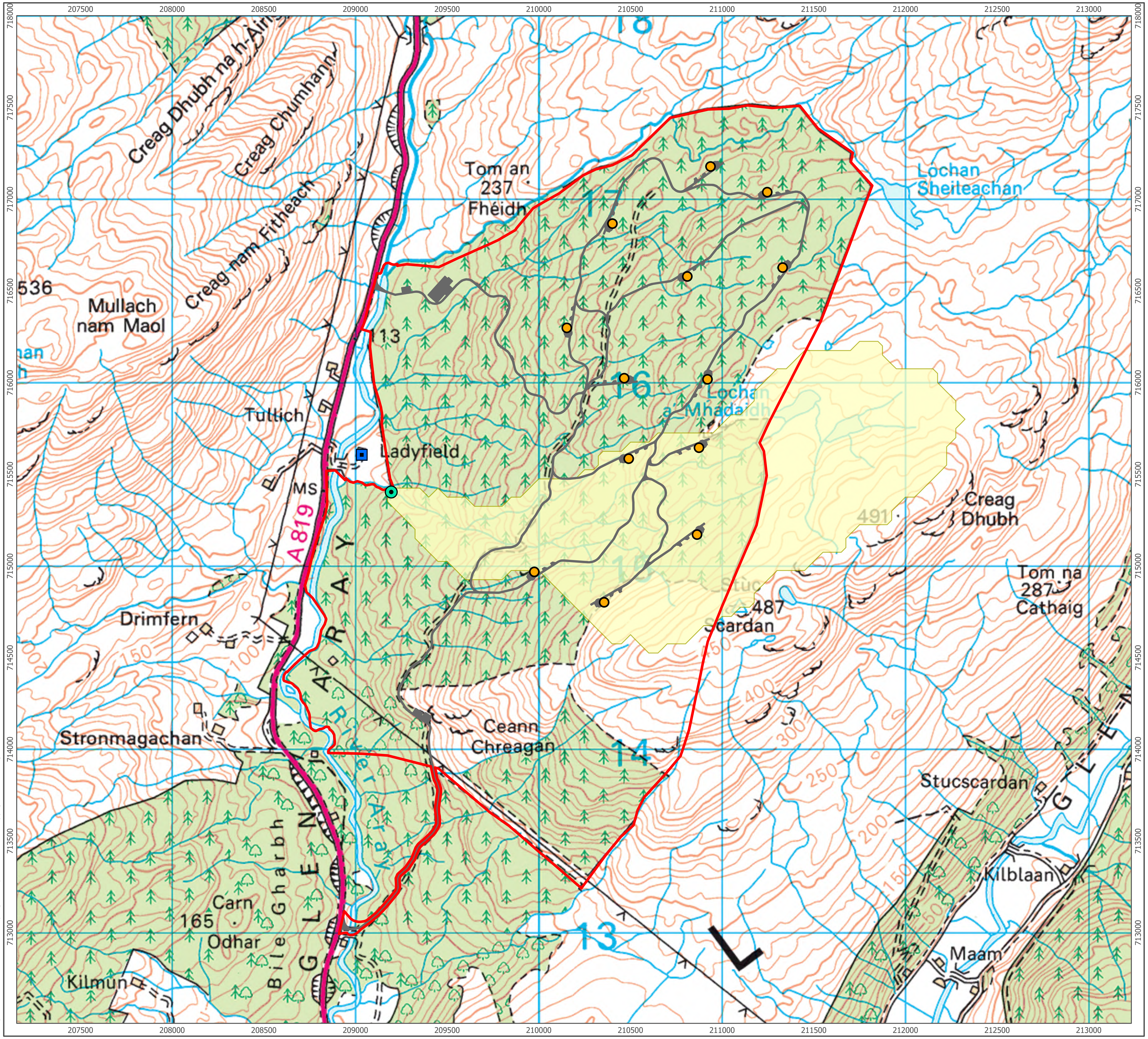

RIDGE CLEAN ENERGY

ERM

- Development Boundary
- Ladyfield Farm Catchment
- Development Infrastructure
- Turbine Location
- Ladyfield Farm Source
- Ladyfield Farm Supply

1:20,000 Scale @ A3

0 0.5 1 km

NORTH

Produced By: IC	Ref: 4378-REP-062
Checked By: GB	Date: 09/09/2023

Ladyfield Farm Private Water Supply Catchment

Figure 10.1.3

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Hydrology\Projects\4378 Ladyfield\4378 Ladyfield.aprx\4378-REP-062 Ladyfield Farm PWS Catchment

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Environmental Impact Assessment – Technical Appendix 11.1: Peat Slide Risk Assessment

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

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TABLE OF CONTENTS

1 INTRODUCTION

1.1 Background

Environmental Resources Management Ltd (ERM) were commissioned by Ladyfield Renewable Energy Park Ltd (the Applicant) to carry out a Peat Slide Risk Assessment (PSRA) for the proposed Ladyfield Renewable Energy Park (the Development). The Development will consist of the following key infrastructure:

- 13 turbines, each with a tip height of up to 180 m. Each turbine may require a small transformer located at its base. Each turbine will have a foundation with an approximate diameter of 25 m;
- Access track to serve the construction and operation of the wind farm with width approximately 5.5 m, this will consist of a combination of upgraded track and newly construction track. New tracks will be constructed of a graded stone or floated, as appropriate for the ground conditions;
- A substation and control building will be located approximately 0.66 km west of T6;
- The project will have a Battery Energy Storage System (BESS) located adjacent to the on-site substation;
- Crane hardstandings will be required adjacent to each turbine, this will consist of an area of approximately 3,450 m^2 at each turbine;
- Two temporary construction compounds will be required during the construction of the Development, forming an area of hardstanding providing space for temporary welfare, parking, lay down areas and potentially concrete batching;
- The project will include a 50m x 40m extension to the existing quarry located at NGR 209387, 714173; and
- The Development will require the felling of existing forestry in necessary areas. There will be replanting on-site and compensatory planting will be required (see Chapter 14: Forestry).

A proposed Site layout is shown on Figure 11.1.1 appended with this PSRA in Appendix A.

1.2 Scope and Purpose

This PSRA provides factual information on the peat survey results relating to the proposed turbine locations. The desk-based information and Site surveys have been utilised to assess the potential risk of any peat landslide. The methodology adopted and details on the assessment are outlined in Sections 3, 4 and 5. The assessment has been undertaken in accordance with Scottish Government Guidance in assessing the likelihood and consequence of such an event.

1.3 Project Team

Team Member	Job Title	Qualifications	No. Years Experience
Miné van der Berg	Graduate Engineer	MSc	3 Years
Gregor Hirst	Senior Engineer	BSc (Hons)	7 Years
Tomos Ap Tomos	Technical Director	BEng (Hons) MCIHT	25 Years

This assessment was undertaken by Miné van der Berg, a Geo-Environmental Engineer with 3 years' experience (1 of those in ground conditions), and was supported by Gregor Hirst, a Geo-Environmental Engineer of 7 years. This Chapter has been technically reviewed by Tomos Ap Tomos, Technical Director of Engineering with 25 years of experience.

2 SITE INFORMATION

2.1 Site Description and Topography

The Site covers an area of approximately 790 hectares (ha), as shown on Figure 11.1.1. The Site is situated approximately 4.7 km north of Inveraray, centred on National Grid References (NGR) 210197, 715498. The Site lies wholly within the administrative boundary of Argyll and Bute Council (the Council).

The predominant land use within the Site consists of private forestry plantation used for commercial purposes with areas of upland moorland also present in the south and east of the Site.

The elevation of the Site ranges from 470 metres (m) Above Ordnance Datum (AOD) in the east of the Site and falls to around 100 m AOD in the west of the Site. There are a number of notable hilltops and ridges within and surrounding the Site including:

- Ceann Chreagan, in the south of the Site;
- Stuc Scardan, directly east of the Site; and
- Tom an Fheidh, directly north to the Site.

There are a number of watercourses within the Site, as well a number of small lochans within and surrounding the Site. These include:

- River Aray, flowing north to south in the west of the Site;
- Allt Sheileachan, in the north of the Site;
- Allt a' Mhadaidh. in the centre of the Site;
- Lochan Mhadaidh, in the east of the Site; and
- Lochan Sheileachan, directly east of the northeast area of the Site.

As well as Allt Sheileachan and Allt a' Mhadaidh, there are also numerous unnamed tributaries draining into the River Aray, flowing from the west of the Site to the east.

2.2 Aerial Photography Review

A historic review of aerial photography available from the Site was undertaken. Image 1 shows the aerial photography from 2021 for the Site and the surrounding areas. It can be seen that there is limited infrastructure in this area apart from tracks on the Site itself and in the surrounding area. There is an existing quarry located on the Site which is not visible from the aerial images. The Site is mostly covered by forested areas but the eastern side of the Site has visibly less forestry than the western portion.

Image 1: 2021 Aerial View of the Site and surrounding areas

2.2.1 Historical Imagery

In addition to the aerial view of the Site shown in the section above, historical imagery from the Site between 1985 and 2021 are shown in Table 1. The imagery shows that the Site was vacant before 1985, with limited initial forestry operations starting at the Site before 2004. The forestry operations at the Site became established at some point prior to 2014.

Table 1: Historical Imagery Review

	
1985	2004
	
2014	2021

2.3 Published Geology

2.3.1 Superficial Soils

Published geological mapping[1] indicates that there are localised pockets of Devensian-Diamicton Till, Hummocky Glacial deposits of Diamicton, and Alluvium in isolated areas on the Site. There are no recorded superficial peat deposits on the Site.

The following information is a summary of the information on soil units within Scotland's Soils, Scotland's Environment Website[2].

National Soils Map of Scotland mapping indicates a varied soil composition as the survey area is large. The majority of the Site is underlain by Peaty gleys. In the eastern areas of the Site there is an isolated occurrence of Montane soils. The western portion of the Site has occurrences of Mineral Podzols. Towards the southern portions of the Site there are occurrences of Peaty Podzols.

The carbon and Peatland Map 2016[3] details that the Site is mostly underlain by class 5 peat. The eastern areas of the Site is underlain by small portions of class 2 and class 3 peat, on the steep slopes located in the south eastern portions of the Site. Class 5 peat is described as "*Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat."*

Superficial Soils within the context of the Site are conveyed on Figure 11.1 in Chapter 11: Geology, Soils and Peat.

2.3.2 Solid Geology

Published bedrock geology mapping[4] indicates that the Site is underlain by various sedimentary and igneous groups.

Throughout the majority of the Site the main bedrock geology is Quartzite from the Crinan Grit Formation. There are smaller areas of Metagabbro and Metamicrogabbro from the Daldrian Supergroup in the central and north western portions of the Site.

Throughout the Site there are isolated occurrences of the following bedrock geology:

- Mafite from the North Britain Siluro-Devonian Calc-Alkaline Dyke Suite;
- Metalimestone and Pelite from the Argyll Group;
- Phyllitic Semipelite and Quartzite from the Ardshaig Phyllite Formation;
- Quartz-Microgabbro from the Central Scotland Late Carboniferous Tholeiitic Dyke Swarm;
- Felsite from the Scottish Highland Siluro-Devonian Calc-Alkaline Minor Intrusion Suite;
- Graphitic Pelite from the Tayvallich Slate and Limestone Formation.

Bedrock Geology within the context of the Site is conveyed on Figure 11.2 in Chapter 11: Soils, Geology and Peat.

2.3.3 Geomorphology

Geomorphological mapping can act as a primary instrument in highlighting geological risk factors when considering peat slides. The Scottish Government guidance provides 5 basic features in which a geomorphological map should convey:

- The position of major slope breaks (e.g. convexities and concavities);
- The position and alignment of major natural drainage features (e.g. peat gullies and streams);

[1] British Geological Survey Mapping Website https://www.bgs.ac.uk/information-hub/bgs-maps-portal/ Accessed 02.10.23)
[2] Scotland's Environmental Website: http://soils.environment.gov.scot/ (Accessed 02.10.23)
[3] Scotland's Environment, Carbon & Peatland 2016. Available at: https://map.environment.gov.scot/Soil_maps/?layer=10 (Accessed 02.10.23)
[4] British Geological Survey Mapping Website https://www.bgs.ac.uk/information-hub/bgs-maps-portal/ Accessed 02.10.23)

- The location and extent of erosion complexes (e.g. haggs and groughs, large areas of bare peat);
- Outlines of past peat landslides (including source areas and deposits), if visible; and
- The location, extent and orientation of cracks, fissures, ridges and other pre-failure indicators.

Figure 11.1.2: Geomorphological Map has been prepared to inform a baseline information of the Site with consideration given to existing site conditions through site visit and aerial photography, slope angle and geomorphological data.

From field observations and aerial review of the Site, there does not appear to be much exposed peat, scarring, hagging or drainage channels on the Site. There is one area of exposed peat in the north of the Site, south of Turbine 1. This is not a large area and only contained two probing points.

Factors that could lead to peat instability is shown on Figure 11.1.2: Geomorphological Map.

There is commercial forestry on Site, therefore the likelihood of artificial drainage being present on the Site cannot be discounted.

2.3.4 Hydrology and Hydrogeology

The groundwater units underlying the Site are identified by Scotland's Environment mapping service[5] as the Oban and Kintyre groundwater body. It is classified as 'good' by SEPA.

BGS 1:625,000 digital mapping and the BGS GeoIndex mapper shows the bedrock aquifer underlying the majority of the Core Study Area to consist of Argyll Group – psammite, semipelite and pelite which dominates the central and northern area of the Core Study Area.

The BGS groundwater vulnerability[6] ranges between 4a to 5 defining the underlying rocks as vulnerable to pollutants not readily adsorbed.

Groundwater vulnerability classes range from 1 to 5, with 5 being most vulnerable. Class 4 is subdivided into 4a and 4b. It is the hydrogeological characteristics within the pathway rather than the 'importance' of a particular aquifer that results in the final vulnerability classification. The methodology behind the classification assumes that where contaminants move through unsaturated fractured bedrock, no attenuation of pollutants can take place. Large parts of Scotland show areas of Classes 4 and 5, reflecting the widespread occurrence of rocks dominated by fracture flow. Rocks which are not exposed at the surface and are overlain by superficial deposits have a reduced potential for attenuation of contaminants.

Further details of the hydrogeology are included in Chapter 10 - Hydrology & Hydrogeology of the Environmental Impact Assessment Report (EIAR).

2.3.5 Meteorological Data

There is no weather station located on the Site itself, so rainfall data from the two closest rainfall stations[7] have been included to give an indication of the rainfall expected at the Site. This data is included in Table 2 and includes rainfall data for the Glen Strae rainfall station located 15 km to the north of the Site, as well as the Lingerton station located 36 km to the south of the Site. This rainfall data was collected between September 2022 and August 2023.

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[5] SEPA (undated) Groundwater classification [Online] Available at: https://map.environment.gov.scot/sewebmap/ (Accessed: 02.10.23)

[6] BGS (2015) Groundwater Vulnerability (Scotland) GIS dataset, Version 2 [Online] Available at: http://nora.nerc.ac.uk/id/eprint/509618/1/OR15002.pdf (Accessed: 02.10.23)

[7] SEPA (2023) Rainfall Data for Scotland [online] Scottish Rainfall Data - provided by Scottish Environment Protection Agency (SEPA) (Accessed 02.10.23)

Table 2: Mean Monthly Rainfall Data

Rainfall Station	Mean Monthly Rainfall (mm)											
	Sep 2022	Oct 2022	Nov 2022	Dec 2022	Jan 2023	Feb 2023	Mar 2023	Apr 2023	May 2023	Jun 2023	Jul 2023	Aug 2023
Glen Strae	225.3	295.3	270.0	302.0	323.7	273.8	218.3	129.7	156.0	144.2	151.2	192.2
Lingerton	144.9	178.1	165.1	187.4	179.4	153.0	130.7	89.1	101.7	92.4	114.8	135.5

2.4 Sources of Information

The following sources of information were used as part of the desk study investigations:

- British Geological Survey - Online GeoIndex;
- Geosure landslip data;
- Ordnance Survey (OS) topographical information;
- Historical OS mapping;
- Aerial and Satellite photography via Ordnance Survey and Google Earth;
- Defra 'Magic' maps;
- Soil Survey of Scotland - 'MacAulay Institute for Soil Research' 1984;
- Soil Survey of Scotland - 'Scottish Peat Surveys' 1964;
- Scottish Government (SG) - 'Peat Landslide Hazard and Risk Assessments' December 2017;
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey, Guidance on Developments on Peatland;
- Carbon and Peatland Mapping 2016;
- National Planning Framework 4 (NFP4) (2023);
- Assessments by other EIA specialists (specifically hydrology and ecology for data on sensitive receptors); and
- Scotland's Environment Interactive Map

No relevant comments from landowners, land managers, local residents or newspaper articles were found to inform this assessment.

3 GUIDANCE AND METHODOLOGY

3.1 General Guidance on Peat Failure

The Scottish Government guidance 'Peat Landslide Hazard and Risk Assessments - Best Practice Guide for Proposed Electricity Generation Developments[8]', divides peat instability into two categories, 'peat slides' and 'bog bursts'. The guidance states that peat slides have a greater risk of occurrence in areas where:

- Peat is encountered at or near to ground surface level;
- The thicknesses are recorded in the region of 2.0 m (above which, in general terms, peat instability would increase with peat thickness); and
- The slope gradients are steep (between 5° and 15°).

Bog bursts are considered to have a greater risk of occurrence in areas where:

- Peat depth is greater than 1.5 m; and
- Slope gradients are shallow (between 2° and 10°).

[8] Scottish Government (2017) Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments [Online]. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2017/04/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/documents/00517176-pdf/00517176-pdf/govscot%3Adocument/00517176.pdf (Accessed 02.10.23)

It should be noted however that peat instability events, although uncommon, can occur out with these limits and reports of bog bursts are generally restricted to the Republic and Northern Ireland.

Preparatory factors which effect the stability of peat slopes in the short to medium-term include:

- Loss of surface vegetation (deforestation);
- Changes in sub-surface hydrology;
- Increase in the mass of peat through accumulation, increase in water content and growth of tree planting; or
- Reduction in shear strength of peat or substrate due to chemical or physical weathering, progressive creep and tension cracking.

Triggering factors which can have immediate effects on peat stability and act on susceptible slopes include:

- Intensive rainfall or snow melt causing pressures along existing or potential peat/substrate interfaces;
- Alterations to drainage patterns, both surface and sub-surface;
- Peat extraction at the toe of the slope reducing the support of the upslope material;
- Peat loading (commonly due to stockpiling) causing an increase in shear stress; and
- Earthquakes or rapid ground accelerations such as blasting or mechanical movement.

Consideration of peat stability should form an integral part of the design of a windfarm development. While peat does not wholly provide a development constraint, areas of deep peat or peat deposits on steep slopes should be either avoided through design and micro-siting or mitigation measures should be designed to avoid potential instability and movement.

3.2 Assessment Approach

This PSRA has been carried out in accordance with the Scottish Government guidance outlined in Section 3.1.

In 2023 the new National Planning Framework 4 (NFP4)[9] for Scotland was published. In relation to peat and the assessment of effects on resource, NPF4 has a policy specifically relating to soils, aimed "*to protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development*". These policy, framework and guidance documents are therefore also considered in this PSRA. The PSRA undertaken is based on;

- Desk based assessment;
- Site visits;
- Historic peat probing data;
- Further peat probing including infrastructure specific probing; and
- A hazard and risk ranking assessment.

The area of the Development subject to assessment was determined by initial finding from desk studies and anticipated peat deposits as well as other physical and environmental constraints.

3.3 Peat Probing Methodology

Initial peat probing (phase one) was undertaken in November 2021 as part of the preliminary EIA works which combined preliminary probing and detailed peat probing within the boundaries of a Site layout iteration. The probing covered an initial design iteration at 100 m centres within the proposed Site boundary where forestation allowed.

This phase one probing was used to determine the distribution of peat across the Site. This peat distribution was used to determine the initial Site infrastructure layout. Following on from this, infrastructure was probed at a more detailed methodology (phase two) between February and April 2023. Proposed access tracks were probed at 50 m intervals and at 25 m either side to create

[9] Scottish Government (2023) National Planning Framework 4. [online] National Planning Framework 4 (www.gov.scot) (Accessed on 02.10.23)

a micrositing corridor. Localised 10 m centres at turbines out to 50 m radius were also sunk in accordance with Scottish Government guidance.

3.3.1 Development of Hazard Rank

The early stages of the PSRA includes a desk study of existing data and considers whether Site visits and peat probing were carried out in parallel with the assessment of wider constraints and the development of the wind farm layout. Following identification of peat depths within the Site, the assessment was carried out to determine the potential effects on the peat resource from construction activities which would include:

- Construction of tracks;
- Excavation of turbine bases;
- Foundation construction;
- Construction of the BESS, sub-station and Site Compounds;
- Construction of harstandings; and
- Temporary storage of peat.

An assessment of the peat probing data and a review of any available Site information was undertaken and a hazard rank calculated zonally across the Site reflecting risk of peat instability/constraint to construction.

Where practical, the Development layout was designed to avoid areas of a risk score above 'low'. Where this has not been achieved, areas affected have been discussed in both the EIA as having significant effect, with relative mitigation measures proposed to reduce this, and recorded on a risk register which sets out specific mitigation measures which are considered necessary to reduce the risk of inducing instability.

4 SITE SURVEYS

4.1 Introduction

The existing peat depths across the Site have been determined through a phased survey approach. The survey was initiated to inform the EIA and Site design work while supporting the PSRA.

Phase 1 of the peat depth surveys was undertaken in November 2021 and the results of this survey informed the initial site layout of the Development. This survey comprised of a 100 m grid covering the whole site, where possible. This rationale of probing is in accordance with the phase one approach as detailed in the Scottish Government guidance for investigating peat.

Further peat depth surveys (phase two) were undertaken between February and April 2023 as part of the design finalisation process. Targeted peat probing was carried out across proposed infrastructure including proposed turbines, access tracks, borrow pit, BESS and other key infrastructure. Peat depths were measured along the proposed access tracks at 50 m centres with offsets of 25 m on either side of the centre line, while an intense 10 m x 10 m provided detailed peat information at the proposed turbine locations.

4.2 Peat Depth

A total of 3,145 probes were recorded during the total peat probing with depths ranging between 0.0 m and 7.2 m.

Peat depths were generally shallow throughout the Site, with nearly 74% of probes recording depths of between 0 and 0.5 m and nearly 90% no greater than 1.0 m. However, a small concentration of probes along a section of proposed track in the central northern portion of the Site recorded peat depths of up to 7.2 m. The average peat depth across the Site was recorded as 0.50 m.

Figure 11.1.3 in Appendix A illustrates the recorded peat depths, while Figure 11.1.4 displays the interpolated peat depths. The recorded peat depths are summarised in Table 3 below:

Table 3: Phase 2 Peat Survey Summary

Peat Depth Range (m)	№ of Peat Probes	Percentage of Total (%)
0.00 - 0.50	2,323	73.9%
0.51 - 1.00	496	15.8%
1.01 - 1.50	112	3.5%
1.51 - 2.00	111	3.6%
2.01 - 2.50	39	1.2%
2.51 – 3.00	26	<1%
3.01 - 4.00	34	1.1%
4.01 - 5.00	1	<1%
5.01 - 6.00	1	<1%
6.01 - 7.00	1	<1%
7.01 - 8.00	1	<1%
Total	**3,145**	

4.3 Substrate

No substrate estimations were taken during the Phase 1 or Phase 2 probing on the Site. The underlying geology and soils may contribute to peat stability on the Site with clay or previous slip material being at higher risk for peat slides than gravel or rock material. The coefficients assigned to the various substrate types are discussed in Section 5.4.

The majority of the Site consists of unrecorded superficial soils, with the portions of the Site that have recorded superficial soils not indicating the possible presence of clays on Site. The absence of recorded superficial soils indicates the presence of rock or gravel as substrate material.

However, a conservative 'not proven' value, equivalent to the coefficient used for clay subsoil has been adopted for this assessment, which is likely to overstate the actual risk of peat slide on the Site. No evidence of land slip or historic peat slides were observed during the site surveys.

4.4 Limitations

The entire area encompassed by the Site boundary was not probed during the Phase 1 survey. This was not amended during the phase two survey as there is no Site infrastructure located in the unprobed area of the Site in the west of the Site. The peat depths in the area around the un-probed area were also lower and in a lower risk zone, therefore the area was not deemed to be a risk. These areas are also downslope of any proposed infrastructure, therefore any peat slides that occur in this area will not have an effect on any of the proposed or current infrastructure.

There are no probes located on the proposed southern access track. The probing points for the widening of the current access track are located within areas that will not have peat such as over a watercourse, or on the existing access track. Therefore, no probes were taken in this area as the likelihood of peat occurrences in this area are very low.

5 HAZARD AND EXPOSURE ASSESSMENT

5.1 Background

A 'Hazard Ranking' system has been applied across the Site based on the analysis of risk of peat landslide as outlined in the Scottish Government guidance. This is applied on the principle:

Hazard Ranking = Hazard x Exposure

Where 'Hazard' represents the likelihood of any peat slide event occurring and 'Exposure' being the impact or consequences that a peat slide may have on sensitive receptors that exist on and around the study area.

5.2 Methodology

The determination of Hazard and Exposure values is based on a number of variables which impact the likelihood of a peat slide (the Hazard), and the relative importance of these variables specific to the Site.

Similarly, the consequences or Exposure to receptors is dependent on variables including the particular scale of a peat slide, the distance it will travel and the sensitivity of the receptor.

In the absence of a predefined system, the approach to determining and categorising Hazard and Exposure is determined on a Site by Site basis. The particular system adopted for the Development PSRA assessment is outlined in the following sub sections.

5.3 Hazard Assessment

The potential for a peat slide to occur during the construction of a windfarm depends on several factors, the importance of which can vary from site to site. The factors requiring considerations would typically include:

- Peat depth;
- Slope gradient;
- Substrate material;
- Hydrology;
- Distance between the closest receptor and the point being evaluated;
- Evidence of instability or potential instability; and
- Vegetation cover.

Of these, peat depth and slope gradient are considered to be principal factors. Without a sufficient peat depth and a prevailing slope, peat slide hazard would be negligible. For the Development, the substrate material is also considered a relevant factor in relation to slide.

The slope data is derived from Ordnance Survey 5 m Digital Terrain Model (OS 5 m DTM). The slope gradients for the Site are illustrated on Figure 11.1.5.

Hazard rankings at each probe point were determined by assigning coefficients based on peat depth, slope gradient and substrate material as outlined in Section 5.4.

The other factors have not been assigned coefficients but have nonetheless been built into the assessment. In regards to hydrology, major and minor watercourses are assigned different coefficients to reflect the sensitivity of the receptor with the distance of each probe from a watercourse affecting its hazard ranking.

No existing peat instability was recorded at the Site, however in the event that slip material is recorded at a probing point, this is fed into the hazard assessment and the highest substrate coefficient is assigned to reflect the highest potential level of hazard.

Vegetation plays a key role on both peatland quality and in reducing the risk of instability in peatland. Vegetation provides structure to the upper soil horizons and acts as an important regulator of water content in peat above the water table. The presence of bare or eroded peat can be an indicator of instability risk due to the lack of vegetation providing stability. No bare peat and only limited areas of eroded peat have been recorded out with the areas of historic peat cutting as indicated on the geomorphology map. The presence of forestry and requirement for felling can also present a risk of instability due to the removal of established root systems and resulting lack of vegetation. There are several areas of established forestry on the Site and this may pose an increased risk on the Site of slide risk due to vegetation clearance. Further details of vegetation present at the Site are discussed in Chapter 8: Ecology and the associated Technical Appendices.

Due to the nature of the assessment and number of data points used to establish hazard ranking, gathering hydrological data at each probe point through the use of groundwater boreholes and a subsequent monitoring period is considered impractical. Therefore, an assumption on groundwater levels has been adopted for the assessment that 90% of the peat at each probe location is below the water table. As such, it is assumed that the water table across the Site is relatively high.

5.4 Hazard Rating

When several factors may impact on the Hazard potential, a relative ranking process is applied attributing different weighting to each factor as shown below.

Table 4: Coefficients for Slope Gradients

Slope Angle (degrees)	Slope Angle Coefficients
Slope < 2°	1
2° < Slope < 4°	2
4° < Slope < 8°	4
8° < Slope < 15°	6
Slope >15°	8

Table 5: Coefficients for Peat Thickness and Ground Conditions

Peat Thickness	Ground Conditions Coefficients
Peaty or organic soil (<0.5m)	1
Thin Peat (0.5 – 1.0m)	2
Deep Peat (>1.0m)	3*
Deep Peat (>3.0)	8

* - Note that thicker peat generally occurs in areas of shallow gradient and records indicate that thick peat does not generally occur on the steeper gradients.

Table 6: Coefficients for Substrate

Substrate Material	Substrate Coefficients
Sand/gravel	1
Rock	1.5
Clay	2
Not proven	2
Slip material (Existing materials)	5

The Hazard Rating Coefficient for a particular location is calculated using the following equation:

Hazard Rating Coefficient = Slope Gradient x Peat Thickness x Substrate

From the Hazard Rating Coefficient, the risk to stability can be ranked as set out in Table 7.

Table 7: Hazard Rating

Hazard Rating Co-efficient	Potential Stability Risk (Pre-Mitigation)
< 6 Negligible	1
7 to 12 Low	2
13 to 24 Medium	3
25 to 30 High	4

Hazard Rating Co-efficient	Potential Stability Risk (Pre-Mitigation)
>30 Very high	5

This risk of peat slide will be mitigated by micrositing points with high risk of failure to shallower peat, areas that are not covered by a sensitive habitat, or areas with flatter slopes. Mitigation measures will also be implemented such as visual inspections and monitoring during construction in areas with the potential for peat slide risk. Best practice measures relating to drainage of the peat will also be implemented prior to and during construction in order to mitigate the risk of failure.

5.5 Peat Stability Assessment

The likelihood of a particular slope or hillside failing can be expressed as a Factor of Safety. For any potential failure surface, there is a balance between the weight of the potential landslide (driving force or shear force) and the inherent strength of the soil or rock within the hillside (shear resistance).

The stability of a slope can be assessed by calculating the factor of safety F, which is the ratio of the sum of resisting forces (shear strength) and the sum of the destabilising forces (shear stress):

$$F = \frac{c' + (\gamma - m\gamma_w)z\cos^2\beta\tan\phi'}{\gamma z\sin\beta\cos\beta}$$

where c' is the effective cohesion, γ is the bulk unit weight of saturated peat, γ_w is the unit weight of water, m is the height of the water table as a fraction of the peat depth, z is the peat depth in the direction of normal stress, β is the angle of the slope to the horizontal and ϕ' is the effective angle of internal friction. Values of $F < 1$ indicate a slope would have undergone failure under the conditions modelled; values of $F > 1$ suggest conditions of stability.

Peat failures occur due to a combination of pre-existing factors including the morphological, geomorphological, hydrological, and geological and trigger factors. Trigger factors could include heavy rainfall events, the loading of the peat, and excavation of the peat. Peat slides occur when a mass of peat moves as an intact body down a slope. Slides generally occur on a shear plane, usually located close to the base of the peat. The dominant failure method in peat failures looked at by Boylan et al (2008) in Ireland was planar failure as opposed to bog bursts.

5.5.1 Geotechnical Parameters

Peat possesses significant shear strength considering that it can consist of moisture contents of more than 900%. This can be attributed to the small amounts of solid plant matter present within the peat. Water within peat is held in three states, free water within cavities in the soil matrix, capillary water within plant matter and adsorbed water bound to soil particles. Most of the water is held in the soil cavities and can therefore be removed by drainage or consolidation. The hydrological properties of peat play a significant role in the failure of peat (Boylan et al [2008]).

In the absence of any historical hydrological monitoring, an assumption on groundwater levels has been adopted for the assessment, that 90% of the peat column at each probe location is below the water table, an overall conservative approach. While the assessment considers the recorded data at each of the peat probes to establish hazard ranking for the purposes of the peat stability analysis, groundwater depth is conservatively assumed to be within close proximity of the surface, based on the understanding of peat and its hydrological properties that it can consist of up to 90% water by volume.

Assumed geotechnical parameters have been sought from various literature values and for the purposes of the assessment in this report have the following average values have been utilised in the formula to inform the stability assessment;

C′ – effective cohesion (kPa), typically ranging from 2.5 to 8.5 therefore 5.0 has been adopted for the purposes of the assessment.

ϕ – effective angle of friction (°), typically ranging from 21.6 to 43.5 therefore 23 has been adopted for the purposes of the assessment.

ϒ – unit weight (kN/m2), typically ranging from 9.61 to 10, therefore 10 has been adopted for the purposes of the assessment.

In accordance with the best practice method, F values of <1.0 indicate slopes that would experience failure under the modelled conditions and as such are considered areas of high risk. However, Boylan et al (2008) indicate that a relatively high value of F=1.4 should be used to identify slopes with the potential for instability. Adopting a similar and more onerous approach, high risk areas are indicated where F is <1.0, medium risk areas are indicated between 1.0 to 1.5, low risk negligible values > 1.5.

According to Boylan et al (2008), it is unlikely that undrained conditions would exist for many in situ tests due to the higher permeability of peat as compared to clay soils. They found that the application of both drained and undrained analysis in peat failure analysis are questionable. Furthermore, they found that the mode of failure for peat is likely partially drained. Due to this the effective stress strength method (assuming steady seepage of groundwater parallel to ground level) was used with the abovementioned mitigation measure of increasing the F value where slip occurs.

Using digital terrain modelling and GPS co-ordinates of each peat probe, a factor of Safety, F has been calculated for each probe location which has been created through ArcGIS Spatial Analyst tools.

The Factor of Safety (FoS) analysis completed on the probes indicates that of the 3,145 points to date, 30 present a moderate risk and four present a high risk of failure. These points are generally located sporadically across the Site, out with areas of proposed infrastructure.

The Factor of Safety Plan is presented in Figure 11.1.6 in Appendix A.

5.6 Exposure Assessment

The main Exposure receptors identified within the Site and surrounding area which could potentially be affected in the event of a peat slide were existing windfarm infrastructure, blanket bog habitats, existing tracks, watercourses and associated tributaries.

The impact of a peat slide on receptors can be assessed on a relative scale based on the potential for loss of habitat, a historical feature or disruption/danger to the public. To effectively assess the impact, the assessment of Exposure effect must also consider the distance between the hazard and the receptor, and the relative elevation between the two.

5.7 Exposure Rating

Similar to the Hazard Rating, the Exposure Ratings were determined using relative ranking process by attributing the different weighting systems to each factor as shown below:

Table 8: Coefficients for Receptor Type

Receptor	Receptor Coefficients
Road, path or track	3
Minor water feature	6
Site infrastructure	3
Dwelling	6
Major water feature	8

Receptor	Receptor Coefficients
Sensitive Habitat	8

Table 9: Coefficients for Distance from Receptor

Distance from Receptor	Distance Coefficients
> 1 km	1
100 m to 1 km	2
10 m to 100 m	3
<10 m	4

Table 10: Coefficients for Receptor Elevation

Receptor Elevation	Elevation Coefficients
< 10 m	1
10 m to 50 m	2
50 m to 100 m	3
> 100 m	4

The Exposure Rating Coefficient for a particular location is calculated using the following equation:

Exposure Rating Coefficient = Receptor x Distance x Elevation

From the Hazard Rating Coefficient, the risk to stability can be ranked as set out in Table 11.

Table 11: Exposure Rating

Exposure Rating Co-efficient	Potential Stability Risk (Pre-Mitigation)
<6	Very Low
7 to12	Low
13 to 24	High
25 to 30	Very High
>30	Extremely High

5.8 Rating Normalisation

In order to achieve an overall Hazard Ranking in accordance with the Scottish Government Guidance, the Hazard and Exposure Rating Coefficient derived from the coefficient tables are normalised as shown in Table 12.

Table 12: Rating Normalisation

Hazard Rating		Exposure Rating	
Current Scale	**Normalised Scale**	**Current Scale**	**Normalised Scale**
< 6 Negligible	1	<5 Very Low	1
7 to 12 Low	2	5 to 15 Low	2
13 to 24 Medium	3	16 to 30 High	3
25 to 30 High	4	31 to 50 Very High	4
>30 Very high	5	>50 Extremely High	5

The record of the Hazard Rank Assessment is included in Appendix C of this report.

6 HAZARD RANKING

Having identified the rating coefficients as defined in Section 5 of this report, it is possible to categorise areas of the Site with a Hazard Ranking by multiplying the Hazard and Exposure Rating. Hazard Ranking and associated suggested actions matrix are shown in Tables 13 and 14 below:

Table 13 - Hazard Ranking and Suggested Actions

Hazard Ranking		**Action Suggested in the Scottish Executive Guidance**
17-25	High	Avoid project development at these locations.
11-16	Medium	Project should not proceed unless hazard can be avoided or mitigated at these locations, without significant environmental impact, in order to reduce hazard ranking to low or less
5-10	Low	Project may proceed pending further investigation to refine assessment. Mitigation of hazards maybe required through micro-siting or re-design at these locations.
1-4	Negligible	Project should proceed with monitoring and mitigation of peat landslide hazards at these locations as appropriate.

Table 14- Hazard Ranking Matrix

Hazard Rating	5	Low	Low	Medium	High	High
	4	Negligible	Low	Medium	Medium	High
	3	Negligible	Low	Low	Medium	Medium
	2	Negligible	Negligible	Low	Low	Low
	1	Negligible	Negligible	Negligible	Negligible	Low
		1	2	3	4	5
		Exposure Rating				

Receptor exposure was assessed for each of the hazard zones using the approach in Section 5. A summary of the Hazard Ranking result for each identified area is summarised in Table 15 and is presented in Figure 11.1.7 'Hazard Ranking Zonation Plan'.

7 SLIDE RISK AND MITIGATION

7.1 General

The PSRA has shown the majority of the Site to be of a Low and Negligible risk with isolated points that are of moderate or high risk for peat slide. The moderate and high-risk points are generally located on steep slopes and within zones of blanket bog. The majority of these points are not located close to the site infrastructure, but there are moderate risk points that are located close to the Site infrastructure. The Hazard Ranking Plan for the development is shown in Figure 11.1.7 in Appendix A. The Hazard Ranking Plan does not take mitigation measures outlined in Table 15 into account.

The moderate risk points are also located throughout the Site, with isolated occurrences of moderate risk points close to Site infrastructure. Some of the Site infrastructure lying close to moderate risk points include the hardstandings of T2, T6, T11, and T13. These points are not located beneath the hardstandings, but in the areas surrounding the hardstandings of these turbines. These points are isolated occurrences and therefore, with the appropriate mitigation measures and monitoring, the risks associated with the points can be mitigated to low.

The high-risk points found on the Site are all located away from Site infrastructure in areas of blanket bog. Mitigation measures will be applied at the high risk points, and taking this as well as the distance from Site infrastructure into account, these points can be mitigated to low risk.

Further to the hazard areas, a FoS assessment has been undertaken, which provides a sense check of the ranking based system as outlined in Section 5.5 of this PSRA. The 'Factor of Safety Plan' is shown in Figure 11.1.6 and demonstrates that the majority of the Site is located in areas with low risk of failure. There are four points on the Site that have a FoS that is lower than 1, which indicates failure. Two of these points are located within 25 m of access tracks, and one in the centre of the Site outside of the Development footprint. The fourth point is located beneath the northern portion of the hardstanding of T8 – as part of construction activities this peat will be removed, lowering the risk of failure at that point. There are 30 points throughout the Site that indicate moderate risk of failure, these points are located sporadically across the Site, some of which interacting with Site infrastructure. The points that show a moderate risk of failure that also interact with Site infrastructure are isolated occurrences. These points have been noted in Figure 11.1.6, and general mitigation will be implemented in all construction zones that will lower the risk of failure. All of the points indicating failure, or a moderate risk of failure are located in deeper areas of peat with significant slope angles.

There is a risk of peat slide on the Site and mitigation measures as outlined in Table 15 and Section 7.3 of this PSRA should be applied to minimise any risk.

Where the hazard ranking has been lowered through mitigation measures, the original ranking will remain in the overall hazard zoning plan and it should be acknowledged that the hazard zonation plan is based on the pre-mitigation status.

While the specific recommended mitigation is proposed, other mitigation is embedded in the design at EIA stage. It is also necessary for detailed design and construction of the Development infrastructure to be undertaken in a competent and controlled manner.

The embedded mitigation and good practice measures are set out in Section 7.2 and 7.3 of this PSRA. It should be noted that the mitigation measures defined are not exclusive and other forms of mitigation may well be required and should be implemented during construction of the Development. Table 15 provides details of the hazard areas and outlines specific mitigation actions for each area.

Table 15 – Hazard Rank

Hazard Area and Infrastructure		**Unmitigated Hazard**		**Mitigated Hazard**	
Hazard Area	**Infrastructure Affected**	**Ranking**	**Key Aspects**	**Specific Actions**	**Ranking**
1	T3, T6, T7, access tracks, the BESS and substation compound (Refer to Figure 11.1.7).	Low	Location: This zone covers the majority of the north western portion of the Site. Hydrology: There are several minor watercourses in this zone. There is a major watercourse running along the western Site boundary, which is also the boundary of this zone. Peat Depths: Maximum peat depths of 7.2 m Topography: The slope in this zone ranges from 0° to 28°. Receptors: Minor watercourses, major watercourses, roads	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP. During construction visual inspections and monitoring in areas with the potential for peat slide risk should take place. Micro-siting into areas of thinner peat where required.	Negligible

Hazard Area and Infrastructure		**Unmitigated Hazard**		**Mitigated Hazard**	
Hazard Area	**Infrastructure Affected**	**Ranking**	**Key Aspects**	**Specific Actions**	**Ranking**
			and tracks, and site infrastructure.		
2	No Site Infrastructure (Refer to Figure 11.1.7)	Moderate	Location: This zone is located in the central portion of the northern half of the Site. Hydrology: There are several minor watercourses in this zone. Peat Depths: Maximum peat depths of 3.2 m Topography: The slope in this zone ranges from 5° to 24°. Receptors: Minor watercourses.	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP.	Negligible
3	No Site Infrastructure (Refer to Figure 11.1.7)	Negligible	Location: This zone is located in the north eastern corner of the Site. Hydrology: There are several minor watercourses in this zone. Peat Depths: Maximum peat depths of 3.2 m Topography: The slope in this zone ranges from 0° to 13°. Receptors: Minor watercourses, sensitive habitat and site infrastructure (closest receptor for some points but no site infrastructure located within the zone).	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP. Micro-siting into areas of thinner peat where required.	Negligible
4	No Site Infrastructure (Refer to Figure 11.1.7)	Moderate	Location: This zone is located in the central portion of the Site Hydrology: There are several minor watercourses in this zone. Peat Depths: Maximum peat depths of 3.2 m Receptors: Minor watercourses, sensitive habitat and site infrastructure (closest	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP.	Low

Hazard Area and Infrastructure		**Unmitigated Hazard**		**Mitigated Hazard**	
Hazard Area	**Infrastructure Affected**	**Ranking**	**Key Aspects**	**Specific Actions**	**Ranking**
			receptor for some points but no site infrastructure located within the zone). Topography: The slope in this zone ranges from 0° to 20°.		
5	Access tracks (Refer to Figure 11.1.7)	Negligible	Location: This zone is located in the central portion of the Site Hydrology: There are several minor watercourses in this zone. Peat Depths: Maximum peat depths of 3.1 m Topography: The slope in this zone ranges from 0° to 17°. Receptors: Minor watercourses, roads and tracks and site infrastructure.	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP. Micro-siting into areas of thinner peat where required. During construction visual inspections and monitoring in areas with the potential for peat slide risk should take place.	Negligible
6	Access tracks (Refer to Figure 11.1.7)	Negligible	Location: This zone is located in the central portion of the Site Hydrology: There are several minor watercourses in this zone. Peat Depths: Limited peat data in this zone but maximum peat depths of 1.5 m Topography: The slope in this zone ranges from 2° to 17°. Receptors: Minor watercourses and site infrastructure.	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP. Micro-siting into areas of thinner peat where required. During construction visual inspections and monitoring in areas with the potential for peat slide risk should take place.	Negligible
7	No Site Infrastructure (Refer to Figure 11.1.7)	Moderate	Location: This zone is located towards the central portion of the Site. Hydrology: There are several minor watercourses in this zone. Peat Depths: Limited peat data in this zone	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP.	Low

Hazard Area and Infrastructure		**Unmitigated Hazard**		**Mitigated Hazard**	
Hazard Area	**Infrastructure Affected**	**Ranking**	**Key Aspects**	**Specific Actions**	**Ranking**
			but maximum peat depths of 3.2 m Topography: The slope in this zone ranges from 6° to 19°. Receptors: Minor watercourses and sensitive habitat.		
8	T9, T10, T11, T12, T13 and access tracks (Refer to Figure 11.1.7).	Low	Location: This zone covers the majority of the south western and central portions of the site. Hydrology: There are several minor watercourses in this zone. Peat Depths: Limited peat data in this zone but maximum peat depths of 4.0 m Topography: The slope in this zone ranges from 0° to 42°. Receptors: Minor watercourses, sensitive habitat, roads and tracks, and site infrastructure.	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP. Micro-siting into areas of thinner peat where required. During construction visual inspections and monitoring in areas with the potential for peat slide risk should take place.	Negligible
9	No Site Infrastructure (Refer to Figure 11.1.7)	Moderate	Location: This zone is located in the south eastern portion of the Site. Hydrology: There are several minor watercourses in this zone. Peat Depths: Limited peat data in this zone but maximum peat depths of 3.2 m Topography: The slope in this zone ranges from 0° to 34°. Receptors: Minor watercourses, site infrastructure, roads and tracks, and sensitive habitats.	Best practice measures in relation to drainage prior to and during construction will be implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP.	Low
10	T1, T2, T4, T5, T8, and access tracks (Refer to Figure 11.1.7).	Low	Location: This zone covers the majority of the north eastern portion of the Site.	Best practice measures in relation to drainage prior to and during construction will be	Negligible

Hazard Area and Infrastructure		**Unmitigated Hazard**		**Mitigated Hazard**	
Hazard Area	**Infrastructure Affected**	**Ranking**	**Key Aspects**	**Specific Actions**	**Ranking**
			Hydrology: There are several minor watercourses in this zone. Peat Depths: Maximum peat depths of 5.5 m Topography: The slope in this zone ranges from 0° to 32°. Receptors: Minor watercourses, sensitive habitat and site infrastructure.	implemented as well as the management of peat and peaty soils as outlined in Technical Appendix 11.2 oPMP. During construction visual inspections and monitoring in areas with the potential for peat slide risk should take place. Micro-siting into areas of thinner peat where required.	

7.2 Embedded Mitigation

Embedded mitigation includes measures taken during design of the Development as actively informed by the peat probing survey work to reduce the potential for peat slide risk. In summary, the principal measures that have been taken are:

- The use of floating tracks where peat depths are greater than 1.0 m (the floating tracks can be viewed in Figure 11.1.8: Floating Tracks);
- Locating infrastructure on shallower slopes, where possible; and
- Locating infrastructure on areas of shallow peat (or no peat) where possible.

7.3 Peat Slide Mitigation Recommendations

The following mitigation measures should be adopted post consent stage to validate the PSRA and influence the detailed design of the Development:

- Ground investigations prior to detailed design;
- Identification of areas sensitive to changes in drainage regime prior to detailed design;
- Update the PSRA as necessary following detailed ground investigations;
- Development of a drainage strategy that will not create areas of concentrated flow and will not affect the current peatland hydrology, particularly in areas where a medium or high peat slide risk has been identified;
- Design of a Development drainage system for tracks and hardstanding that will require minimal ongoing maintenance during the operation of the windfarm;
- Inspection and maintenance of the drainage systems during construction and operation;
- Identification of suitable areas for stockpiling material during construction prior to commencement of works; and
- Consideration of specific construction methods appropriate for infrastructure in peatland (i.e. geogrids) as part of design development.

8 CONCLUSIONS

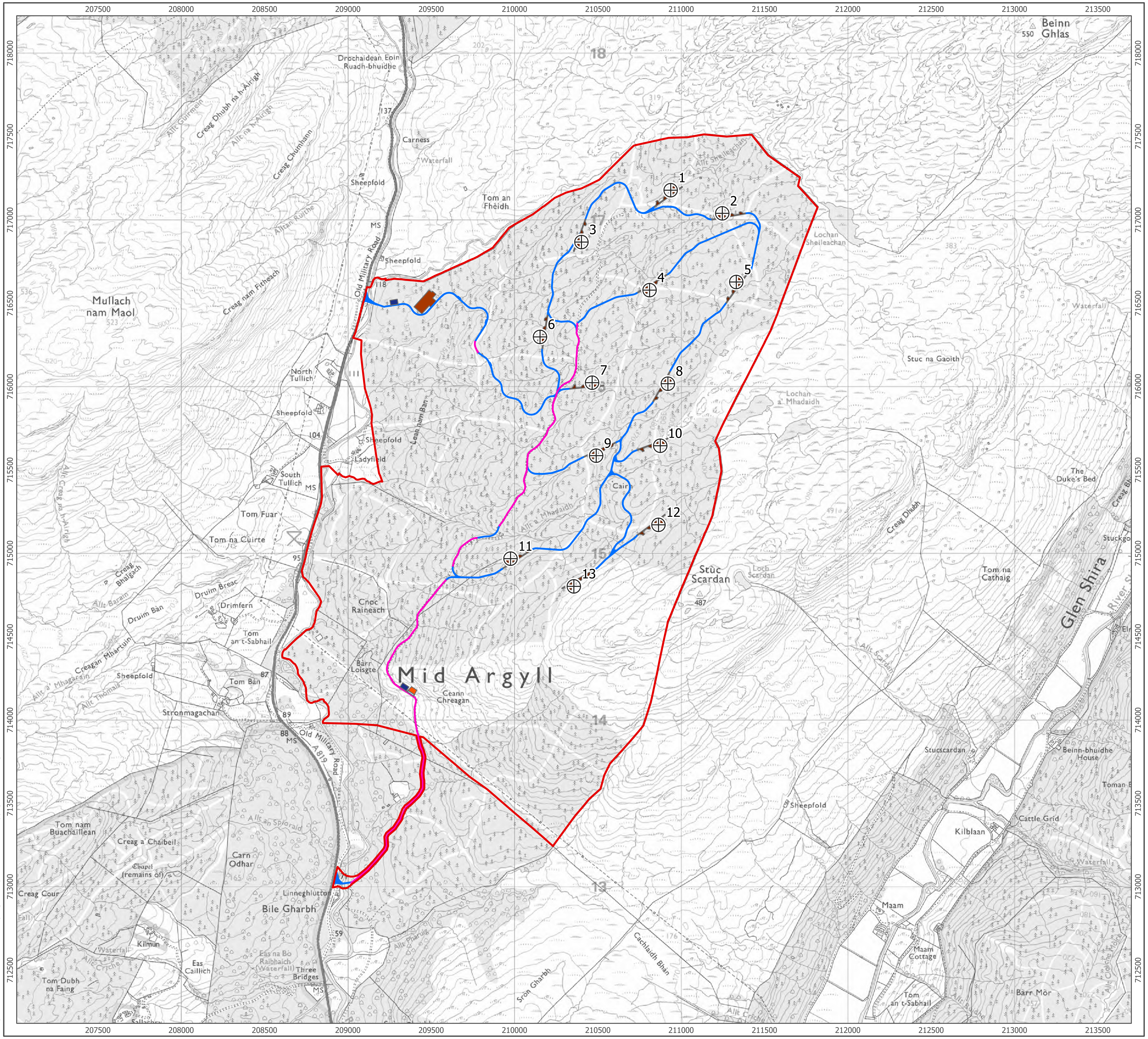
This PSRA has been undertaken for the Development in accordance with Scottish Government guidance, as outlined in Section 3 of this PSRA. The early stages of the assessment included a desk study, historical review, peat probing across the site, followed by further intensive probing targeting the finalised Site layout design. The information gathered during this investigation was used to develop a Hazard Ranking across the Development Site.

The findings of the peat probing indicate that there are areas on site with deep peat, but that the vast majority of the Site does not have peat with depths greater than 1 m. There is a risk of peat slide on the site, although proposed infrastructure has been sited out with moderate risk areas and risks can be mitigated through construction monitoring, proper drainage, and micrositing where required. According to the hazard risk assessment the site is at negligible and low risk after mitigation measures have been implemented.

Based on the scope of the study, the PSRA has indicated that the Site is generally of low and negligible hazard ranking, with limited areas of medium hazard ranking. It is considered that following the implementation of mitigation measures outlined in Table 15 and Section 7.3 of this PSRA, the maximum residual hazard posed to the Development will be low.

Notwithstanding this, infrastructure locations and existing site conditions should be checked on Site at the time of construction and micro-siting adopted in order to maintain the design objective of avoiding any potential peat slide risk.

APPENDIX A – FIGURES



RIDGE CLEAN ENERGY

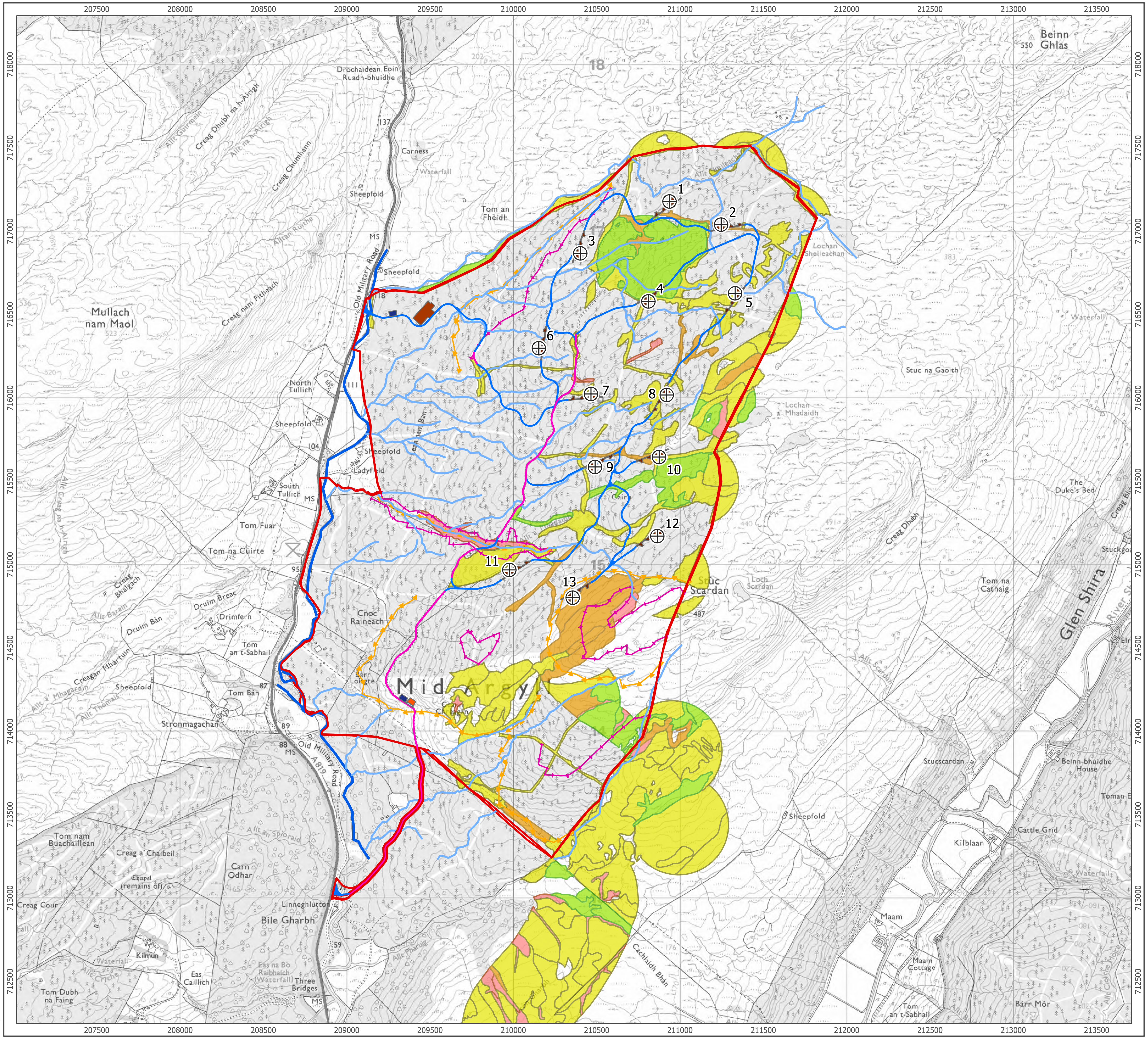
ERM

Produced By: MV	Ref: 4378-REP-021
Checked By: GH	Date: 08/09/2023

Site Layout
Figure 11.1.1

Ladyfield Renewable Energy Park
EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-021 Fig 11.1.1 Site Layout



Site Boundary

Minor Watercourse

Major Watercourse

Bottom_Of_Slope

Top_of_Slope

Potential Groundwater Dependent Terrestrial Ecosystems (GWDTE)

Highly Dominant

Highly Sub-dominant

Moderately Dominant

Moderately Sub-dominant

Site Data

Turbine

Temporary Construction Compound

Quarry Extension

New Road

Hardstandings

Existing Quarry

BESS and Substation Compound

Upgraded Road

1:22,000 Scale @ A3

0 500 1,000 m

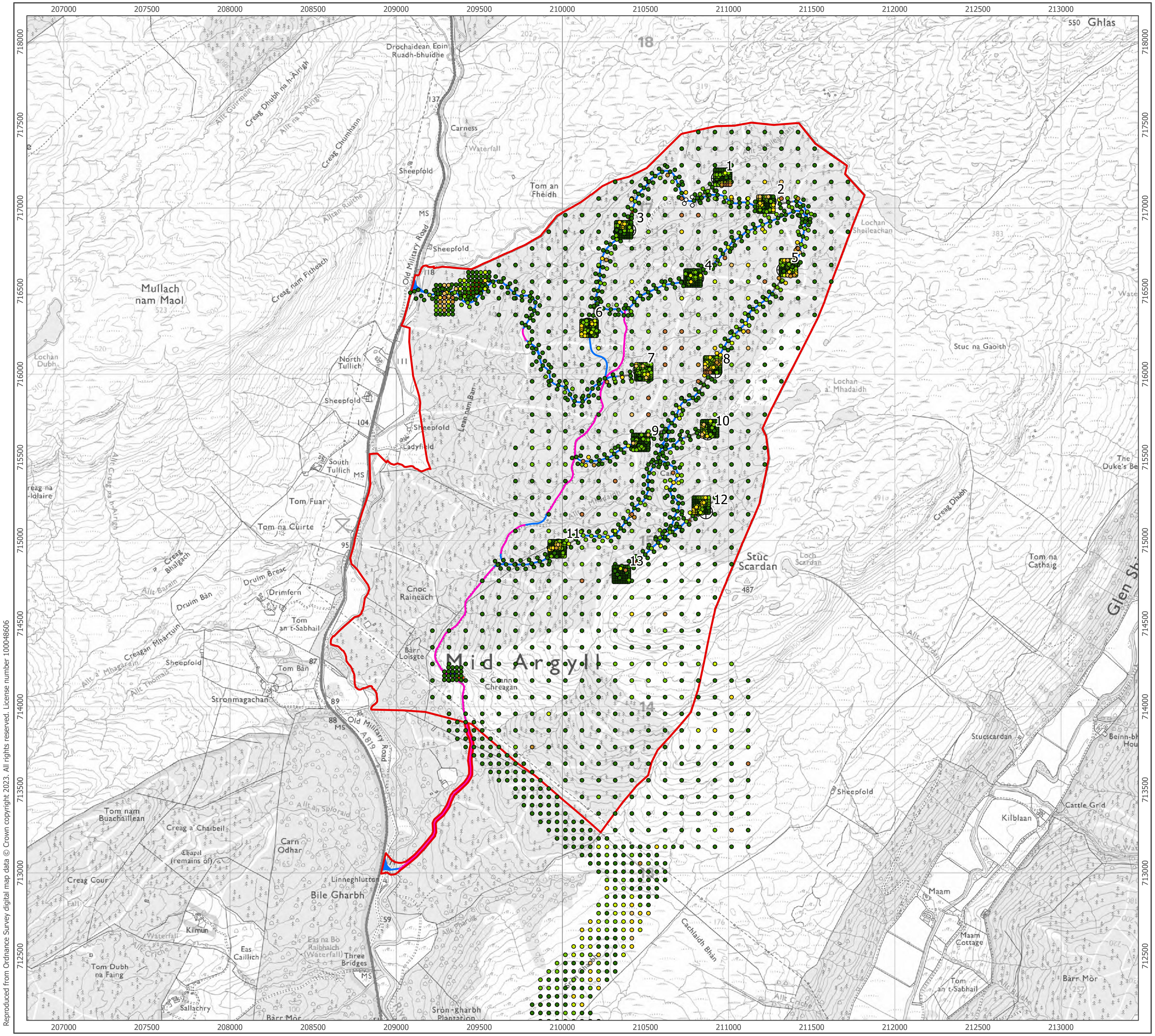
NORTH

Produced By: MV	Ref: 4378-REP-022
Checked By: GH	Date: 08/09/2023

Geomorphological Map

Figure 11.1.2

Ladyfield Renewable Energy Park EIA Report



\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-023 Fig 11.1.3 Recorded Peat Depths

RIDGE CLEAN ENERGY

ERM

Site Boundary

Peat Depth (m)

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 4.00
- >4.01

Turbine

Temporary Construction Compound

Quarry Extension

Hardstandings

Existing Quarry

Upgraded Road

New Road

BESS and Substation Compound

1:22,000 Scale @ A3

0 500 1,000 m

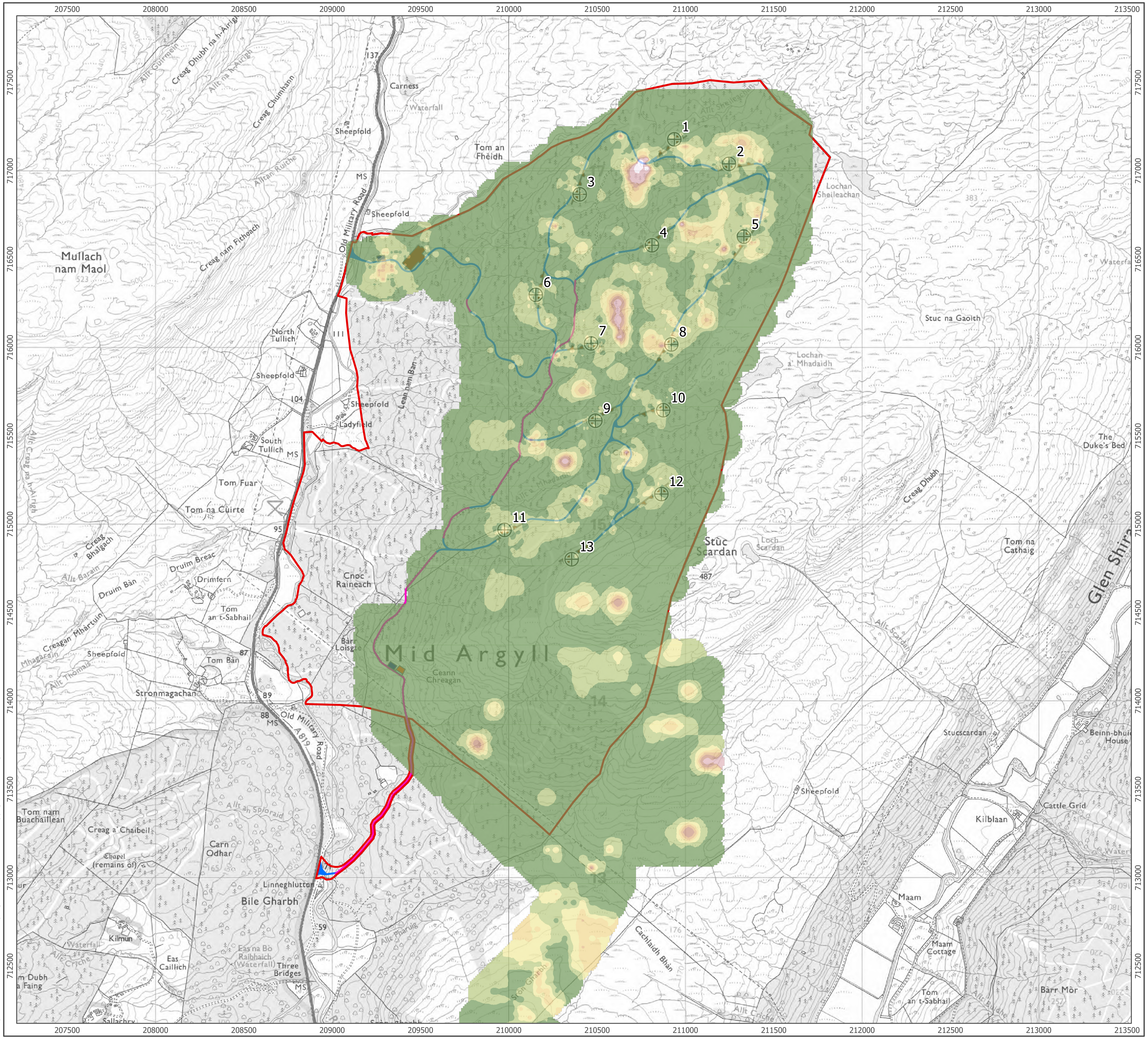
NORTH

Produced By: MV	Ref: 4378-REP-023
Checked By: GH	Date: 08/09/2023

Recorded Peat Depths

Figure 11.1.3

Ladyfield Renewable Energy Park
EIA Report



RIDGE CLEAN ENERGY

ERM

Site Boundary

Peat Depths (m)

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 4.00
- >4.00

Turbine

Temporary Construction Compound

Quarry Extension

Hardstandings

Existing Quarry

Upgraded Road

New Road

BESS and Substation Compound

1:20,756 Scale @ A3

0 490 980 m

NORTH

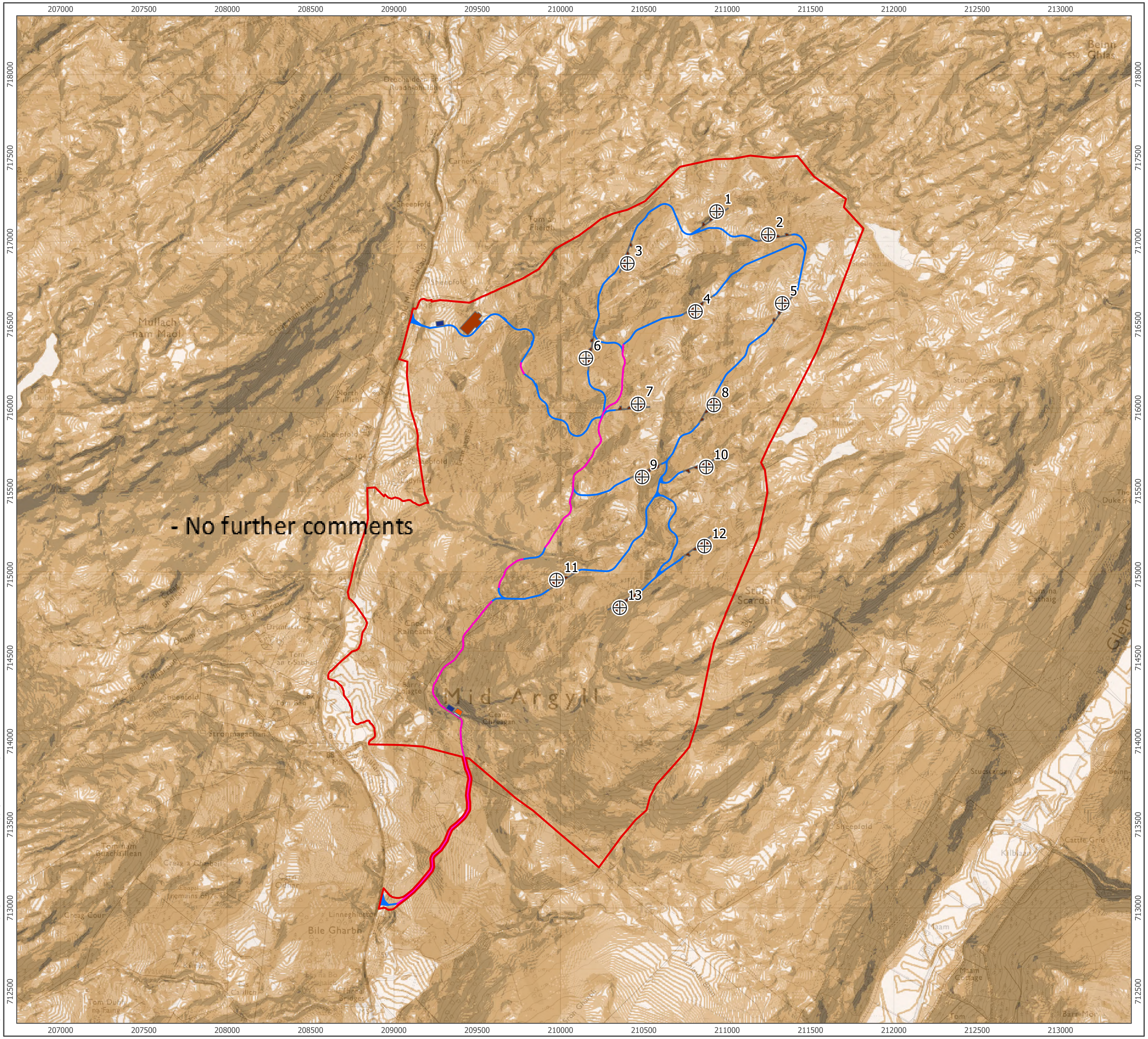
Produced By: MV	Ref: 4378-REP-024
Checked By: GH	Date: 08/09/2023

Interpolated Peat Depths

Figure 11.1.4

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-024 Fig 11.1.4 Interpolated Peat Depths



RIDGE CLEAN ENERGY

ERM

Site Boundary

Slope

0.00 - 2.00

2.01 - 4.00

4.01 - 8.00

8.01 - 15.00

15.01 - 30.00

>30.00

Site Data

Turbine

Temporary Construction Compound

Quarry Extension

New Road

Hardstandings

Existing Quarry

BESS and Substation Compound

Upgraded Road

1:22,000 Scale @ A3

0 500 1,000 m

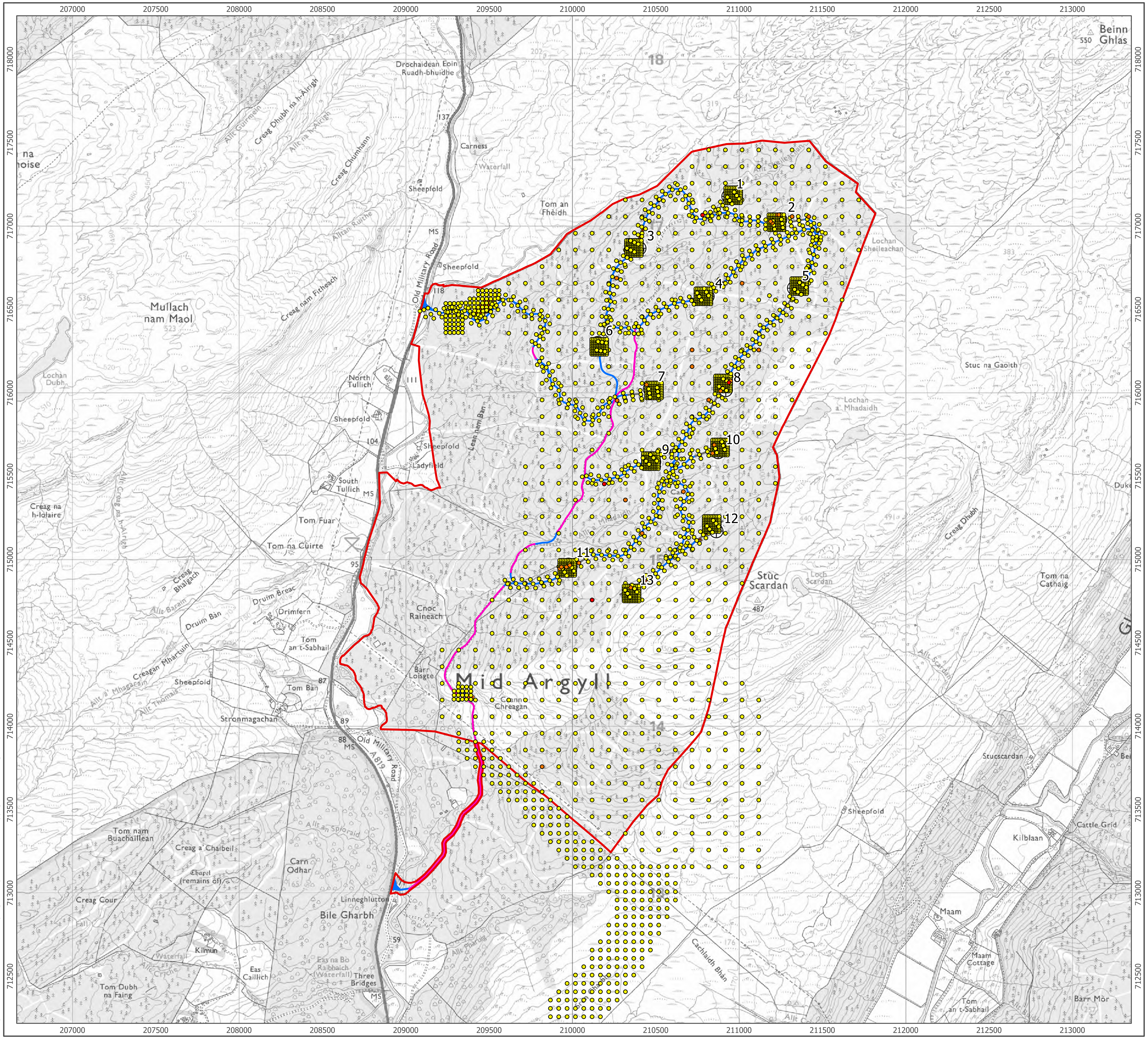
NORTH

Produced By: MV	Ref: 4378-REP-025
Checked By: GH	Date: 08/09/2023

Slope
Figure 11.1.5

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-025 Fig 11.1.5 Slope



RIDGE CLEAN ENERGY

ERM

1:22,000 Scale @ A3

0 500 1,000 m

NORTH

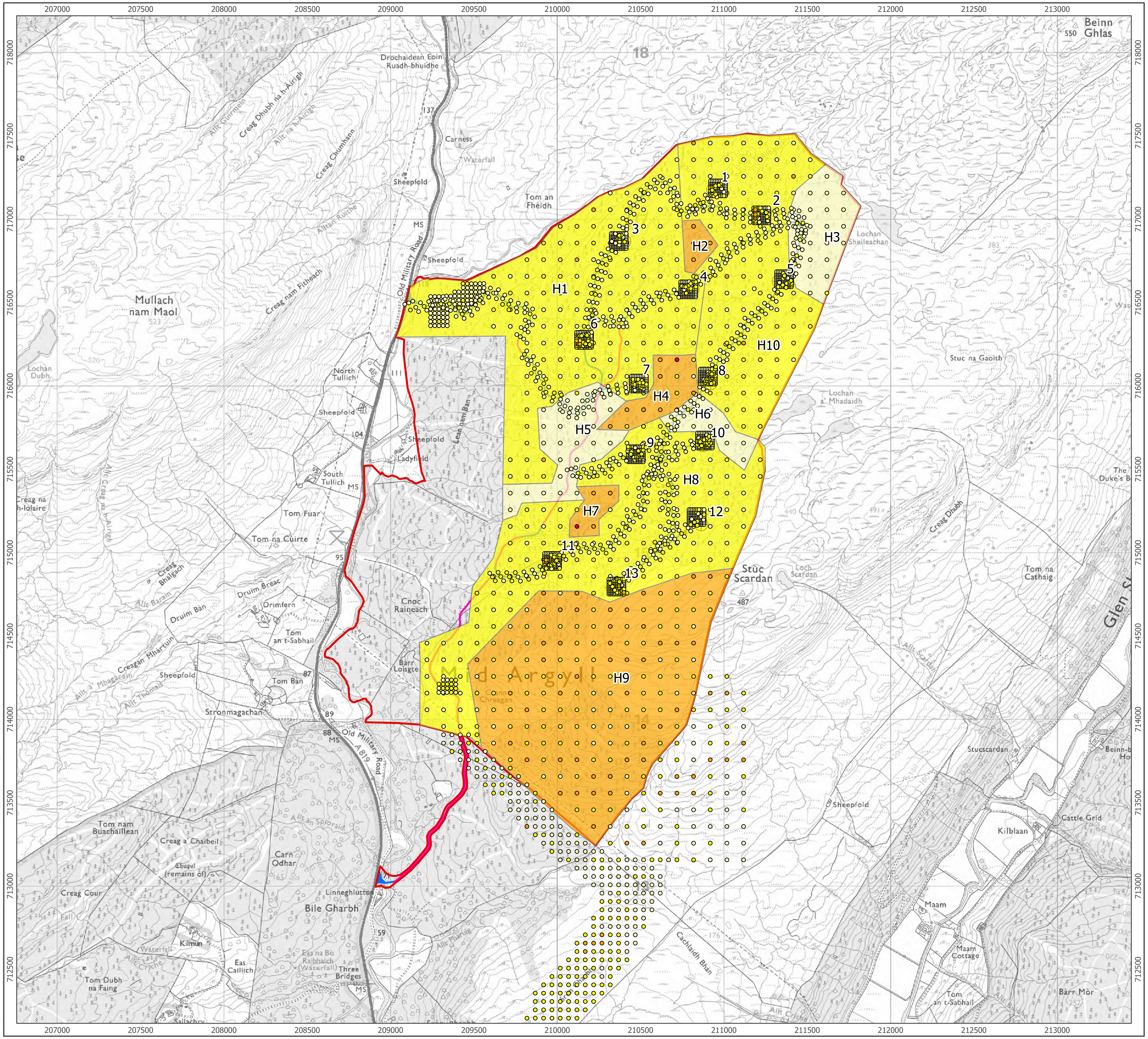
Produced By: MV	Ref: 4378-REP-026
Checked By: GH	Date: 08/09/2023

Factor of Safety Plan

Figure 11.1.6

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-026 Fig 11.1.6 Factor of Safety Plan



RIDGE CLEAN ENERGY

ERM

Site Boundary

Hazard Ranking

- Negligible
- Low
- Moderate
- High

Hazard Ranking Zones

- Negligible Zone
- Low Zone
- Moderate Zone

Site Data

- Turbine
- Temporary Construction Compound
- Quarry Extension
- New Road
- Hardstandings
- Existing Quarry
- BESS and Substation Compound
- Upgraded Road

1:22,000 Scale @ A3

0 500 1,000 m

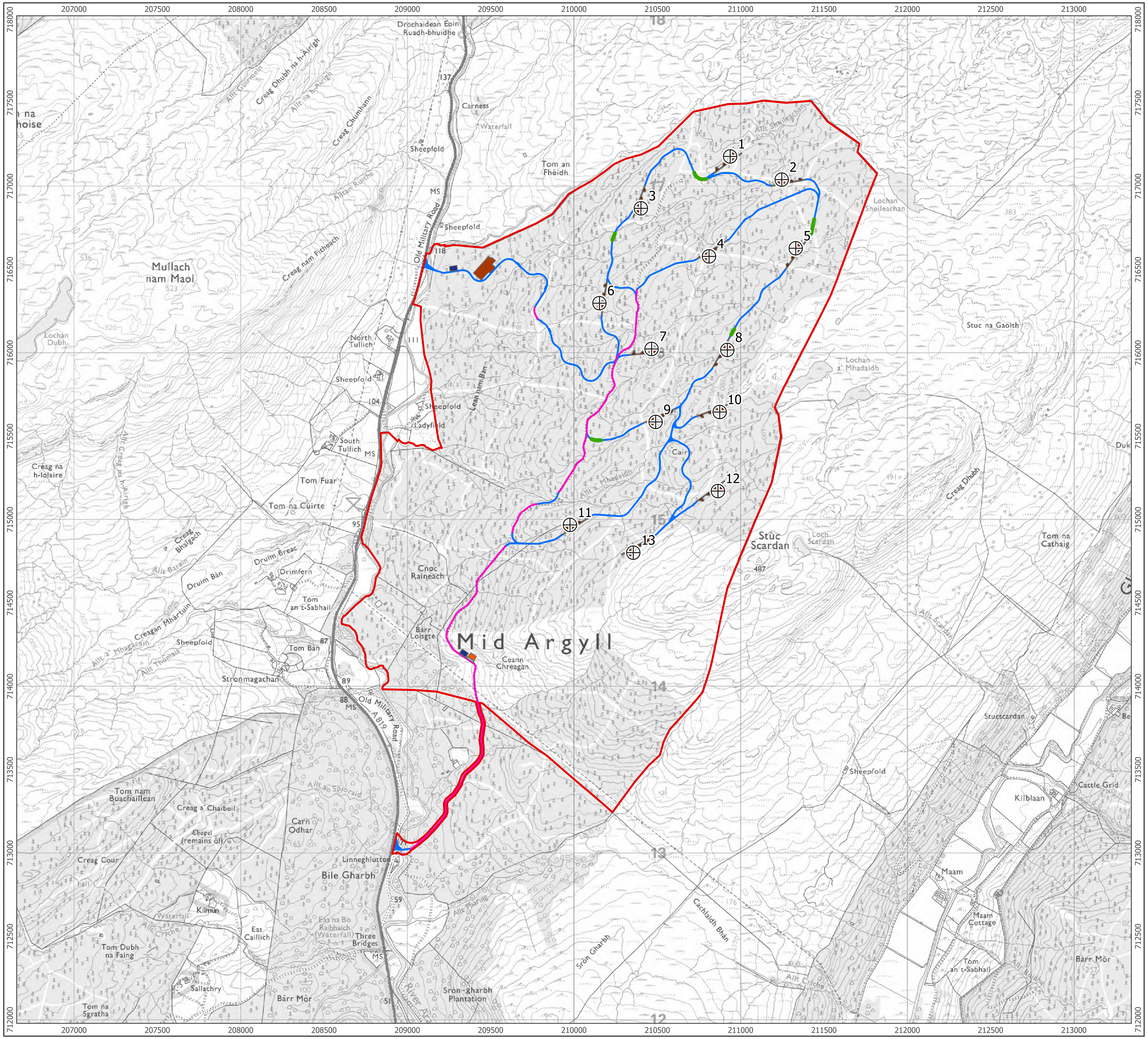
NORTH

Produced By: MV	Ref: 4378-REP-027
Checked By: GH	Date: 08/09/2023

Hazard Ranking Plan
Figure 11.1.7

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-027 Fig 11.1.7 Hazard Ranking Plan



RIDGE CLEAN ENERGY

ERM

- Site Boundary
- Floating Tracks
- Turbine
- Temporary Construction Compound
- Quarry Extension
- Hardstandings
- Existing Quarry
- Upgraded Road
- New Road
- BESS and Substation Compound

1:22,000 Scale @ A3

0 500 1,000 m

NORTH

Produced By: MV	Ref: 4378-REP-052
Checked By: GH	Date: 08/09/2023

Floating Tracks
Figure 11.1.8

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-052 Fig 11.1.8 Floating Tracks

APPENDIX B – SITE PHOTOGRAPHS

Photograph	Description
	Forest clearing in the northern portion of the Site, located to the west of T3.

Photograph	Description
	Forestry observed when facing east towards T4 and T5. This image was taken from the central area of the Site, between T3 and T4.

Photograph	Description
	Clearing with wet conditions observed to the north of T5.

Photograph	Description
	The view from the centre of the Site to the north. There is a forestry ride to the north and the south, with dense forestry observed to the east and west. The underfoot conditions are wet with the presence of Sphagnum moss.

Photograph	Description
	This image was taken from the central portion of the Site, slightly towards the southwest and notes felled forest area to the north and west, forestry track to the east as well as dense forestry, track and forestry to the south following felled area, area sloping south west.

Photograph	Description
	Minor watercourse located in the south eastern area of the Site.

Photograph	Description
	Grassy area with a stream located in the southern central portion of the Site.

APPENDIX C – HAZARD RANK ASSESSMENT RECORDS

4378 - Ladyfield - PSRA - Tabulated Peat Probe Data - May 2023

ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
1	209460.8226	716538.5386	144.6645	11.37838	6	0	144.6645	1	Not Proven	2	12	2	Site Infrastructure	3	144.6188	0.865411	4	0.0457	1	12	2	4
2	209484.852	716563.4207	148.4321	1.553072	1	0	148.4321	1	Not Proven	2	2	1	Site Infrastructure	3	148.4412	0.383033	4	-0.0091	1	12	2	2
3	209459.3287	716563.2447	145	5.710593	4	0	145	1	Not Proven	2	8	2	Site Infrastructure	3	145.8839	10.471375	3	-0.8839	1	9	1	2
4	209435.3068	716563.7678	141.5614	13.12111	6	0	141.5614	1	Not Proven	2	12	2	Site Infrastructure	3	144.016	29.252508	3	-2.4546	1	9	1	2
5	209461.0712	716588.4346	142.8131	12.15482	6	0	142.8131	1	Not Proven	2	12	2	Site Infrastructure	3	148	26.081195	3	-5.1869	1	9	1	2
6	209484.6092	716588.4691	146	6.724402	4	0	146	1	Not Proven	2	8	2	Site Infrastructure	3	147.9592	10.94666	3	-1.9592	1	9	1	2
7	209434.4916	716613.5192	133.8773	9.552226	6	0	133.8773	1	Not Proven	2	12	2	Major Watercourse	8	131	27.893372	3	2.8773	1	24	3	6
8	209462.4815	716468.9977	143	6.174118	4	0.1	142.9	1	Not Proven	2	8	2	Site Infrastructure	3	143.0188	0.71512	4	-0.0188	1	12	2	4
9	209436.7752	716490.4465	139.855	10.49825	6	0.1	139.755	1	Not Proven	2	12	2	Site Infrastructure	3	139.8188	0.764364	4	0.0362	1	12	2	4
10	209463.2809	716490.1994	144	4.818713	4	0.1	143.9	1	Not Proven	2	8	2	Site Infrastructure	3	144	0.846885	4	0	1	12	2	4
11	209509.7017	716489.2351	144	0.582217	1	0.1	143.9	1	Not Proven	2	2	1	Site Infrastructure	3	144	1.008043	4	0	1	12	2	2
12	209459.9303	716514.0736	143.6478	7.970521	4	0.1	143.5478	1	Not Proven	2	8	2	Site Infrastructure	3	143.7106	0.759808	4	-0.0628	1	12	2	4
13	209334.7594	716538.6878	128	0.263661	1	0.1	127.9	1	Not Proven	2	2	1	Site Infrastructure	3	129	40.984233	3	-1	1	9	1	1
14	209360.6758	716538.5085	129	2.321402	2	0.1	128.9	1	Not Proven	2	4	1	Site Infrastructure	3	129.6188	43.975839	3	-0.6188	1	9	1	1
15	209484.6848	716538.996	147	5.931515	4	0.1	146.9	1	Not Proven	2	8	2	Site Infrastructure	3	147	0.713687	4	0	1	12	2	4
16	209510.4343	716538.7963	146.1071	4.104134	4	0.1	146.0071	1	Not Proven	2	8	2	Site Infrastructure	3	146.168	0.921561	4	-0.0609	1	12	2	4
17	209435.7962	716589.6165	138.2359	14.89389	6	0.1	138.1359	1	Not Proven	2	12	2	Site Infrastructure	3	146.2188	45.761515	3	-7.9829	1	9	1	2
18	209510.7814	716588.3945	145.8211	10.73488	6	0.1	145.7211	1	Not Proven	2	12	2	Site Infrastructure	3	147.1523	17.207836	3	-1.3312	1	9	1	2
19	209459.9818	716613.1385	137.3687	15.987	8	0.1	137.2687	1	Not Proven	2	16	3	Major Watercourse	8	132	42.401422	3	5.3687	1	24	3	9
20	209421.2454	716450.8431	137.7491	11.20309	6	0.2	137.5491	1	Not Proven	2	12	2	Site Infrastructure	3	138.4188	4.404312	4	-0.6697	1	12	2	4
21	209485.6266	716489.5278	144	0	1	0.2	143.8	1	Not Proven	2	2	1	Site Infrastructure	3	144	0.983396	4	0	1	12	2	2
22	209509.5954	716513.1686	144.4968	6.631377	4	0.2	144.2968	1	Not Proven	2	8	2	Site Infrastructure	3	144.7106	1.133114	4	-0.2138	1	12	2	4
23	209385.0398	716538.7683	131	5.9943	4	0.2	130.8	1	Not Proven	2	8	2	Site Infrastructure	3	138.1304	49.590741	3	-7.1304	1	9	1	2
24	209559.5365	716614.0208	147	4.976621	4	0.2	146.8	1	Not Proven	2	8	2	Site Infrastructure	3	146.4408	59.008292	3	0.5592	1	9	1	2
25	209510.3086	716563.1648	147	0.117997	1	0.2	146.8	1	Not Proven	2	2	1	Site Infrastructure	3	147	0.610032	4	0	1	12	2	2
26	209435.9362	716467.5038	139.6872	8.885297	6	0.3	139.3872	1	Not Proven	2	12	2	Site Infrastructure	3	139.8188	0.687657	4	-0.1316	1	12	2	4
27	209484.1668	716513.5865	144.0724	3.622193	2	0.3	143.7724	1	Not Proven	2	4	1	Site Infrastructure	3	144.1008	0.443134	4	-0.0284	1	12	2	2
28	209560.1327	716588.6012	148.4106	5.380745	4	0.3	148.1106	1	Not Proven	2	8	2	Site Infrastructure	3	146.0408	35.992589	3	2.3698	1	9	1	2
29	209534.6705	716587.6525	146.4209	5.314772	4	0.3	146.1209	1	Not Proven	2	8	2	Site Infrastructure	3	147	29.745636	3	-0.5791	1	9	1	2
30	209445.1603	716450.6446	141	4.209683	4	0.4	140.6	1	Not Proven	2	8	2	Site Infrastructure	3	141	1.097952	4	0	1	12	2	4
31	209413.3077	716492.4472	136.1615	11.30993	6	0.4	135.7615	1	Not Proven	2	12	2	Site Infrastructure	3	136.0188	1.030398	4	0.1427	1	12	2	4
32	209409.88	716514.22	135.476	9.934762	6	0.4	135.076	1	Not Proven	2	12	2	Site Infrastructure	3	137.6188	15.012671	3	-2.1428	1	9	1	2
33	209484.852	716612.929	143	5.237913	4	0.4	142.6	1	Not Proven	2	8	2	Site Infrastructure	3	147.9592	35.268153	3	-4.9592	1	9	1	2
34	209389.7726	716466.2984	133	6.52432	4	0.5	132.5	1	Not Proven	2	8	2	Site Infrastructure	3	132.8188	4.102961	4	0.1812	1	12	2	4
35	209385.0742	716489.2795	132	6.110818	4	0.5	131.5	1	Not Proven	2	8	2	Site Infrastructure	3	131	14.195936	3	1	1	9	1	2
36	209534.9757	716537.5983	145	2.293897	2	0.5	144.5	1	Not Proven	2	4	1	Site Infrastructure	3	145	13.799013	3	0	1	9	1	1
37	209559.2545	716563.993	146	2.042902	2	0.5	145.5	1	Not Proven	2	4	1	Site Infrastructure	3	145.8408	16.721498	3	0.1592	1	9	1	1
38	209433.0439	716538.5094	138.1088	11.88371	6	0.6	137.5088	2	Not Proven	2	24	3	Site Infrastructure	3	141.6376	14.377091	3	-3.5288	1	9	1	3
39	209410.3849	716539.0248	133.577	9.183648	6	0.7	132.877	2	Not Proven	2	24	3	Site Infrastructure	3	139.0188	30.786837	3	-5.4418	1	9	1	3
40	209384.4475	716563.9698	130.3895	9.4456	6	0.8	129.5895	2	Not Proven	2	24	3	Site Infrastructure	3	139.0188	66.772963	3	-8.6293	1	9	1	3
41	209411.6013	716467.9104	135.8203	9.44637	6	0.85	134.9703	2	Not Proven	2	24	3	Site Infrastructure	3	136.0188	1.014048	4	-0.1985	1	12	2	6
42	209508.9922	716612.7174	143.2984	5.791941	4	0.9	142.3984	2	Not Proven	2	16	3	Site Infrastructure	3	147.9592	40.521941	3	-4.6608	1	9	1	3
43	209434.4484	716513.2467	139.3897	10.56804	6	0.9	138.4897	2	Not Proven	2	24	3	Site Infrastructure	3	139.4188	0.479854	4	-0.0291	1	12	2	6
44	209409.3334	716563.5909	135.5849	13.31048	6	1.1	134.4849	3	Not Proven	2	36	4	Site Infrastructure	3	141.6376	47.766019	3	-6.0527	1	9	1	4
45	209534.7626	716513.4734	144.6356	5.768242	4	1.2	143.4356	3	Not Proven	2	24	3	Site Infrastructure	3	144.682	0.285521	4	-0.0464	1	12	2	6
46	209385.7195	716514.1951	131.6439	8.073669	6	1.2	130.4439	3	Not Proven	2	36	4	Site Infrastructure	3	135.2188	32.07961	3	-3.5749	1	9	1	4
47	209536.1221	716613.5456	145	4.897714	4	1.3	143.7	3	Not Proven	2	24	3	Site Infrastructure	3	147.1523	51.211626	3	-2.1523	1	9	1	3
48	209535.4358	716563.3046	146	0	1	1.8	144.2	3	Not Proven	2	6	2	Site Infrastructure	3	146	13.051785	3	0	1	9	1	2
49	209360.1229	716514.1215	130	1.928419	1	2.1	127.9	3	Not Proven	2	6	2	Site Infrastructure	3	129.6188	20.736586	3	0.3812	1	9	1	2
50	210418	716257	322.1	11.18899	6	0.1	322	1	Not Proven	2	12	2	Site Infrastructure	3	315.3781	31.522082	3	6.7219	1	9	1	2
51	210518	716257	330.9	6.044724	4	1	329.9	2	Not Proven	2	16	3	Minor Watercourse	6	337	105.989539	3	-6.1	1	18	2	6
52	210618	716257	343.9	6.640598	4	3.2	340.7	8	Not Proven	2	64	5	Minor Watercourse	6	339	50.618475	3	4.9	1	18	2	10
53	210718	716257	345.1	10.75	6	3.2	341.9	8	Not Proven	2	96	5	Minor Watercourse	6	344.2188	37.300831	3	0.8812	1	18	2	10
54	210818	716257	355	5.514446	4	1	354	2	Not Proven	2	16	3	Minor Watercourse	6	353.4579	19.313561	3	1.5421	1	18	2	6
55	210918	716257	367.19	11.9236	6	0.7	366.49	2	Not Proven	2	24	3	Minor Watercourse	6	366.2188	32.709296	3	0.9712	1	18	2	6
56	211018	716257	385.1	11.29708	6	0.3	384.8	1	Not Proven	2	12	2	Minor Watercourse	6	384.978	6.730173	4	0.122	1	24	3	6
57	211118	716257	397.1	9.610348	6	3.2	393.9	8	Not Proven	2	96	5	Minor Watercourse	6	397.0667	6.296732	4	0.0333	1	24	3	15
58	210418	716157	316.2	12.60438	6	1	315.2	2	Not Proven	2	24	3	Site Infrastructure	3	307.0188	45.411356	3	9.1812	1	9	1	3
59	210518	716157	334.91	10.00483	6	0.4	334.51	1	Not Proven	2	12	2	Minor Watercourse	6	331.2941	32.454652	3	3.6159	1	18	2	4
60	210618	716157	340.01	2.655662	2	3.2	336.81	8	Not Proven	2	32	4	Sensitive Habitat	8	340	0.921103	4	0.01	1	32	4	16
61	210718	716157	353.01	10.42878	6	3.2	349.81	8	Not Proven	2	96	5	Sensitive Habitat	8	341.6795	59.259109	3	11.3305	2	48	4	20
62	210818	716157	366.1	12.0112	6	0.4	365.7	1	Not Proven	2	12	2	Minor Watercourse	6	350.7373	73.25084	3	15.3627	2	36	4	8
63	210918	716157	381	5.692733	4	2	379	3	Not Proven	2	24	3	Site Infrastructure	3	385	42.85609	3	-4	1	9	1	3
64	211018	716157	393.2	12.46085	6	0.5	392.7	1	Not Proven	2	12	2	Site Infrastructure	3	384.978	39.957643	3	8.222	1	9	1	2
65	211118	716157	403.1	6.689125	4	2.1	401	3	Not Proven	2	24	3	Sensitive Habitat	8	410.8188	51.580438	3	-7.7188	1	24	3	9
66	210218	715657	296	8.479323	6	0	296	1	Not Proven	2	12	2	Site Infrastructure	3	283.778	51.547823	3	12.222	2	18	2	4
67	210318	715657	312.9	10.64391	6	0.2	312.7	1	Not Proven	2	12	2	Minor Watercourse	6	307.0188	34.531632	3	5.8812	1	18	2	4
68	210418	715657	315.01	3.250045	2	0.3	314.71	1	Not Proven	2	4	1	Minor Watercourse	6	315.0181	10.753661	3	-0.0081	1	18	2	2
69	210518	715657	328.19	8.144172	6	0.7	327.49	2	Not Proven	2	24	3	Site Infrastructure	3	330.4028	27.424945	3	-2.2128	1	9	1	3
70	210618	715657	351.1	12.14277	6	0	351.1	1	Not Proven	2	12	2	Site Infrastructure	3	349.8839	8.816713	4	1.2161	1	12	2	4
71	210718	715657	373.1	10.71139	6	0.3	372.8	1	Not Proven	2	12	2	Site Infrastructure	3	378	39.365092	3	-4.9	1	9	1	2
72	210118	715557	289.1	6.312492	4	0	289.1	1	Not Proven	2	8	2	Site Infrastructure	3	280.187	39.412186	3	8.913	1	9	1	2
73	210218	715557	289.01	8.356002	6	0.2	288.81	1	Not Proven	2	12	2	Minor Watercourse	6	287.6557	12.717784	3	1.3543	1	18	2	4
74	210318	715557	304.1	10.25628	6	0	304.1	1	Not Proven	2	12	2	Site Infrastructure	3	305.0188	22.630573	3	-0.9188	1	9	1	2
75	210418	715557	315	6.392166	4	0.3	314.7	1	Not Proven	2	8	2	Site Infrastructure	3	313.2188	17.45496	3	1.7812	1	9	1	2
76	210518	715557	334.2	15.99074	8	0.4	333.8	1	Not Proven	2	16	3	Site Infrastructure	3	326.578	26.952269	3	7.622	1	9	1	3
77	210618	715557	362.1	15.54081	8	0.1	362	1	Not Proven	2	16	3	Site Infrastructure	3	362.2188	1.425773	4	-0.1188	1	12	2	6
78	210718	715557	370.09	6.4955	4	0.1	369.99	1	Not Proven	2	8	2	Site Infrastructure	3	375.6408	41.092832	3	-5.5508	1	9	1	2
79	209618	714857	222.11	13.06662	6	0.1	222.01	1	Not Proven	2	12	2	Site Infrastructure	3	222.2188	0.921103	4	-0.1088	1	12	2	4
80	209718	714857	247.3	23.13254	8	0.3	247	1	Not Proven	2	16	3	Site Infrastructure	3	247.3969	0.921103	4	-0.0969	1	12	2	6
81	209818	714857	269.1	11.30993	6	0	269.1	1	Not Proven	2	12	2	Site Infrastructure	3	268.8188	3.047561	4	0.2812	1	12	2	4
82	209918	714857	291.1	11.30993	6	0	291.1	1	Not Proven	2	12	2	Minor Watercourse	6	292.578	21.495833	3	-1.478	1	18	2	4
83	210018	714857	312.9	12.7602	6	0.6	312.3	2	Not Proven	2	24	3	Minor Watercourse	6	307.6188	46.663879	3	5.2812	1	18	2	6
84	210118	714857	328.19	7.710155	4	0.9	327.29	2	Not Proven	2	16	3	Minor Watercourse	6	326.9926	90.021598	3	1.1974	1	18	2	6
85	210218	714857	338.01	8.659664	6	0.1	337.91	1	Not Proven	2	12	2	Minor Watercourse	6	341.1592	66.246528	3	-3.1492	1	18	2	4
86	210318	714857	347.1	12.60438	6	0	347.1	1	Not Proven	2	12	2	Minor Watercourse	6	341.1592	38.337742	3	5.9408	1	18	2	4
87	210418	714857	361.21	21.69791	8	0.4	360.81	1	Not Proven	2	16	3	Site Infrastructure	3	359.1373	4.909504	4	2.0727	1	12	2	6
88	210518	714857	385.3	19.09051	8	0.1	385.2	1	Not Proven	2	16	3	Site Infrastructure	3	362.9561	55.190228	3	22.3439	2	18	2	6
89	210618	714857	402.11	19.1953	8	0	402.11	1	Not Proven	2	16	3	Sensitive Habitat	8	408.2223	31.048627	3	-6.1123	1	24	3	9
90	209518	714757	203.2	16.61557	8	0	203.2	1	Not Proven	2	16	3	Site Infrastructure	3	203.4376	0.921103	4	-0.2376	1	12	2	6
91	209618	714757	231.1	21.27989	8	0	231.1	1	Not Proven	2	16	3	Minor Watercourse	6	230.3153	7.320248	4	0.7847	1	24	3	9
92	209718	714757	252.1	10.92091	6	0.3	251.8	1	Not Proven	2	12	2	Minor Watercourse	6	250	32.217691	3	2.1	1	18	2	4
93	209818	714757	275.2	13.02745	6	0.3	274.9	1	Not Proven	2	12	2	Minor Watercourse	6	274.9649	57.34278	3	0.2351	1	18	2	4
94	209918	714757	303.29	17.30056	8	0.5	302.79	1	Not Proven	2	16	3	Minor Watercourse	6	288.9649	55.503751	3	14.3251	2	36	4	12
95	210018	714757	320.2	12.10346	6	0.1	320.1	1	Not Proven	2	12	2	Minor Watercourse	6	315.949	29.962851	3	4.251	1	18	2	4
96	210118	714757	330.2	12.6614	6	3.2	327	8	Not Proven	2	96	5	Minor Watercourse	6	329.4995	8.724152	4	0.7005	1	24	3	15
97	210218	714757	350.1	12.60438	6	0.2	349.9	1	Not Proven	2	12	2	Minor Watercourse	6	336.2974	69.949531	3	13.8026	2	36	4	8
98	210318	714757	369.3	19.82703	8	0	369.3	1	Not Proven	2	16	3	Site Infrastructure	3	365.778	22.416735	3	3.522	1	9	1	3
99	210418	714757	391.3	23.41946	8	0.1	391.2	1	Not Proven	2	16	3	Sensitive Habitat	8	396.1373	13.079909	3	-4.8373	1	24	3	9
100	210518	714757	407.11	15.01273	8	0.3	406.81	1	Not Proven	2	16	3	Sensitive Habitat	8	406.9592	0.921103	4	0.1508	1	32	4	12
101	210018	713557	223.99	16.36605	8	0	223.99	1	Not Proven	2	16	3	Minor Watercourse	6	193.6188	121.505519	3	30.3712	2	36	4	12
102	210118	713557	234.81	17.5484	8	0	234.81	1	Not Proven	2	16	3	Minor Watercourse	6	193.6188	219.646924	3	41.1912	2	36	4	12
103	210218	713557	240.8	20.561	8	0	240.8	1	Not Proven	2	16	3	Minor Watercourse	6	204.7106	223.496254	3	36.0894	2	36	4	12
104	210318	713557	245.8	16.58778	8	0	245.8	1	Not Proven	2	16	3	Minor Watercourse	6	220.1329	148.808476	3	25.6671	2	36	4	12
105	210418	713557	241.9	14.52425	6	0.1	241.8	1	Not Proven	2	12	2	Minor Watercourse	6	238.6188	86.987714	3	3.2812	1	18	2	4
106	210118	713457	206.99	13.46234	6	0.2	206.79	1	Not Proven	2	12	2	Minor Watercourse	6	193.6188	228.003402	3	13.3712	2	36	4	8
107	210218	713457	209.8	16.7616	8	1	208.8	2	Not Proven	2	32	4	Minor Watercourse	6	204.7106	165.200955	3	5.0894	1	18	2	8
108	210318	713457	210	15.51292	8	0	210	1	Not Proven	2	16	3	Minor Watercourse	6	204.7106	82.295417	3	5.2894	1	18	2	6
109	210218	713657	273.71	16.66659	8	0	273.71	1	Not Proven	2	16	3	Minor Watercourse	6	220.1329	290.037933	3	53.5771	2	36	4	12
110	210318	713657	267.7	23.29596	8	0	267.7	1	Not Proven	2	16	3	Minor Watercourse	6	244.5004	220.247487	3	23.1996	2	36	4	12
111	210418	713657	263.81	14.40407	6	0	263.81	1	Not Proven	2	12	2	Minor Watercourse	6	260.6457	129.939708	3	3.1643	1	18	2	4
112	210218	714657	365.01	8.049467	6	0.5	364.51	1	Not Proven	2	12	2	Sensitive Habitat	8	388.978	91.564607	3	-23.968	1	24	3	6
113	210318	714657	388.3	19.82703	8	0.3	388	1	Not Proven	2	16	3	Sensitive Habitat	8	389.5969	2.899867	4	-1.2969	1	32	4	12
114	210418	714657	410.1	11.7727	6	0.6	409.5	2	Not Proven	2	24	3	Sensitive Habitat	8	409.9681	0.921103	4	0.1319	1	32	4	12
115	210518	714657	421.2	10.46626	6	0.4	420.8	1	Not Proven	2	12	2	Sensitive Habitat	8	421.2099	0.921103	4	-0.0099	1	32	4	8
116	210618	714657	434.3	18.22008	8	0.3	434	1	Not Proven	2	16	3	Sensitive Habitat	8	432.578	14.414119	3	1.722	1	24	3	9
117	210218	714557	374.29	11.43813	6	0.2	374.09	1	Not Proven	2	12	2	Sensitive Habitat	8	379.2565	28.081297	3	-4.9665	1	24	3	6
118	210318	714557	406.11	14.60824	6	1	405.11	2	Not Proven	2	24	3	Sensitive Habitat	8	406.2188	0.921103	4	-0.1088	1	32	4	12
119	210418	714557	424	0.452023	1	1.9	422.1	3	Not Proven	2	6	2	Sensitive Habitat	8	424	0.921103	4	0	1	32	4	8
120	210518	714557	437.2	15.79317	8	0.5	436.7	1	Not Proven	2	16	3	Sensitive Habitat	8	437.178	0.921103	4	0.022	1	32	4	12
121	210618	714557	451	0	1	2.8	448.2	3	Not Proven	2	6	2	Sensitive Habitat	8	450.9681	9.432202	4	0.0319	1	32	4	8
122	209518	714557	215.11	15.56494	8	0.1	215.01	1	Not Proven	2	16	3	Minor Watercourse	6	214.562	4.741269	4	0.548	1	24	3	9
123	209618	714557	248.2	24.67165	8	0	248.2	1	Not Proven	2	16	3	Minor Watercourse	6	247.9881	11.798391	3	0.2119	1	18	2	6
124	209718	714557	277.01	10.08124	6	0.3	276.71	1	Not Proven	2	12	2	Minor Watercourse	6	279.1505	21.566734	3	-2.1405	1	18	2	4
125	209818	714557	299.3	19.82703	8	0.2	299.1	1	Not Proven	2	16	3	Minor Watercourse	6	305.8188	50.819894	3	-6.5188	1	18	2	6
126	209918	714557	315.1	7.576634	4	1	314.1	2	Not Proven	2	16	3	Minor Watercourse	6	305.8188	94.147977	3	9.2812	1	18	2	6
127	210018	714557	338.11	18.45723	8	0.3	337.81	1	Not Proven	2	16	3	Sensitive Habitat	8	345.3781	83.336484	3	-7.2681	1	24	3	9
128	210118	714557	362.1	11.30993	6	0.4	361.7	1	Not Proven	2	12	2	Sensitive Habitat	8	361.6188	53.359194	3	0.4812	1	24	3	6
129	210018	713657	237	10.6789	6	0	237	1	Not Proven	2	12	2	Roads and Tracks	3	208.0121	119.574109	3	28.9879	2	18	2	4
130	210018	713757	261.81	16.64288	8	0	261.81	1	Not Proven	2	16	3	Minor Watercourse	6	240.1972	107.565658	3	21.6128	2	36	4	12
131	210018	713857	270.11	14.36876	6	0	270.11	1	Not Proven	2	12	2	Minor Watercourse	6	254.0436	44.648279	3	16.0664	2	36	4	8
132	210018	713957	272.9	10.52547	6	0	272.9	1	Not Proven	2	12	2	Minor Watercourse	6	273.4408	6.044405	4	-0.5408	1	24	3	6
133	210018	714057	285.9	20.68512	8	0.2	285.7	1	Not Proven	2	16	3	Minor Watercourse	6	284.3989	5.89729	4	1.5011	1	24	3	9
134	210118	714157	321.19	17.5484	8	0.2	320.99	1	Not Proven	2	16	3	Minor Watercourse	6	318.5013	9.432202	4	2.6887	1	24	3	9
135	210118	714057	311	19.42364	8	0.1	310.9	1	Not Proven	2	16	3	Minor Watercourse	6	310.5197	28.601965	3	0.4803	1	18	2	6
136	210118	713957	301.19	15.91272	8	0.1	301.09	1	Not Proven	2	16	3	Minor Watercourse	6	293.8376	52.657019	3	7.3524	1	18	2	6
137	210118	713857	296.1	11.44007	6	0.2	295.9	1	Not Proven	2	12	2	Minor Watercourse	6	261.1636	138.906897	3	34.9364	2	36	4	8
138	210118	713757	280	19.42364	8	0	280	1	Not Proven	2	16	3	Minor Watercourse	6	249.9711	178.584924	3	30.0289	2	36	4	12
139	210118	713657	259.19	16.64288	8	0	259.19	1	Not Proven	2	16	3	Roads and Tracks	3	208.0121	217.667516	3	51.1779	2	18	2	6
140	210218	715757	285.09	8.049467	6	0.1	284.99	1	Not Proven	2	12	2	Site Infrastructure	3	285.3609	3.047561	4	-0.2709	1	12	2	4
141	210318	715757	311.2	14.33301	6	0.7	310.5	2	Not Proven	2	24	3	Minor Watercourse	6	294.149	66.547529	3	17.051	2	36	4	12
142	210418	715757	326	5.710593	4	2.2	323.8	3	Not Proven	2	24	3	Minor Watercourse	6	322	71.684283	3	4	1	18	2	6
143	210518	715757	328	7.268727	4	3.2	324.8	8	Not Proven	2	64	5	Minor Watercourse	6	325.675	17.628251	3	2.325	1	18	2	10
144	210618	715757	350.29	28.04352	8	0.2	350.09	1	Not Proven	2	16	3	Minor Watercourse	6	351.4596	22.630573	3	-1.1696	1	18	2	6
145	210718	715757	366	5.857144	4	0.8	365.2	2	Not Proven	2	16	3	Site Infrastructure	3	361.4017	25.73732	3	4.5983	1	9	1	3
146	210818	715757	376.29	13.04904	6	0.3	375.99	1	Not Proven	2	12	2	Minor Watercourse	6	370.6042	42.271764	3	5.6858	1	18	2	4
147	210918	715757	397.1	10.21938	6	1	396.1	2	Not Proven	2	24	3	Site Infrastructure	3	400.2408	63.876872	3	-3.1408	1	9	1	3
148	210318	715857	302	7.201849	4	0.1	301.9	1	Not Proven	2	8	2	Minor Watercourse	6	300.2507	22.013051	3	1.7493	1	18	2	4
149	210418	715857	321.3	19.20572	8	0.6	320.7	2	Not Proven	2	32	4	Minor Watercourse	6	305.7868	49.078594	3	15.5132	2	36	4	16
150	210518	715857	335	0	1	3.2	331.8	8	Not Proven	2	16	3	Sensitive Habitat	8	335	0.921103	4	0	1	32	4	12
151	210618	715857	343.2	20.13994	8	0.9	342.3	2	Not Proven	2	32	4	Sensitive Habitat	8	336.8119	33.819037	3	6.3881	1	24	3	12
152	210718	715857	364.1	11.44007	6	0.4	363.7	1	Not Proven	2	12	2	Site Infrastructure	3	364.8596	23.785685	3	-0.7596	1	9	1	2
153	210818	715857	381.9	12.48114	6	0.3	381.6	1	Not Proven	2	12	2	Site Infrastructure	3	384.0188	21.29663	3	-2.1188	1	9	1	2
154	210918	715857	392.1	14.52767	6	0.4	391.7	1	Not Proven	2	12	2	Minor Watercourse	6	390.8188	28.052751	3	1.2812	1	18	2	4
155	210018	715257	277.1	11.04351	6	0.3	276.8	1	Not Proven	2	12	2	Roads and Tracks	3	269.2188	32.032734	3	7.8812	1	9	1	2
156	210118	715257	291.2	10.32025	6	0.3	290.9	1	Not Proven	2	12	2	Sensitive Habitat	8	292.5247	21.342456	3	-1.3247	1	24	3	6
157	210218	715257	303.9	11.30993	6	0.1	303.8	1	Not Proven	2	12	2	Minor Watercourse	6	295.1691	60.23506	3	8.7309	1	18	2	4
158	210318	715257	309.91	8.870885	6	0.2	309.71	1	Not Proven	2	12	2	Minor Watercourse	6	302.978	33.3014	3	6.932	1	18	2	4
159	210418	715257	317.1	14.39957	6	0.1	317	1	Not Proven	2	12	2	Site Infrastructure	3	320.8477	53.5664	3	-3.7477	1	9	1	2
160	209518	714657	214.29	16.2994	8	0.2	214.09	1	Not Proven	2	16	3	Site Infrastructure	3	197.2537	60.37635	3	17.0363	2	18	2	6
161	209618	714657	235.2	12.60438	6	0	235.2	1	Not Proven	2	12	2	Minor Watercourse	6	237.7027	83.737246	3	-2.5027	1	18	2	4
162	209718	714657	259.11	18.54198	8	0.1	259.01	1	Not Proven	2	16	3	Minor Watercourse	6	256.8745	56.584609	3	2.2355	1	18	2	6
163	209818	714657	287.1	14.8234	6	0.3	286.8	1	Not Proven	2	12	2	Minor Watercourse	6	283.978	26.710508	3	3.122	1	18	2	4

1 TO 4	Negligible
5 TO10	Low
11 TO 16	Medium
17 TO 25	High

Row	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
166	164	209918	714657	307.2	15.82225	8	0.7	306.5	2	Not Proven	2	32	4	Minor Watercourse	6	302.6188	39.406081	3	4.5812	1	18	2	8
167	165	210018	714657	328.2	12.41632	6	1	327.2	2	Not Proven	2	24	3	Minor Watercourse	6	304.4188	101.889497	3	23.7812	2	36	4	12
168	166	210118	714657	349.59	25.98275	8	0.4	349.19	1	Not Proven	2	16	3	Minor Watercourse	6	329.4995	108.705523	3	20.0905	2	36	4	12
169	167	210518	715257	327.1	8.128001	6	1	326.1	2	Not Proven	2	24	3	Site Infrastructure	3	327	14.988677	3	0.1	1	9	1	3
170	168	210618	715257	354.2	16.51236	8	0.3	353.9	1	Not Proven	2	16	3	Site Infrastructure	3	364.0309	39.326678	3	-9.8309	1	9	1	3
171	169	210718	715257	367.9	10.26913	6	0.2	367.7	1	Not Proven	2	12	2	Site Infrastructure	3	363.4408	30.734587	3	4.4592	1	9	1	2
172	170	210718	715057	379.1	15.06996	8	0.3	378.8	1	Not Proven	2	16	3	Site Infrastructure	3	373.3781	24.66515	3	5.7219	1	9	1	3
173	171	209918	715157	257.91	6.657397	4	0.4	257.51	1	Not Proven	2	8	2	Roads and Tracks	3	257.0188	5.451535	4	0.8912	1	12	2	4
174	172	210018	715157	281	12.60438	6	0.2	280.8	1	Not Proven	2	12	2	Minor Watercourse	6	269.2697	51.718198	3	11.7303	2	36	4	8
175	173	210118	715157	287.9	6.577724	4	3.2	284.7	8	Not Proven	2	64	5	Sensitive Habitat	8	288	0.921103	4	-0.1	1	32	4	20
176	174	210218	715157	305.2	15.28012	8	0.3	304.9	1	Not Proven	2	16	3	Minor Watercourse	6	295.1691	42.059986	3	10.0309	2	36	4	12
177	175	210318	715157	314.09	6.548486	4	0.7	313.39	2	Not Proven	2	16	3	Minor Watercourse	6	309.0527	43.300176	3	5.0373	1	18	2	6
178	176	210418	715157	319.1	8.164558	6	3.2	315.9	8	Not Proven	2	96	5	Site Infrastructure	3	319.0334	1.572269	4	0.0666	1	12	2	10
179	177	210518	715157	337.11	14.60824	6	0.4	336.71	1	Not Proven	2	12	2	Minor Watercourse	6	338	68.464417	3	-0.89	1	18	2	4
180	178	210618	715157	348.19	14.71471	6	0.2	347.99	1	Not Proven	2	12	2	Site Infrastructure	3	360.578	56.022128	3	-12.388	1	9	1	2
181	179	210718	715157	368.1	11.19429	6	0.5	367.6	1	Not Proven	2	12	2	Site Infrastructure	3	363.4188	28.755111	3	4.6812	1	9	1	2
182	180	209718	714957	250.2	21.09925	8	0.1	250.1	1	Not Proven	2	16	3	Roads and Tracks	3	231.0188	64.337849	3	19.1812	2	18	2	6
183	181	209818	714957	270.1	14.2405	6	0.2	269.9	1	Not Proven	2	12	2	Minor Watercourse	6	280.6376	80.474764	3	-10.5376	1	18	2	4
184	182	209918	714957	284.01	8.481068	6	0.3	283.71	1	Not Proven	2	12	2	Minor Watercourse	6	286.3781	13.546794	3	-2.3681	1	18	2	4
185	183	210018	714957	300.1	12.72651	6	0.3	299.8	1	Not Proven	2	12	2	Site Infrastructure	3	299.1592	5.807481	4	0.9408	1	12	2	4
186	184	210118	714957	315.3	25.97681	8	0.8	314.5	2	Not Proven	2	32	4	Site Infrastructure	3	296.778	59.642401	3	18.522	2	18	2	8
187	185	210218	714957	321.1	11.30993	6	1	320.1	2	Not Proven	2	24	3	Site Infrastructure	3	311.0349	64.706627	3	10.0651	2	18	2	6
188	186	210318	714957	326.1	12.60438	6	1	325.1	2	Not Proven	2	24	3	Minor Watercourse	6	324.3781	13.424367	3	1.7219	1	18	2	6
189	187	210418	714957	337.01	10.42878	6	0.5	336.51	1	Not Proven	2	12	2	Site Infrastructure	3	359.8805	76.88603	3	-22.8705	1	9	1	2
190	188	210518	714957	354.29	17.74864	8	0.15	354.14	1	Not Proven	2	16	3	Site Infrastructure	3	359.178	14.094411	3	-4.888	1	9	1	3
191	189	210618	714957	374.2	17.90092	8	0.1	374.1	1	Not Proven	2	16	3	Minor Watercourse	6	369.8188	35.895265	3	4.3812	1	18	2	6
192	190	209918	713657	216.19	15.50373	8	0.5	215.69	1	Not Proven	2	16	3	Roads and Tracks	3	208.2408	33.023392	3	7.9492	1	9	1	3
193	191	209918	713757	234	15.79317	8	0.3	233.7	1	Not Proven	2	16	3	Minor Watercourse	6	232	29.780262	3	2	1	18	2	6
194	192	209918	713857	250.8	18.87923	8	0.3	250.5	1	Not Proven	2	16	3	Minor Watercourse	6	244.4816	22.858846	3	6.3184	1	18	2	6
195	193	209918	713957	262.2	8.9486	6	1.5	260.7	3	Not Proven	2	36	4	Minor Watercourse	6	262.4188	40.846146	3	-0.2188	1	18	2	8
196	194	209818	713957	241.29	17.37615	8	0.1	241.19	1	Not Proven	2	16	3	Minor Watercourse	6	242.0271	13.509065	3	-0.7371	1	18	2	6
197	195	209818	713857	237.9	17.92478	8	0.2	237.7	1	Not Proven	2	16	3	Minor Watercourse	6	238.2551	104.031707	3	-0.3551	1	18	2	6
198	196	209818	713757	216.1	11.89665	6	2.8	213.3	3	Not Proven	2	36	4	Minor Watercourse	6	216.0596	7.743541	4	0.0404	1	24	3	12
199	197	209718	713757	201.1	14.71742	6	0.6	200.5	2	Not Proven	2	24	3	Roads and Tracks	3	187.9382	44.792285	3	13.1618	2	18	2	6
200	198	209718	713857	216.2	17.33138	8	0.2	216	1	Not Proven	2	16	3	Minor Watercourse	6	196.0376	69.953105	3	20.1624	2	36	4	12
201	199	209618	713857	187.1	13.4557	6	0.1	187	1	Not Proven	2	12	2	Minor Watercourse	6	184.378	10.246054	3	2.722	1	18	2	4
202	200	210418	716057	320.91	6.4955	4	0.5	320.41	1	Not Proven	2	8	2	Site Infrastructure	3	326.8188	46.145392	3	-5.9088	1	9	1	2
203	201	210518	716057	335	5.777471	4	0.7	334.3	2	Not Proven	2	16	3	Site Infrastructure	3	334	27.929376	3	1	1	9	1	3
204	202	210618	716057	340	2.576165	2	3.2	336.8	8	Not Proven	2	32	4	Sensitive Habitat	8	340	0.921103	4	0	1	32	4	16
205	203	210718	716057	366.2	13.65333	6	0.2	366	1	Not Proven	2	12	2	Sensitive Habitat	8	341.8188	84.512648	3	24.3812	2	48	4	8
206	204	210818	716057	379	5.710593	4	2.7	376.3	3	Not Proven	2	24	3	Site Infrastructure	3	384.6188	81.614352	3	-5.6188	1	9	1	3
207	205	210918	716057	386.01	8.851574	6	1	385.01	2	Not Proven	2	24	3	Site Infrastructure	3	385.9681	0.921103	4	0.0419	1	12	2	6
208	206	211018	716057	397.19	11.79793	6	0.8	396.39	2	Not Proven	2	24	3	Sensitive Habitat	8	399.5592	17.353145	3	-2.3692	1	24	3	9
209	207	210318	715957	309.19	7.930062	4	1	308.19	2	Not Proven	2	16	3	Site Infrastructure	3	308.1661	26.710508	3	1.0239	1	9	1	3
210	208	210418	715957	321.91	10.04608	6	0.7	321.21	2	Not Proven	2	24	3	Site Infrastructure	3	321.6188	35.485321	3	0.2912	1	9	1	3
211	209	210518	715957	329.99	2.684901	2	0.5	329.49	1	Not Proven	2	4	1	Site Infrastructure	3	333.6408	43.29643	3	-3.6508	1	9	1	1
212	210	210618	715957	335.2	15.69609	8	0.3	334.9	1	Not Proven	2	16	3	Sensitive Habitat	8	333.4188	13.424367	3	1.7812	1	24	3	9
213	211	210718	715957	363.1	18.28304	8	0.1	363	1	Not Proven	2	16	3	Minor Watercourse	6	366.003	37.824892	3	-2.903	1	18	2	6
214	212	210818	715957	377.01	10.21938	6	3.2	373.81	8	Not Proven	2	96	5	Minor Watercourse	6	375.0188	8.61197	4	1.9912	1	24	3	15
215	213	210918	715957	398.29	20.15729	8	0.1	398.19	1	Not Proven	2	16	3	Site Infrastructure	3	385.8114	37.616247	3	12.4786	2	18	2	6
216	214	210118	715457	288.1	5.606899	4	0.6	287.5	2	Not Proven	2	16	3	Site Infrastructure	3	289	18.713333	3	-0.9	1	9	1	3
217	215	210218	715457	286.9	12.8104	6	0	286.9	1	Not Proven	2	12	2	Minor Watercourse	6	286.2551	5.654205	4	0.6449	1	24	3	6
218	216	210318	715457	310.2	21.69825	8	0.1	310.1	1	Not Proven	2	16	3	Sensitive Habitat	8	314	23.04237	3	-3.8	1	24	3	9
219	217	210418	715457	316.19	10.00239	6	0.6	315.59	2	Not Proven	2	24	3	Sensitive Habitat	8	312.9763	43.411607	3	3.2137	1	24	3	9
220	218	210518	715457	336.1	17.23954	8	0.1	336	1	Not Proven	2	16	3	Site Infrastructure	3	338.6188	29.712503	3	-2.5188	1	9	1	3
221	219	210618	715457	351.1	23.34772	8	0	351.1	1	Not Proven	2	16	3	Site Infrastructure	3	349.2596	10.720375	3	1.8404	1	9	1	3
222	220	210718	715457	365	0.364476	1	0.6	364.4	2	Not Proven	2	4	1	Site Infrastructure	3	362.0045	42.382615	3	2.9955	1	9	1	1
223	221	210118	715357	276.1	8.860484	6	0.1	276	1	Not Proven	2	12	2	Minor Watercourse	6	275.4188	17.958353	3	0.6812	1	18	2	4
224	222	210218	715357	296.19	19.22582	8	0.1	296.09	1	Not Proven	2	16	3	Minor Watercourse	6	281.2124	63.008625	3	14.9776	2	36	4	12
225	223	210318	715357	315.19	8.217841	6	3.2	311.99	8	Not Proven	2	96	5	Sensitive Habitat	8	315.8477	17.031243	3	-0.6577	1	24	3	15
226	224	210418	715357	313.91	6.376122	4	0.5	313.41	1	Not Proven	2	8	2	Sensitive Habitat	8	316	27.414938	3	-2.09	1	24	3	6
227	225	210518	715357	334.01	16.83224	8	0.05	333.96	1	Not Proven	2	16	3	Site Infrastructure	3	333.6376	1.572269	4	0.3724	1	12	2	6
228	226	210618	715357	353.1	13.08634	6	0.7	352.4	2	Not Proven	2	24	3	Site Infrastructure	3	359.2342	45.653097	3	-6.1342	1	9	1	3
229	227	210718	715357	366.01	8.461828	6	1	365.01	2	Not Proven	2	24	3	Site Infrastructure	3	361.1224	32.032734	3	4.8876	1	9	1	3
230	228	209718	715057	239.3	19.63726	8	0	239.3	1	Not Proven	2	16	3	Roads and Tracks	3	237.978	4.348704	4	1.322	1	12	2	6
231	229	209818	715057	259.1	11.63362	6	0.3	258.8	1	Not Proven	2	12	2	Roads and Tracks	3	247.9184	31.883978	3	11.1816	2	18	2	4
232	230	209918	715057	269.29	20.58899	8	0.7	268.59	2	Not Proven	2	32	4	Roads and Tracks	3	252.2965	37.099866	3	16.9935	2	18	2	8
233	231	210018	715057	277.19	12.4341	6	0.4	276.79	1	Not Proven	2	12	2	Minor Watercourse	6	265.9192	46.707678	3	11.2708	2	36	4	8
234	232	210118	715057	295.2	10.74567	6	0.1	295.1	1	Not Proven	2	12	2	Site Infrastructure	3	299.178	25.70989	3	-3.978	1	9	1	2
235	233	210218	715057	306.01	8.071458	6	0.5	305.51	1	Not Proven	2	12	2	Site Infrastructure	3	310.3592	31.301738	3	-4.3492	1	9	1	2
236	234	210318	715057	315.19	6.54638	4	1.1	314.09	3	Not Proven	2	24	3	Site Infrastructure	3	317	13.662358	3	-1.81	1	9	1	3
237	235	210418	715057	326.01	9.893724	6	0.6	325.41	2	Not Proven	2	24	3	Minor Watercourse	6	325.0786	35.32748	3	0.9314	1	18	2	6
238	236	210518	715057	340.11	16.89594	8	0.05	340.06	1	Not Proven	2	16	3	Minor Watercourse	6	334.9926	15.641868	3	5.1174	1	18	2	6
239	237	210618	715057	360.2	12.92326	6	0.1	360.1	1	Not Proven	2	12	2	Site Infrastructure	3	360.2188	0.921103	4	-0.0188	1	12	2	4
240	238	209818	716157	211.1	12.60438	6	0.2	210.9	1	Not Proven	2	12	2	Roads and Tracks	3	210.8596	7.165921	4	0.2404	1	12	2	4
241	239	209918	716157	236.29	18.87115	8	0.3	235.99	1	Not Proven	2	16	3	Minor Watercourse	6	230.7868	32.806622	3	5.5032	1	18	2	6
242	240	210018	716157	260.1	10.75	6	0.3	259.8	1	Not Proven	2	12	2	Minor Watercourse	6	246.5693	72.581417	3	13.5307	2	36	4	8
243	241	210118	716157	275.1	9.094622	6	0.5	274.6	1	Not Proven	2	12	2	Site Infrastructure	3	281.2188	50.812298	3	-6.1188	1	9	1	2
244	242	210218	716157	287.1	9.984827	6	1.2	285.9	3	Not Proven	2	36	4	Site Infrastructure	3	283	41.21112	3	4.1	1	9	1	4
245	243	210318	716157	296.91	10.20064	6	0.1	296.81	1	Not Proven	2	12	2	Minor Watercourse	6	295.0188	19.835454	3	1.8912	1	18	2	4
246	244	209918	716357	226.1	12.55582	6	0.1	226	1	Not Proven	2	12	2	Minor Watercourse	6	216.8188	49.564617	3	9.2812	1	18	2	4
247	245	210018	716357	254.1	9.869182	6	0.2	253.9	1	Not Proven	2	12	2	Minor Watercourse	6	250.6217	37.696616	3	3.4783	1	18	2	4
248	246	210118	716357	268.1	10.16568	6	0.4	267.7	1	Not Proven	2	12	2	Minor Watercourse	6	270.4188	23.54537	3	-2.3188	1	18	2	4
249	247	210218	716357	285.1	11.19429	6	1.1	284	3	Not Proven	2	36	4	Minor Watercourse	6	284.4188	4.348704	4	0.6812	1	24	3	12
250	248	210318	716357	304.2	13.42405	6	0.2	304	1	Not Proven	2	12	2	Site Infrastructure	3	303.178	32.480216	3	1.022	1	9	1	2
251	249	210518	716957	291.91	8.138818	6	0.3	291.61	1	Not Proven	2	12	2	Roads and Tracks	3	293.4188	20.074014	3	-1.5088	1	9	1	2
252	250	210618	716957	301.99	6.28846	4	0.1	301.89	1	Not Proven	2	8	2	Minor Watercourse	6	293.1224	51.58525	3	8.8676	1	18	2	4
253	251	210718	716957	294	0	1	3.2	290.8	8	Not Proven	2	16	3	Minor Watercourse	6	294	25.524358	3	0	1	18	2	6
254	252	210818	716957	296	5.214639	4	3.2	292.8	8	Not Proven	2	64	5	Minor Watercourse	6	296	7.320248	4	0	1	24	3	15
255	253	210918	716957	310.29	13.38802	6	0.8	309.49	2	Not Proven	2	24	3	Minor Watercourse	6	314.2188	15.486666	3	-3.9288	1	18	2	6
256	254	211018	716957	326.01	8.049467	6	0.4	325.61	1	Not Proven	2	12	2	Minor Watercourse	6	323	25.790115	3	3.01	1	18	2	4
257	255	211118	716957	347.2	10.56931	6	0.1	347.1	1	Not Proven	2	12	2	Minor Watercourse	6	354.5936	56.022128	3	-7.3936	1	18	2	4
258	256	211218	716957	353	5.671443	4	0.7	352.3	2	Not Proven	2	16	3	Minor Watercourse	6	349.7438	35.739939	3	3.2562	1	18	2	6
259	257	211318	716957	359.1	11.30993	6	0.1	359	1	Not Proven	2	12	2	Site Infrastructure	3	360.1592	5.89729	4	-1.0592	1	12	2	4
260	258	211418	716957	369.2	10.3763	6	0.1	369.1	1	Not Proven	2	12	2	Site Infrastructure	3	367.778	22.416735	3	1.422	1	9	1	2
261	259	210618	716757	292.1	12.0112	6	0.1	292	1	Not Proven	2	12	2	Minor Watercourse	6	295.178	20.606126	3	-3.078	1	18	2	4
262	260	210718	716757	302.29	14.89133	6	0.2	302.09	1	Not Proven	2	12	2	Minor Watercourse	6	305.5592	23.162401	3	-3.2692	1	18	2	4
263	261	210818	716757	331.2	21.16688	8	0.1	331.1	1	Not Proven	2	16	3	Minor Watercourse	6	315.5592	85.458477	3	15.6408	2	36	4	12
264	262	210918	716757	360.2	18.93199	8	0.1	360.1	1	Not Proven	2	16	3	Site Infrastructure	3	362	55.317918	3	-1.8	1	9	1	3
265	263	211018	716757	365.2	16.16821	8	0.2	365	1	Not Proven	2	16	3	Site Infrastructure	3	359.1627	18.469088	3	6.0373	1	9	1	3
266	264	211118	716757	375.1	6.202223	4	0.4	374.7	1	Not Proven	2	8	2	Minor Watercourse	6	374	73.298508	3	1.1	1	18	2	4
267	265	211218	716757	380.01	7.089415	4	1.2	378.81	3	Not Proven	2	24	3	Minor Watercourse	6	377.0188	96.735129	3	2.9912	1	18	2	6
268	266	211318	716757	385	2.259489	2	0.1	384.9	1	Not Proven	2	4	1	Site Infrastructure	3	389	99.914257	3	-4	1	9	1	1
269	267	211418	716757	382.01	2.684901	2	3.2	378.81	8	Not Proven	2	32	4	Site Infrastructure	3	383	11.844139	3	-0.99	1	9	1	4
270	268	210318	716757	266.2	15.79317	8	0.1	266.1	1	Not Proven	2	16	3	Minor Watercourse	6	264.2551	8.61197	4	1.9449	1	24	3	9
271	269	210418	716757	280.1	8.562816	6	0.1	280	1	Not Proven	2	12	2	Minor Watercourse	6	279	10.246054	3	1.1	1	18	2	4
272	270	210518	716757	278.19	6.588126	4	0.1	278.09	1	Not Proven	2	8	2	Minor Watercourse	6	278.2188	0.921103	4	-0.0288	1	24	3	6
273	271	210018	716557	231.09	5.397926	4	0.1	230.99	1	Not Proven	2	8	2	Minor Watercourse	6	231.7868	3.747056	4	-0.6968	1	24	3	6
274	272	210118	716557	245.1	12.50948	6	0.2	244.9	1	Not Proven	2	12	2	Minor Watercourse	6	245.2277	0.921103	4	-0.1277	1	24	3	6
275	273	210218	716557	264.29	10.49699	6	0.4	263.89	1	Not Proven	2	12	2	Minor Watercourse	6	264.6884	4.909504	4	-0.3984	1	24	3	6
276	274	210318	716557	278.2	10.99198	6	0.2	278	1	Not Proven	2	12	2	Minor Watercourse	6	273	42.271764	3	5.2	1	18	2	4
277	275	210418	716557	296.01	10.42878	6	1.5	294.51	3	Not Proven	2	36	4	Roads and Tracks	3	301.3781	25.394795	3	-5.3681	1	9	1	4
278	276	210518	716557	309.2	12.56232	6	0.2	309	1	Not Proven	2	12	2	Roads and Tracks	3	298.2941	42.546967	3	10.9059	2	18	2	4
279	277	210618	716557	325	5.88373	4	0.1	324.9	1	Not Proven	2	8	2	Site Infrastructure	3	326.5114	16.656915	3	-1.5114	1	9	1	2
280	278	210718	716557	335.1	12.36588	6	0.2	334.9	1	Not Proven	2	12	2	Site Infrastructure	3	335.2188	1.425773	4	-0.1188	1	12	2	4
281	279	210818	716557	352.1	11.30993	6	0.1	352	1	Not Proven	2	12	2	Site Infrastructure	3	350.4188	11.232704	3	1.6812	1	9	1	2
282	280	210918	716557	359.9	5.746762	4	1.2	358.7	3	Not Proven	2	24	3	Minor Watercourse	6	357.6188	26.357922	3	2.2812	1	18	2	6
283	281	211018	716557	375.2	12.74132	6	0.5	374.7	1	Not Proven	2	12	2	Minor Watercourse	6	377.0237	42.656156	3	-1.8237	1	18	2	4
284	282	211118	716557	384	2.453631	2	0.6	383.4	2	Not Proven	2	8	2	Minor Watercourse	6	382.1402	21.304385	3	1.8598	1	18	2	4
285	283	211218	716557	387	5.139534	4	3.2	383.8	8	Not Proven	2	64	5	Minor Watercourse	6	385.9201	34.688465	3	1.0799	1	18	2	10
286	284	210618	716357	343	6.805121	4	0.4	342.6	1	Not Proven	2	8	2	Minor Watercourse	6	339.0334	99.031379	3	3.9666	1	18	2	4
287	285	210718	716357	340	5.786324	4	0.4	339.6	1	Not Proven	2	8	2	Minor Watercourse	6	340	2.687904	4	0	1	24	3	6
288	286	210818	716357	356.91	6.376122	4	1	355.91	2	Not Proven	2	16	3	Minor Watercourse	6	355.9911	10.720375	3	0.9189	1	18	2	6
289	287	210918	716357	365.01	8.536668	6	0.4	364.61	1	Not Proven	2	12	2	Minor Watercourse	6	365.9075	65.384867	3	-0.8975	1	18	2	4
290	288	211018	716357	381.09	9.696063	6	0.4	380.69	1	Not Proven	2	12	2	Minor Watercourse	6	373.9492	72.456271	3	7.1408	1	18	2	4
291	289	211118	716357	396.1	6.317868	4	0.2	395.9	1	Not Proven	2	8	2	Site Infrastructure	3	396.6188	2.687904	4	-0.5188	1	12	2	4
292	290	211218	716357	402	4.496021	4	0.5	401.5	1	Not Proven	2	8	2	Minor Watercourse	6	402.3432	30.953604	3	-0.3432	1	18	2	4
293	291	210418	716357	318.1	8.860484	6	0.3	317.8	1	Not Proven	2	12	2	Site Infrastructure	3	311.0786	40.355704	3	7.0214	1	9	1	2
294	292	210518	716357	332.01	8.659664	6	0.8	331.21	2	Not Proven	2	24	3	Site Infrastructure	3	313.578	112.422564	3	18.432	2	18	2	6
295	293	210018	716657	224.1	9.795995	6	0.1	224	1	Not Proven	2	12	2	Minor Watercourse	6	225.5675	8.621997	4	-1.4675	1	24	3	6
296	294	210118	716657	243.1	11.8346	6	0.1	243	1	Not Proven	2	12	2	Minor Watercourse	6	238.978	20.11674	3	4.122	1	18	2	4
297	295	210218	716657	263.29	16.47803	8	0.8	262.49	2	Not Proven	2	32	4	Site Infrastructure	3	265.778	8.622878	4	-2.488	1	12	2	8
298	296	210318	716657	277.9	4.682408	4	1	276.9	2	Not Proven	2	16	3	Minor Watercourse	6	272.0786	37.464154	3	5.8214	1	18	2	6
299	297	210418	716657	281.1	12.60438	6	0.1	281	1	Not Proven	2	12	2	Minor Watercourse	6	277	22.957945	3	4.1	1	18	2	4
300	298	209918	716457	219.1	10.7695	6	0.1	219	1	Not Proven	2	12	2	Minor Watercourse	6	221.2188	47.299831	3	-2.1188	1	18	2	4
301	299	210018	716457	238.11	13.04006	6	0.1	238.01	1	Not Proven	2	12	2	Minor Watercourse	6	241.7969	50.397286	3	-3.6869	1	18	2	4
302	300	210118	716457	261.1	11.79188	6	0.1	261	1	Not Proven	2	12	2	Minor Watercourse	6	262.2767	61.164169	3	-1.1767	1	18	2	4
303	301	210218	716457	280.21	18.18372	8	0.2	280.01	1	Not Proven	2	16	3	Site Infrastructure	3	277.3781	13.424367	3	2.8319	1	9	1	3
304	302	210318	716457	301.1	9.006645	6	0.3	300.8	1	Not Proven	2	12	2	Site Infrastructure	3	300.2188	63.298888	3	0.8812	1	9	1	2
305	303	209918	716257	231.1	11.19429	6	0.1	231	1	Not Proven	2	12	2	Minor Watercourse	6	235.6855	56.328679	3	-4.5855	1	18	2	4
306	304	210018	716257	252.9	8.300076	6	0.1	252.8	1	Not Proven	2	12	2	Minor Watercourse	6	252	19.305244	3	0.9	1	18	2	4
307	305	210118	716257	268.19	9.201937	6	0.1	268.09	1	Not Proven	2	12	2	Minor Watercourse	6	268.6188	2.687904	4	-0.4288	1	24	3	6
308	306	210218	716257	287.1	11.30993	6	0.1	287	1	Not Proven	2	12	2	Minor Watercourse	6	287.2188	9.315065	4	-0.1188	1	24	3	6
309	307	210318	716257	304.1	11.04848	6	0.2	303.9	1	Not Proven	2	12	2	Minor Watercourse	6	304.6188	4.194476	4	-0.5188	1	24	3	6
310	308	209818	716257	212.2	12.60438	6	0.1	212.1	1	Not Proven	2	12	2	Site Infrastructure	3	204.5969	51.547823	3	7.6031	1	9	1	2
311	309	209818	716057	212.1	6.294745	4	0.4	211.7	1	Not Proven	2	8	2	Roads and Tracks	3	213.9845	12.613756	3	-1.8845	1	9	1	2
312	310	209918	716057	230	6.472888	4	0.1	229.9	1	Not Proven	2	8	2	Minor Watercourse	6	230.0089	22.013051	3	-0.0089	1	18	2	4
313	311	210018	716057	250.9	12.85094	6	0.2	250.7	1	Not Proven	2	12	2	Minor Watercourse	6	245.0188	24.691724	3	5.8812	1	18	2	4
314	312	210118	716057	265	12.86228	6	0.2	264.8	1	Not Proven	2	12	2	Minor Watercourse	6	262.2507	19.305244	3	2.7493	1	18	2	4
315	313	210218	716057	281.2	16.35371	8	0.2	281	1	Not Proven	2	16	3	Minor Watercourse	6	277.978	14.770959	3	3.222	1	18	2	6
316	314	210318	716057	303.2	12.60438	6	0.2	303	1	Not Proven	2	12	2	Roads and Tracks	3	307.0786	23.785685	3	-3.8786	1	9	1	2
317	315	210618	717057	300.1	6.37937	4	1	299.1	2	Not Proven	2	16	3	Roads and Tracks	3	302.1592	15.51451	3	-2.0592	1	9	1	3
318	316	210718	717057	296.9	4.806587	4	3.2	293.7	8	Not Proven	2	64	5	Site Infrastructure	3	296	11.591446	3	0.9	1	9	1	5
319	317	210818	717057	304	12.92326	6	0.4	303.6	1	Not Proven	2	12	2	Site Infrastructure	3	304.2188	0.921103	4	-0.2188	1	12	2	4
320	318	210918	717057	315.09	8.247381	6	0.6	314.49	2	Not Proven	2	24	3	Site Infrastructure	3	318	20.712422	3	-2.91	1	9	1	3
321	319	211018	717057	323.1	4.796396	4	2	321.1	3	Not Proven	2	24	3	Site Infrastructure	3	323	17.518014	3	0.1	1	9	1	3
322	320	211118	717057	331.01	4.291719	4	1.4	329.61	3	Not Proven	2	24	3	Site Infrastructure	3	331.9082	24.444951	3	-0.8982	1	9	1	3
323	321	211218	717057	337.1	12.47494	6	0.8	336.3	2	Not Proven	2	24	3	Site Infrastructure	3	340.1592	15.307633	3	-3.0592	1	9	1	3
324	322	211318	717057	344.01	10.40954	6	3.2	340.81	8	Not Proven	2	96	5	Site Infrastructure	3	345.778	22.41504	3	-1.768	1	9	1	5
325	323	211418	717057	359.1	10.05003	6	2.9	356.2	3	Not Proven	2	36	4	Site Infrastructure	3	359.978	15.360574	3	-0.878	1	9	1	4
326	324	211218	717157	321.1	11.30993	6	1.6	319.5	3	Not Proven	2	36	4	Minor Watercourse	6	320.978	24.212625	3	0.122	1	18	2	8
327	325	211318	717157	333.2	10.50831	6	2.2	331	3	Not Proven	2	36	4	Minor Watercourse	6	326.0667	65.224833	3	7.1333	1	18	2	8
328	326	211418	717157	350.01	7.652728	4	0.9	349.11	2	Not Proven	2	16	3	Site Infrastructure	3	358.318	114.086478	3	-8.308	1	9	1	3
329	327	210518	716857	287.9	11.30993	6	0.6	287.3	2	Not Proven	2	24	3	Minor Watercourse	6	284.778	25.428764	3	3.122	1	18	2	6
330	328	210618	716857	298.11	14.27408	6	0.1	298.01	1	Not Proven	2	12	2	Minor Watercourse	6	291.0143	30.829207	3	7.0957	1	18	2	4
331	329	210718	716857	294.81	6.246397	4	1.9	292.91	3	Not Proven	2	24	3	Minor Watercourse	6	293.0171	44.432146	3	1.7929	1	18	2	6
332	330	210818	716857	313.01	19.95107	8	0.2	312.81	1	Not Proven	2	16	3	Minor Watercourse	6	299.744	76.921893	3	13.266	2	36	4	12

	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
333	331	210918	716857	336.3	23.49262	8	0.2	336.1	1	Not Proven	2	16	3	Minor Watercourse	6	308.178	77.69775	3	28.122	2	36	4	12
334	332	211018	716857	348.2	15.28012	8	0.5	347.7	1	Not Proven	2	16	3	Site Infrastructure	3	361.178	51.542278	3	-12.978	1	9	1	3
335	333	211118	716857	361.2	12.39706	6	0.7	360.5	2	Not Proven	2	24	3	Site Infrastructure	3	360.5592	3.047561	4	0.6408	1	12	2	6
336	334	211218	716857	365.01	9.649639	6	1.1	363.91	3	Not Proven	2	36	4	Site Infrastructure	3	361.4698	18.272045	3	3.5402	1	9	1	4
337	335	211318	716857	376.1	5.726133	4	0.6	375.5	2	Not Proven	2	16	3	Site Infrastructure	3	362.578	80.866772	3	13.522	2	18	2	6
338	336	211418	716857	376.1	9.869182	6	0.8	375.3	2	Not Proven	2	24	3	Site Infrastructure	3	380.2188	31.975247	3	-4.1188	1	9	1	3
339	337	210518	716657	296.2	13.02745	6	0.3	295.9	1	Not Proven	2	12	2	Roads and Tracks	3	292.9763	23.416482	3	3.2237	1	9	1	2
340	338	210618	716657	312.01	10.062	6	0.6	311.41	2	Not Proven	2	24	3	Site Infrastructure	3	316	34.495826	3	-3.99	1	9	1	3
341	339	210718	716657	320.1	12.60438	6	0.2	319.9	1	Not Proven	2	12	2	Minor Watercourse	6	312.4995	43.619501	3	7.6005	1	18	2	4
342	340	210818	716657	346.11	16.78416	8	0.3	345.81	1	Not Proven	2	16	3	Minor Watercourse	6	347.187	9.315065	4	-1.077	1	24	3	9
343	341	210918	716657	361	4.406456	4	0.1	360.9	1	Not Proven	2	8	2	Minor Watercourse	6	360.2507	9.315065	4	0.7493	1	24	3	6
344	342	211018	716657	370.2	12.29819	6	2.1	368.1	3	Not Proven	2	36	4	Minor Watercourse	6	370.0349	4.741269	4	0.1651	1	24	3	12
345	343	211118	716657	376.19	8.356002	6	1.9	374.29	3	Not Proven	2	36	4	Minor Watercourse	6	374	20.226587	3	2.19	1	18	2	8
346	344	211218	716657	383.1	4.854873	4	1	382.1	2	Not Proven	2	16	3	Minor Watercourse	6	377.0188	59.147825	3	6.0812	1	18	2	6
347	345	210418	716457	308.2	10.21938	6	0.4	307.8	1	Not Proven	2	12	2	Site Infrastructure	3	312.2941	21.756434	3	-4.0941	1	9	1	2
348	346	210518	716457	323.19	11.62339	6	0.3	322.89	1	Not Proven	2	12	2	Site Infrastructure	3	318.578	31.58444	3	4.612	1	9	1	2
349	347	210618	716457	335.19	6.043441	4	0.8	334.39	2	Not Proven	2	16	3	Minor Watercourse	6	334.1013	59.955464	3	1.0887	1	18	2	6
350	348	210718	716457	339	4.478157	4	1.2	337.8	3	Not Proven	2	24	3	Minor Watercourse	6	339	0.921103	4	0	1	24	3	9
351	349	210818	716457	351.19	10.20188	6	1	350.19	2	Not Proven	2	24	3	Minor Watercourse	6	345.778	29.780262	3	5.412	1	18	2	6
352	350	210918	716457	361.91	6.283234	4	0.4	361.51	1	Not Proven	2	8	2	Minor Watercourse	6	359.7638	56.889701	3	2.1462	1	18	2	4
353	351	211018	716457	380.1	12.64845	6	0.3	379.8	1	Not Proven	2	12	2	Minor Watercourse	6	372.3781	45.682706	3	7.7219	1	18	2	4
354	352	211118	716457	393	5.692733	4	1.2	391.8	3	Not Proven	2	24	3	Site Infrastructure	3	398	67.97002	3	-5	1	9	1	3
355	353	211218	716457	395	4.270691	4	0.5	394.5	1	Not Proven	2	8	2	Site Infrastructure	3	395.2342	9.83439	4	-0.2342	1	12	2	4
356	354	209818	715957	211.1	8.774507	6	0.3	210.8	1	Not Proven	2	12	2	Roads and Tracks	3	212.0188	8.621997	4	-0.9188	1	12	2	4
357	355	209918	715957	229.1	13.62329	6	0.3	228.8	1	Not Proven	2	12	2	Site Infrastructure	3	231.4376	12.537034	3	-2.3376	1	9	1	2
358	356	210018	715957	247.1	5.75888	4	0.1	247	1	Not Proven	2	8	2	Minor Watercourse	6	247.0089	10.720375	3	0.0911	1	18	2	4
359	357	210118	715957	269.1	15.68126	8	0.1	269	1	Not Proven	2	16	3	Minor Watercourse	6	268.3849	6.730173	4	0.7151	1	24	3	9
360	358	210218	715957	292.1	7.529294	4	0.3	291.8	1	Not Proven	2	8	2	Site Infrastructure	3	292.2188	13.309366	3	-0.1188	1	9	1	2
361	359	209818	715857	212.1	8.25148	6	0.1	212	1	Not Proven	2	12	2	Minor Watercourse	6	212.2188	1.425773	4	-0.1188	1	24	3	6
362	360	209918	715857	232.1	14.9541	6	0.3	231.8	1	Not Proven	2	12	2	Minor Watercourse	6	228.8188	57.839665	3	3.2812	1	18	2	4
363	361	210018	715857	260.91	8.05191	6	0.1	260.81	1	Not Proven	2	12	2	Site Infrastructure	3	257.778	30.531885	3	3.132	1	9	1	2
364	362	210118	715857	274.2	16.90172	8	0.1	274.1	1	Not Proven	2	16	3	Site Infrastructure	3	277.6188	18.313864	3	-3.4188	1	9	1	3
365	363	210218	715857	291.09	8.853573	6	0.1	290.99	1	Not Proven	2	12	2	Site Infrastructure	3	292.0334	8.622878	4	-0.9434	1	12	2	4
366	364	209818	715757	213.1	12.39598	6	0.1	213	1	Not Proven	2	12	2	Minor Watercourse	6	213.2277	0.921103	4	-0.1277	1	24	3	6
367	365	209918	715757	233.8	13.7529	6	0.3	233.5	1	Not Proven	2	12	2	Minor Watercourse	6	227.2915	19.305244	3	6.5085	1	18	2	4
368	366	210018	715757	249.01	13.60157	6	0.1	248.91	1	Not Proven	2	12	2	Minor Watercourse	6	239.578	85.359667	3	9.432	1	18	2	4
369	367	210118	715757	269.09	4.663343	4	0.1	268.99	1	Not Proven	2	8	2	Minor Watercourse	6	274.0188	62.351526	3	-4.9288	1	18	2	4
370	368	209818	715657	220.2	12.52027	6	0.1	220.1	1	Not Proven	2	12	2	Minor Watercourse	6	221.2188	5.329318	4	-1.0188	1	24	3	6
371	369	209918	715657	237.19	8.26702	6	0.1	237.09	1	Not Proven	2	12	2	Minor Watercourse	6	241.2739	51.978188	3	-4.0839	1	18	2	4
372	370	210018	715657	258.1	12.9096	6	0.1	258	1	Not Proven	2	12	2	Minor Watercourse	6	256.6665	15.360574	3	1.4335	1	18	2	4
373	371	210118	715657	272.29	14.89133	6	0.3	271.99	1	Not Proven	2	12	2	Minor Watercourse	6	271.4188	16.114802	3	0.8712	1	18	2	4
374	372	209718	715557	215.19	11.17408	6	0.3	214.89	1	Not Proven	2	12	2	Minor Watercourse	6	203.978	53.467478	3	11.212	2	36	4	8
375	373	209818	715557	236.2	15.80367	8	0.6	235.6	2	Not Proven	2	32	4	Minor Watercourse	6	229.8188	82.312585	3	6.3812	1	18	2	8
376	374	209918	715557	250.19	11.39164	6	0.6	249.59	2	Not Proven	2	24	3	Minor Watercourse	6	232.4188	79.583179	3	17.7712	2	36	4	12
377	375	210018	715557	269.1	11.24937	6	0.6	268.5	2	Not Proven	2	24	3	Roads and Tracks	3	278.3901	54.609483	3	-9.2901	1	9	1	3
378	376	209718	715457	223.1	11.30993	6	0.3	222.8	1	Not Proven	2	12	2	Minor Watercourse	6	221.6188	53.359194	3	1.4812	1	18	2	4
379	377	209818	715457	246.1	12.48114	6	0.6	245.5	2	Not Proven	2	24	3	Minor Watercourse	6	244.8188	42.842297	3	1.2812	1	18	2	6
380	378	209918	715457	261.2	19.30915	8	0.6	260.6	2	Not Proven	2	32	4	Minor Watercourse	6	267.7912	118.775393	3	-6.5912	1	18	2	8
381	379	210018	715457	277.9	9.962836	6	0.6	277.3	2	Not Proven	2	24	3	Site Infrastructure	3	276.9776	38.934746	3	0.9224	1	9	1	3
382	380	209718	715357	224.19	10.56219	6	0.1	224.09	1	Not Proven	2	12	2	Minor Watercourse	6	221.2537	44.707848	3	2.9363	1	18	2	4
383	381	209818	715357	247.09	10.11236	6	0.3	246.79	1	Not Proven	2	12	2	Minor Watercourse	6	243.2188	58.043997	3	3.8712	1	18	2	4
384	382	209918	715357	265.09	10.20064	6	0.3	264.79	1	Not Proven	2	12	2	Minor Watercourse	6	258.7194	57.907243	3	6.3706	1	18	2	4
385	383	210018	715357	268.01	7.882457	4	0.3	267.71	1	Not Proven	2	8	2	Site Infrastructure	3	269	12.660017	3	-0.99	1	9	1	2
386	384	209718	715257	224	10.69878	6	0.3	223.7	1	Not Proven	2	12	2	Minor Watercourse	6	219.4188	17.628251	3	4.5812	1	18	2	4
387	385	209818	715257	241.2	17.91328	8	0.1	241.1	1	Not Proven	2	16	3	Minor Watercourse	6	238.0188	17.55688	3	3.1812	1	18	2	6
388	386	209918	715257	257.1	12.47494	6	0.3	256.8	1	Not Proven	2	12	2	Minor Watercourse	6	252.4425	20.982174	3	4.6575	1	18	2	4
389	387	209718	715157	219.31	36.68844	8	0.3	219.01	1	Not Proven	2	16	3	Minor Watercourse	6	216.0586	5.371781	4	3.2514	1	24	3	9
390	388	209818	715157	239.01	18.58334	8	0.3	238.71	1	Not Proven	2	16	3	Minor Watercourse	6	231.1592	26.988213	3	7.8508	1	18	2	6
391	389	209518	713857	167.29	18.39644	8	0	167.29	1	Not Proven	2	16	3	Roads and Tracks	3	167.4376	0.921103	4	-0.1476	1	12	2	6
392	390	210218	713357	191.8	16.70617	8	0.1	191.7	1	Not Proven	2	16	3	Minor Watercourse	6	171.2894	130.446102	3	20.5106	2	36	4	12
393	391	210318	713257	181.81	16.89193	8	0	181.81	1	Not Proven	2	16	3	Minor Watercourse	6	181.1939	7.011022	4	0.6161	1	24	3	9
394	392	210418	713257	204	15.79317	8	0.1	203.9	1	Not Proven	2	16	3	Minor Watercourse	6	189.4376	65.937078	3	14.5624	2	36	4	12
395	393	210518	713257	218.8	16.61557	8	0	218.8	1	Not Proven	2	16	3	Minor Watercourse	6	195.9986	154.684866	3	22.8014	2	36	4	12
396	394	210618	713257	210.9	12.0112	6	0.3	210.6	1	Not Proven	2	12	2	Minor Watercourse	6	204.6408	91.117717	3	6.2592	1	18	2	4
397	395	210718	713257	208.91	9.934195	6	0.2	208.71	1	Not Proven	2	12	2	Minor Watercourse	6	209.0408	8.622878	4	-0.1308	1	24	3	6
398	396	210818	713257	219	2.100247	2	0.2	218.8	1	Not Proven	2	4	1	Minor Watercourse	6	208.9214	89.415294	3	10.0786	2	36	4	4
399	397	210918	713257	215.81	6.716329	4	0.6	215.21	2	Not Proven	2	16	3	Minor Watercourse	6	208.9214	189.410335	3	6.8886	1	18	2	6
400	398	211018	713257	215.99	2.684901	2	3	212.99	3	Not Proven	2	12	2	Minor Watercourse	6	208.9214	289.408802	3	7.0686	1	18	2	4
401	399	211118	713257	212	3.863871	2	0.5	211.5	1	Not Proven	2	4	1	Minor Watercourse	6	215	214.908949	3	-3	1	18	2	2
402	400	211118	713357	221.81	6.622718	4	0.4	221.41	1	Not Proven	2	8	2	Minor Watercourse	6	215	173.335156	3	6.81	1	18	2	4
403	401	211018	713357	230.9	11.59417	6	0.1	230.8	1	Not Proven	2	12	2	Minor Watercourse	6	259.7557	223.525268	3	-28.8557	1	18	2	4
404	402	210918	713357	227.91	9.869365	6	0.3	227.61	1	Not Proven	2	12	2	Minor Watercourse	6	257	165.021777	3	-29.09	1	18	2	4
405	403	210818	713357	232.9	11.30993	6	0.1	232.8	1	Not Proven	2	12	2	Minor Watercourse	6	223.4408	95.030471	3	9.4592	1	18	2	4
406	404	210718	713357	228.1	14.71555	6	0	228.1	1	Not Proven	2	12	2	Minor Watercourse	6	228.5014	0.921103	4	-0.4014	1	24	3	6
407	405	210618	713357	232.99	8.659664	6	0.2	232.79	1	Not Proven	2	12	2	Minor Watercourse	6	228.6177	98.596613	3	4.3723	1	18	2	4
408	406	210518	713357	238.1	11.04604	6	0.2	237.9	1	Not Proven	2	12	2	Minor Watercourse	6	224.4058	130.661901	3	13.6942	2	36	4	8
409	407	210418	713357	219	14.91447	6	0.2	218.8	1	Not Proven	2	12	2	Minor Watercourse	6	201.4784	41.672236	3	17.5216	2	36	4	8
410	408	210318	713357	196.1	14.66656	6	0.1	196	1	Not Proven	2	12	2	Minor Watercourse	6	197.0233	56.189875	3	-0.9233	1	18	2	4
411	409	210418	713457	219.71	14.14617	6	0.2	219.51	1	Not Proven	2	12	2	Minor Watercourse	6	220.1329	12.881088	3	-0.4229	1	18	2	4
412	410	210518	713457	237.1	12.96365	6	0.2	236.9	1	Not Proven	2	12	2	Minor Watercourse	6	224.8565	69.444767	3	12.2435	2	36	4	8
413	411	210618	713457	250.99	15.56506	8	0.2	250.79	1	Not Proven	2	16	3	Minor Watercourse	6	246	111.938421	3	4.99	1	18	2	6
414	412	210718	713457	248.99	10.20749	6	0.1	248.89	1	Not Proven	2	12	2	Minor Watercourse	6	247.04	17.30333	3	1.95	1	18	2	4
415	413	210818	713457	254.99	4.291719	4	0.5	254.49	1	Not Proven	2	8	2	Minor Watercourse	6	255.7592	29.037783	3	-0.7692	1	18	2	4
416	414	210918	713457	248.9	17.90985	8	0.2	248.7	1	Not Proven	2	16	3	Minor Watercourse	6	259.7557	82.107157	3	-10.8557	1	18	2	6
417	415	211018	713457	244.9	8.26814	6	0.2	244.7	1	Not Proven	2	12	2	Minor Watercourse	6	265	150.705071	3	-20.1	1	18	2	4
418	416	211118	713457	232.8	15.58628	8	0.1	232.7	1	Not Proven	2	16	3	Minor Watercourse	6	223.8696	174.420209	3	8.9304	1	18	2	6
419	417	211118	713557	248.8	12.60438	6	0	248.8	1	Not Proven	2	12	2	Minor Watercourse	6	265.0408	93.721748	3	-16.2408	1	18	2	4
420	418	211018	713557	266.9	10.26913	6	0.2	266.7	1	Not Proven	2	12	2	Minor Watercourse	6	265	50.70738	3	1.9	1	18	2	4
421	419	210918	713557	265.29	15.43429	8	0.1	265.19	1	Not Proven	2	16	3	Minor Watercourse	6	263.115	11.428265	3	2.175	1	18	2	6
422	420	210818	713557	268.8	15.99074	8	0.1	268.7	1	Not Proven	2	16	3	Minor Watercourse	6	258.4188	56.012067	3	10.3812	2	36	4	12
423	421	210718	713557	277.99	17.40093	8	0	277.99	1	Not Proven	2	16	3	Minor Watercourse	6	248.9711	99.493564	3	29.0189	2	36	4	12
424	422	210618	713557	273	18.31872	8	0.2	272.8	1	Not Proven	2	16	3	Minor Watercourse	6	252.9371	88.336226	3	20.0629	2	36	4	12
425	423	210518	713557	245.21	24.01888	8	0	245.21	1	Not Proven	2	16	3	Minor Watercourse	6	244.9004	1.572269	4	0.3096	1	24	3	9
426	424	210518	713657	269.81	15.33329	8	0.3	269.51	1	Not Proven	2	16	3	Minor Watercourse	6	263.5424	36.004806	3	6.2676	1	18	2	6
427	425	210618	713657	284	12.60438	6	0.2	283.8	1	Not Proven	2	12	2	Minor Watercourse	6	269.2972	57.469543	3	14.7028	2	36	4	8
428	426	210718	713657	313.99	17.05569	8	0.1	313.89	1	Not Proven	2	16	3	Minor Watercourse	6	288.6188	130.405044	3	25.3712	2	36	4	12
429	427	210818	713657	307.8	17.94399	8	0	307.8	1	Not Proven	2	16	3	Minor Watercourse	6	262.2099	127.887155	3	45.5901	2	36	4	12
430	428	210918	713657	278.8	14.8417	6	0.2	278.6	1	Not Proven	2	12	2	Minor Watercourse	6	263	68.507013	3	15.8	2	36	4	8
431	429	211018	713657	267	0.020249	1	0.4	266.6	1	Not Proven	2	2	1	Minor Watercourse	6	265.0408	43.473256	3	1.9592	1	18	2	2
432	430	211118	713657	265.9	4.914897	4	3.2	262.7	8	Not Proven	2	64	5	Minor Watercourse	6	265.0408	81.504515	3	0.8592	1	18	2	10
433	431	211118	713757	270	6.090468	4	0.8	269.2	2	Not Proven	2	16	3	Minor Watercourse	6	256.2914	110.59634	3	13.7086	2	36	4	12
434	432	211018	713757	289.8	21.3912	8	0.1	289.7	1	Not Proven	2	16	3	Minor Watercourse	6	265.0408	140.531648	3	24.7592	2	36	4	12
435	433	210918	713757	309.71	17.90975	8	0.1	309.61	1	Not Proven	2	16	3	Minor Watercourse	6	264	162.721434	3	45.71	2	36	4	12
436	434	210818	713757	323.9	9.275472	6	0.5	323.4	1	Not Proven	2	12	2	Minor Watercourse	6	315.0089	134.665105	3	8.8911	1	18	2	4
437	435	210718	713757	312.91	8.484419	6	0.3	312.61	1	Not Proven	2	12	2	Minor Watercourse	6	294.4188	77.451332	3	18.4912	2	36	4	8
438	436	210618	713757	288.91	9.682243	6	0.2	288.71	1	Not Proven	2	12	2	Minor Watercourse	6	289.0188	5.654205	4	-0.1088	1	24	3	6
439	437	210518	713757	291.8	16.58778	8	0.2	291.6	1	Not Proven	2	16	3	Minor Watercourse	6	279.9514	76.108959	3	11.8486	2	36	4	12
440	438	210418	713757	295.89	18.54198	8	0.1	295.79	1	Not Proven	2	16	3	Minor Watercourse	6	275.6664	161.215966	3	20.2236	2	36	4	12
441	439	210318	713757	303.8	13.86191	6	0.3	303.5	1	Not Proven	2	12	2	Minor Watercourse	6	273.6784	254.610653	3	30.1216	2	36	4	8
442	440	210218	713757	296	13.72218	6	0.2	295.8	1	Not Proven	2	12	2	Minor Watercourse	6	252.5101	267.600034	3	43.4899	2	36	4	8
443	441	210218	713857	311.9	8.548559	6	0.3	311.6	1	Not Proven	2	12	2	Minor Watercourse	6	307.359	190.930408	3	4.541	1	18	2	4
444	442	210318	713857	318.9	10.41459	6	0.2	318.7	1	Not Proven	2	12	2	Minor Watercourse	6	320.2739	242.918381	3	-1.3739	1	18	2	4
445	443	210418	713857	323.9	11.30993	6	0.3	323.6	1	Not Proven	2	12	2	Minor Watercourse	6	279.9514	216.727049	3	43.9486	2	36	4	8
446	444	210518	713857	322.9	16.69924	8	0.2	322.7	1	Not Proven	2	16	3	Minor Watercourse	6	295.1235	144.222132	3	27.7765	2	36	4	12
447	445	210618	713857	315.9	13.44609	6	0.2	315.7	1	Not Proven	2	12	2	Minor Watercourse	6	300.3326	60.735571	3	15.5674	2	36	4	8
448	446	210718	713857	313.1	10.3088	6	0.2	312.9	1	Not Proven	2	12	2	Minor Watercourse	6	313.6188	4.194476	4	-0.5188	1	24	3	6
449	447	210818	713857	323	0	1	1.1	321.9	3	Not Proven	2	6	2	Minor Watercourse	6	322.4425	75.346636	3	0.5575	1	18	2	4
450	448	210918	713857	318	5.052649	4	1.8	316.2	3	Not Proven	2	24	3	Sensitive Habitat	8	324.022	83.592316	3	-6.022	1	24	3	9
451	449	211018	713857	317.89	7.518379	4	0.9	316.99	2	Not Proven	2	16	3	Sensitive Habitat	8	323.4408	87.902219	3	-5.5508	1	24	3	9
452	450	211118	713857	291.6	29.09246	8	0.2	291.4	1	Not Proven	2	16	3	Minor Watercourse	6	261.0596	142.471192	3	30.5404	2	36	4	12
453	451	211118	713957	310.99	13.64267	6	0.2	310.79	1	Not Proven	2	12	2	Minor Watercourse	6	324.2973	69.644242	3	-13.3073	1	18	2	4
454	452	211018	713957	323.81	8.117193	6	0.2	323.61	1	Not Proven	2	12	2	Sensitive Habitat	8	328.0408	33.413315	3	-4.2308	1	24	3	6
455	453	210918	713957	333.9	12.61059	6	0.1	333.8	1	Not Proven	2	12	2	Sensitive Habitat	8	334.0408	32.412535	3	-0.1408	1	24	3	6
456	454	210818	713957	333.09	8.049467	6	0.2	332.89	1	Not Proven	2	12	2	Minor Watercourse	6	331.6219	53.410539	3	1.4681	1	18	2	4
457	455	210718	713957	337.51	28.98158	8	0	337.51	1	Not Proven	2	16	3	Minor Watercourse	6	333.0408	45.860737	3	4.4692	1	18	2	6
458	456	210618	713957	347.8	17.21698	8	0.3	347.5	1	Not Proven	2	16	3	Minor Watercourse	6	308.0596	137.887776	3	39.7404	2	36	4	12
459	457	210518	713957	346.8	16.7616	8	0.2	346.6	1	Not Proven	2	16	3	Minor Watercourse	6	300.3326	202.155509	3	46.4674	2	36	4	12
460	458	210418	713957	343.9	11.30993	6	0.3	343.6	1	Not Proven	2	12	2	Minor Watercourse	6	353.8631	239.452837	3	-9.9631	1	18	2	4
461	459	210318	713957	335.9	12.36588	6	0.3	335.6	1	Not Proven	2	12	2	Minor Watercourse	6	331.79	167.022086	3	4.11	1	18	2	4
462	460	210218	713957	324.09	10.3738	6	0.2	323.89	1	Not Proven	2	12	2	Minor Watercourse	6	320.2739	102.894995	3	3.8161	1	18	2	4
463	461	210218	714057	335	12.60438	6	0.2	334.8	1	Not Proven	2	12	2	Minor Watercourse	6	331.79	25.969544	3	3.21	1	18	2	4
464	462	210318	714057	350.91	10.3738	6	0.3	350.61	1	Not Proven	2	12	2	Minor Watercourse	6	350.5587	99.51782	3	0.3513	1	18	2	4
465	463	210418	714057	361.09	8.442228	6	0.6	360.49	2	Not Proven	2	24	3	Sensitive Habitat	8	385.0527	155.759973	3	-23.9627	1	24	3	9
466	464	210518	714057	367.91	9.869365	6	0.2	367.71	1	Not Proven	2	12	2	Sensitive Habitat	8	384.0408	120.883885	3	-16.1308	1	24	3	6
467	465	210618	714057	368.9	11.66059	6	0.1	368.8	1	Not Proven	2	12	2	Sensitive Habitat	8	390	121.446077	3	-21.1	1	24	3	6
468	466	210718	714057	372.9	6.270527	4	0.6	372.3	2	Not Proven	2	16	3	Minor Watercourse	6	361.5667	56.690003	3	11.3333	2	36	4	12
469	467	210818	714057	361.61	30.80721	8	0.1	361.51	1	Not Proven	2	16	3	Minor Watercourse	6	361.5667	43.530868	3	0.0433	1	18	2	6
470	468	210918	714057	351.9	14.7827	6	0	351.9	1	Not Proven	2	12	2	Sensitive Habitat	8	349.6884	24.077193	3	2.2116	1	24	3	6
471	469	211018	714057	357	2.601057	2	1.8	355.2	3	Not Proven	2	12	2	Sensitive Habitat	8	357	0.921103	4	0	1	32	4	8
472	470	211118	714057	330.7	26.31803	8	0.3	330.4	1	Not Proven	2	16	3	Minor Watercourse	6	335.2627	19.683832	3	-4.5627	1	18	2	6
473	471	211118	714157	368.61	20.77745	8	0	368.61	1	Not Proven	2	16	3	Minor Watercourse	6	382.0588	68.604542	3	-13.4488	1	18	2	6
474	472	211018	714157	373.89	18.53799	8	0	373.89	1	Not Proven	2	16	3	Sensitive Habitat	8	374.0816	0.921103	4	-0.1916	1	32	4	12
475	473	210918	714157	391.8	20.01745	8	0.2	391.6	1	Not Proven	2	16	3	Sensitive Habitat	8	356.0808	86.513717	3	35.7192	2	48	4	12
476	474	210818	714157	391.91	10.02479	6	0.4	391.51	1	Not Proven	2	12	2	Minor Watercourse	6	391.0408	19.418662	3	0.8692	1	18	2	4
477	475	210718	714157	390.9	6.317868	4	0.3	390.6	1	Not Proven	2	8	2	Minor Watercourse	6	391.0408	80.597174	3	-0.1408	1	18	2	4
478	476	210618	714157	388.9	6.696591	4	0.9	388	2	Not Proven	2	16	3	Sensitive Habitat	8	391	23.338612	3	-2.1	1	24	3	9
479	477	210518	714157	382.1	6.374522	4	0.9	381.2	2	Not Proven	2	16	3	Sensitive Habitat	8	384.0408	21.728636	3	-1.9408	1	24	3	9
480	478	210418	714157	375.81	15.34336	8	1	374.81	2	Not Proven	2	32	4	Sensitive Habitat	8	384.4188	70.347077	3	-8.6088	1	24	3	12
481	479	210318	714157	361.91	8.517391	6	0.3	361.61	1	Not Proven	2	12	2	Minor Watercourse	6	357.1846	33.515149	3	4.7254	1	18	2	4
482	480	210218	714157	348.09	8.266459	6	0.3	347.79	1	Not Proven	2	12	2	Minor Watercourse	6	349.2596	39.530996	3	-1.1696	1	18	2	4
483	481	210218	714257	365	15.8877	8	0.1	364.9	1	Not Proven	2	16	3	Sensitive Habitat	8	372.7194	30.596549	3	-7.7194	1	24	3	9
484	482	210318	714257	373.9	13.20215	6	0.8	373.1	2	Not Proven	2	24	3	Sensitive Habitat	8	379.2408	27.245587	3	-5.3408	1	24	3	9
485	483	210418	714257	378.9	11.24235	6	0.9	378	2	Not Proven	2	24	3	Sensitive Habitat	8	384	44.200878	3	-5.1	1	24	3	9
486	484	210518	714257	387.1	10.50605	6	0.5	386.6	1	Not Proven	2	12	2	Sensitive Habitat	8	387.178	0.921103	4	-0.078	1	32	4	8
487	485	210618	714257	396	2.474033	2	1.1	394.9	3	Not Proven	2	12	2	Sensitive Habitat	8	396.0089	0.921103	4	-0.0089	1	32	4	8
488	486	210718	714257	399.9	7.761492	4	0.4	399.5	1	Not Proven	2	8	2	Sensitive Habitat	8	396	84.459046	3	3.9	1	24	3	6
489	487	210818	714257	404.81	8.468867	6	0.6	404.21	2	Not Proven	2	24	3	Minor Watercourse	6	402.0408	17.30333	3	2.7692	1	18	2	6
490	488	210918	714257	411	4.255776	4	1.3	409.7	3	Not Proven	2	24	3	Minor Watercourse	6	408.0121	62.399741	3	2.9879	1	18	2	6
491	489	211018	714257	410.8	8.9486	6	0.8	410	2	Not Proven	2	24	3	Minor Watercourse	6	409.422	12.613756	3	1.378	1	18	2	6
492	490	210618	714357	407.81	14.95575	6	0.1	407.71	1	Not Proven	2	12	2	Minor Watercourse	6	398	38.136214	3	9.81	1	18	2	4
493	491	210518	714357	409.9	22.40687	8	0	409.9	1	Not Proven	2	16	3	Sensitive Habitat	8	410.3004	0.921103	4	-0.4004	1	32	4	12
494	492	210418	714357	400.71	24.74862	8	0	400.71	1	Not Proven	2	16	3	Sensitive Habitat	8	401.0816	0.921103	4	-0.3716	1	32	4	12
495	493	210318	714357	388.71	24.27394	8	0.1	388.61	1	Not Proven	2	16	3	Sensitive Habitat	8	389.0816	0.921103	4	-0.3716	1	32	4	12
496	494	210218	714357	380.1	11.29708	6	0.3	379.8	1	Not Proven	2	12	2	Sensitive Habitat	8	380.2188	0.921103	4	-0.1188	1	32	4	8
497	495	210218	714457	380.1	13.1951	6	0.2	379.9	1	Not Proven	2	12	2	Sensitive Habitat	8	380.2188	0.921103	4	-0.1188	1	32	4	8
498	496	210318	714457	407.01	16.20768	8	0.4	406.61	1	Not Proven	2	16	3	Sensitive Habitat	8	407.4508	7.743541	4	-0.4408	1	32	4	12
499	497	210418	714457	432	7.569991	4	0.2	431.8	1	Not Proven	2	8	2	Sensitive Habitat	8	431.9681	0.921103	4	0.0319	1	32	4	8

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking				
500	498	210518	714457	445.09	8.474017	6	0.2	444.89	1	Not Proven	2	12	2	Sensitive Habitat	8	445.2507	0.921103	4	-0.1607	1	32	4	8				
501	499	210618	714457	445.89	17.5484	8	0.6	445.29	2	Not Proven	2	32	4	Sensitive Habitat	8	455.4816	35.57177	3	-9.5916	1	24	3	12				
502	500	210118	714257	351.5	34.17673	8	0.1	351.4	1	Not Proven	2	16	3	Sensitive Habitat	8	351.4251	0.921103	4	0.0749	1	32	4	12				
503	501	210268	713107	165	6.090468	4	1	164	2	Not Proven	2	16	3	Minor Watercourse	6	171.4188	126.749668	3	-6.4188	1	18	2	6				
504	502	210318	713107	171.91	6.37937	4	0.4	171.51	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	129.400201	3	-6.0185	1	18	2	4				
505	503	210368	713107	178.09	10.21938	6	0.1	177.99	1	Not Proven	2	12	2	Minor Watercourse	6	177.9285	143.474744	3	0.1615	1	18	2	4				
506	504	210418	713107	183	0.364476	1	1	182	2	Not Proven	2	4	1	Minor Watercourse	6	177.9285	171.538894	3	5.0715	1	18	2	2				
507	505	210468	713107	185.09	11.75562	6	0.1	184.99	1	Not Proven	2	12	2	Minor Watercourse	6	182.4841	203.758835	3	2.6059	1	18	2	4				
508	506	210518	713107	190	0.759985	1	0.4	189.6	1	Not Proven	2	2	1	Minor Watercourse	6	204.6408	228.325269	3	-14.6408	1	18	2	2				
509	507	210568	713107	193.9	8.556698	6	0.2	193.7	1	Not Proven	2	12	2	Minor Watercourse	6	204.6408	189.137565	3	-10.7408	1	18	2	4				
510	508	210618	713057	184.9	9.653739	6	0.1	184.8	1	Not Proven	2	12	2	Minor Watercourse	6	204.6408	199.459265	3	-19.7408	1	18	2	4				
511	509	210568	713057	184.9	12.31072	6	0.3	184.6	1	Not Proven	2	12	2	Minor Watercourse	6	204.6408	226.149085	3	-19.7408	1	18	2	4				
512	510	210518	713057	182.9	5.850456	4	1	181.9	2	Not Proven	2	16	3	Minor Watercourse	6	204.6408	259.813045	3	-21.7408	1	18	2	6				
513	511	210468	713057	181.9	6.683742	4	3	178.9	3	Not Proven	2	24	3	Minor Watercourse	6	177.9285	242.149896	3	3.9715	1	18	2	6				
514	512	210518	713007	177.9	6.14517	4	0.2	177.7	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	296.434155	3	-26.7408	1	18	2	4				
515	513	210568	713007	177	5.139534	4	0.1	176.9	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	267.420639	3	-27.6408	1	18	2	4				
516	514	210468	713007	175	6.326785	4	0.1	174.9	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	281.081771	3	-2.9285	1	18	2	4				
517	515	210418	713007	173	12.37149	6	0.1	172.9	1	Not Proven	2	12	2	Minor Watercourse	6	177.9285	255.27705	3	-4.9285	1	18	2	4				
518	516	210368	713007	168.09	5.873616	4	0.3	167.79	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	237.330533	3	-9.8385	1	18	2	4				
519	517	210318	713007	165.09	7.882457	4	0.1	164.99	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	229.096469	3	-12.8385	1	18	2	4				
520	518	210268	713057	164.91	8.049467	6	0.1	164.81	1	Not Proven	2	12	2	Minor Watercourse	6	171.4188	176.736721	3	-6.5088	1	18	2	4				
521	519	210318	713057	169.09	5.691832	4	0.5	168.59	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	179.206032	3	-8.8385	1	18	2	4				
522	520	210368	713057	172.09	8.049467	6	0.2	171.89	1	Not Proven	2	12	2	Minor Watercourse	6	177.9285	189.619071	3	-5.8385	1	18	2	4				
523	521	210268	712907	166.1	6.577724	4	1.6	164.5	3	Not Proven	2	24	3	Minor Watercourse	6	171.4188	326.721653	3	-5.3188	1	18	2	6				
524	522	210318	712907	168.19	6.116688	4	1	167.19	2	Not Proven	2	16	3	Minor Watercourse	6	177.9285	328.97716	3	-9.7385	1	18	2	6				
525	523	210368	712907	167	4.248174	4	1	166	2	Not Proven	2	16	3	Minor Watercourse	6	177.9285	334.763442	3	-10.9285	1	18	2	6				
526	524	210418	712907	166	0.427069	1	0.2	165.8	1	Not Proven	2	2	1	Minor Watercourse	6	177.9285	347.717057	3	-11.9285	1	18	2	2				
527	525	210468	712907	167	2.474033	2	0.1	166.9	1	Not Proven	2	4	1	Minor Watercourse	6	177.9285	367.080021	3	-10.9285	1	18	2	2				
528	526	210518	712907	170.09	6.647752	4	0.1	169.99	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	378.964363	3	-34.5508	1	18	2	4				
529	527	210568	712907	174.91	6.54638	4	0.3	174.61	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	356.727597	3	-29.7308	1	18	2	4				
530	528	210568	712857	171	0.571059	1	0.1	170.9	1	Not Proven	2	2	1	Minor Watercourse	6	204.6408	403.267862	3	-33.6408	1	18	2	2				
531	529	210518	712857	173	6.459044	4	0.2	172.8	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	423.065454	3	-31.6408	1	18	2	4				
532	530	210468	712857	171.1	11.30993	6	0.3	170.8	1	Not Proven	2	12	2	Minor Watercourse	6	177.9285	412.453794	3	-6.8285	1	18	2	4				
533	531	210418	712857	172.1	10.76486	6	1.5	170.6	3	Not Proven	2	36	4	Minor Watercourse	6	177.9285	395.319544	3	-5.8285	1	18	2	8				
534	532	210368	712857	173.1	5.710593	4	0.1	173	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	383.975197	3	-4.8285	1	18	2	4				
535	533	210318	712857	173	5.710593	4	0.3	172.7	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	378.941106	3	-4.9285	1	18	2	4				
536	534	210268	712857	171.1	5.777471	4	1	170.1	2	Not Proven	2	16	3	Minor Watercourse	6	171.4188	376.719297	3	-0.3188	1	18	2	6				
537	535	210418	713057	179.09	8.060254	6	0.1	178.99	1	Not Proven	2	12	2	Minor Watercourse	6	177.9285	211.650613	3	1.1615	1	18	2	4				
538	536	210218	712707	181	5.983335	4	1.2	179.8	3	Not Proven	2	24	3	Minor Watercourse	6	171.2894	528.423368	3	9.7106	1	18	2	6				
539	537	210268	712707	182.19	6.168502	4	0.8	181.39	2	Not Proven	2	16	3	Minor Watercourse	6	171.4188	526.714912	3	10.7712	2	36	4	12				
540	538	210318	712707	184	5.139534	4	1	183	2	Not Proven	2	16	3	Minor Watercourse	6	177.9285	528.873834	3	6.0715	1	18	2	6				
541	539	210368	712707	183	4.255776	4	1.5	181.5	3	Not Proven	2	24	3	Minor Watercourse	6	177.9285	532.492368	3	5.0715	1	18	2	6				
542	540	210418	712707	182	0	1	1.8	180.2	3	Not Proven	2	6	2	Minor Watercourse	6	177.9285	540.729796	3	4.0715	1	18	2	4				
543	541	210468	712707	181	0.182238	1	1.5	179.5	3	Not Proven	2	6	2	Minor Watercourse	6	177.9285	553.379889	3	3.0715	1	18	2	4				
544	542	210418	712607	187	2.229202	2	2.1	184.9	3	Not Proven	2	12	2	Minor Watercourse	6	177.9285	638.850133	3	9.0715	1	18	2	4				
545	543	210368	712607	188	2.259489	2	1	187	2	Not Proven	2	8	2	Minor Watercourse	6	177.9285	631.89311	3	10.0715	2	36	4	8				
546	544	210318	712607	189.91	5.705728	4	0.1	189.81	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	628.846811	3	11.9815	2	36	4	8				
547	545	210268	712607	190.1	6.270527	4	0.1	190	1	Not Proven	2	8	2	Minor Watercourse	6	171.4188	626.713155	3	18.6812	2	36	4	8				
548	546	210218	712607	189	6.459044	4	0.4	188.6	1	Not Proven	2	8	2	Minor Watercourse	6	171.2894	628.149692	3	17.7106	2	36	4	8				
549	547	210168	712607	186.19	6.188701	4	1	185.19	2	Not Proven	2	16	3	Minor Watercourse	6	171.2894	633.507258	3	14.9006	2	36	4	12				
550	548	210118	712607	184.1	4.873465	4	1.5	182.6	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	634.771828	3	-64.1322	1	24	3	9				
551	549	210018	712507	190.19	8.356002	6	1	189.19	2	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	512.635225	3	-58.0422	1	24	3	9				
552	550	210068	712507	193.1	5.943389	4	1.1	192	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	524.438236	3	-55.1322	1	24	3	9				
553	551	210118	712507	195.1	6.9849	4	0.8	194.3	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	540.625613	3	-53.1322	1	24	3	9				
554	552	210168	712507	198	6.37937	4	0.8	197.2	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	560.817835	3	-50.2322	1	24	3	9				
555	553	210218	712507	200.1	4.854873	4	1.8	198.3	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	584.600063	3	-48.1322	1	24	3	9				
556	554	210268	712407	205.9	8.774507	6	0.2	205.7	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	532.295598	3	-42.3322	1	24	3	6				
557	555	210218	712407	207.19	6.168502	4	0.8	206.39	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	501.096811	3	-41.0422	1	24	3	9				
558	556	210168	712407	206.01	2.684901	2	2	204.01	3	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	473.135735	3	-42.2222	1	24	3	6				
559	557	210118	712407	207	5.646991	4	0.5	206.5	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	449.017632	3	-41.2322	1	24	3	6				
560	558	210068	712407	208.09	8.141483	6	0.2	207.89	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	429.390549	3	-40.1422	1	24	3	6				
561	559	210018	712407	206.01	9.915715	6	0.3	205.71	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	414.89234	3	-42.2222	1	24	3	6				
562	560	209968	712407	201.19	10.00239	6	1	200.19	2	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	406.072732	3	-47.0422	1	24	3	9				
563	561	209918	712407	197.01	8.356002	6	1	196.01	2	Not Proven	2	24	3	Sensitive Habitat	8	248.7285	403.296538	3	-51.7185	1	24	3	9				
564	562	209868	712307	206.2	10.21938	6	0.7	205.5	2	Not Proven	2	24	3	Sensitive Habitat	8	250.6036	306.854256	3	-44.4036	1	24	3	9				
565	563	209918	712307	211	6.37937	4	1	210	2	Not Proven	2	16	3	Sensitive Habitat	8	248.7285	303.296682	3	-37.7285	1	24	3	9				
566	564	209968	712307	214.1	8.662129	6	0.7	213.4	2	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	306.978572	3	-34.1322	1	24	3	9				
567	565	210018	712307	215.1	5.726133	4	0.5	214.6	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	318.553659	3	-33.1322	1	24	3	6				
568	566	210068	712307	217.01	6.37937	4	0.2	216.81	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	337.219548	3	-31.2222	1	24	3	6				
569	567	210118	712307	215.91	8.049467	6	0.5	215.41	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	361.880662	3	-32.3222	1	24	3	6				
570	568	210168	712307	212.1	6.14517	4	0.7	211.4	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	391.405421	3	-36.1322	1	24	3	9				
571	569	210218	712307	212.1	5.710593	4	2	210.1	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	424.780877	3	-36.1322	1	24	3	9				
572	570	210118	712207	222	2.205297	2	1.8	220.2	3	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	283.369712	3	-26.2322	1	24	3	6				
573	571	210068	712207	223.91	6.150658	4	1.2	222.71	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	251.113129	3	-24.3222	1	24	3	9				
574	572	210018	712207	225.09	4.663343	4	0.3	224.79	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	225.426737	3	-23.1422	1	24	3	6				
575	573	209968	712207	225.1	7.152367	4	0.3	224.8	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	208.750146	3	-23.1322	1	24	3	6				
576	574	209918	712207	224.01	8.356002	6	0.4	223.61	1	Not Proven	2	12	2	Sensitive Habitat	8	248.7285	203.296968	3	-24.7185	1	24	3	6				
577	575	209868	712207	221.19	10.54294	6	0.1	221.09	1	Not Proven	2	12	2	Sensitive Habitat	8	250.6036	208.56729	3	-29.4136	1	24	3	6				
578	576	209818	712207	217.01	10.21938	6	0.2	216.81	1	Not Proven	2	12	2	Sensitive Habitat	8	252.7812	224.396479	3	-35.7712	1	24	3	6				
579	577	209868	712107	235	6.37937	4	0.2	234.8	1	Not Proven	2	8	2	Sensitive Habitat	8	252.7812	112.85012	3	-17.7812	1	24	3	6				
580	578	209918	712107	236.1	5.710593	4	1	235.1	2	Not Proven	2	16	3	Sensitive Habitat	8	248.7285	103.297808	3	-12.6285	1	24	3	9				
581	579	209968	712107	236	4.248174	4	0.7	235.3	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	113.654756	3	-12.2322	1	24	3	9				
582	580	210018	712107	234.09	5.873616	4	1.4	232.69	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	141.978849	3	-14.1422	1	24	3	9				
583	581	210068	712107	231.91	5.873616	4	0.7	231.21	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	179.996066	3	-16.3222	1	24	3	9				
584	582	210118	712107	228.09	5.873616	4	0.2	227.89	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	222.798505	3	-20.1422	1	24	3	6				
585	583	210168	712107	225.1	5.710593	4	0.5	224.6	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	268.104016	3	-23.1322	1	24	3	6				
586	584	210218	712107	225	4.406456	4	0.4	224.6	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	314.833851	3	-23.2322	1	24	3	6				
587	585	210268	712007	230	5.710593	4	0.2	229.8	1	Not Proven	2	8	2	Sensitive Habitat	8	239	262.08475	3	-9	1	24	3	6				
588	586	210218	712007	231.1	6.044724	4	0.3	230.8	1	Not Proven	2	8	2	Sensitive Habitat	8	236	231.581838	3	-4.9	1	24	3	6				
589	587	210168	712007	233	5.219973	4	1.5	231.5	3	Not Proven	2	24	3	Sensitive Habitat	8	235	205.247868	3	-2	1	24	3	9				
590	588	210118	712007	234.81	5.477589	4	0.2	234.61	1	Not Proven	2	8	2	Sensitive Habitat	8	234.6188	184.081257	3	0.1912	1	24	3	6				
591	589	210068	712007	237.9	6.14517	4	0.7	237.2	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	147.442747	3	-10.3322	1	24	3	9				
592	590	210018	712007	240.99	1.150355	1	0.1	240.89	1	Not Proven	2	2	1	Sensitive Habitat	8	248.2322	97.461652	3	-7.2422	1	24	3	3				
593	591	209968	712007	238	5.495606	4	0.6	237.4	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	47.52035	3	-10.2322	1	24	3	9				
594	592	209918	712007	248.81	21.25062	8	0.1	248.71	1	Not Proven	2	16	3	Sensitive Habitat	8	248.7285	3.349213	4	0.0815	1	32	4	12				
595	593	209968	711907	229.09	4.663343	4	0.1	228.99	1	Not Proven	2	8	2	Sensitive Habitat	8	226	67.298722	3	3.09	1	24	3	6				
596	594	210018	711907	232.1	6.14517	4	0.5	231.6	1	Not Proven	2	8	2	Sensitive Habitat	8	230	70.58093	3	2.1	1	24	3	6				
597	595	210068	711907	235	0.427069	1	1.1	233.9	3	Not Proven	2	6	2	Sensitive Habitat	8	234.6188	73.390049	3	0.3812	1	24	3	6				
598	596	210118	711907	236	0	1	2	234	3	Not Proven	2	6	2	Sensitive Habitat	8	235.8601	93.927166	3	0.1399	1	24	3	6				
599	597	210168	711907	237.19	6.014203	4	1.2	235.99	3	Not Proven	2	24	3	Sensitive Habitat	8	237.0188	121.521177	3	0.1712	1	24	3	9				
600	598	210218	711907	239	0.182238	1	0.4	238.6	1	Not Proven	2	2	1	Sensitive Habitat	8	239	154.882556	3	0	1	24	3	3				
601	599	210268	711807	246.01	2.684901	2	1	245.01	2	Not Proven	2	8	2	Sensitive Habitat	8	256	153.398473	3	-9.99	1	24	3	6				
602	600	210218	711807	244.19	6.168502	4	0.9	243.29	2	Not Proven	2	16	3	Sensitive Habitat	8	241.9201	105.015397	3	2.2699	1	24	3	9				
603	601	210168	711807	242.1	4.854873	4	0.4	241.7	1	Not Proven	2	8	2	Sensitive Habitat	8	241	58.042819	3	1.1	1	24	3	6				
604	602	210118	711807	240	5.692733	4	0.1	239.9	1	Not Proven	2	8	2	Sensitive Habitat	8	240.0786	14.699416	3	-0.0786	1	24	3	6				
605	603	210068	711807	236	5.863482	4	1	235	2	Not Proven	2	16	3	Sensitive Habitat	8	235.9681	0.921103	4	0.0319	1	32	4	12				
606	604	210018	711807	232.01	4.320957	4	0.5	231.51	1	Not Proven	2	8	2	Sensitive Habitat	8	232	0.921103	4	0.01	1	32	4	8				
607	605	209968	711807	227	6.392166	4	0.5	226.5	1	Not Proven	2	8	2	Sensitive Habitat	8	226.9681	0.921103	4	0.0319	1	32	4	8				
608	606	209968	711707	229.1	9.610348	6	0.1	229	1	Not Proven	2	12	2	Sensitive Habitat	8	228.8188	57.351468	3	0.2812	1	24	3	6				
609	607	210018	711707	235.01	8.356002	6	0.5	234.51	1	Not Proven	2	12	2	Sensitive Habitat	8	234.8188	50.269223	3	0.1912	1	24	3	6				
610	608	210068	711707	241	5.906103	4	0.2	240.8	1	Not Proven	2	8	2	Sensitive Habitat	8	236.6217	48.076489	3	4.3783	1	24	3	6				
611	609	210118	711707	245.19	8.069222	6	1	244.19	2	Not Proven	2	24	3	Sensitive Habitat	8	243.4017	40.846146	3	1.7883	1	24	3	9				
612	610	210168	711707	250.1	6.577724	4	0.4	249.7	1	Not Proven	2	8	2	Sensitive Habitat	8	243.4017	67.14907	3	6.6983	1	24	3	6				
613	611	210218	711707	253.1	9.769383	6	0.6	252.5	2	Not Proven	2	24	3	Sensitive Habitat	8	264.1592	78.06164	3	-11.0592	1	24	3	9				
614	612	210268	711707	254.01	7.350068	4	1	253.01	2	Not Proven	2	16	3	Sensitive Habitat	8	264.1592	79.466738	3	-10.1492	1	24	3	9				
615	613	210218	711607	268.1	10.43741	6	0.6	267.5	2	Not Proven	2	24	3	Sensitive Habitat	8	268.3592	2.899867	4	-0.2592	1	32	4	12				
616	614	210168	711607	264.19	8.375257	6	0.3	263.89	1	Not Proven	2	12	2	Sensitive Habitat	8	269.2099	36.170961	3	-5.0199	1	24	3	6				
617	615	210118	711607	260.1	11.43938	6	0.1	260	1	Not Proven	2	12	2	Sensitive Habitat	8	271.0349	75.653035	3	-10.9349	1	24	3	6				
618	616	210068	711607	252.1	11.7727	6	0.5	251.6	1	Not Proven	2	12	2	Sensitive Habitat	8	271.0181	115.948408	3	-18.9181	1	24	3	6				
619	617	210018	711607	245.01	10.20188	6	0.3	244.71	1	Not Proven	2	12	2	Sensitive Habitat	8	247.4994	78.728361	3	-2.4894	1	24	3	6				
620	618	209968	711607	238.01	10.06374	6	0.2	237.81	1	Not Proven	2	12	2	Sensitive Habitat	8	232.778	31.413787	3	5.232	1	24	3	6				
621	619	209918	711607	230.01	10.06374	6	0.1	229.91	1	Not Proven	2	12	2	Sensitive Habitat	8	229.9681	0.921103	4	0.0419	1	32	4	8				
622	620	210318	712807	177.1	5.710593	4	1.2	175.9	3	Not Proven	2	24	3	Minor Watercourse	6	177.9285	428.913455	3	-0.8285	1	18	2	6				
623	621	210268	712807	176.01	6.350132	4	1	175.01	2	Not Proven	2	16	3	Minor Watercourse	6	171.4188	426.717493	3	4.5912	1	18	2	6				
624	622	210218	712807	173.01	4.455793	4	0.8	172.21	2	Not Proven	2	16	3	Minor Watercourse	6	171.2894	428.824528	3	1.7206	1	18	2	6				
625	623	210218	713157	161.91	5.887512	4	1.3	160.61	3	Not Proven	2	24	3	Minor Watercourse	6	171.2894	87.736797	3	-9.3794	1	18	2	6				
626	624	210268	713157	165.91	8.227264	6	1.5	164.41	3	Not Proven	2	36	4	Minor Watercourse	6	171.4188	76.779479	3	-5.5088	1	18	2	8				
627	625	210318	713157	173	6.392166	4	0.1	172.9	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	79.837473	3	-4.9285	1	18	2	4				
628	626	210368	713157	184.11	17.28168	8	0	184.11	1	Not Proven	2	16	3	Minor Watercourse	6	177.9285	101.067364	3	6.1815	1	18	2	6				
629	627	210418	713157	189	12.60438	6	0	189	1	Not Proven	2	12	2	Minor Watercourse	6	182.4841	133.06646	3	6.5159	1	18	2	4				
630	628	210468	713157	192.9	12.67232	6	0.1	192.8	1	Not Proven	2	12	2	Minor Watercourse	6	186.9382	168.369786	3	5.9618	1	18	2	4				
631	629	210518	713157	195.8	12.83366	6	0	195.8	1	Not Proven	2	12	2	Minor Watercourse	6	204.6408	204.357624	3	-8.8408	1	18	2	4				
632	630	210568	713157	194.19	4.513393	4	1.7	192.49	3	Not Proven	2	24	3	Minor Watercourse	6	204.6408	159.38202	3	-10.4508	1	18	2	6				
633	631	210618	713157	195.99	7.424533	4	0.7	195.29	2	Not Proven	2	16	3	Minor Watercourse	6	204.6408	118.504086	3	-8.6508	1	18	2	6				
634	632	210668	713157	197.91	5.943318	4	0.2	197.71	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	87.657335	3	-6.7308	1	18	2	4				
635	633	210718	713157	198.8	16.153	8	0	198.8	1	Not Proven	2	16	3	Minor Watercourse	6	204.8596	79.263957	3	-6.0596	1	18	2	6				
636	634	210818	713157	201.9	15.17162	8	0.1	201.8	1	Not Proven	2	16	3	Minor Watercourse	6	207.5588	127.445002	3	-5.6588	1	18	2	6				
637	635	210918	713157	206.9	7.363039	4	0.5	206.4	1	Not Proven	2	8	2	Minor Watercourse	6	207.5588	211.951429	3	-0.6588	1	18	2	4				
638	636	211018	713157	208	0.182238	1	0.2	207.8	1	Not Proven	2	2	1	Minor Watercourse	6	208.9214	305.774811	3	-0.9214	1	18	2	2				
639	637	211118	713157	209.09	7.940904	4	0.1	208.99	1	Not Proven	2	8	2	Minor Watercourse	6	215	286.52085	3	-5.91	1	18	2	4				
640	638	210618	713007	179.91	5.705728	4	0.1	179.81	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	245.263916	3	-24.7308	1	18	2	4				
641	639	210618	712957	181	0	1	0.1	180.9	1	Not Proven	2	2	1	Minor Watercourse	6	204.6408	292.446197	3	-23.6408	1	18	2	2				
642	640	210568	712957	180	5.951539	4	0.1	179.9	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	311.26225	3	-24.6408	1	18	2	4				
643	641	210518	712957	173.19	5.926187	4	0	173.19	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	336.516862	3	-31.4508	1	18	2	4				
644	642	210468	712957	170.09	8.05191	6	0	170.09	1	Not Proven	2	12	2	Minor Watercourse	6	177.9285	323.07484	3	-7.8385	1	18	2	4				
645	643	210418	712957	166.91	5.873616	4	0.1	166.81	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	300.893273	3	-11.0185	1	18	2	4				
646	644	210368	712957	165	5.863482	4	0.8	164.2	2	Not Proven	2	16	3	Minor Watercourse	6	177.9285	285.825422	3	-12.9285	1	18	2	6				
647	645	210318	712957	164.19	5.738034	4	0.2	163.99	1	Not Proven	2	8	2	Minor Watercourse	6	177.9285	279.026131	3	-13.7385	1	18	2	4				
648	646	210268	712957	163	2.292996	2	0.9	162.1	2	Not Proven	2	8	2	Minor Watercourse	6	171.4188	276.724861	3	-8.4188	1	18	2	4				
649	647	210518	712757	179.09	5.695081	4	1.8	177.29	3	Not Proven	2	24	3	Minor Watercourse	6	204.6408	514.514488	3	-25.5508	1	18	2	6				
650	648	210468	712757	180	0	1	1.7	178.3	3	Not Proven	2	6	2	Minor Watercourse	6	177.9285	505.824982	3	2.0715	1	18	2	4				
651	649	210418	712757	181	1.640143	1	2.1	178.9	3	Not Proven	2	6	2	Minor Watercourse	6	177.9285	491.953577	3	3.0715	1	18	2	4				
652	650	210368	712757	181	2.205297	2	1.4	179.6	3	Not Proven	2	12	2	Minor Watercourse	6	177.9285	482.884802	3	3.0715	1	18	2	4				
653	651	210318	712757	181	3.843622	2	1.2	179.8	3	Not Proven	2	12	2	Minor Watercourse	6	177.9285	478.891576	3	3.0715	1	18	2	4				
654	652	210268	712757	179.1	4.854873	4	0.2	178.9	1	Not Proven	2	8	2	Minor Watercourse	6	171.4188	476.716067	3	7.6812	1	18	2	4				
655	653	210218	712757	177.1	6.360779	4	0.9	176.2	2	Not Proven	2	16	3	Minor Watercourse	6	171.2894	478.603036	3	5.8106	1	18	2	6				
656	654	210168	712707	178.19	7.650325	4	1.6	176.59	3	Not Proven	2	24	3	Minor Watercourse	6	171.2894	534.780951	3	6.9006	1	18	2	6				
657	655	210118	712657	180.01	4.320957	4	1.6	178.41	3	Not Proven	2	24	3	Minor Watercourse	6	171.2894	594.071095	3	8.7206	1	18	2	6				
658	656	210168	712657	182.1	6.360779	4	1.4	180.7	3	Not Proven	2	24	3	Minor Watercourse	6	171.2894	584.089938	3	10.8106	2	36	4	12				
659	657	210218	712657	185	5.692733	4	1.2	183.8	3	Not Proven	2	24	3	Minor Watercourse	6	171.2894	578.274715	3	13.7106	2	36	4	12				
660	658	210268	712657	186	4.496021	4	1	185	2	Not Proven	2	16	3	Minor Watercourse	6	171.4188	576.713957	3	14.5812	2	36	4	12				
661	659	210318	712657	187	2.387535	2	0.2	186.8	1	Not Proven	2	4	1	Minor Watercourse	6	177.9285	578.859156	3	9.0715	1	18	2	2				
662	660	210368	712657	185.09	4.481559	4	1.2	183.89	3	Not Proven	2	24	3	Minor Watercourse	6	177.9285	582.167083	3	7.1615	1	18	2	6				
663	661	210418	712657	184	0.427069	1	1.8	182.2	3	Not Proven	2	6	2	Minor Watercourse	6	177.9285	589.711033	3	6.0715	1	18	2	4				
664	662	210468	712657	183	2.046964	2	1.4	181.6	3	Not Proven	2	12	2	Minor Watercourse	6	177.9285	601.331599	3	5.0715	1	18	2	4				
665	663	210418	712557	188	2.205297	2	1.8	186.2	3	Not Proven	2	12	2	Minor Watercourse	6	177.9285	688.113277	3	10.0715	2	36	4	8				
666	664	210368	712557	190	2.205297	2	1.4	188.6	3	Not Proven	2	12	2	Minor Watercourse	6	177.9285	681.65922	3	12.0715	2	36	4	8				

ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
665	210318	712557	195.9	11.30993	6	0	195.9	1	Not Proven	2	12	2	Minor Watercourse	6	171.4188	678.808042	3	24.4812	2	36	4	8
666	210268	712557	199.1	10.22141	6	0	199.1	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	653.320315	3	-49.1322	1	24	3	6
667	210218	712557	196.01	8.334011	6	0.2	195.81	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	628.161479	3	-52.2222	1	24	3	6
668	210168	712557	192.01	7.901602	4	1.5	190.51	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	606.090962	3	-56.2222	1	24	3	9
669	210118	712557	189.1	7.202156	4	1.2	187.9	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	587.456946	3	-59.1322	1	24	3	9
670	210068	712557	188	6.392166	4	1.3	186.7	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	572.595035	3	-60.2322	1	24	3	9
671	209968	712457	193.2	10.45788	6	0.6	192.6	2	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	455.768224	3	-55.0322	1	24	3	9
672	210018	712457	198.1	12.18932	6	0.2	197.9	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	463.643466	3	-50.1322	1	24	3	6
673	210068	712457	201	6.392166	4	0	201	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	476.661152	3	-47.2322	1	24	3	6
674	210118	712457	201.1	8.578356	6	0	201.1	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	494.415254	3	-47.1322	1	24	3	6
675	210168	712457	202.1	5.710593	4	2.4	199.7	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	516.417499	3	-46.1322	1	24	3	9
676	210218	712457	203.01	4.455793	4	0.9	202.11	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	542.150923	3	-45.2222	1	24	3	9
677	210268	712457	204	2.387535	2	0.2	203.8	1	Not Proven	2	4	1	Sensitive Habitat	8	248.2322	571.111385	3	-44.2322	1	24	3	3
678	210318	712457	197.9	11.15383	6	0	197.9	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	602.833977	3	-50.3322	1	24	3	6
679	210368	712507	192	4.255776	4	1.4	190.6	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	673.408497	3	-56.2322	1	24	3	9
680	210318	712507	196.9	11.44007	6	0	196.9	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	641.278733	3	-51.3322	1	24	3	6
681	210268	712507	203	0	1	0.2	202.8	1	Not Proven	2	2	1	Sensitive Habitat	8	248.2322	611.553615	3	-45.2322	1	24	3	3
682	210318	712407	198.9	6.044724	4	0.2	198.7	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	566.197133	3	-49.3322	1	24	3	6
683	210268	712357	206.91	9.831529	6	0.4	206.51	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	495.488641	3	-41.3222	1	24	3	6
684	210218	712357	209.1	5.710593	4	1.8	207.3	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	461.809922	3	-39.1322	1	24	3	9
685	210168	712357	209.1	5.75888	4	1.8	207.3	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	431.309418	3	-39.1322	1	24	3	9
686	210118	712357	211.91	6.366833	4	0.7	211.21	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	404.706342	3	-36.3222	1	24	3	9
687	210068	712357	213	5.439068	4	0.8	212.2	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	382.814098	3	-35.2322	1	24	3	9
688	210018	712357	211	4.496021	4	0.3	210.7	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	366.47789	3	-37.2322	1	24	3	6
689	209968	712357	207.2	10.21938	6	0.3	206.9	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	356.462415	3	-41.0322	1	24	3	6
690	209918	712357	204.01	8.356002	6	0.2	203.81	1	Not Proven	2	12	2	Sensitive Habitat	8	248.7285	353.2966	3	-44.7185	1	24	3	6
691	209868	712357	199.19	10.00239	6	0.6	198.59	2	Not Proven	2	24	3	Sensitive Habitat	8	250.6036	356.355363	3	-51.4136	1	24	3	9
692	209868	712257	213.19	8.375257	6	0.1	213.09	1	Not Proven	2	12	2	Sensitive Habitat	8	250.6036	257.545966	3	-37.4136	1	24	3	6
693	209918	712257	217.1	8.860484	6	0.3	216.8	1	Not Proven	2	12	2	Sensitive Habitat	8	248.7285	253.296797	3	-31.6285	1	24	3	6
694	209968	712257	219.1	5.943389	4	0	219.1	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	257.69407	3	-29.1322	1	24	3	6
695	210018	712257	221	5.710593	4	0.2	220.8	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	271.379483	3	-27.2322	1	24	3	6
696	210068	712257	220.01	3.303116	2	1.8	218.21	3	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	293.065545	3	-28.2222	1	24	3	6
697	210118	712257	221.19	6.116688	4	1	220.19	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	321.135491	3	-27.0422	1	24	3	9
698	210168	712257	216.41	8.060254	6	0.5	215.91	1	Not Proven	2	12	2	Sensitive Habitat	8	248.2322	354.074277	3	-31.3222	1	24	3	6
699	210168	712157	222	2.632316	2	0.2	221.8	1	Not Proven	2	4	1	Sensitive Habitat	8	248.2322	291.048748	3	-26.2322	1	24	3	3
700	210118	712157	224.09	5.691832	4	0.1	223.99	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	249.937559	3	-24.1422	1	24	3	6
701	210068	712157	227.09	6.376122	4	0.7	226.39	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	212.669212	3	-21.1422	1	24	3	9
702	210018	712157	229.91	6.37937	4	0.7	229.21	2	Not Proven	2	16	3	Sensitive Habitat	8	248.2322	181.624898	3	-18.3222	1	24	3	9
703	209968	712157	231.1	5.850456	4	0.5	230.6	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	160.45876	3	-17.1322	1	24	3	6
704	209918	712157	231.01	7.424533	4	0.1	230.91	1	Not Proven	2	8	2	Sensitive Habitat	8	248.7285	153.297251	3	-17.7185	1	24	3	6
705	209868	712157	229	8.009735	6	0.3	228.7	1	Not Proven	2	12	2	Sensitive Habitat	8	250.6036	160.220799	3	-21.6036	1	24	3	6
706	209818	712157	224.01	8.464664	6	0	224.01	1	Not Proven	2	12	2	Sensitive Habitat	8	253.325	179.55668	3	-29.315	1	24	3	6
707	209868	712057	242.1	11.30993	6	0.5	241.6	1	Not Proven	2	12	2	Sensitive Habitat	8	253.325	67.985081	3	-11.225	1	24	3	6
708	209918	712057	241	2.62593	2	0.1	240.9	1	Not Proven	2	4	1	Sensitive Habitat	8	248.7285	53.299411	3	-7.7285	1	24	3	3
709	209968	712057	238.09	6.059811	4	0.2	237.89	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	71.328771	3	-10.1422	1	24	3	6
710	210018	712057	238	2.286308	2	0.3	237.7	1	Not Proven	2	4	1	Sensitive Habitat	8	248.2322	111.033255	3	-10.2322	1	24	3	3
711	210068	712057	235	4.406456	4	1.3	233.7	3	Not Proven	2	24	3	Sensitive Habitat	8	248.2322	156.744932	3	-13.2322	1	24	3	9
712	210118	712057	232	4.406456	4	0.2	231.8	1	Not Proven	2	8	2	Sensitive Habitat	8	248.2322	204.47387	3	-16.2322	1	24	3	6
713	210168	712057	229.1	5.710593	4	1.8	227.3	3	Not Proven	2	24	3	Sensitive Habitat	8	235	249.712429	3	-5.9	1	24	3	9
714	210218	712057	228	2.387535	2	0.3	227.7	1	Not Proven	2	4	1	Sensitive Habitat	8	235.8601	273.847261	3	-7.8601	1	24	3	3
715	210268	712057	225	6.326785	4	0.5	224.5	1	Not Proven	2	8	2	Sensitive Habitat	8	236	301.496845	3	-11	1	24	3	6
716	210268	711957	235.1	5.850456	4	0.3	234.8	1	Not Proven	2	8	2	Sensitive Habitat	8	239	225.51897	3	-3.9	1	24	3	6
717	210218	711957	236	4.746397	4	0.1	235.9	1	Not Proven	2	8	2	Sensitive Habitat	8	239	191.880734	3	-3	1	24	3	6
718	210168	711957	235	0.020249	1	1.3	233.7	3	Not Proven	2	6	2	Sensitive Habitat	8	236	162.357469	3	-1	1	24	3	6
719	210118	711957	234	0	1	2.3	231.7	3	Not Proven	2	6	2	Sensitive Habitat	8	235	138.045236	3	-1	1	24	3	6
720	210068	711957	236	1.640143	1	0.3	235.7	1	Not Proven	2	2	1	Sensitive Habitat	8	234.6188	122.538603	3	1.3812	1	24	3	3
721	210018	711957	235.09	6.37937	4	0.2	234.89	1	Not Proven	2	8	2	Sensitive Habitat	8	247.6031	98.509462	3	-12.5131	1	24	3	6
722	209968	711957	233.9	6.312492	4	0.9	233	2	Not Proven	2	16	3	Sensitive Habitat	8	247.6031	49.6339	3	-13.7031	1	24	3	9
723	209968	711857	226.09	5.876865	4	0.1	225.99	1	Not Proven	2	8	2	Sensitive Habitat	8	226	17.3063	3	0.09	1	24	3	6
724	210018	711857	231.01	7.330924	4	0.6	230.41	2	Not Proven	2	16	3	Sensitive Habitat	8	231.0068	21.971519	3	0.0032	1	24	3	9
725	210068	711857	235	0	1	1.3	233.7	3	Not Proven	2	6	2	Sensitive Habitat	8	235	26.877992	3	0	1	24	3	6
726	210118	711857	237	2.292996	2	0.8	236.2	2	Not Proven	2	8	2	Sensitive Habitat	8	236	51.576522	3	1	1	24	3	6
727	210168	711857	239	0.652852	1	0.1	238.9	1	Not Proven	2	2	1	Sensitive Habitat	8	239	84.370647	3	0	1	24	3	3
728	210218	711857	241.1	4.854873	4	0.4	240.7	1	Not Proven	2	8	2	Sensitive Habitat	8	240.4698	124.669257	3	0.6302	1	24	3	6
729	210268	711857	243	4.071063	4	1.2	241.8	3	Not Proven	2	24	3	Sensitive Habitat	8	241	169.350993	3	2	1	24	3	9
730	210318	711857	244	0.571059	1	0.9	243.1	2	Not Proven	2	4	1	Sensitive Habitat	8	254.9911	160.93108	3	-10.9911	1	24	3	3
731	210318	711907	239.1	5.777471	4	0.8	238.3	2	Not Proven	2	16	3	Sensitive Habitat	8	254	204.462102	3	-14.9	1	24	3	9
732	210268	711907	239	0.571059	1	0.3	238.7	1	Not Proven	2	2	1	Sensitive Habitat	8	240.4698	193.939742	3	-1.4698	1	24	3	3
733	210268	711757	250	5.496327	4	0.8	249.2	2	Not Proven	2	16	3	Sensitive Habitat	8	257	127.237834	3	-7	1	24	3	9
734	210218	711757	248.1	5.75888	4	0.6	247.5	2	Not Proven	2	16	3	Sensitive Habitat	8	242.9926	101.408343	3	5.1074	1	24	3	9
735	210168	711757	246	4.496021	4	0.3	245.7	1	Not Proven	2	8	2	Sensitive Habitat	8	242.9926	51.410719	3	3.0074	1	24	3	6
736	210118	711757	243.1	6.33154	4	0.8	242.3	2	Not Proven	2	16	3	Sensitive Habitat	8	242.9926	1.572269	4	0.1074	1	32	4	12
737	210068	711757	238.01	8.336857	6	0.2	237.81	1	Not Proven	2	12	2	Sensitive Habitat	8	237.4017	3.477877	4	0.6083	1	32	4	8
738	210018	711757	233	4.603154	4	0.2	232.8	1	Not Proven	2	8	2	Sensitive Habitat	8	233	8.724152	4	0	1	32	4	8
739	209968	711757	228.1	9.769383	6	0.2	227.9	1	Not Proven	2	12	2	Sensitive Habitat	8	228	8.724152	4	0.1	1	32	4	8
740	209918	711657	223.19	10.63655	6	0.1	223.09	1	Not Proven	2	12	2	Sensitive Habitat	8	222.0188	24.691724	3	1.1712	1	24	3	6
741	209968	711657	231.19	10.02214	6	0.3	230.89	1	Not Proven	2	12	2	Sensitive Habitat	8	230.0786	57.080582	3	1.1114	1	24	3	6
742	210018	711657	238.2	10.26981	6	0.3	237.9	1	Not Proven	2	12	2	Sensitive Habitat	8	232.778	95.168409	3	5.422	1	24	3	6
743	210068	711657	245.01	8.463573	6	0.2	244.81	1	Not Proven	2	12	2	Sensitive Habitat	8	241.6188	96.38243	3	3.3912	1	24	3	6
744	210118	711657	252.19	11.9927	6	0.1	252.09	1	Not Proven	2	12	2	Sensitive Habitat	8	243.4017	90.767823	3	8.7883	1	24	3	6
745	210168	711657	260	8.009735	6	0.2	259.8	1	Not Proven	2	12	2	Sensitive Habitat	8	264.7592	70.898883	3	-4.7592	1	24	3	6
746	210218	711657	259.1	10.81736	6	0.2	258.9	1	Not Proven	2	12	2	Sensitive Habitat	8	264.1592	32.61916	3	-5.0592	1	24	3	6
747	210268	711657	260.01	6.37937	4	0.2	259.81	1	Not Proven	2	8	2	Sensitive Habitat	8	264.9592	35.140439	3	-4.9492	1	24	3	6
748	210218	711557	272	5.219973	4	1.4	270.6	3	Not Proven	2	24	3	Sensitive Habitat	8	271.9592	0.921103	4	0.0408	1	32	4	12
749	210168	711557	270.19	8.049467	6	0	270.19	1	Not Proven	2	12	2	Sensitive Habitat	8	271.0143	5.654205	4	-0.8243	1	32	4	8
750	210118	711557	264.1	10.65386	6	0.5	263.6	1	Not Proven	2	12	2	Sensitive Habitat	8	271.0181	45.332254	3	-6.9181	1	24	3	6
751	210068	711557	256.2	10.32025	6	0.3	255.9	1	Not Proven	2	12	2	Sensitive Habitat	8	270.8188	88.782884	3	-14.6188	1	24	3	6
752	210018	711557	251.1	6.37937	4	0.4	250.7	1	Not Proven	2	8	2	Sensitive Habitat	8	247.9082	49.235207	3	3.1918	1	24	3	6
753	209968	711557	245.2	10.76137	6	0.3	244.9	1	Not Proven	2	12	2	Sensitive Habitat	8	246.378	9.900385	4	-1.178	1	32	4	8
754	209918	711557	238.1	14.76617	6	0	238.1	1	Not Proven	2	12	2	Sensitive Habitat	8	237.9274	0.921103	4	0.1726	1	32	4	8
755	209868	711557	229.2	15.79317	8	0	229.2	1	Not Proven	2	16	3	Sensitive Habitat	8	229.178	0.921103	4	0.022	1	32	4	12
756	209818	711557	217.1	12.60438	6	0	217.1	1	Not Proven	2	12	2	Sensitive Habitat	8	217.178	0.921103	4	-0.078	1	32	4	8
757	209768	711557	203.2	24.97248	8	0.3	202.9	1	Not Proven	2	16	3	Sensitive Habitat	8	206.6376	10.094911	3	-3.4376	1	24	3	9
758	209718	711557	185.29	17.40075	8	0	185.29	1	Not Proven	2	16	3	Sensitive Habitat	8	206.1939	56.696441	3	-20.9039	1	24	3	9
759	209668	711557	169.2	19.28662	8	0.1	169.1	1	Not Proven	2	16	3	Sensitive Habitat	8	206.1939	105.706653	3	-36.9939	1	24	3	9
760	210368	712807	177.1	5.710593	4	1.3	175.8	3	Not Proven	2	24	3	Minor Watercourse	6	177.9285	433.367445	3	-0.8285	1	18	2	6
761	210418	712807	177.1	5.710593	4	1.8	175.3	3	Not Proven	2	24	3	Minor Watercourse	6	177.9285	443.450033	3	-0.8285	1	18	2	6
762	210468	712807	177.1	5.710593	4	0.7	176.4	2	Not Proven	2	16	3	Minor Watercourse	6	177.9285	458.790281	3	-0.8285	1	18	2	6
763	210518	712807	178	5.786324	4	0.5	177.5	1	Not Proven	2	8	2	Minor Watercourse	6	204.6408	468.353252	3	-26.6408	1	18	2	4
764	210718	714357	409.11	11.24854	6	0	409.11	1	Not Proven	2	12	2	Minor Watercourse	6	409.8411	2.899867	4	-0.7311	1	24	3	6
765	210818	714357	413.99	8.634342	6	0	413.99	1	Not Proven	2	12	2	Minor Watercourse	6	411.4425	68.899025	3	2.5475	1	18	2	4
766	210718	714457	443.8	24.81908	8	0	443.8	1	Not Proven	2	16	3	Minor Watercourse	6	410.8596	97.519297	3	32.9404	2	36	4	12
767	210818	714457	438.71	17.5484	8	0	438.71	1	Not Proven	2	16	3	Minor Watercourse	6	427.2408	109.765915	3	11.4692	2	36	4	12
768	210718	714557	456.2	10.26981	6	0.2	456	1	Not Proven	2	12	2	Sensitive Habitat	8	447.578	109.383174	3	8.622	1	24	3	6
769	210818	714557	465	0.3931	1	0.1	464.9	1	Not Proven	2	2	1	Sensitive Habitat	8	458.115	139.274489	3	6.885	1	24	3	3
770	210718	714657	447.19	13.18178	6	0.1	447.09	1	Not Proven	2	12	2	Sensitive Habitat	8	443.1505	91.462091	3	4.0395	1	24	3	6
771	210818	714657	462.19	8.057364	6	0	462.19	1	Not Proven	2	12	2	Sensitive Habitat	8	458.115	40.701391	3	4.075	1	24	3	6
772	210918	714657	462.9	6.076217	4	0.31	462.59	1	Not Proven	2	8	2	Sensitive Habitat	8	461.4698	67.930359	3	1.4302	1	24	3	6
773	210718	714757	430.29	21.4639	8	0.01	430.28	1	Not Proven	2	16	3	Sensitive Habitat	8	430.1373	18.73825	3	0.1527	1	24	3	9
774	210818	714757	448.1	7.017646	4	0	448.1	1	Not Proven	2	8	2	Sensitive Habitat	8	448.2188	2.768398	4	-0.1188	1	32	4	8
775	210918	714757	458.19	10.00239	6	0.12	458.07	1	Not Proven	2	12	2	Sensitive Habitat	8	458.2099	0.921103	4	-0.0199	1	32	4	8
776	210718	714857	410.1	10.18392	6	0.05	410.05	1	Not Proven	2	12	2	Sensitive Habitat	8	409.9681	0.921103	4	0.1319	1	32	4	8
777	210818	714857	425.39	21.33127	8	0.02	425.37	1	Not Proven	2	16	3	Sensitive Habitat	8	425.3879	0.921103	4	0.0021	1	32	4	12
778	210918	714857	444.3	20.38445	8	0.04	444.26	1	Not Proven	2	16	3	Sensitive Habitat	8	444.178	0.921103	4	0.122	1	32	4	12
779	211018	714857	453.1	11.30993	6	0.03	453.07	1	Not Proven	2	12	2	Sensitive Habitat	8	452.9592	0.921103	4	0.1408	1	32	4	8
780	210718	714957	389.2	13.70513	6	0.1	389.1	1	Not Proven	2	12	2	Minor Watercourse	6	386.978	32.272174	3	2.222	1	18	2	4
781	210818	714957	402.19	8.049467	6	0.15	402.04	1	Not Proven	2	12	2	Sensitive Habitat	8	403.3781	45.940414	3	-1.1881	1	24	3	6
782	210918	714957	418.1	12.36588	6	0.06	418.04	1	Not Proven	2	12	2	Sensitive Habitat	8	423.778	37.300831	3	-5.678	1	24	3	6
783	211018	714957	432.1	9.984827	6	0.06	432.04	1	Not Proven	2	12	2	Sensitive Habitat	8	432.778	54.257018	3	-0.678	1	24	3	6
784	210818	715057	397.01	7.901602	4	0.05	396.96	1	Not Proven	2	8	2	Site Infrastructure	3	381.8119	69.051845	3	15.1981	2	18	2	4
785	210918	715057	407.01	8.049467	6	0.03	406.98	1	Not Proven	2	12	2	Site Infrastructure	3	386.1224	113.969443	3	20.8876	2	18	2	4
786	211018	715057	417.01	10.04451	6	0.04	416.97	1	Not Proven	2	12	2	Minor Watercourse	6	412	59.082116	3	5.01	1	18	2	4
787	210818	715157	379.2	10.57058	6	0.1	379.1	1	Not Proven	2	12	2	Site Infrastructure	3	379.2941	1.912179	4	-0.0941	1	12	2	4
788	210918	715157	394.19	13.16429	6	0.04	394.15	1	Not Proven	2	12	2	Site Infrastructure	3	386.178	35.436456	3	8.012	1	9	1	2
789	211018	715157	407.1	9.784924	6	0.08	407.02	1	Not Proven	2	12	2	Minor Watercourse	6	406.9592	8.622878	4	0.1408	1	24	3	6
790	211118	715157	417.19	10.6558	6	0.07	417.12	1	Not Proven	2	12	2	Minor Watercourse	6	416.3781	14.715897	3	0.8119	1	18	2	4
791	210818	715257	369.19	8.071458	6	0.1	369.09	1	Not Proven	2	12	2	Minor Watercourse	6	366	29.037783	3	3.19	1	18	2	4
792	210918	715257	380.19	8.356002	6	0.17	380.02	1	Not Proven	2	12	2	Site Infrastructure	3	382.178	29.618144	3	-1.988	1	9	1	2
793	211018	715257	390.1	11.79188	6	0.1	390	1	Not Proven	2	12	2	Minor Watercourse	6	390.4017	19.746838	3	-0.3017	1	18	2	4
794	211118	715257	406	5.987465	4	0.22	405.78	1	Not Proven	2	8	2	Minor Watercourse	6	400.9564	47.509545	3	5.0436	1	18	2	4
795	210818	715357	376.9	10.72708	6	0.01	376.89	1	Not Proven	2	12	2	Minor Watercourse	6	368.8408	52.526021	3	8.0592	1	18	2	4
796	210918	715357	374.1	10.39857	6	0.08	374.02	1	Not Proven	2	12	2	Minor Watercourse	6	373.4017	33.669357	3	0.6983	1	18	2	4
797	211018	715357	382	13.37842	6	0.11	381.89	1	Not Proven	2	12	2	Minor Watercourse	6	380	15.307633	3	2	1	18	2	4
798	211118	715357	395.1	12.41437	6	0.03	395.07	1	Not Proven	2	12	2	Minor Watercourse	6	389.8188	23.932949	3	5.2812	1	18	2	4
799	210818	715457	370	0	1	0.2	369.8	1	Not Proven	2	2	1	Minor Watercourse	6	373.0667	85.962124	3	-3.0667	1	18	2	2
800	210918	715457	377.1	8.774507	6	0.2	376.9	1	Not Proven	2	12	2	Minor Watercourse	6	374.8188	62.719659	3	2.2812	1	18	2	4
801	211018	715457	387.91	7.699662	4	0.12	387.79	1	Not Proven	2	8	2	Minor Watercourse	6	383.1592	94.705763	3	4.7508	1	18	2	4
802	211118	715457	396	12.60438	6	0.04	395.96	1	Not Proven	2	12	2	Minor Watercourse	6	390.6188	83.138566	3	5.3812	1	18	2	4
803	211218	715457	402.9	11.03219	6	0.04	402.86	1	Not Proven	2	12	2	Sensitive Habitat	8	406.6596	25.001337	3	-3.7596	1	24	3	6
804	210818	715557	369.9	6.50203	4	0.04	369.86	1	Not Proven	2	8	2	Minor Watercourse	6	370	18.639218	3	-0.1	1	18	2	4
805	210918	715557	380	14.35485	6	0.02	379.98	1	Not Proven	2	12	2	Minor Watercourse	6	378.4188	28.601965	3	1.5812	1	18	2	4
806	211018	715557	382.1	10.45788	6	0.03	382.07	1	Not Proven	2	12	2	Minor Watercourse	6	381.9845	2.687904	4	0.1155	1	24	3	6
807	211118	715557	396	2.10407	2	0.02	395.98	1	Not Proven	2	4	1	Minor Watercourse	6	386.9773	34.352165	3	9.0227	1	18	2	2
808	211218	715557	411.1	4.806587	4	0.05	411.05	1	Not Proven	2	8	2	Sensitive Habitat	8	412	16.609023	3	-0.9	1	24	3	6
809	210818	715657	382	0	1	0.01	381.99	1	Not Proven	2	2	1	Site Infrastructure	3	382	4.194476	4	0	1	12	2	2
810	210918	715657	390.9	13.43624	6	0.01	390.89	1	Not Proven	2	12	2	Site Infrastructure	3	391.4408	4.348704	4	-0.5408	1	12	2	4
811	211018	715657	391.09	5.954978	4	0.1	390.99	1	Not Proven	2	8	2	Minor Watercourse	6	383	88.189433	3	8.09	1	18	2	4
812	211118	715657	395.91	8.307626	6	0.1	395.81	1	Not Proven	2	12	2	Minor Watercourse	6	390.4596	30.952622	3	5.4504	1	18	2	4
813	211018	715757	410.99	10.42878	6	0.02	410.97	1	Not Proven	2	12	2	Site Infrastructure	3	400.2408	109.54365	3	10.7492	2	18	2	4
814	211118	715757	416.9	7.410596	4	0.02	416.88	1	Not Proven	2	8	2	Sensitive Habitat	8	420.7194	52.878983	3	-3.8194	1	24	3	6
815	211218	715757	409	6.285033	4	0.07	408.93	1	Not Proven	2	8	2	Sensitive Habitat	8	414.3205	36.896694	3	-5.3205	1	24	3	6
816	211018	715857	408.19	10.56219	6	0.05	408.14	1	Not Proven	2	12	2	Sensitive Habitat	8	414.3781	57.709199	3	-6.1881	1	24	3	6
817	211118	715857	424.99	9.935955	6	0.23	424.76	1	Not Proven	2	12	2	Sensitive Habitat	8	421.2146	20.788411	3	3.7754	1	24	3	6
818	211218	715857	417.8	15.62722	8	0.02	417.78	1	Not Proven	2	16	3	Sensitive Habitat	8	417.5713	0.921103	4	0.2287	1	32	4	12
819	211018	715957	400	4.279067	4	0.02	399.98	1	Not Proven	2	8	2	Sensitive Habitat	8	400.0408	0.921103	4	-0.0408	1	32	4	8
820	211118	715957	409.2	10.7976	6	0.02	409.18	1	Not Proven	2	12	2	Sensitive Habitat	8	409.2188	0.921103	4	-0.0188	1	32	4	8
821	211218	715957	415.81	13.65295	6	0.03	415.78	1	Not Proven	2	12	2	Sensitive Habitat	8	415.8309	0.921103	4	-0.0209	1	32	4	8
822	211318	715957	417.8	12.83366	6	0.02	417.78	1	Not Proven	2	12	2	Sensitive Habitat	8	408.4408	58.13461	3	9.3592	1	24	3	6
823	211118	716057	408.8	12.355	6	0.03	408.77	1	Not Proven	2	12	2	Sensitive Habitat	8	408.7812	0.921103	4	0.0188	1	32	4	8
824	211218	716057	415.91	9.926711	6	0.04	415.87	1	Not Proven	2	12	2	Sensitive Habitat	8	416.0089	0.921103	4	-0.0989	1	32	4	8
825	211318	716057	429.2	21.08099	8	0	429.2	1	Not Proven	2	16	3	Sensitive Habitat	8	421.0799	31.20384	3	8.1201	1	24	3	9
826	211218	716157	416	5.777471	4	0.1	415.9	1	Not Proven	2	8	2	Sensitive Habitat	8	415.9592	0.921103	4	0.0408	1	32	4	8
827	211318	716157	427	5.077603	4	0	427	1	Not Proven	2	8	2	Sensitive Habitat	8	427.0089	0.921103	4	-0.0089	1	32	4	8
828	211418	716157	430.01	2.499771	2	0.15	429.86	1	Not Proven	2	4	1	Sensitive Habitat	8	429.3461	14.70498	3	0.6639	1	24	3	3
829	211218	716257	408.19	8.049467	6	0.03	408.16	1	Not Proven	2	12	2	Sensitive Habitat	8	413.003	29.204117	3	-4.813	1	24	3	6
830	211318	716257	421.1	11.92204	6	0	421.1	1	Not Proven	2	12	2	Sensitive Habitat	8	421.178	0.921103	4	-0.078	1	32	4	8
831	211418	716257	429	4.496021	4	0.1	428.9	1	Not Proven	2	8	2	Sensitive Habitat	8	428.9681	0.921103	4	0.0319	1	32	4	8

Row	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
834	832	209618	716357	151	0.182238	1	0	151	1	Not Proven	2	2	1	Minor Watercourse	6	145.6188	82.559584	3	5.3812	1	18	2	3
835	833	209718	716357	176.3	21.73243	8	0	176.3	1	Not Proven	2	16	3	Site Infrastructure	3	201.178	81.614352	3	-24.878	1	9	1	3
836	834	209818	716357	204.1	11.43938	6	0	204.1	1	Not Proven	2	12	2	Site Infrastructure	3	204.2188	0.921103	4	-0.1188	1	12	2	4
837	835	211318	716357	409.19	9.984892	6	0.3	408.89	1	Not Proven	2	12	2	Sensitive Habitat	8	420.3781	62.472791	3	-11.1881	1	24	3	6
838	836	211418	716357	419.01	8.334011	6	0.03	418.98	1	Not Proven	2	12	2	Sensitive Habitat	8	422.1592	25.524358	3	-3.1492	1	24	3	6
839	837	211518	716357	425.1	12.18932	6	0.03	425.07	1	Not Proven	2	12	2	Sensitive Habitat	8	426	77.923327	3	-0.9	1	24	3	6
840	838	209618	716457	148.2	12.60438	6	0	148.2	1	Not Proven	2	12	2	Minor Watercourse	6	147.0188	7.165921	4	1.1812	1	24	3	6
841	839	209718	716457	168.1	13.22316	6	0	168.1	1	Not Proven	2	12	2	Minor Watercourse	6	168.3412	7.320248	4	-0.2412	1	24	3	6
842	840	209818	716457	190.1	10.50199	6	0	190.1	1	Not Proven	2	12	2	Site Infrastructure	3	190.6188	2.687904	4	-0.5188	1	12	2	4
843	841	211318	716457	405	6.459044	4	0.02	404.98	1	Not Proven	2	8	2	Site Infrastructure	3	397.9845	62.483012	3	7.0155	1	9	1	2
844	842	211418	716457	407.1	6.497715	4	0.1	407	1	Not Proven	2	8	2	Sensitive Habitat	8	422.1592	125.342382	3	-15.0592	1	24	3	6
845	843	211518	716457	412	5.876288	4	0.12	411.88	1	Not Proven	2	8	2	Sensitive Habitat	8	389.7592	122.540216	3	22.2408	2	48	4	8
846	844	209618	716557	147.91	7.882457	4	0.1	147.81	1	Not Proven	2	8	2	Site Infrastructure	3	148.0965	2.768398	4	-0.1865	1	12	2	4
847	845	209718	716557	158.92	5.302381	4	0	158.92	1	Not Proven	2	8	2	Minor Watercourse	6	159	4.348704	4	-0.08	1	24	3	6
848	846	209818	716557	181.1	11.43938	6	0	181.1	1	Not Proven	2	12	2	Minor Watercourse	6	175.378	47.287436	3	5.722	1	18	2	4
849	847	209918	716557	211.11	15.39339	8	0	211.11	1	Not Proven	2	16	3	Minor Watercourse	6	209.3412	12.717784	3	1.7688	1	18	2	6
850	848	211318	716557	393	5.288869	4	0.35	392.65	1	Not Proven	2	8	2	Site Infrastructure	3	392.2342	4.348704	4	0.7658	1	12	2	4
851	849	211418	716557	397.1	10.75	6	0.2	396.9	1	Not Proven	2	12	2	Minor Watercourse	6	391	54.036155	3	6.1	1	18	2	4
852	850	211518	716557	393.1	11.27516	6	0.02	393.08	1	Not Proven	2	12	2	Minor Watercourse	6	386.7812	84.62369	3	6.3188	1	18	2	4
853	851	211618	716557	388.1	12.76538	6	0.29	387.81	1	Not Proven	2	12	2	Sensitive Habitat	8	387.9592	0.921103	4	0.1408	1	32	4	8
854	852	209618	716657	152.1	6.114429	4	0.1	152	1	Not Proven	2	8	2	Major Watercourse	8	145.6188	67.966089	3	6.4812	1	24	3	6
855	853	209718	716657	167.1	6.14517	4	0.02	167.08	1	Not Proven	2	8	2	Minor Watercourse	6	167.0408	69.678947	3	0.0592	1	18	2	4
856	854	209818	716657	183	14.75899	6	0	183	1	Not Proven	2	12	2	Minor Watercourse	6	179.6596	32.532962	3	3.3404	1	18	2	4
857	855	209918	716657	195.01	13.97643	6	0	195.01	1	Not Proven	2	12	2	Minor Watercourse	6	195.2223	2.899867	4	-0.2123	1	24	3	6
858	856	211318	716657	390.1	7.948029	4	0.05	390.05	1	Not Proven	2	8	2	Site Infrastructure	3	390	18.127251	3	0.1	1	9	1	2
859	857	211418	716657	389.09	7.86992	4	0	389.09	1	Not Proven	2	8	2	Site Infrastructure	3	389	25.549975	3	0.09	1	9	1	2
860	858	211518	716657	384	0	1	0.02	383.98	1	Not Proven	2	2	1	Minor Watercourse	6	384	18.652282	3	0	1	18	2	2
861	859	211618	716657	381	0	1	0.2	380.8	1	Not Proven	2	2	1	Minor Watercourse	6	381	1.572269	4	0	1	24	3	3
862	860	209818	716757	187.1	11.48755	6	0.02	187.08	1	Not Proven	2	12	2	Major Watercourse	8	184.7741	92.705804	3	2.3259	1	24	3	6
863	861	209918	716757	207.01	20.84151	8	0.01	207	1	Not Proven	2	16	3	Minor Watercourse	6	208.422	72.048961	3	-1.412	1	18	2	6
864	862	210018	716757	220.9	21.77052	8	0	220.9	1	Not Proven	2	16	3	Minor Watercourse	6	218.5693	13.079909	3	2.3307	1	18	2	6
865	863	210118	716757	240.2	15.06996	8	0	240.2	1	Not Proven	2	16	3	Minor Watercourse	6	223.0188	61.505382	3	17.1812	2	36	4	12
866	864	210218	716757	255.1	6.37937	4	0.04	255.06	1	Not Proven	2	8	2	Minor Watercourse	6	253.978	32.16043	3	1.122	1	18	2	4
867	865	211518	716757	382.99	2.655662	2	0.08	382.91	1	Not Proven	2	4	1	Minor Watercourse	6	380.7493	53.424923	3	2.2407	1	18	2	2
868	866	211618	716757	379	0.020249	1	0.03	378.97	1	Not Proven	2	2	1	Minor Watercourse	6	379	3.477877	4	0	1	24	3	3
869	867	209918	716857	199.09	10.04848	6	0.03	199.06	1	Not Proven	2	12	2	Major Watercourse	8	190.6794	42.513956	3	8.4106	1	24	3	6
870	868	210018	716857	226.91	6.322957	4	0.02	226.89	1	Not Proven	2	8	2	Minor Watercourse	6	224.6408	72.048961	3	2.2692	1	18	2	4
871	869	210118	716857	231.81	15.54427	8	0.02	231.79	1	Not Proven	2	16	3	Minor Watercourse	6	231.8627	0.921103	4	-0.0527	1	24	3	9
872	870	210218	716857	256.01	8.430468	6	0.16	255.85	1	Not Proven	2	12	2	Minor Watercourse	6	241	56.892678	3	15.01	2	36	4	8
873	871	210318	716857	271.1	6.154882	4	0.04	271.06	1	Not Proven	2	8	2	Site Infrastructure	3	273.6344	29.712503	3	-2.5344	1	9	1	2
874	872	210418	716857	285	0.22744	1	0.08	284.92	1	Not Proven	2	2	1	Site Infrastructure	3	285	7.165921	4	0	1	12	2	2
875	873	211518	716857	383	0.22744	1	0.03	382.97	1	Not Proven	2	2	1	Site Infrastructure	3	380.2188	61.198575	3	2.7812	1	9	1	1
876	874	211618	716857	378.99	2.684901	2	0.1	378.89	1	Not Proven	2	4	1	Minor Watercourse	6	377.3812	16.917838	3	1.6088	1	18	2	2
877	875	211718	716857	378	2.387535	2	0.1	377.9	1	Not Proven	2	4	1	Sensitive Habitat	8	377	14.65154	3	1	1	24	3	3
878	876	210018	716957	226.19	8.247203	6	0.04	226.15	1	Not Proven	2	12	2	Major Watercourse	8	214.978	31.176164	3	11.212	2	48	4	8
879	877	210118	716957	241.1	6.270527	4	0.02	241.08	1	Not Proven	2	8	2	Major Watercourse	8	227.778	72.581417	3	13.322	2	48	4	8
880	878	210218	716957	242.9	5.844879	4	0.03	242.87	1	Not Proven	2	8	2	Minor Watercourse	6	243	3.047561	4	-0.1	1	24	3	6
881	879	210318	716957	267.1	12.18932	6	0.06	267.04	1	Not Proven	2	12	2	Minor Watercourse	6	249.4408	59.481692	3	17.6592	2	36	4	8
882	880	210418	716957	281	6.112976	4	0.03	280.97	1	Not Proven	2	8	2	Site Infrastructure	3	280.003	7.165921	4	0.997	1	12	2	4
883	881	211518	716957	381	6.166	4	0.02	380.98	1	Not Proven	2	8	2	Site Infrastructure	3	376.4017	43.411607	3	4.5983	1	9	1	2
884	882	211618	716957	381	0.22744	1	0.04	380.96	1	Not Proven	2	2	1	Minor Watercourse	6	375	78.077843	3	6	1	18	2	2
885	883	211718	716957	374	0	1	0.05	373.95	1	Not Proven	2	2	1	Minor Watercourse	6	374	21.304385	3	0	1	18	2	2
886	884	210218	717057	249.29	16.72746	8	0.01	249.28	1	Not Proven	2	16	3	Major Watercourse	8	232.8596	59.877342	3	16.4304	2	48	4	12
887	885	210318	717057	252.81	6.168502	4	0.12	252.69	1	Not Proven	2	8	2	Minor Watercourse	6	252	9.83439	4	0.81	1	24	3	6
888	886	210418	717057	272.1	12.03099	6	0.07	272.03	1	Not Proven	2	12	2	Site Infrastructure	3	275.2188	22.595009	3	-3.1188	1	9	1	2
889	887	210518	717057	290.01	10.18999	6	0.04	289.97	1	Not Proven	2	12	2	Site Infrastructure	3	276.578	62.415566	3	13.432	2	18	2	4
890	888	211518	717057	369.01	8.071458	6	0.06	368.95	1	Not Proven	2	12	2	Site Infrastructure	3	366.6188	78.023963	3	2.3912	1	9	1	2
891	889	211618	717057	374.1	6.317868	4	0.02	374.08	1	Not Proven	2	8	2	Minor Watercourse	6	373	123.804276	3	1.1	1	18	2	4
892	890	211718	717057	372.01	6.398515	4	0.1	371.91	1	Not Proven	2	8	2	Minor Watercourse	6	373.1661	61.453016	3	-1.1561	1	18	2	4
893	891	210318	717157	258.01	6.517141	4	0.02	257.99	1	Not Proven	2	8	2	Minor Watercourse	6	249.3812	44.779103	3	8.6288	1	18	2	4
894	892	210418	717157	258.9	9.984827	6	0.01	258.89	1	Not Proven	2	12	2	Minor Watercourse	6	257.0408	19.020558	3	1.8592	1	18	2	4
895	893	210518	717157	275.3	18.43679	8	0	275.3	1	Not Proven	2	16	3	Site Infrastructure	3	275.4287	0.921103	4	-0.1287	1	12	2	6
896	894	210618	717157	291.1	10.21938	6	0.03	291.07	1	Not Proven	2	12	2	Site Infrastructure	3	281.578	58.507784	3	9.522	1	9	1	2
897	895	211518	717157	357.1	8.578356	6	0.19	356.91	1	Not Proven	2	12	2	Site Infrastructure	3	363.4188	148.857222	3	-6.3188	1	9	1	2
898	896	211618	717157	359.01	6.398515	4	0.16	358.85	1	Not Proven	2	8	2	Minor Watercourse	6	354.2199	121.144005	3	4.7901	1	18	2	4
899	897	211718	717157	361.01	7.901602	4	0.13	360.88	1	Not Proven	2	8	2	Minor Watercourse	6	354.9592	44.749838	3	6.0508	1	18	2	4
900	898	210618	717257	279.01	9.871125	6	0.03	278.98	1	Not Proven	2	12	2	Minor Watercourse	6	278.3781	8.106271	4	0.6319	1	24	3	6
901	899	211518	717257	346.01	8.049467	6	0.03	345.98	1	Not Proven	2	12	2	Minor Watercourse	6	335	116.595376	3	11.01	2	36	4	8
902	900	211618	717257	348	5.710593	4	0.3	347.7	1	Not Proven	2	8	2	Minor Watercourse	6	342.0045	78.713709	3	5.9955	1	18	2	4
903	901	211518	717357	336	0.020249	1	0.14	335.86	1	Not Proven	2	2	1	Minor Watercourse	6	334.9666	35.302607	3	1.0334	1	18	2	2
904	902	210818	716957	296	5.214639	4	0.42	295.58	1	Not Proven	2	8	2	Minor Watercourse	6	296	7.320248	4	0	1	24	3	6
905	903	210718	716957	294	0	1	0.6	293.4	2	Not Proven	2	4	1	Minor Watercourse	6	294	25.524358	3	0	1	18	2	2
906	904	210718	717057	296.9	4.806587	4	0.6	296.3	1	Not Proven	2	16	3	Site Infrastructure	3	296	11.591446	3	0.9	1	9	1	3
907	905	211118	716257	397.1	9.610348	6	0.45	396.65	1	Not Proven	2	12	2	Minor Watercourse	6	397.0667	6.296732	4	0.0333	1	24	3	6
908	906	211318	717057	344.01	10.40954	6	0.37	343.64	1	Not Proven	2	12	2	Site Infrastructure	3	345.778	22.41504	3	-1.768	1	9	1	2
909	907	211002	717032	323	0.571059	1	0.51	322.49	1	Not Proven	2	4	1	Site Infrastructure	3	323	7.323949	4	0	1	12	2	2
910	908	211414	716759	382	1.556708	1	0.5	381.5	1	Not Proven	2	2	1	Site Infrastructure	3	383	16.316275	3	-1	1	9	1	1
911	909	210620	714756	414	5.049595	4	0.5	413.5	1	Not Proven	2	8	2	Sensitive Habitat	8	414	0.6638	4	0	1	32	4	8
912	910	209318	713957	130.19	16.70109	8	0.02	130.17	1	Not Proven	2	16	3	Site Infrastructure	3	148.4188	88.591049	3	-18.2288	1	9	1	3
913	911	209418	713957	150.1	19.86173	8	0	150.1	1	Not Proven	2	16	3	Site Infrastructure	3	148.0777	5.451535	4	2.0223	1	12	2	6
914	912	209518	713957	180.2	29.82899	8	0	180.2	1	Not Proven	2	16	3	Roads and Tracks	3	165.6784	27.803986	3	14.5216	2	18	2	6
915	913	209618	713957	202.1	13.0552	6	0.02	202.08	1	Not Proven	2	12	2	Minor Watercourse	6	198.2408	65.08409	3	3.8592	1	18	2	4
916	914	209718	713957	211.19	18.31914	8	0	211.19	1	Not Proven	2	16	3	Minor Watercourse	6	208.1175	26.877992	3	3.0725	1	18	2	6
917	915	209218	714057	113.1	10.33871	6	0.01	113.09	1	Not Proven	2	12	2	Minor Watercourse	6	105.5983	39.301471	3	7.5017	1	18	2	4
918	916	209318	714057	136.1	10.64104	6	0.01	136.09	1	Not Proven	2	12	2	Site Infrastructure	3	149.2188	80.597174	3	-13.1188	1	9	1	2
919	917	209418	714057	154.1	12.85255	6	0	154.1	1	Not Proven	2	12	2	Roads and Tracks	3	157.0777	14.611065	3	-2.9777	1	9	1	2
920	918	209518	714057	181.19	14.60557	6	0	181.19	1	Not Proven	2	12	2	Roads and Tracks	3	163.3263	77.923327	3	17.8637	2	18	2	4
921	919	209618	714057	208.29	19.59221	8	0	208.29	1	Not Proven	2	16	3	Minor Watercourse	6	205.4376	148.978259	3	2.8524	1	18	2	6
922	920	209718	714057	233.9	11.15383	6	0	233.9	1	Not Proven	2	12	2	Minor Watercourse	6	222.8411	109.88702	3	11.0589	2	36	4	8
923	921	209818	714057	255.1	23.05494	8	0	255.1	1	Not Proven	2	16	3	Minor Watercourse	6	242.0271	87.416902	3	13.0729	2	36	4	12
924	922	209918	714057	278	14.97963	6	0.01	277.99	1	Not Proven	2	12	2	Sensitive Habitat	8	277.5038	25.260547	3	0.4962	1	24	3	6
925	923	209218	714157	111.91	5.63658	4	0.01	111.9	1	Not Proven	2	8	2	Minor Watercourse	6	108.8408	39.894301	3	3.0692	1	18	2	4
926	924	209318	714157	137.1	30.7323	8	0	137.1	1	Not Proven	2	16	3	Site Infrastructure	3	150.9608	25.330599	3	-13.8608	1	9	1	3
927	925	209418	714157	167.97	42.20176	8	0	167.97	1	Not Proven	2	16	3	Site Infrastructure	3	159.952	14.20721	3	8.018	1	9	1	3
928	926	209518	714157	212.1	22.72342	8	0	212.1	1	Not Proven	2	16	3	Site Infrastructure	3	173.0384	107.419995	3	39.0616	2	18	2	6
929	927	209618	714157	237.21	20.17545	8	0	237.21	1	Not Proven	2	16	3	Roads and Tracks	3	158.4188	203.121474	3	78.7912	2	18	2	6
930	928	209718	714157	257.19	15.77348	8	0.01	257.18	1	Not Proven	2	16	3	Minor Watercourse	6	224.6784	205.134887	3	32.5116	2	36	4	12
931	929	209818	714157	294	15.8877	8	0.01	293.99	1	Not Proven	2	16	3	Sensitive Habitat	8	289.5038	159.424626	3	4.4962	1	24	3	9
932	930	209918	714157	309.91	12.14745	6	0	309.91	1	Not Proven	2	12	2	Sensitive Habitat	8	314.0996	65.259599	3	-4.1896	1	24	3	6
933	931	210018	714157	322.81	29.79981	8	0.01	322.8	1	Not Proven	2	16	3	Sensitive Habitat	8	323.3093	0.921103	4	-0.4993	1	32	4	12
934	932	209218	714257	134	15.79008	8	0.01	133.99	1	Not Proven	2	16	3	Roads and Tracks	3	141.6088	23.705384	3	-7.6088	1	9	1	3
935	933	209318	714257	173.1	10.90168	6	0.01	173.09	1	Not Proven	2	12	2	Site Infrastructure	3	167.5572	36.851725	3	5.5428	1	9	1	2
936	934	209418	714257	214.01	25.51049	8	0	214.01	1	Not Proven	2	16	3	Site Infrastructure	3	169.4596	68.058663	3	44.5504	2	18	2	6
937	935	209518	714257	246.09	10.07551	6	0	246.09	1	Not Proven	2	12	2	Site Infrastructure	3	173.0384	131.902522	3	73.0516	2	18	2	4
938	936	209618	714257	268	22.74297	8	0	268	1	Not Proven	2	16	3	Site Infrastructure	3	173.0384	220.180506	3	94.9616	2	18	2	6
939	937	209718	714257	281.81	24.767	8	0.01	281.8	1	Not Proven	2	16	3	Sensitive Habitat	8	317	167.099266	3	-35.19	1	24	3	9
940	938	209818	714257	295.1	11.30993	6	0.03	295.07	1	Not Proven	2	12	2	Sensitive Habitat	8	317.9349	105.980963	3	-22.8349	1	24	3	6
941	939	209918	714257	317.1	15.80063	8	0.02	317.08	1	Not Proven	2	16	3	Sensitive Habitat	8	326.8916	92.740188	3	-9.7916	1	24	3	9
942	940	210018	714257	340.91	10.39672	6	0.02	340.89	1	Not Proven	2	12	2	Sensitive Habitat	8	341.0188	5.654205	4	-0.1088	1	32	4	8
943	941	209218	714357	146.2	18.96627	8	0.01	146.19	1	Not Proven	2	16	3	Roads and Tracks	3	150.8188	19.974324	3	-4.6188	1	9	1	3
944	942	209318	714357	175.91	12.10462	6	0	175.91	1	Not Proven	2	12	2	Roads and Tracks	3	160.0985	53.456543	3	15.8115	2	18	2	4
945	943	209418	714357	204.3	19.001	8	0	204.3	1	Not Proven	2	16	3	Site Infrastructure	3	173.4508	136.725427	3	30.8492	2	18	2	6
946	944	209518	714357	236.3	18.54198	8	0	236.3	1	Not Proven	2	16	3	Minor Watercourse	6	222.3412	193.801213	3	13.9588	2	36	4	12
947	945	209618	714357	267.1	14.37469	6	0.01	267.09	1	Not Proven	2	12	2	Minor Watercourse	6	252.0406	184.761025	3	15.0594	2	36	4	8
948	946	209718	714357	289.3	22.12553	8	0.02	289.28	1	Not Proven	2	16	3	Sensitive Habitat	8	310.8119	116.525668	3	-21.5119	1	24	3	9
949	947	209818	714357	315.09	10.67498	6	0.01	315.08	1	Not Proven	2	12	2	Sensitive Habitat	8	316.3592	27.820008	3	-1.2692	1	24	3	6
950	948	209918	714357	327.82	17.63178	8	0.01	327.81	1	Not Proven	2	16	3	Sensitive Habitat	8	328.0497	0.921103	4	-0.2297	1	32	4	12
951	949	210018	714357	352.29	14.62524	6	0.04	352.25	1	Not Proven	2	12	2	Sensitive Habitat	8	351.0158	47.28404	3	1.2742	1	24	3	6
952	950	210118	714357	364.1	11.50731	6	0.07	364.03	1	Not Proven	2	12	2	Sensitive Habitat	8	365.0188	10.369341	3	-0.9188	1	24	3	6
953	951	209218	714457	136.39	26.05639	8	0.02	136.37	1	Not Proven	2	16	3	Roads and Tracks	3	149.8206	36.600869	3	-13.4306	1	9	1	3
954	952	209318	714457	170.2	14.28125	6	0.01	170.19	1	Not Proven	2	12	2	Site Infrastructure	3	170.178	0.921103	4	0.022	1	12	2	4
955	953	209418	714457	196.1	11.43938	6	0	196.1	1	Not Proven	2	12	2	Site Infrastructure	3	179.653	60.890847	3	16.447	2	18	2	4
956	954	209518	714457	224.21	23.25529	8	0	224.21	1	Not Proven	2	16	3	Minor Watercourse	6	222.3412	94.963835	3	1.8688	1	18	2	6
957	955	209618	714457	258.2	16.69924	8	0	258.2	1	Not Proven	2	16	3	Minor Watercourse	6	252.0406	84.828394	3	6.1594	1	18	2	6
958	956	209718	714457	285.1	10.71139	6	0.02	285.08	1	Not Proven	2	12	2	Minor Watercourse	6	286.6188	53.721489	3	-1.5188	1	18	2	4
959	957	209818	714457	302.1	11.13372	6	0.03	302.07	1	Not Proven	2	12	2	Minor Watercourse	6	299.0188	33.147682	3	3.0812	1	18	2	4
960	958	209918	714457	323.2	18.26229	8	0.02	323.18	1	Not Proven	2	16	3	Sensitive Habitat	8	324.7173	5.89729	4	-1.5173	1	32	4	12
961	959	210018	714457	348.3	18.62656	8	0.04	348.26	1	Not Proven	2	16	3	Sensitive Habitat	8	348.178	0.921103	4	0.122	1	32	4	12
962	960	210118	714457	365.19	6.0344	4	0.06	365.13	1	Not Proven	2	8	2	Sensitive Habitat	8	365.2099	0.921103	4	-0.0199	1	32	4	8
963	961	210718	717157	295	2.632316	2	0.03	294.97	1	Not Proven	2	4	1	Site Infrastructure	3	296.5114	23.997601	3	-1.5114	1	9	1	1
964	962	210818	717157	296.19	6.622718	4	0.04	296.15	1	Not Proven	2	8	2	Minor Watercourse	6	295	51.042837	3	1.19	1	18	2	4
965	963	210918	717157	309.4	29.05738	8	0.01	309.39	1	Not Proven	2	16	3	Site Infrastructure	3	310.7213	11.591446	3	-1.3213	1	9	1	3
966	964	211018	717157	319.01	2.655662	2	0.25	318.76	1	Not Proven	2	4	1	Site Infrastructure	3	313.778	38.028069	3	5.232	1	9	1	1
967	965	211118	717157	321.19	5.738034	4	0.27	320.92	1	Not Proven	2	8	2	Minor Watercourse	6	333.9895	107.419583	3	-12.7995	1	18	2	4
968	966	210718	717257	283.19	4.453203	4	0.1	283.09	1	Not Proven	2	8	2	Minor Watercourse	6	283.5675	61.743476	3	-0.3775	1	18	2	4
969	967	210818	717257	291.19	6.350132	4	0	291.19	1	Not Proven	2	8	2	Minor Watercourse	6	292.5936	12.613756	3	-1.4036	1	18	2	4
970	968	210918	717257	296.2	10.26981	6	0.1	296.1	1	Not Proven	2	12	2	Minor Watercourse	6	295	12.781456	3	1.2	1	18	2	4
971	969	211018	717257	302.1	11.07864	6	0.08	302.02	1	Not Proven	2	12	2	Minor Watercourse	6	296.8839	35.806793	3	5.2161	1	18	2	4
972	970	211118	717257	306.11	14.88593	6	0.04	306.07	1	Not Proven	2	12	2	Minor Watercourse	6	298.1592	34.708985	3	7.9508	1	18	2	4
973	971	211218	717257	308.2	10.3756	6	0	308.2	1	Not Proven	2	12	2	Minor Watercourse	6	308.7592	6.331511	4	-0.5592	1	24	3	6
974	972	211318	717257	326.2	13.14633	6	0.04	326.16	1	Not Proven	2	12	2	Minor Watercourse	6	310.3592	100.045664	3	15.8408	2	36	4	8
975	973	211418	717257	337.1	15.00932	8	0.03	337.07	1	Not Proven	2	16	3	Minor Watercourse	6	311.2362	173.902737	3	25.8638	2	36	4	12
976	974	210718	717357	280.1	6.044724	4	0.1	280	1	Not Proven	2	8	2	Minor Watercourse	6	280	28.783447	3	0.1	1	18	2	4
977	975	210818	717357	290.19	14.84441	6	0.04	290.15	1	Not Proven	2	12	2	Minor Watercourse	6	279.8188	63.637291	3	10.3712	2	36	4	8
978	976	210918	717357	303.09	4.43373	4	0.02	303.07	1	Not Proven	2	8	2	Minor Watercourse	6	295	83.336484	3	8.09	1	18	2	4
979	977	211018	717357	303.81	10.20012	6	0.09	303.72	1	Not Proven	2	12	2	Minor Watercourse	6	297.7059	36.40311	3	6.1041	1	18	2	4
980	978	211118	717357	302	2.213672	2	0.02	301.98	1	Not Proven	2	4	1	Minor Watercourse	6	297	44.140807	3	5	1	18	2	2
981	979	211218	717357	299.09	5.954978	4	0.03	299.06	1	Not Proven	2	8	2	Minor Watercourse	6	299.9393	13.662358	3	-0.8493	1	18	2	4
982	980	211318	717357	306.1	12.47173	6	0.01	306.09	1	Not Proven	2	12	2	Minor Watercourse	6	311.2362	61.807783	3	-5.1362	1	18	2	4
983	981	211418	717357	324.1	7.036238	4	0.03	324.07	1	Not Proven	2	8	2	Minor Watercourse	6	311.3724	93.992415	3	12.7276	2	36	4	8
984	982	210818	717457	290.1	16.3528	8	0.02	290.08	1	Not Proven	2	16	3	Minor Watercourse	6	278.0188	76.302787	3	12.0812	2	36	4	12
985	983	210918	717457	307.09	9.411994	6	0.47	306.62	1	Not Proven	2	12	2	Minor Watercourse	6	297.1592	124.788495	3	9.9308	1	18	2	4
986	984	211018	717457	314.99	6.37937	4	0.08	314.91	1	Not Proven	2	8	2	Minor Watercourse	6	297.5421	130.468079	3	17.4479	2	36	4	8
987	985	211118	717457	304.99	2.790498	2	0.16	304.83	1	Not Proven	2	4	1	Minor Watercourse	6	298	142.973977	3	6.99	1	18	2	2
988	986	211218	717457	310.91	10.04608	6	0.13	310.78	1	Not Proven	2	12	2	Minor Watercourse	6	300	99.885056	3	10.91	2	36	4	8
989	987	211318	717457	316	2.500787	2	0.1	315.9	1	Not Proven	2	4	1	Minor Watercourse	6	312.0436	45.080071	3	3.9564	1	18	2	2
990	988	211418	717457	317.01	9.893724	6	0.06	316.95	1	Not Proven	2	12	2	Minor Watercourse	6	313.1224	24.575151	3	3.8876	1	18	2	4
991	989	210118	717457	330.2	12.6614	6	0.12	330.08	1	Not Proven	2	12	2	Minor Watercourse	6	329.4995	8.724152	4	0.7005	1	24	3	6
992	990	210118	715157	287.9	6.577724	4	0.36	287.54	1	Not Proven	2	8	2	Sensitive Habitat	8	288	0.921103	4	-0.1	1	32	4	8
993	991	210418	715157	319.1	8.164558	6	0.42	318.68	1	Not Proven	2	12	2	Site Infrastructure	3	319.0334	1.572269	4	0.0666	1	12	2	4
994	992	210318	715357	315.19	8.217841	6	0.39	314.8	1	Not Proven	2	12	2	Sensitive Habitat	8	315.8477	17.031243	3	-0.6577	1	24	3	6
995	993	210518	715757	328	7.268737	4	0.07	327.93	1	Not Proven	2	8	2	Minor Watercourse	6	325.675	17.628251	3	2.325	1	18	2	4
996	994	210518	715857	335	0	1	0.4	334.6	1	Not Proven	2	2	1	Sensitive Habitat	8	335	0.921103	4	0	1	32	4	4
997	995	210818	715957	377.01	10.21938	6	0.37	376.64	1	Not Proven	2	12	2	Minor Watercourse	6	375.0188	8.61197	4	1.9912	1	24	3	6
998	996	210618	716057	340	2.576165	2	0.33	339.67	1	Not Proven	2	4	1	Sensitive Habitat	8	340	0.921103	4	0	1	32	4	4
999	997	210718	716157	353.01	10.42878	6	0.07	352.94	1	Not Proven	2	12	2	Sensitive Habitat	8	341.6795	59.259109	3	11.3305	2	48	4	8
1000	998	210618	716157	340.01	2.655662	2	0.35	339.66	1	Not Proven	2	4	1	Sensitive Habitat	8	340	0.921103	4	0.01	1	32	4	4

2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
1001	999	210618	716257	343.9	6.640598	4	0.02	343.88	1	Not Proven	2	8	2	Minor Watercourse	6	339	50.618475	3	4.9	1	18	2	4
1002	1000	210718	716257	345.1	10.75	6	0.36	344.74	1	Not Proven	2	12	2	Minor Watercourse	6	344.2188	37.300831	3	0.8812	1	18	2	4
1003	1001	211182	716583	384	1.640143	1	0.34	383.66	1	Not Proven	2	2	1	Minor Watercourse	6	383.8188	51.93454	3	0.1812	1	18	1	2
1004	1002	209518	713907	171.1	24.09484	8	0	171.1	1	Not Proven	2	16	3	Roads and Tracks	3	167.4784	9.432202	4	3.6216	1	12	2	6
1005	1003	209468	713907	157.1	12.60438	6	0	157.1	1	Not Proven	2	12	2	Roads and Tracks	3	166.2784	34.306688	3	-9.1784	1	9	1	2
1006	1004	209418	713907	146	7.518519	4	0	146	1	Not Proven	2	8	2	Roads and Tracks	3	145.8188	1.572269	4	0.1812	1	12	2	4
1007	1005	209368	713907	137.1	10.26322	6	0.02	137.08	1	Not Proven	2	12	2	Roads and Tracks	3	145.6475	45.435577	3	-8.5475	1	9	1	2
1008	1006	209318	713907	128	14.75899	6	0.02	127.98	1	Not Proven	2	12	2	Roads and Tracks	3	145.6475	94.993693	3	-17.6475	1	9	1	2
1009	1007	209468	713857	152.1	12.84458	6	0	152.1	1	Not Proven	2	12	2	Minor Watercourse	6	151.8596	4.348704	4	0.2404	1	24	3	6
1010	1008	209418	713857	143.09	8.853573	6	0.03	143.06	1	Not Proven	2	12	2	Roads and Tracks	3	144.8188	10.899579	3	-1.7288	1	9	1	2
1011	1009	209368	713857	135.1	11.30993	6	0.02	135.08	1	Not Proven	2	12	2	Minor Watercourse	6	138.9075	44.486187	3	-3.8075	1	18	2	4
1012	1010	209318	713857	125.1	10.26913	6	0.02	125.08	1	Not Proven	2	12	2	Minor Watercourse	6	124.9393	72.979148	3	0.1607	1	18	2	4
1013	1011	209568	713807	174.1	12.53847	6	0	174.1	1	Not Proven	2	12	2	Roads and Tracks	3	174.2596	0.921103	4	-0.1596	1	12	2	4
1014	1012	209518	713807	163.01	17.5484	8	0	163.01	1	Not Proven	2	16	3	Roads and Tracks	3	169.8596	27.8279	3	-6.8496	1	9	1	3
1015	1013	209468	713807	147.19	17.26585	8	0.01	147.18	1	Not Proven	2	16	3	Roads and Tracks	3	143.6596	12.575501	3	3.5304	1	9	1	3
1016	1014	209418	713807	136	13.78324	6	0.02	135.98	1	Not Proven	2	12	2	Minor Watercourse	6	136.0408	23.932949	3	-0.0408	1	18	2	4
1017	1015	209368	713807	129.18	15.78154	8	0.02	129.16	1	Not Proven	2	16	3	Minor Watercourse	6	129.4816	9.204501	4	-0.3016	1	24	3	9
1018	1016	209618	713757	176	14.43218	6	0	176	1	Not Proven	2	12	2	Roads and Tracks	3	181.2596	25.568825	3	-5.2596	1	9	1	2
1019	1017	209568	713757	167.9	12.60438	6	0	167.9	1	Not Proven	2	12	2	Roads and Tracks	3	176.0171	43.956474	3	-8.1171	1	9	1	2
1020	1018	209518	713757	158	18.23368	8	0.02	157.98	1	Not Proven	2	16	3	Site Infrastructure	3	141.2188	59.591842	3	16.7812	2	18	2	6
1021	1019	209468	713757	143.19	17.05414	8	0.01	143.18	1	Not Proven	2	16	3	Site Infrastructure	3	141.2188	10.516541	3	1.9712	1	9	1	3
1022	1020	209418	713757	134.1	11.30993	6	0.03	134.07	1	Not Proven	2	12	2	Roads and Tracks	3	140.0188	34.601261	3	-5.9188	1	9	1	2
1023	1021	209718	713707	194.99	20.13802	8	0	194.99	1	Not Proven	2	16	3	Roads and Tracks	3	193.0039	7.320248	4	1.9861	1	12	2	6
1024	1022	209668	713707	182.09	23.51445	8	0	182.09	1	Not Proven	2	16	3	Roads and Tracks	3	190.359	22.357881	3	-8.269	1	9	1	3
1025	1023	209618	713707	169	15.8877	8	0	169	1	Not Proven	2	16	3	Roads and Tracks	3	187.6042	66.151327	3	-18.6042	1	9	1	3
1026	1024	209568	713707	157.9	12.60438	6	0.02	157.88	1	Not Proven	2	12	2	Minor Watercourse	6	147.4376	75.298444	3	10.4624	2	36	4	8
1027	1025	209518	713707	148.9	10.56456	6	0.03	148.87	1	Not Proven	2	12	2	Roads and Tracks	3	139	66.107065	3	9.9	1	9	1	2
1028	1026	209468	713707	140.09	8.681273	6	0.02	140.07	1	Not Proven	2	12	2	Site Infrastructure	3	137.6188	17.420127	3	2.4712	1	9	1	2
1029	1027	209768	713657	192.19	20.02189	8	0	192.19	1	Not Proven	2	16	3	Roads and Tracks	3	198.7004	28.728613	3	-6.5104	1	9	1	3
1030	1028	209718	713657	184.1	8.538631	6	0	184.1	1	Not Proven	2	12	2	Minor Watercourse	6	185.0045	5.654205	4	-0.9045	1	24	3	6
1031	1029	209668	713657	174.01	15.85111	8	0	174.01	1	Not Proven	2	16	3	Minor Watercourse	6	173.4376	13.309366	3	0.5724	1	18	2	6
1032	1030	209618	713657	159.11	14.43075	6	0.01	159.1	1	Not Proven	2	12	2	Minor Watercourse	6	161.9302	26.141439	3	-2.8202	1	18	2	4
1033	1031	209568	713657	147.1	12.71749	6	0.02	147.08	1	Not Proven	2	12	2	Minor Watercourse	6	147.4376	25.303076	3	-0.3376	1	18	2	4
1034	1032	209518	713657	141.91	7.882457	4	0.04	141.87	1	Not Proven	2	8	2	Minor Watercourse	6	140.2596	35.810312	3	1.6504	1	18	2	4
1035	1033	209818	713607	198.09	11.92892	6	0	198.09	1	Not Proven	2	12	2	Roads and Tracks	3	207.7868	60.314844	3	-9.6968	1	9	1	2
1036	1034	209768	713607	190	10.5	6	0	190	1	Not Proven	2	12	2	Minor Watercourse	6	185.0045	65.137931	3	4.9955	1	18	2	4
1037	1035	209718	713607	185	2.271393	2	0	185	1	Not Proven	2	4	1	Minor Watercourse	6	182.2376	40.621935	3	2.7624	1	18	2	2
1038	1036	209668	713607	176.2	16.82592	8	0.02	176.18	1	Not Proven	2	16	3	Minor Watercourse	6	170.0293	27.437362	3	6.1707	1	18	2	6
1039	1037	209618	713607	162.29	17.37615	8	0.01	162.28	1	Not Proven	2	16	3	Minor Watercourse	6	160.3412	22.711672	3	1.9488	1	18	2	6
1040	1038	209568	713607	148.29	17.88332	8	0.01	148.28	1	Not Proven	2	16	3	Minor Watercourse	6	147.4376	24.711043	3	0.8524	1	18	2	6
1041	1039	209868	713557	193.81	15.52475	8	0	193.81	1	Not Proven	2	16	3	Minor Watercourse	6	193.6188	45.186516	3	0.1912	1	18	2	6
1042	1040	209818	713557	190.9	12.84143	6	0	190.9	1	Not Proven	2	12	2	Minor Watercourse	6	182.6188	62.576539	3	8.2812	1	18	2	4
1043	1041	209768	713557	186.09	5.968874	4	0	186.09	1	Not Proven	2	8	2	Minor Watercourse	6	179.04	77.451283	3	7.05	1	18	2	4
1044	1042	209718	713557	187.09	4.295645	4	0.03	187.06	1	Not Proven	2	8	2	Minor Watercourse	6	182.2376	88.43377	3	4.8524	1	18	2	4
1045	1043	209668	713557	182.1	14.60219	6	0.02	182.08	1	Not Proven	2	12	2	Minor Watercourse	6	169.2188	73.318691	3	12.8812	2	36	4	8
1046	1044	209618	713557	168.11	17.48179	8	0.03	168.08	1	Not Proven	2	16	3	Minor Watercourse	6	160.3412	72.706327	3	7.7688	1	18	2	6
1047	1045	209918	713507	196	7.02955	4	0	196	1	Not Proven	2	8	2	Minor Watercourse	6	193.6188	25.549975	3	2.3812	1	18	2	4
1048	1046	209868	713507	189	4.31427	4	0	189	1	Not Proven	2	8	2	Minor Watercourse	6	189	2.898867	4	0	1	24	3	6
1049	1047	209818	713507	181.1	12.70023	6	0	181.1	1	Not Proven	2	12	2	Minor Watercourse	6	182	14.06741	3	-0.9	1	18	2	4
1050	1048	209768	713507	183.99	6.54842	4	0.02	183.97	1	Not Proven	2	8	2	Minor Watercourse	6	180	35.354695	3	3.99	1	18	2	4
1051	1049	209718	713507	184.9	6.154882	4	0.01	184.89	1	Not Proven	2	8	2	Minor Watercourse	6	179.9895	79.43146	3	4.9105	1	18	2	4
1052	1050	209968	713457	196.1	10.21938	6	0	196.1	1	Not Proven	2	12	2	Minor Watercourse	6	193.6188	96.248539	3	2.4812	1	18	2	4
1053	1051	209918	713457	193.09	6.150658	4	0	193.09	1	Not Proven	2	8	2	Minor Watercourse	6	190.6188	64.62896	3	2.4712	1	18	2	4
1054	1052	209868	713457	188.1	10.64104	6	0	188.1	1	Not Proven	2	12	2	Minor Watercourse	6	188	43.727497	3	0.1	1	18	2	4
1055	1053	209818	713457	181.1	11.1654	6	0.04	181.06	1	Not Proven	2	12	2	Minor Watercourse	6	179	28.213926	3	2.1	1	18	2	4
1056	1054	209768	713457	177.9	10.75	6	0.02	177.88	1	Not Proven	2	12	2	Minor Watercourse	6	176.6408	16.917838	3	1.2592	1	18	2	4
1057	1055	209718	713457	181.9	11.30993	6	0	181.9	1	Not Proven	2	12	2	Minor Watercourse	6	176	51.69641	3	5.9	1	18	2	4
1058	1056	209968	713407	191.9	7.497519	4	0	191.9	1	Not Proven	2	8	2	Minor Watercourse	6	192	133.44741	3	-0.1	1	18	2	4
1059	1057	209918	713407	189	4.682795	4	0	189	1	Not Proven	2	8	2	Minor Watercourse	6	189	108.59368	3	0	1	18	2	4
1060	1058	209868	713407	187	0.182238	1	0	187	1	Not Proven	2	2	1	Minor Watercourse	6	186.6344	92.358881	3	0.3656	1	18	2	2
1061	1059	209818	713407	181.1	9.90505	6	0.03	181.07	1	Not Proven	2	12	2	Minor Watercourse	6	176.2408	52.405893	3	4.8592	1	18	2	4
1062	1060	209768	713407	175	11.44762	6	0.03	174.97	1	Not Proven	2	12	2	Minor Watercourse	6	174.8596	18.469088	3	0.1404	1	18	2	4
1063	1061	210018	713357	182.9	10.997	6	0	182.9	1	Not Proven	2	12	2	Minor Watercourse	6	192	203.51705	3	-9.1	1	18	2	4
1064	1062	209968	713357	184.9	9.789405	6	0	184.9	1	Not Proven	2	12	2	Minor Watercourse	6	190.6188	175.94963	3	-5.7188	1	18	2	4
1065	1063	209918	713357	183.99	4.320957	4	0	183.99	1	Not Proven	2	8	2	Minor Watercourse	6	188	154.57510	3	-4.01	1	18	2	4
1066	1064	209868	713357	184.9	6.14517	4	0.04	184.86	1	Not Proven	2	8	2	Minor Watercourse	6	176.2408	123.11522	3	8.6592	1	18	2	4
1067	1065	209818	713357	180.01	16.52726	8	0.01	180	1	Not Proven	2	16	3	Minor Watercourse	6	164.6408	85.415734	3	15.3692	2	36	4	12
1068	1066	210118	713307	183.9	8.418198	6	0	183.9	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	160.32902	3	12.6106	2	36	4	8
1069	1067	210068	713307	179.9	10.00686	6	0.02	179.88	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	206.06990	3	8.6106	1	18	2	4
1070	1068	210018	713307	175	2.725369	2	0.25	174.75	1	Not Proven	2	4	1	Minor Watercourse	6	192	244.51908	3	-17	1	18	2	2
1071	1069	209968	713307	177	4.496021	4	0	177	1	Not Proven	2	8	2	Minor Watercourse	6	189	220.39500	3	-12	1	18	2	4
1072	1070	209918	713307	179	5.756349	4	0.02	178.98	1	Not Proven	2	8	2	Minor Watercourse	6	163.4513	190.26027	3	15.5487	2	36	4	8
1073	1071	209868	713307	181	4.31427	4	0	181	1	Not Proven	2	8	2	Minor Watercourse	6	163.4513	141.98021	3	17.5487	2	36	4	8
1074	1072	210168	713257	176.9	11.30993	6	0	176.9	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	95.479713	3	5.6106	1	18	2	4
1075	1073	210118	713257	175.91	9.696063	6	0	175.91	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	144.48455	3	4.6206	1	18	2	4
1076	1074	210068	713257	173	0.753297	1	0.2	172.8	1	Not Proven	2	2	1	Minor Watercourse	6	171.2894	193.99792	3	1.7106	1	18	2	2
1077	1075	210018	713257	171.91	4.663343	4	0.05	171.86	1	Not Proven	2	8	2	Minor Watercourse	6	171.2894	243.71008	3	0.6206	1	18	2	4
1078	1076	209968	713257	178.09	6.58272	4	0.07	178.02	1	Not Proven	2	8	2	Minor Watercourse	6	161.0799	252.11637	3	17.0101	2	36	4	8
1079	1077	209918	713257	182	0.182238	1	0.05	181.95	1	Not Proven	2	2	1	Minor Watercourse	6	161.0799	204.74881	3	20.9201	2	36	4	4
1080	1078	210268	713207	172.9	7.979182	4	0	172.9	1	Not Proven	2	8	2	Minor Watercourse	6	171.4188	26.920223	3	1.4812	1	18	2	4
1081	1079	210218	713207	165.1	7.839545	4	0	165.1	1	Not Proven	2	8	2	Minor Watercourse	6	171.2894	50.272812	3	-6.1894	1	18	2	4
1082	1080	210168	713207	166.89	12.88642	6	0.04	166.85	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	96.367866	3	-4.3994	1	18	2	4
1083	1081	210118	713207	167.99	6.595674	4	0.15	167.84	1	Not Proven	2	8	2	Minor Watercourse	6	171.2894	145.07300	3	-3.2994	1	18	2	4
1084	1082	210068	713207	169.09	6.37937	4	0.16	168.93	1	Not Proven	2	8	2	Minor Watercourse	6	171.2894	194.43658	3	-2.1994	1	18	2	4
1085	1083	210018	713207	166.9	10.41459	6	0.04	166.86	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	244.05941	3	-4.3894	1	18	2	4
1086	1084	209968	713207	172.81	13.37382	6	0.02	172.79	1	Not Proven	2	12	2	Minor Watercourse	6	161.0799	270.80076	3	11.7301	2	36	4	8
1087	1085	210168	713157	159.9	4.62736	4	0.05	159.85	1	Not Proven	2	8	2	Minor Watercourse	6	171.2894	120.23791	3	-11.3894	1	18	2	4
1088	1086	210118	713157	158.91	9.536963	6	0.02	158.89	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	161.91530	3	-12.3794	1	18	2	4
1089	1087	210068	713157	159.71	16.74172	8	0.02	159.69	1	Not Proven	2	16	3	Minor Watercourse	6	171.2894	207.30647	3	-11.5794	1	18	2	6
1090	1088	210018	713157	157.99	10.13165	6	0.02	157.97	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	254.43149	3	-13.2994	1	18	2	4
1091	1089	210218	713107	162.1	9.094622	6	0.05	162.05	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	133.67174	3	-9.1894	1	18	2	4
1092	1090	210168	713107	158.01	10.20188	6	0.03	157.98	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	156.93165	3	-13.2794	1	18	2	4
1093	1091	210118	713107	153.91	8.67883	6	0.06	153.85	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	190.73565	3	-17.3794	1	18	2	4
1094	1092	210218	713057	162.1	10.32853	6	0.02	162.08	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	181.76502	3	-9.1894	1	18	2	4
1095	1093	210168	713057	156.9	4.94645	4	0.02	156.88	1	Not Proven	2	8	2	Minor Watercourse	6	171.2894	199.49419	3	-14.3894	1	18	2	4
1096	1094	210268	713007	161.1	12.00166	6	0.03	161.07	1	Not Proven	2	12	2	Minor Watercourse	6	171.4188	226.72948	3	-10.3188	1	18	2	4
1097	1095	210218	713007	156.2	13.24189	6	0.02	156.18	1	Not Proven	2	12	2	Minor Watercourse	6	171.2894	230.67057	3	-15.0894	1	18	2	4
1098	1096	210841	715627	377.9413	8.804109	6	2.2	375.7413	3	Not Proven	2	36	4	Site Infrastructure	3	380.0408	19.731789	3	-2.0995	1	9	1	4
1099	1097	210851	715627	377	5.883335	4	0.9	376.1	2	Not Proven	2	16	3	Site Infrastructure	3	379.0965	14.469592	3	-2.0965	1	9	1	3
1100	1098	210861	715627	377.7157	7.649212	4	0.95	376.7657	2	Not Proven	2	16	3	Site Infrastructure	3	379.0527	9.767185	4	-1.337	1	12	2	6
1101	1099	210871	715627	378	7.749488	4	1.9	376.1	3	Not Proven	2	24	3	Site Infrastructure	3	379.149	6.536016	4	-1.149	1	12	2	6
1102	1100	210881	715627	378.9859	10.09192	6	0.3	378.6859	1	Not Proven	2	12	2	Site Infrastructure	3	380.2935	7.039169	4	-1.3076	1	12	2	4
1103	1101	210891	715627	379.9859	7.823083	4	0.1	379.8859	1	Not Proven	2	8	2	Site Infrastructure	3	382.0415	13.638985	3	-2.0556	1	9	1	2
1104	1102	210901	715627	380.7157	9.816167	6	0.9	379.8157	2	Not Proven	2	24	3	Site Infrastructure	3	385.6477	16.71831	3	-4.932	1	9	1	3
1105	1103	210911	715627	380.9859	12.01855	6	0.4	380.5859	1	Not Proven	2	12	2	Site Infrastructure	3	386.6528	20.444645	3	-5.6669	1	9	1	2
1106	1104	210921	715627	381.9413	12.08246	6	0.3	381.6413	1	Not Proven	2	12	2	Site Infrastructure	3	387.867	25.22826	3	-5.9257	1	9	1	2
1107	1105	210931	715627	382.9413	12.45561	6	0.45	382.4913	1	Not Proven	2	12	2	Site Infrastructure	3	388.5372	31.965248	3	-5.5959	1	9	1	2
1108	1106	210841	715637	379.1809	10.62833	6	2.4	376.7809	3	Not Proven	2	36	4	Site Infrastructure	3	380.0408	16.715008	3	-0.8599	1	9	1	4
1109	1107	210851	715637	378.9413	10.37224	6	0.95	377.9913	2	Not Proven	2	24	3	Site Infrastructure	3	379.0965	7.708249	4	-0.1552	1	12	2	6
1110	1108	210861	715637	378.9413	10.15078	6	0.3	378.6413	1	Not Proven	2	12	2	Site Infrastructure	3	379.2728	2.595901	4	-0.3315	1	12	2	4
1111	1109	210871	715637	379.7157	15.54747	8	0.45	379.2657	1	Not Proven	2	16	3	Site Infrastructure	3	379.7004	0.865045	4	0.0153	1	12	2	6
1112	1110	210881	715637	381.657	16.57219	8	0.3	381.357	1	Not Proven	2	16	3	Site Infrastructure	3	381.6596	0.865045	4	-0.0026	1	12	2	6
1113	1111	210891	715637	382.657	18.06136	8	0.9	381.757	2	Not Proven	2	32	4	Site Infrastructure	3	384.3898	6.536016	4	-1.7328	1	12	2	8
1114	1112	210901	715637	383.6429	21.93228	8	0.2	383.4429	1	Not Proven	2	16	3	Site Infrastructure	3	385.6477	7.039169	4	-2.0048	1	12	2	6
1115	1113	210911	715637	383.9272	19.98324	8	0.1	383.8272	1	Not Proven	2	16	3	Site Infrastructure	3	387.867	11.50483	3	-3.9398	1	9	1	3
1116	1114	210921	715637	384.8825	19.4752	8	0.1	384.7825	1	Not Proven	2	16	3	Site Infrastructure	3	388.5372	17.823386	3	-3.6547	1	9	1	3
1117	1115	210931	715637	384.9413	15.01824	8	0.1	384.8413	1	Not Proven	2	16	3	Site Infrastructure	3	389.3611	25.278155	3	-4.4198	1	9	1	3
1118	1116	210841	715647	380.9413	5.870796	4	0.95	379.9913	2	Not Proven	2	16	3	Site Infrastructure	3	381	8.52701	4	-0.0587	1	12	2	6
1119	1117	210851	715647	380	3.45543	2	2	378	3	Not Proven	2	12	2	Site Infrastructure	3	380.1846	4.132542	4	-0.1846	1	12	2	4
1120	1118	210861	715647	380.7016	14.33729	6	0.45	380.2516	1	Not Proven	2	12	2	Site Infrastructure	3	380.6596	0.865045	4	0.042	1	12	2	4
1121	1119	210871	715647	382.7016	17.98481	8	0.2	382.5016	1	Not Proven	2	16	3	Site Infrastructure	3	382.6848	0.865045	4	0.0168	1	12	2	6
1122	1120	210881	715647	384.6429	18.54198	8	0.1	384.5429	1	Not Proven	2	16	3	Site Infrastructure	3	384.6596	0.865045	4	-0.0167	1	12	2	6
1123	1121	210891	715647	385.657	18.33319	8	0.2	385.457	1	Not Proven	2	16	3	Site Infrastructure	3	385.6751	0.865045	4	-0.0181	1	12	2	6
1124	1122	210901	715647	386.9272	17.92854	8	0.2	386.7272	1	Not Proven	2	16	3	Site Infrastructure	3	387.066	0.865045	4	-0.1388	1	12	2	6
1125	1123	210911	715647	387.8825	19.32081	8	0.3	387.5825	1	Not Proven	2	16	3	Site Infrastructure	3	388.5372	3.683626	4	-0.6547	1	12	2	6
1126	1124	210921	715647	387.9413	18.05942	8	0.3	387.6413	1	Not Proven	2	16	3	Site Infrastructure	3	389.3611	11.613832	3	-1.4198	1	9	1	3
1127	1125	210931	715647	388.8684	18.53781	8	0.45	388.4184	1	Not Proven	2	16	3	Site Infrastructure	3	392.0247	19.278576	3	-3.1563	1	9	1	3
1128	1126	210841	715657	381	3.298632	2	0.3	380.7	1	Not Proven	2	4	1	Site Infrastructure	3	381	0.865045	4	0	1	12	2	2
1129	1127	210851	715657	380.9413	11.40072	6	0.95	379.9913	2	Not Proven	2	24	3	Site Infrastructure	3	381.0596	1.384884	4	-0.1183	1	12	2	6
1130	1128	210861	715657	382.7016	15.76653	8	0.95	381.7516	2	Not Proven	2	32	4	Site Infrastructure	3	382.6596	0.865045	4	0.042	1	12	2	8
1131	1129	210871	715657	385.4619	19.62099	8	0.2	385.2619	1	Not Proven	2	16	3	Site Infrastructure	3	385.2784	0.865045	4	0.1835	1	12	2	6
1132	1130	210881	715657	387.6429	17.19113	8	0.45	387.1929	1	Not Proven	2	16	3	Site Infrastructure	3	387.6596	0.865045	4	-0.0167	1	12	2	6
1133	1131	210891	715657	388.657	16.42659	8	0.15	388.507	1	Not Proven	2	16	3	Site Infrastructure	3	388.6596	0.865045	4	-0.0026	1	12	2	6
1134	1132	210901	715657	389.7016	15.47877	8	0.2	389.5016	1	Not Proven	2	16	3	Site Infrastructure	3	389.6751	0.865045	4	0.0265	1	12	2	6
1135	1133	210911	715657	390.7016	13.87107	6	0.1	390.6016	1	Not Proven	2	12	2	Site Infrastructure	3	390.6751	0.865045	4	0.0265	1	12	2	4
1136	1134	210921	715657	390.9413	15.25446	8	0.2	390.7413	1	Not Proven	2	16	3	Site Infrastructure	3	392.0247	5.249715	4	-1.0834	1	12	2	6
1137	1135	210931	715657	391.8825	16.75131	8	0.2	391.6825	1	Not Proven	2	16	3	Site Infrastructure	3	392.0247	13.480041	3	-0.1422	1	9	1	3
1138	1136	210841	715667	381.9413	9.469201	6	0.8	381.1413	2	Not Proven	2	24	3	Site Infrastructure	3	381.0158	5.652141	4	0.9255	1	12	2	6
1139	1137	210851	715667	382.7157	11.21599	6	0.7	382.0157	2	Not Proven	2	24	3	Site Infrastructure	3	382.6596	1.981793	4	0.0561	1	12	2	6
1140	1138	210861	715667	384.7016	15.8195	8	0.3	384.4016	1	Not Proven	2	16	3	Site Infrastructure	3	384.6596	0.865045	4	0.042	1	12	2	6
1141	1139	210871	715667	387.4619	21.0731	8	0.1	387.3619	1	Not Proven	2	16	3	Site Infrastructure	3	387.2784	0.865045	4	0.1835	1	12	2	6
1142	1140	210881	715667	389.7016	14.33882	6	0.2	389.5016	1	Not Proven	2	12	2	Site Infrastructure	3	389.6751	0.865045	4	0.0265	1	12	2	4
1143	1141	210891	715667	390.7016	13.67974	6	0.45	390.2516	1	Not Proven	2	12	2	Site Infrastructure	3	390.6596	0.865045	4	0.042	1	12	2	4
1144	1142	210901	715667	391.9413	11.87675	6	0.45	391.4913	1	Not Proven	2	12	2	Site Infrastructure	3	392.0252	0.865045	4	-0.0839	1	12	2	4
1145	1143	210911	715667	392.9413	15.49337	8	0.15	392.7913	1	Not Proven	2	16	3	Site Infrastructure	3	393.066	0.865045	4	-0.1247	1	12	2	6
1146	1144	210921	715667	393.9272	14.75981	6	0.2	393.7272	1	Not Proven	2	12	2	Site Infrastructure	3	393.867	4.733825	4	0.0602	1	12	2	4
1147	1145	210931	715667	394.657	16.58655	8	0.1	394.557	1	Not Proven	2	16	3	Site Infrastructure	3	392.0247	13.847726	3	2.6323	1	9	1	3
1148	1146	210841	715677	383.7157	6.945887	4	0.95	382.7657	2	Not Proven	2	16	3	Site Infrastructure	3	381.8625	14.502562	3	1.8532	1	9	1	3
1149	1147	210851	715677	383.9413	12.45222	6	0.95	382.9913	2	Not Proven	2	24	3	Site Infrastructure	3	382.6596	11.574779	3	1.2817	1	9	1	3
1150	1148	210861	715677	386.7016	16.5286	8	0.95	385.7516	2	Not Proven	2	32	4	Site Infrastructure	3	385.4596	7.612904	4	1.242	1	12	2	8
1151	1149	210871	715677	389.4619	23.05085	8	0.1	389.3619	1	Not Proven	2	16	3	Site Infrastructure	3	390.0784	4.806943	4	-0.6165	1	12	2	6
1152	1150	210881	715677	392.657	15.42285	8	0.1	392.557	1	Not Proven	2	16	3	Site Infrastructure	3	392.6596	0.865045	4	-0.0026	1	12	2	6
1153	1151	210891	715677	391.9859	11.92568	6	0.1	391.8859	1	Not Proven	2	12	2	Site Infrastructure	3	392.0408	0.865045	4	-0.0549	1	12	2	4
1154	1152	210901	715677	394.4173	20.62016	8	0.9	393.5173	2	Not Proven	2	32	4	Site Infrastructure	3	394.294	0.865045	4	0.1233	1	12	2	8
1155	1153	210911	715677	395.9272	16.202	8	0.1	395.8272	1	Not Proven	2	16	3	Site Infrastructure	3	396.066	0.865045	4	-0.1388	1	12	2	6
1156	1154	210921	715677	396.657	14.92364	6	0.1	396.557	1	Not Proven	2	12	2	Site Infrastructure	3	395.2408	7.566948	4	1.4162	1	12	2	4
1157	1155	210931	715677	396.9413	13.28911	6	0.1	396.8413	1	Not Proven	2	12	2	Site Infrastructure	3	399.0408	12.457588	3	-2.0995	1	9	1	2
1158	1156	210841	715687	384	6.270525	4	1.2	382.8	3	Not Proven	2	24	3	Site Infrastructure	3	381.8625	24.090917	3	2.1375	1	9	1	3
1159	1157	210851	715687	384.9859	11.48467	6	2	382.9859	3	Not Proven	2	36	4	Site Infrastructure	3	384.2596	20.821208	3	0.7263	1	9	1	4
1160	1158	210861	715687	387.7463	13.63818	6	0.95	386.7963	2	Not Proven	2	24	3	Site Infrastructure	3	387.2784	17.131944	3	0.4679	1	9	1	3
1161	1159	210871	715687	390.5207	19.70785	8	0.1	390.4207	1	Not Proven	2	16	3	Site Infrastructure	3	393.0596	11.942977	3	-2.5389	1	9	1	3
1162	1160	210881	715687	393.7603	8.863174	6	0.1	393.6603	1	Not Proven	2	12	2	Site Infrastructure	3	393.822	5.652141	4	-0.0617	1	12	2	4
1163	1161	210891	715687	393.9413	8.493487	6	0.3	393.6413	1	Not Proven	2	12	2	Site Infrastructure	3	393.2408	3.573164	4	0.7005	1	12	2	4
1164	1162	210901	715687	395.7603	15.16484	8	0.1	395.6603	1	Not Proven	2	16	3	Site Infrastructure	3	395.6188	3.573164	4	0.1415	1	12	2	6
1165	1163	210911	715687	397.9859	10.9225	6	0.1	397.8859	1	Not Proven	2	12	2	Site Infrastructure	3	398.0252	0.865045	4	-0.0393	1	12	2	4
1166	1164	210921	715687	398.9272	12.93615	6	0.1	398.8272	1	Not Proven	2	12	2	Site Infrastructure	3	399.0408	0.865045	4	-0.1136	1	12	2	4
1167	1165	210931	715687	399.657	12.50103	6	0.1	399.557	1	Not Proven	2	12	2	Site Infrastructure	3	399.5631	3.683626	4	0.0939	1	12	2	4

	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
1168	1166	210841	715697	385	2.197618	2	0.95	384.05	2	Not Proven	2	8	2	Site Infrastructure	3	382.6596	33.465198	3	2.3404	1	9	1	2
1169	1167	210851	715697	385.7603	10.3858	6	2.1	383.6603	3	Not Proven	2	36	4	Site Infrastructure	3	385.4596	29.730461	3	0.3007	1	9	1	4
1170	1168	210861	715697	387.7603	14.54431	6	0.45	387.3103	1	Not Proven	2	12	2	Site Infrastructure	3	393.0596	26.048622	3	-5.2993	1	9	1	2
1171	1169	210871	715697	389.9859	10.16375	6	0.1	389.8859	1	Not Proven	2	12	2	Site Infrastructure	3	393.822	19.179226	3	-3.8361	1	9	1	2
1172	1170	210881	715697	391.8191	11.13879	6	0.01	391.8091	1	Not Proven	2	12	2	Site Infrastructure	3	393.3783	14.502562	3	-1.5592	1	9	1	2
1173	1171	210891	715697	393.7603	15.3983	8	0.3	393.4603	1	Not Proven	2	16	3	Site Infrastructure	3	393.2408	13.520928	3	0.5195	1	9	1	3
1174	1172	210901	715697	396.7603	12.39637	6	0.1	396.6603	1	Not Proven	2	12	2	Site Infrastructure	3	397.3435	12.661544	3	-0.5832	1	9	1	2
1175	1173	210911	715697	398.7603	14.99077	6	0.8	397.9603	2	Not Proven	2	24	3	Site Infrastructure	3	399.2596	9.181258	4	-0.4993	1	12	2	6
1176	1174	210921	715697	400.9413	11.75056	6	0.45	400.4913	1	Not Proven	2	12	2	Site Infrastructure	3	399.8408	5.652141	4	1.1005	1	12	2	4
1177	1175	210931	715697	400.9413	15.46613	8	0.01	400.9313	1	Not Proven	2	16	3	Site Infrastructure	3	400.2408	4.426952	4	0.7005	1	12	2	6
1178	1176	210841	715707	385	1.576995	1	0.2	384.8	1	Not Proven	2	2	1	Site Infrastructure	3	382.6596	43.011249	3	2.3404	1	9	1	1
1179	1177	210851	715707	385.7744	13.33653	6	0.45	385.3244	1	Not Proven	2	12	2	Site Infrastructure	3	385.4596	39.165652	3	0.3148	1	9	1	2
1180	1178	210861	715707	388.7603	12.39637	6	0.45	388.3103	1	Not Proven	2	12	2	Site Infrastructure	3	393.822	33.222563	3	-5.0617	1	9	1	2
1181	1179	210871	715707	390.7603	10.26039	6	0.2	390.5603	1	Not Proven	2	12	2	Site Infrastructure	3	393.822	27.890692	3	-3.0617	1	9	1	2
1182	1180	210881	715707	392.7016	14.93647	6	0.1	392.6016	1	Not Proven	2	12	2	Site Infrastructure	3	393.3783	24.090917	3	-0.6767	1	9	1	2
1183	1181	210891	715707	394.7463	14.84187	6	0.95	393.7963	2	Not Proven	2	24	3	Site Infrastructure	3	393.2408	23.51305	3	1.5055	1	9	1	3
1184	1182	210901	715707	396.7603	14.37784	6	0.01	396.7503	1	Not Proven	2	12	2	Site Infrastructure	3	398.0252	21.603062	3	-1.2649	1	9	1	2
1185	1183	210911	715707	399.7463	13.65263	6	0.01	399.7363	1	Not Proven	2	12	2	Site Infrastructure	3	399.2596	18.285062	3	0.4867	1	9	1	2
1186	1184	210921	715707	401.7603	14.30503	6	0.1	401.6603	1	Not Proven	2	12	2	Site Infrastructure	3	400.2408	14.502562	3	1.5195	1	9	1	2
1187	1185	210931	715707	403.9413	10.91957	6	0.1	403.8413	1	Not Proven	2	12	2	Site Infrastructure	3	400.2408	13.771198	3	3.7005	1	9	1	2
1188	1186	210841	715717	384.7744	6.158716	4	0.1	384.6744	1	Not Proven	2	8	2	Site Infrastructure	3	385.4596	52.056165	3	-0.6852	1	9	1	2
1189	1187	210851	715717	386.5207	14.82182	6	0.1	386.4207	1	Not Proven	2	12	2	Site Infrastructure	3	393.822	47.324779	3	-7.3013	1	9	1	2
1190	1188	210861	715717	388.7603	11.33029	6	0.1	388.6603	1	Not Proven	2	12	2	Site Infrastructure	3	393.822	41.397907	3	-5.0617	1	9	1	2
1191	1189	210871	715717	390.7603	11.30993	6	0.1	390.6603	1	Not Proven	2	12	2	Site Infrastructure	3	393.3783	36.827548	3	-2.618	1	9	1	2
1192	1190	210881	715717	392.805	12.72266	6	0.1	392.705	1	Not Proven	2	12	2	Site Infrastructure	3	393.3783	33.917846	3	-0.5733	1	9	1	2
1193	1191	210891	715717	394.8191	15.10291	8	1.25	393.5691	3	Not Proven	2	48	4	Site Infrastructure	3	393.2408	33.509872	3	1.5783	1	9	1	4
1194	1192	210901	715717	397.5348	16.92035	8	0.4	397.1348	1	Not Proven	2	16	3	Site Infrastructure	3	398.0252	30.931219	3	-0.4904	1	9	1	3
1195	1193	210911	715717	399.7603	14.97895	6	0.1	399.6603	1	Not Proven	2	12	2	Site Infrastructure	3	399.8408	27.890692	3	-0.0805	1	9	1	2
1196	1194	210921	715717	402.7016	13.50973	6	0.25	402.4516	1	Not Proven	2	12	2	Site Infrastructure	3	400.2408	24.090917	3	2.4608	1	9	1	2
1197	1195	210931	715717	404.7603	11.88161	6	0.1	404.6603	1	Not Proven	2	12	2	Site Infrastructure	3	400.2408	23.657851	3	4.5195	1	9	1	2
1198	1196	210859	716011	382	4.206358	4	3.9	378.1	8	Not Proven	2	64	5	Site Infrastructure	3	383	23.240448	3	-1	1	9	1	5
1199	1197	210869	716011	382.3338	5.710593	4	4	378.3338	8	Not Proven	2	64	5	Site Infrastructure	3	383.0188	14.327596	3	-0.685	1	9	1	5
1200	1198	210879	716011	383.2142	4.545047	4	3.6	379.6142	8	Not Proven	2	64	5	Site Infrastructure	3	383.675	5.517392	4	-0.4608	1	12	2	10
1201	1199	210889	716011	384.2142	7.216349	4	3.5	380.7142	8	Not Proven	2	64	5	Site Infrastructure	3	384.184	1.149615	4	0.0302	1	12	2	10
1202	1200	210899	716011	385.9063	15.62763	8	0.1	385.8063	1	Not Proven	2	16	3	Site Infrastructure	3	385.562	1.149615	4	0.3443	1	12	2	6
1203	1201	210909	716011	389.4534	17.65651	8	0.1	389.3534	1	Not Proven	2	16	3	Site Infrastructure	3	389.2537	1.149615	4	0.1997	1	12	2	6
1204	1202	210919	716011	392.0259	19.57498	8	0.1	391.9259	1	Not Proven	2	16	3	Site Infrastructure	3	391.5969	1.149615	4	0.429	1	12	2	6
1205	1203	210929	716011	394.6921	16.61522	8	0.8	393.8921	2	Not Proven	2	32	4	Site Infrastructure	3	394.3781	1.149615	4	0.314	1	12	2	8
1206	1204	210939	716011	396.6921	17.70605	8	0.1	396.5921	1	Not Proven	2	16	3	Site Infrastructure	3	394.3781	8.257361	4	2.314	1	12	2	6
1207	1205	210949	716011	399.6921	19.45802	8	0.3	399.3921	1	Not Proven	2	16	3	Site Infrastructure	3	394.3781	17.311268	3	5.314	1	9	1	3
1208	1206	210859	716021	382	4.238184	4	2.3	379.7	3	Not Proven	2	24	3	Site Infrastructure	3	383.675	27.704469	3	-1.675	1	9	1	3
1209	1207	210869	716021	382.3338	5.741542	4	3	379.3338	3	Not Proven	2	24	3	Site Infrastructure	3	383.675	18.948182	3	-1.3412	1	9	1	3
1210	1208	210879	716021	383.3338	5.710593	4	2.9	380.4338	3	Not Proven	2	24	3	Site Infrastructure	3	384.2188	10.671383	3	-0.885	1	9	1	3
1211	1209	210889	716021	384.3338	5.710593	4	1.6	382.7338	3	Not Proven	2	24	3	Site Infrastructure	3	384.6188	1.743564	4	-0.285	1	12	2	6
1212	1210	210899	716021	385.4534	10.45531	6	0.45	385.0034	1	Not Proven	2	12	2	Site Infrastructure	3	385.2537	1.149615	4	0.1997	1	12	2	4
1213	1211	210909	716021	387.6921	13.77491	6	0.45	387.2421	1	Not Proven	2	12	2	Site Infrastructure	3	387.3781	1.149615	4	0.314	1	12	2	4
1214	1212	210919	716021	389.6921	15.2353	8	0.1	389.5921	1	Not Proven	2	16	3	Site Infrastructure	3	389.3781	1.149615	4	0.314	1	12	2	6
1215	1213	210929	716021	392.2646	18.70459	8	0.1	392.1646	1	Not Proven	2	16	3	Site Infrastructure	3	391.7213	1.149615	4	0.5433	1	12	2	6
1216	1214	210939	716021	394.6921	16.01538	8	0.1	394.5921	1	Not Proven	2	16	3	Site Infrastructure	3	393.578	6.651076	4	1.1141	1	12	2	6
1217	1215	210949	716021	396.8117	19.71232	8	0.2	396.6117	1	Not Proven	2	16	3	Site Infrastructure	3	393.2188	15.255478	3	3.5929	1	9	1	3
1218	1216	210859	716031	382	4.580547	4	2.4	379.6	3	Not Proven	2	24	3	Site Infrastructure	3	383.675	32.979169	3	-1.675	1	9	1	3
1219	1217	210869	716031	382.5725	5.400879	4	2.45	380.1225	3	Not Proven	2	24	3	Site Infrastructure	3	384.6188	24.086013	3	-2.0463	1	9	1	3
1220	1218	210879	716031	383.3338	5.344962	4	2	381.3338	3	Not Proven	2	24	3	Site Infrastructure	3	385	15.142576	3	-1.6662	1	9	1	3
1221	1219	210889	716031	384.1196	4.867908	4	2	382.1196	3	Not Proven	2	24	3	Site Infrastructure	3	384.9763	6.201549	4	-0.8567	1	12	2	6
1222	1220	210899	716031	385.1196	8.442059	6	0.95	384.1696	2	Not Proven	2	24	3	Site Infrastructure	3	385.0349	1.149615	4	0.0847	1	12	2	6
1223	1221	210909	716031	386.9063	14.38074	6	0.4	386.5063	1	Not Proven	2	12	2	Site Infrastructure	3	386.562	1.149615	4	0.3443	1	12	2	4
1224	1222	210919	716031	389.3338	12.14053	6	0.4	388.9338	1	Not Proven	2	12	2	Site Infrastructure	3	389.2188	1.149615	4	0.115	1	12	2	4
1225	1223	210929	716031	391.3338	12.72882	6	0.45	390.8838	1	Not Proven	2	12	2	Site Infrastructure	3	391.2188	1.149615	4	0.115	1	12	2	4
1226	1224	210939	716031	393.3338	12.60438	6	0.2	393.1338	1	Not Proven	2	12	2	Site Infrastructure	3	393.2188	1.149615	4	0.115	1	12	2	4
1227	1225	210949	716031	395.3338	12.82323	6	0.1	395.2338	1	Not Proven	2	12	2	Site Infrastructure	3	393.3781	9.082996	4	1.9557	1	12	2	4
1228	1226	210859	716041	382	3.804511	2	2.2	379.8	3	Not Proven	2	12	2	Site Infrastructure	3	385	37.501915	3	-3	1	9	1	2
1229	1227	210869	716041	382.3338	5.710593	4	0.95	381.3838	2	Not Proven	2	16	3	Site Infrastructure	3	384.9763	28.557927	3	-2.6425	1	9	1	3
1230	1228	210879	716041	383	2.469476	2	0.45	382.55	1	Not Proven	2	4	1	Site Infrastructure	3	384.9763	20.17551	3	-1.9763	1	9	1	1
1231	1229	210889	716041	384	3.762519	2	0.2	383.8	1	Not Proven	2	4	1	Site Infrastructure	3	384.8119	11.742913	3	-0.8119	1	9	1	1
1232	1230	210899	716041	384.3338	7.310311	4	2	382.3338	3	Not Proven	2	24	3	Site Infrastructure	3	384.6188	3.325299	4	-0.285	1	12	2	6
1233	1231	210909	716041	386.1196	10.19396	6	1.8	384.3196	3	Not Proven	2	36	4	Site Infrastructure	3	386.0349	1.149615	4	0.0847	1	12	2	8
1234	1232	210919	716041	387.6921	13.74705	6	0.95	386.7421	2	Not Proven	2	24	3	Site Infrastructure	3	387.3781	1.149615	4	0.314	1	12	2	6
1235	1233	210929	716041	389.6921	13.82491	6	0.2	389.4921	1	Not Proven	2	12	2	Site Infrastructure	3	389.3781	1.149615	4	0.314	1	12	2	4
1236	1234	210939	716041	391.6921	15.79317	8	0.3	391.3921	1	Not Proven	2	16	3	Site Infrastructure	3	391.3781	1.149615	4	0.314	1	12	2	6
1237	1235	210949	716041	393.6921	15.79317	8	0.2	393.4921	1	Not Proven	2	16	3	Site Infrastructure	3	392.178	6.649753	4	1.5141	1	12	2	6
1238	1236	210859	716051	382	3.804511	2	1.5	380.5	3	Not Proven	2	12	2	Site Infrastructure	3	384.9763	42.239167	3	-2.9763	1	9	1	2
1239	1237	210869	716051	382.3338	5.710593	4	1.3	381.0338	3	Not Proven	2	24	3	Site Infrastructure	3	384.5675	33.440287	3	-2.2337	1	9	1	3
1240	1238	210879	716051	383	1.906082	1	0.95	382.05	2	Not Proven	2	4	1	Site Infrastructure	3	384.5675	23.446723	3	-1.5675	1	9	1	1
1241	1239	210889	716051	384	3.804511	2	0.2	383.8	1	Not Proven	2	4	1	Site Infrastructure	3	384.5675	13.462719	3	-0.5675	1	9	1	1
1242	1240	210899	716051	384.1196	4.303019	4	0.4	383.7196	1	Not Proven	2	8	2	Site Infrastructure	3	384.5675	3.569428	4	-0.4479	1	12	2	4
1243	1241	210909	716051	385.1196	7.647389	4	0.1	385.0196	1	Not Proven	2	8	2	Site Infrastructure	3	385.0349	1.149615	4	0.0847	1	12	2	4
1244	1242	210919	716051	386.6921	12.68224	6	0.7	385.9921	2	Not Proven	2	24	3	Site Infrastructure	3	386.3781	1.149615	4	0.314	1	12	2	6
1245	1243	210929	716051	388.5725	12.2038	6	0.95	387.6225	2	Not Proven	2	24	3	Site Infrastructure	3	388.3432	1.149615	4	0.2293	1	12	2	6
1246	1244	210939	716051	390.3338	12.03768	6	0.45	389.8838	1	Not Proven	2	12	2	Site Infrastructure	3	390.2188	1.149615	4	0.115	1	12	2	4
1247	1245	210949	716051	391.6921	12.27569	6	0.9	390.7921	2	Not Proven	2	24	3	Site Infrastructure	3	391.003	6.649753	4	0.6891	1	12	2	6
1248	1246	210859	716061	382	3.804511	2	1.95	380.05	3	Not Proven	2	12	2	Site Infrastructure	3	384.5675	44.797822	3	-2.5675	1	9	1	2
1249	1247	210869	716061	382.3338	5.710593	4	0.95	381.3838	2	Not Proven	2	16	3	Site Infrastructure	3	384.5675	35.190067	3	-2.2337	1	9	1	3
1250	1248	210879	716061	383	1.651137	1	0.45	382.55	1	Not Proven	2	2	1	Site Infrastructure	3	384.5675	25.881206	3	-1.5675	1	9	1	1
1251	1249	210889	716061	384	4.524077	4	0.9	383.1	2	Not Proven	2	16	3	Site Infrastructure	3	384.4188	16.216683	3	-0.4188	1	9	1	3
1252	1250	210899	716061	384	0.974322	1	0.95	383.05	2	Not Proven	2	4	1	Site Infrastructure	3	384.4188	7.380841	4	-0.4188	1	12	2	2
1253	1251	210909	716061	384.5725	6.37937	4	0.45	384.1225	1	Not Proven	2	8	2	Site Infrastructure	3	384.6557	1.157244	4	-0.0832	1	12	2	4
1254	1252	210919	716061	385.5725	7.27245	4	0.95	384.6225	2	Not Proven	2	16	3	Site Infrastructure	3	385.3432	1.149615	4	0.2293	1	12	2	6
1255	1253	210929	716061	386.6921	11.45253	6	1.55	385.1421	3	Not Proven	2	36	4	Site Infrastructure	3	386.3781	1.149615	4	0.314	1	12	2	8
1256	1254	210939	716061	388.6921	13.59855	6	2.9	385.7921	3	Not Proven	2	36	4	Site Infrastructure	3	388.3781	1.149615	4	0.314	1	12	2	8
1257	1255	210949	716061	390.6921	14.53893	6	0.85	389.8421	2	Not Proven	2	24	3	Site Infrastructure	3	389.578	6.651076	4	1.1141	1	12	2	6
1258	1256	210859	716071	382	3.295646	2	0.95	381.05	2	Not Proven	2	8	2	Site Infrastructure	3	384.4188	47.839114	3	-2.4188	1	9	1	2
1259	1257	210869	716071	382.3338	5.710593	4	1.5	380.8338	3	Not Proven	2	24	3	Site Infrastructure	3	384.4188	38.471766	3	-2.085	1	9	1	3
1260	1258	210879	716071	383	0.242188	1	0.45	382.55	1	Not Proven	2	2	1	Site Infrastructure	3	384.4188	29.522412	3	-1.4188	1	9	1	1
1261	1259	210889	716071	383.3338	5.362246	4	0.4	382.9338	1	Not Proven	2	8	2	Site Infrastructure	3	384.4188	21.519034	3	-1.085	1	9	1	2
1262	1260	210899	716071	384	0.865604	1	0.95	383.05	2	Not Proven	2	4	1	Site Infrastructure	3	384.6557	14.489003	3	-0.6557	1	9	1	1
1263	1261	210909	716071	384.3338	5.344962	4	0.95	383.3838	2	Not Proven	2	16	3	Site Infrastructure	3	385	7.797026	4	-0.6662	1	12	2	6
1264	1262	210919	716071	385.3338	6.13972	4	1.3	384.0338	3	Not Proven	2	24	3	Site Infrastructure	3	385.2188	1.157244	4	0.115	1	12	2	6
1265	1263	210929	716071	386.3338	7.065772	4	2.9	383.4338	3	Not Proven	2	24	3	Site Infrastructure	3	386	2.763768	4	0.3338	1	12	2	6
1266	1264	210939	716071	387.5725	8.832071	6	2.2	385.3725	3	Not Proven	2	36	4	Site Infrastructure	3	387.8188	7.462655	4	-0.2463	1	12	2	8
1267	1265	210949	716071	389.3338	11.99605	6	1.9	387.4338	3	Not Proven	2	36	4	Site Infrastructure	3	388.778	12.434083	3	0.5558	1	9	1	4
1268	1266	210859	716081	382	1.349008	1	0.1	381.9	1	Not Proven	2	2	1	Site Infrastructure	3	384.4188	51.852375	3	-2.4188	1	9	1	1
1269	1267	210869	716081	382.3338	5.344962	4	0.85	381.4838	2	Not Proven	2	16	3	Site Infrastructure	3	384.4188	43.360867	3	-2.085	1	9	1	3
1270	1268	210879	716081	383	0.865604	1	0.7	382.3	2	C	2	4	1	Site Infrastructure	3	384.4188	35.660354	3	-1.4188	1	9	1	1
1271	1269	210889	716081	383	2.469476	2	0.4	382.6	1	C	2	4	1	Site Infrastructure	3	384.6557	28.609845	3	-1.6557	1	9	1	1
1272	1270	210899	716081	384	3.520331	2	0.45	383.55	1	Not Proven	2	4	1	Site Infrastructure	3	385	21.665309	3	-1	1	9	1	1
1273	1271	210909	716081	384	2.469476	2	0.95	383.05	2	Not Proven	2	8	2	Site Infrastructure	3	385.4698	13.401374	3	-1.4698	1	9	1	2
1274	1272	210919	716081	385	5.950243	4	1.35	383.65	3	C	2	24	3	Site Infrastructure	3	385.0188	4.55614	4	-0.0188	1	12	2	6
1275	1273	210929	716081	386	5.950243	4	2.2	383.8	3	Not Proven	2	24	3	Site Infrastructure	3	386	1.149615	4	0	1	12	2	6
1276	1274	210939	716081	387	5.924277	4	2	385	3	Not Proven	2	24	3	Site Infrastructure	3	386.0188	8.257361	4	0.9812	1	12	2	6
1277	1275	210949	716081	388.1196	9.389299	6	1.4	386.7196	3	Not Proven	2	36	4	Site Infrastructure	3	386.2342	17.127335	3	1.8854	1	9	1	4
1278	1276	210859	716091	381.5725	6.42535	4	0.1	381.4725	1	Not Proven	2	8	2	Site Infrastructure	3	384.4188	57.347684	3	-2.8463	1	9	1	2
1279	1277	210869	716091	382	3.080135	2	0.2	381.8	1	Not Proven	2	4	1	Site Infrastructure	3	384.4188	49.802137	3	-2.4188	1	9	1	1
1280	1278	210879	716091	383	4.239897	4	0.45	382.55	1	Not Proven	2	8	2	Site Infrastructure	3	384.6557	42.744768	3	-1.6557	1	9	1	2
1281	1279	210889	716091	383	0.974322	1	0.95	382.05	2	Not Proven	2	4	1	Site Infrastructure	3	385.4698	35.730838	3	-2.4698	1	9	1	1
1282	1280	210899	716091	383.5725	5.460364	4	0.8	382.7725	2	Not Proven	2	16	3	Site Infrastructure	3	385.0188	26.792805	3	-1.4463	1	9	1	3
1283	1281	210909	716091	384	0.974322	1	0.2	383.8	1	Not Proven	2	2	1	Site Infrastructure	3	385.0188	18.690918	3	-1.0188	1	9	1	1
1284	1282	210919	716091	384.5725	6.37937	4	0.1	384.4725	1	Not Proven	2	8	2	Site Infrastructure	3	385.9681	9.892463	4	-1.3956	1	12	2	4
1285	1283	210929	716091	385.5725	6.37937	4	0.15	385.4225	1	Not Proven	2	8	2	Site Infrastructure	3	385.6795	1.738509	4	-0.107	1	12	2	4
1286	1284	210939	716091	386.5725	5.89167	4	0.95	385.6225	2	Not Proven	2	16	3	Site Infrastructure	3	386	3.95009	4	0.5725	1	12	2	6
1287	1285	210949	716091	387.1196	5.433944	4	0.1	387.0196	1	Not Proven	2	8	2	Site Infrastructure	3	386.0786	11.695401	3	1.041	1	9	1	2
1288	1286	210859	716101	380.5725	8.049467	6	0.4	380.1725	1	C	2	12	2	Site Infrastructure	3	384.4188	63.944076	3	-3.8463	1	9	1	2
1289	1287	210869	716101	381.5725	6.666934	4	0.9	380.6725	2	C	2	16	3	Site Infrastructure	3	384.6557	56.883277	3	-3.0832	1	9	1	3
1290	1288	210879	716101	382.1196	5.195333	4	0.95	381.1696	2	Not Proven	2	16	3	Site Infrastructure	3	385.0188	49.142145	3	-2.8992	1	9	1	3
1291	1289	210889	716101	383	3.505294	2	2	381	3	C	2	12	2	Site Infrastructure	3	385.0188	40.576427	3	-2.0188	1	9	1	2
1292	1290	210899	716101	383.1196	4.00446	4	0.45	382.6696	1	C	2	8	2	Site Infrastructure	3	385.9681	32.170745	3	-2.8485	1	9	1	2
1293	1291	210909	716101	384	3.505294	2	0.2	383.8	1	Not Proven	2	4	1	Site Infrastructure	3	385.6795	23.240448	3	-1.6795	1	9	1	1
1294	1292	210919	716101	384.3338	5.344962	4	0.2	384.1338	1	Not Proven	2	8	2	Site Infrastructure	3	386	14.327596	3	-1.6662	1	9	1	2
1295	1293	210929	716101	385.1196	4.867908	4	0.95	384.1696	2	Not Proven	2	16	3	Site Infrastructure	3	386	6.064323	4	-0.8804	1	12	2	6
1296	1294	210939	716101	386	5.144244	4	0.45	385.55	1	Not Proven	2	8	2	Site Infrastructure	3	386	1.149615	4	0	1	12	2	4
1297	1295	210949	716101	386.5725	5.814112	4	0.95	385.6225	2	Not Proven	2	16	3	Site Infrastructure	3	386	7.225068	4	0.5725	1	12	2	6
1298	1296	210445	715969	329.5513	17.47231	8	0.2	329.3513	1	Not Proven	2	16	3	Site Infrastructure	3	327.6276	26.433365	3	1.9237	1	9	1	3
1299	1297	210455	715969	331.79	8.334898	6	0.01	331.78	1	Not Proven	2	12	2	Site Infrastructure	3	328.778	26.433365	3	3.012	1	9	1	2
1300	1298	210465	715969	330.6841	16.58182	8	0.01	330.6741	1	Not Proven	2	16	3	Site Infrastructure	3	328.778	28.240942	3	1.9061	1	9	1	3
1301	1299	210475	715969	329.3541	11.12108	6	0.1	329.2541	1	Not Proven	2	12	2	Site Infrastructure	3	332.6276	28.282411	3	-3.2735	1	9	1	2
1302	1300	210485	715969	330.1442	8.475513	6	0.1	330.0442	1	Not Proven	2	12	2	Site Infrastructure	3	332.6276	26.433365	3	-2.4834	1	9	1	2
1303	1301	210495	715969	330.6171	7.701734	4	0.95	329.6671	2	Not Proven	2	16	3	Site Infrastructure	3	333.6408	26.433365	3	-3.0237	1	9	1	3
1304	1302	210505	715969	331	4.30691	4	0.95	330.05	2	Not Proven	2	16	3	Site Infrastructure	3	333.6408	27.092796	3	-2.6408	1	9	1	3
1305	1303	210515	715969	331	5.710593	4	0.4	330.6	1	Not Proven	2	8	2	Site Infrastructure	3	334	30.839092	3	-3	1	9	1	2
1306	1304	210525	715969	331	5.710593	4	0.1	330.9	1	Not Proven	2	8	2	Site Infrastructure	3	334.8408	32.671908	3	-3.8408	1	9	1	2
1307	1305	210535	715969	331	5.710593	4	0.1	330.9	1	Not Proven	2	8	2	Site Infrastructure	3	335.2408	34.43335	3	-4.2408	1	9	1	2
1308	1306	210445	715979	329.4071	11.94602	6	0.1	329.3071	1	C	2	12	2	Site Infrastructure	3	327.6276	16.433404	3	1.7795	1	9	1	2
1309	1307	210455	715979	330.79	8.049467	6	0.1	330.69	1	Not Proven	2	12	2	Site Infrastructure	3	328.778	16.433404	3	2.012	1	9	1	2
1310	1308	210465	715979	332.053	7.385561	4	0.4	331.653	1	Not Proven	2	8	2	Site Infrastructure	3	329.9763	18.433393	3	2.0767	1	9	1	2
1311	1309	210475	715979	331.5641	10.77769	6	0.45	331.1141	1	Not Proven	2	12	2	Site Infrastructure	3	330.9763	18.433393	3	0.5878	1	9	1	2
1312	1310	210485	715979	331.3541	9.106127	6	0.01	331.3441	1	Not Proven	2	12	2	Site Infrastructure	3	332.6276	16.433404	3	-1.2735	1	9	1	2
1313	1311	210495	715979	332	6.292977	4	0.95	331.05	2	Not Proven	2	16	3	Site Infrastructure	3	333.6408	16.433404	3	-1.6408	1	9	1	3
1314	1312	210505	715979	332	5.710593	4	2.5	329.5	3	Not Proven	2	24	3	Site Infrastructure	3	333.6408	17.474369	3	-1.6408	1	9	1	3
1315	1313	210515	715979	332	5.710593	4	0.95	331.05	2	Not Proven	2	16	3	Site Infrastructure	3	334	21.922262	3	-2	1	9	1	3
1316	1314	210525	715979	332	6.21562	4	0.45	331.55	1	Not Proven	2	8	2	Site Infrastructure	3	334.8408	22.776909	3	-2.8408	1	9	1	2
1317	1315	210535	715979	332.3541	8.97545	6	0.1	332.2541	1	Not Proven	2	12	2	Site Infrastructure	3	335.2408	24.43337	3	-2.8867	1	9	1	2
1318	1316	210445	715989	328.2629	10.53817	6	0.1	328.1629	1	C	2	12	2	Site Infrastructure	3	327.6276	6.433567	4	0.6353	1	12	2	4
1319	1317	210455	715989	329.79	9.915332	6	0.1	329.69	1	Not Proven	2	12	2	Site Infrastructure	3	328.778	6.433567	4	1.012	1	12	2	4
1320	1318	210465	715989	330.79	8.568906	6	0.4	330.39	1	Not Proven	2	12	2	Site Infrastructure	3	329.9763	8.433504	4	0.8137	1	12	2	4
1321	1319	210475	715989	332.053	7.921454	4	0.1	331.953	1	Not Proven	2	8	2	Site Infrastructure	3	330.9763	8.433504	4	1.0767	1	12	2	4
1322	1320	210485	715989	332.6171	5.399408	4	0.45	332.1671	1	Not Proven	2	8	2	Site Infrastructure	3	332.6276	6.433567	4	-0.0105	1	12	2	4
1323	1321	210495	715989	333	5.460667	4	0.95	332.05	2	Not Proven	2	16	3	Site Infrastructure	3	333.6408	6.433567	4	-0.6408	1	12	2	6
1324	1322	210505	715989	333	6.21562	4	1.4	331.6	3	Not Proven	2	24	3	Site Infrastructure	3	334	8.653877	4	-1	1	12	2	6
1325	1323	210515	715989	333.3541	8.97545	6	1.3	332.0541	3	Not Proven	2	36	4	Site Infrastructure	3	334.8408	12.433438	3	-1.4867	1	9	1	4
1326	1324	210525	715989	333.3541	9.213267	6	0.45	332.9041	1	Not Proven	2	12	2	Site Infrastructure	3	334.8408	13.043066	3	-1.4867	1	9	1	2
1327	1325	210535	715989	333.3541	8.018752	6	0.9	332.4541	2	C	2	24	3	Site Infrastructure	3	335.2408	14.433419	3	-1.8867	1	9	1	3
1328	1326	210445	715999	327.2629	9.336007	6	0.4	326.8629	1	C	2	12	2	Site Infrastructure	3	327.2342	0.437245	4	0.0287	1	12	2	4
1329	1327	210455	715999	328.2629	10.15142	6	0.2	328.0629	1	Not Proven	2	12	2	Site Infrastructure	3	328.2342	0.437245	4	0.0287	1	12	2	4
1330	1328	210465	715999	329.79	9.261567	6	0.45	329.34	1	C	2	12	2	Site Infrastructure	3	329.7438	0.437245	4	0.0462	1	12	2	4
1331	1329	210475	715999	330.79	8.956115	6	0.4	330.39	1	Not Proven	2	12	2	Site Infrastructure	3	330.7438	0.437245	4	0.0462	1	12	2	4
1332	1330	210485	715999	332.4071	10.19092	6	0.9	331.5071	2	Not Proven	2	24	3	Site Infrastructure	3	332.4188	0.437245	4	-0.0117	1	12	2	6
1333	1331	210495	715999	334	5.572103	4	1.2	332.8	3	Not Proven	2	24	3	Site Infrastructure	3	334	0.437245	4	0	1	12	2	6
1334	1332	210505	715999	334	5.732926	4	0.35	333.65	1	Not Proven	2	8	2	Site Infrastructure	3	334	0.437245	4	0	1	12	2	4

	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
1335	1333	210515	715999	334.3541	6.107111	4	1.7	332.6541	3	Not Proven	2	24	3	Site Infrastructure	3	334.8408	2.434006	4	-0.4867	1	12	2	6
1336	1334	210525	715999	334.3541	5.982852	4	0.95	333.4041	2	Not Proven	2	16	3	Site Infrastructure	3	335	4.433687	4	-0.6459	1	12	2	6
1337	1335	210535	715999	335	6.107111	4	0.95	334.05	2	Not Proven	2	16	3	Site Infrastructure	3	335.2408	4.433687	4	-0.2408	1	12	2	6
1338	1336	210445	716009	326.053	10.84123	6	0.45	325.603	1	Not Proven	2	12	2	Site Infrastructure	3	326.6795	6.52898	4	-0.6265	1	12	2	4
1339	1337	210455	716009	327.2629	8.932837	6	0.75	326.5129	2	Not Proven	2	24	3	Site Infrastructure	3	327.2342	0.437245	4	0.0287	1	12	2	6
1340	1338	210465	716009	328.79	9.802708	6	1	327.79	2	Not Proven	2	24	3	Site Infrastructure	3	328.7438	0.437245	4	0.0462	1	12	2	6
1341	1339	210475	716009	330.4071	10.81787	6	0.3	330.1071	1	Not Proven	2	12	2	Site Infrastructure	3	330.4188	0.437245	4	-0.0117	1	12	2	4
1342	1340	210485	716009	332.4071	9.439055	6	0.95	331.4571	2	Not Proven	2	24	3	Site Infrastructure	3	332.4188	0.437245	4	-0.0117	1	12	2	6
1343	1341	210495	716009	333.4071	6.599343	4	0.8	332.6071	2	Not Proven	2	16	3	Site Infrastructure	3	333.4188	0.437245	4	-0.0117	1	12	2	6
1344	1342	210505	716009	334.79	4.785532	4	0.45	334.34	1	Not Proven	2	8	2	Site Infrastructure	3	334.7438	0.437245	4	0.0462	1	12	2	4
1345	1343	210515	716009	335	2.605789	2	0.85	334.15	2	Not Proven	2	8	2	Site Infrastructure	3	335	0.437245	4	0	1	12	2	4
1346	1344	210525	716009	335.3541	5.399408	4	0.1	335.2541	1	Not Proven	2	8	2	Site Infrastructure	3	335	3.567181	4	0.3541	1	12	2	4
1347	1345	210535	716009	336	5.445321	4	0.8	335.2	2	Not Proven	2	16	3	Site Infrastructure	3	336	1.567796	4	0	1	12	2	6
1348	1346	210445	716019	325.053	10.30017	6	0.35	324.703	1	Not Proven	2	12	2	Site Infrastructure	3	325.832	6.074075	4	-0.779	1	12	2	4
1349	1347	210455	716019	326.4071	9.547285	6	0.45	325.9571	1	C	2	12	2	Site Infrastructure	3	326.4188	0.437245	4	-0.0117	1	12	2	4
1350	1348	210465	716019	328.4071	11.30993	6	0.3	328.1071	1	C	2	12	2	Site Infrastructure	3	328.4188	0.437245	4	-0.0117	1	12	2	4
1351	1349	210475	716019	330.4071	11.30993	6	0.2	330.2071	1	Not Proven	2	12	2	Site Infrastructure	3	330.4188	0.437245	4	-0.0117	1	12	2	4
1352	1350	210485	716019	332.2629	7.961298	4	0.95	331.3129	2	Not Proven	2	16	3	Site Infrastructure	3	332.2342	0.437245	4	0.0287	1	12	2	6
1353	1351	210495	716019	333.4071	7.089572	4	0.9	332.5071	2	Not Proven	2	16	3	Site Infrastructure	3	333.4188	0.437245	4	-0.0117	1	12	2	6
1354	1352	210505	716019	334.4071	6.036875	4	0.1	334.3071	1	Not Proven	2	8	2	Site Infrastructure	3	334.4188	0.437245	4	-0.0117	1	12	2	4
1355	1353	210515	716019	335.4071	5.435099	4	0.95	334.4571	2	Not Proven	2	16	3	Site Infrastructure	3	335.4188	0.437245	4	-0.0117	1	12	2	6
1356	1354	210525	716019	336	2.605789	2	0.45	335.55	1	Not Proven	2	4	1	Site Infrastructure	3	335.4188	9.950838	4	0.5812	1	12	2	2
1357	1355	210535	716019	336.6171	5.850181	4	0.45	336.1671	1	Not Proven	2	8	2	Site Infrastructure	3	336	11.566848	3	0.6171	1	9	1	2
1358	1356	210445	716029	324.4071	10.81787	6	0.45	323.9571	1	C	2	12	2	Site Infrastructure	3	325.6795	9.693378	4	-1.2724	1	12	2	4
1359	1357	210455	716029	326.4071	11.30993	6	0.8	325.6071	2	Not Proven	2	24	3	Site Infrastructure	3	326.4188	1.567796	4	-0.0117	1	12	2	6
1360	1358	210465	716029	328.4071	11.30993	6	0.1	328.3071	1	Not Proven	2	12	2	Site Infrastructure	3	328.4188	0.437245	4	-0.0117	1	12	2	4
1361	1359	210475	716029	330.4071	11.12469	6	0.4	330.0071	1	Not Proven	2	12	2	Site Infrastructure	3	330.4188	0.437245	4	-0.0117	1	12	2	4
1362	1360	210485	716029	332	6.075041	4	0.35	331.65	1	Not Proven	2	8	2	Site Infrastructure	3	332	0.437245	4	0	1	12	2	4
1363	1361	210495	716029	333	6.481545	4	0.1	332.9	1	Not Proven	2	8	2	Site Infrastructure	3	333	0.437245	4	0	1	12	2	4
1364	1362	210505	716029	334.2629	7.562995	4	0.1	334.1629	1	Not Proven	2	8	2	Site Infrastructure	3	334.2342	0.437245	4	0.0287	1	12	2	4
1365	1363	210515	716029	335.4071	7.089572	4	0.1	335.3071	1	Not Proven	2	8	2	Site Infrastructure	3	335.0188	2.494711	4	0.3883	1	12	2	4
1366	1364	210525	716029	336.4071	5.75688	4	0.9	335.5071	2	Not Proven	2	16	3	Site Infrastructure	3	335.4188	11.39384	3	0.9883	1	9	1	3
1367	1365	210535	716029	337.1442	5.009561	4	0.2	336.9442	1	Not Proven	2	8	2	Site Infrastructure	3	335.4188	20.703806	3	1.7254	1	9	1	2
1368	1366	210445	716039	324.4071	11.30993	6	0.95	323.4571	2	Not Proven	2	24	3	Site Infrastructure	3	326.8188	14.236038	3	-2.4117	1	9	1	3
1369	1367	210455	716039	326.4071	11.30993	6	0.95	325.4571	2	Not Proven	2	24	3	Site Infrastructure	3	327.2188	6.88915	4	-0.8117	1	12	2	6
1370	1368	210465	716039	328.4071	11.12469	6	0.1	328.3071	1	Not Proven	2	12	2	Site Infrastructure	3	328.4188	3.567181	4	-0.0117	1	12	2	4
1371	1369	210475	716039	330.2629	8.956748	6	0.95	329.3129	2	Not Proven	2	24	3	Site Infrastructure	3	329.6188	5.315636	4	0.6441	1	12	2	6
1372	1370	210485	716039	331.4071	8.69062	6	0.95	330.4571	2	Not Proven	2	24	3	Site Infrastructure	3	332.2188	5.403109	4	-0.8117	1	12	2	6
1373	1371	210495	716039	332.79	6.987753	4	0.45	332.34	1	Not Proven	2	8	2	Site Infrastructure	3	333	3.567181	4	-0.21	1	12	2	4
1374	1372	210505	716039	334	6.075041	4	0.2	333.8	1	Not Proven	2	8	2	Site Infrastructure	3	334	5.895522	4	0	1	12	2	4
1375	1373	210515	716039	335	6.481545	4	0.45	334.55	1	Not Proven	2	8	2	Site Infrastructure	3	335.0188	11.728494	3	-0.0188	1	9	1	2
1376	1374	210525	716039	336.2629	7.562995	4	0.45	335.8129	1	Not Proven	2	8	2	Site Infrastructure	3	335.0188	16.624848	3	1.2441	1	9	1	2
1377	1375	210535	716039	337.4071	7.089572	4	0.1	337.3071	1	Not Proven	2	8	2	Site Infrastructure	3	335.0188	24.803499	3	2.3883	1	9	1	2
1378	1376	210445	716049	324.4071	11.30993	6	2.45	321.9571	3	Not Proven	2	36	4	Site Infrastructure	3	327.2188	20.975376	3	-2.8117	1	9	1	4
1379	1377	210455	716049	326.4071	11.12469	6	0.4	326.0071	1	Not Proven	2	12	2	Site Infrastructure	3	328.0188	15.779619	3	-1.6117	1	9	1	2
1380	1378	210465	716049	328.2629	8.956748	6	0.45	327.8129	1	Not Proven	2	12	2	Site Infrastructure	3	328.4188	13.566827	3	-0.1559	1	9	1	2
1381	1379	210475	716049	329.4071	9.362045	6	0.95	328.4571	2	Not Proven	2	24	3	Site Infrastructure	3	329.6188	14.127632	3	-0.2117	1	9	1	3
1382	1380	210485	716049	331.2629	8.453371	6	2.2	329.0629	3	Not Proven	2	36	4	Site Infrastructure	3	332.2188	14.160776	3	-0.9559	1	9	1	4
1383	1381	210495	716049	332.4071	7.498186	4	0.95	331.4571	2	Not Proven	2	16	3	Site Infrastructure	3	333	13.566827	3	-0.5929	1	9	1	3
1384	1382	210505	716049	333.4071	7.377943	4	0.45	332.9571	1	Not Proven	2	8	2	Site Infrastructure	3	334	15.687294	3	-0.5929	1	9	1	2
1385	1383	210515	716049	334.79	6.37937	4	0.01	334.78	1	Not Proven	2	8	2	Site Infrastructure	3	334	19.619357	3	0.79	1	9	1	2
1386	1384	210525	716049	335.79	6.987753	4	0.45	335.34	1	Not Proven	2	8	2	Site Infrastructure	3	335.0188	24.651969	3	0.7712	1	9	1	2
1387	1385	210535	716049	337	6.718372	4	0.45	336.55	1	Not Proven	2	8	2	Site Infrastructure	3	335.0188	30.766013	3	1.9812	1	9	1	2
1388	1386	210445	716059	324.4071	11.12469	6	1.9	322.5071	3	Not Proven	2	36	4	Site Infrastructure	3	327.2188	29.177052	3	-2.8117	1	9	1	4
1389	1387	210455	716059	326.2629	8.956748	6	0.95	325.3129	2	Not Proven	2	24	3	Site Infrastructure	3	328.0188	24.906433	3	-1.7559	1	9	1	3
1390	1388	210465	716059	327.4071	9.362045	6	0.2	327.2071	1	Not Proven	2	12	2	Site Infrastructure	3	328.4188	23.566773	3	-1.0117	1	9	1	2
1391	1389	210475	716059	329.2629	8.956748	6	0.4	328.8629	1	Not Proven	2	12	2	Site Infrastructure	3	329.6188	23.894016	3	-0.3559	1	9	1	2
1392	1390	210485	716059	330.4071	9.362045	6	0.3	330.1071	1	Not Proven	2	12	2	Site Infrastructure	3	332.2188	23.913628	3	-1.8117	1	9	1	2
1393	1391	210495	716059	332	6.845993	4	0.8	331.2	2	Not Proven	2	16	3	Site Infrastructure	3	333	23.566773	3	-1	1	9	1	3
1394	1392	210505	716059	333.2629	7.562995	4	0.45	332.8129	1	C	2	8	2	Site Infrastructure	3	333	24.868759	3	0.2629	1	9	1	2
1395	1393	210515	716059	334.4071	7.089572	4	0.8	333.6071	2	Not Proven	2	16	3	Site Infrastructure	3	334	28.217959	3	0.4071	1	9	1	3
1396	1394	210525	716059	335.4071	6.445488	4	0.7	334.7071	2	Not Proven	2	16	3	Site Infrastructure	3	334	33.690966	3	1.4071	1	9	1	3
1397	1395	210535	716059	336.4071	6.142543	4	0.9	335.5071	2	Not Proven	2	16	3	Site Infrastructure	3	335.0188	38.443225	3	1.3883	1	9	1	3
1398	1396	210426	715545	315.7731	9.526137	6	0.95	314.8231	2	Not Proven	2	24	3	Site Infrastructure	3	317	29.005455	3	-1.2269	1	9	1	3
1399	1397	210436	715545	317	5.573326	4	0.35	316.65	1	Not Proven	2	8	2	Site Infrastructure	3	317	23.167745	3	0	1	9	1	2
1400	1398	210446	715545	318.2564	9.659269	6	0.95	317.3064	2	Not Proven	2	24	3	Site Infrastructure	3	317	20.788757	3	1.2564	1	9	1	3
1401	1399	210456	715545	319.7731	11.13917	6	0.4	319.3731	1	Not Proven	2	12	2	Site Infrastructure	3	318.9082	19.257498	3	0.8649	1	9	1	2
1402	1400	210466	715545	321.3995	10.50958	6	0.45	320.9495	1	Not Proven	2	12	2	Site Infrastructure	3	319.318	18.870824	3	2.0815	1	9	1	2
1403	1401	210476	715545	323.6635	14.0556	6	0.45	323.2135	1	Not Proven	2	12	2	Site Infrastructure	3	320.3746	21.573809	3	3.2889	1	9	1	2
1404	1402	210486	715545	325.7731	12.07304	6	0.45	325.3231	1	Not Proven	2	12	2	Site Infrastructure	3	321.3951	25.648314	3	4.378	1	9	1	2
1405	1403	210496	715545	328.5462	20.68225	8	0.4	328.1462	1	Not Proven	2	16	3	Site Infrastructure	3	326.178	28.841949	3	2.3682	1	9	1	3
1406	1404	210506	715545	332.5462	21.28302	8	0.3	332.2462	1	Not Proven	2	16	3	Site Infrastructure	3	326.178	31.101222	3	6.3682	1	9	1	3
1407	1405	210516	715545	335.6635	17.09273	8	0.45	335.2135	1	Not Proven	2	16	3	Site Infrastructure	3	326.578	35.548457	3	9.0855	1	9	1	3
1408	1406	210426	715555	315.5731	8.185124	6	0.2	315.3731	1	Not Proven	2	12	2	Site Infrastructure	3	317	22.925235	3	-1.2269	1	9	1	2
1409	1407	210436	715555	316.8904	6.37937	4	0.45	316.4404	1	Not Proven	2	8	2	Site Infrastructure	3	317	14.865881	3	-0.1096	1	9	1	2
1410	1408	210446	715555	317.8904	7.859354	4	0.3	317.5904	1	Not Proven	2	8	2	Site Infrastructure	3	317	10.789922	3	0.8904	1	9	1	2
1411	1409	210456	715555	319.2898	10.21938	6	0.45	318.8398	1	Not Proven	2	12	2	Site Infrastructure	3	318.9082	9.751985	4	0.3816	1	12	2	4
1412	1410	210466	715555	320.3995	10.84198	6	0.55	319.8495	2	Not Proven	2	24	3	Site Infrastructure	3	319.318	8.964263	4	1.0815	1	12	2	6
1413	1411	210476	715555	322.7731	13.64442	6	0.45	322.3231	1	Not Proven	2	12	2	Site Infrastructure	3	320.3746	12.234346	3	2.3985	1	9	1	2
1414	1412	210486	715555	325.1726	15.63519	8	0.85	324.3226	2	Not Proven	2	32	4	Site Infrastructure	3	321.3951	17.380622	3	3.7775	1	9	1	4
1415	1413	210496	715555	327.9731	17.25456	8	0.2	327.7731	1	Not Proven	2	16	3	Site Infrastructure	3	326.178	18.870824	3	1.5951	1	9	1	3
1416	1414	210506	715555	331.5462	20.24742	8	0.45	331.0962	1	Not Proven	2	16	3	Site Infrastructure	3	326.178	22.170611	3	5.3682	1	9	1	3
1417	1415	210516	715555	334.2898	16.01521	8	0.4	333.8898	1	Not Proven	2	16	3	Site Infrastructure	3	326.578	27.348543	3	7.7118	1	9	1	3
1418	1416	210426	715565	315.7731	6.9394	4	0.45	315.3231	1	Not Proven	2	8	2	Site Infrastructure	3	314.6188	14.029584	3	1.1543	1	9	1	2
1419	1417	210436	715565	316.7731	6.0338	4	0.15	316.6231	1	Not Proven	2	8	2	Site Infrastructure	3	317	9.51998	4	-0.2269	1	12	2	4
1420	1418	210446	715565	317	4.696714	4	0.45	316.55	1	Not Proven	2	8	2	Site Infrastructure	3	317	0.820009	4	0	1	12	2	4
1421	1419	210456	715565	318.3995	8.283539	6	0.1	318.2995	1	Not Proven	2	12	2	Site Infrastructure	3	318.2941	0.820009	4	0.1054	1	12	2	4
1422	1420	210466	715565	319.3995	11.57087	6	0.1	319.2995	1	Not Proven	2	12	2	Site Infrastructure	3	319.2941	0.820009	4	0.1054	1	12	2	4
1423	1421	210476	715565	321.7731	14.87547	6	0.95	320.8231	2	Not Proven	2	24	3	Site Infrastructure	3	321.3951	3.302728	4	0.378	1	12	2	6
1424	1422	210486	715565	324.6635	15.26793	8	0.4	324.2635	1	Not Proven	2	16	3	Site Infrastructure	3	323.8188	8.790473	4	0.8447	1	12	2	6
1425	1423	210496	715565	326.7731	15.74074	8	0.45	326.3231	1	Not Proven	2	16	3	Site Infrastructure	3	326.178	8.964263	4	0.5951	1	12	2	6
1426	1424	210506	715565	330.1726	17.73798	8	0.4	329.7726	1	Not Proven	2	16	3	Site Infrastructure	3	326.578	13.295293	3	3.5946	1	9	1	3
1427	1425	210516	715565	332.6635	16.70298	8	0.45	332.2135	1	Not Proven	2	16	3	Site Infrastructure	3	326.578	20.304118	3	6.0855	1	9	1	3
1428	1426	210426	715575	315	5.715206	4	0.45	314.55	1	Not Proven	2	8	2	Site Infrastructure	3	315	5.104705	4	0	1	12	2	4
1429	1427	210436	715575	316	5.3773	4	0.45	315.55	1	Not Proven	2	8	2	Site Infrastructure	3	316	5.064703	4	0	1	12	2	4
1430	1428	210446	715575	316.8904	4.714012	4	0.2	316.6904	1	Not Proven	2	8	2	Site Infrastructure	3	316.8839	0.820009	4	0.0065	1	12	2	4
1431	1429	210456	715575	317.3995	6.530947	4	0.1	317.2995	1	Not Proven	2	8	2	Site Infrastructure	3	317.2941	0.820009	4	0.1054	1	12	2	4
1432	1430	210466	715575	318.7731	10.63858	6	0.1	318.6731	1	Not Proven	2	12	2	Site Infrastructure	3	318.8188	0.820009	4	-0.0457	1	12	2	4
1433	1431	210476	715575	321.1726	16.42997	8	0.1	321.0726	1	Not Proven	2	16	3	Site Infrastructure	3	321.1129	0.820009	4	0.0597	1	12	2	6
1434	1432	210486	715575	323.7731	15.07798	8	0.1	323.6731	1	Not Proven	2	16	3	Site Infrastructure	3	323.8188	0.820009	4	-0.0457	1	12	2	6
1435	1433	210496	715575	326.2898	15.17826	8	0.45	325.8398	1	Not Proven	2	16	3	Site Infrastructure	3	326.178	0.820009	4	0.1118	1	12	2	6
1436	1434	210506	715575	328.2898	17.74978	8	0.45	327.8398	1	Not Proven	2	16	3	Site Infrastructure	3	326.578	6.409307	4	1.7118	1	12	2	6
1437	1435	210516	715575	331.2898	16.40998	8	0.45	330.8398	1	Not Proven	2	16	3	Site Infrastructure	3	326.1939	15.353228	3	5.0959	1	9	1	3
1438	1436	210426	715585	315	5.794431	4	2.1	312.9	3	Not Proven	2	24	3	Site Infrastructure	3	315	0.820009	4	0	1	12	2	6
1439	1437	210436	715585	315.8828	7.414076	4	1.25	314.6328	3	Not Proven	2	24	3	Site Infrastructure	3	315.9349	0.820009	4	-0.0521	1	12	2	6
1440	1438	210446	715585	316.8828	7.031247	4	0.45	316.4328	1	Not Proven	2	8	2	Site Infrastructure	3	316.9349	0.820009	4	-0.0521	1	12	2	4
1441	1439	210456	715585	317.3736	7.995458	4	0.45	316.9236	1	Not Proven	2	8	2	Site Infrastructure	3	317.5247	0.820009	4	-0.1511	1	12	2	4
1442	1440	210466	715585	318.3736	7.670717	4	0.01	318.3636	1	Not Proven	2	8	2	Site Infrastructure	3	318.5247	0.820009	4	-0.1511	1	12	2	4
1443	1441	210476	715585	320.1726	13.68656	6	0.1	320.0726	1	Not Proven	2	12	2	Site Infrastructure	3	320.1129	0.820009	4	0.0597	1	12	2	4
1444	1442	210486	715585	322.2898	13.89109	6	0.1	322.1898	1	Not Proven	2	12	2	Site Infrastructure	3	322.178	0.820009	4	0.1118	1	12	2	4
1445	1443	210496	715585	324.2898	15.09273	8	0.4	323.8898	1	Not Proven	2	16	3	Site Infrastructure	3	324.178	0.820009	4	0.1118	1	12	2	6
1446	1444	210506	715585	327.0629	18.11229	8	0.45	326.6129	1	Not Proven	2	16	3	Site Infrastructure	3	325.3969	3.852741	4	1.666	1	12	2	6
1447	1445	210516	715585	329.2898	16.24555	8	0.4	328.8898	1	Not Proven	2	16	3	Site Infrastructure	3	325.4855	13.588084	3	3.8043	1	9	1	3
1448	1446	210426	715595	316.4833	12.60438	6	0.45	316.0333	1	Not Proven	2	12	2	Site Infrastructure	3	315.6596	8.360695	4	0.8237	1	12	2	4
1449	1447	210436	715595	317.4833	12.60438	6	0.8	316.6833	2	Not Proven	2	24	3	Site Infrastructure	3	316.4408	5.21751	4	1.0425	1	12	2	6
1450	1448	210446	715595	318.4833	12.21747	6	0.4	318.0833	1	Not Proven	2	12	2	Site Infrastructure	3	318.6408	0.820009	4	-0.1575	1	12	2	4
1451	1449	210456	715595	319.4833	10.48623	6	0.3	319.1833	1	Not Proven	2	12	2	Site Infrastructure	3	319.6408	0.820009	4	-0.1575	1	12	2	4
1452	1450	210466	715595	319.4833	10.38465	6	0.1	319.3833	1	Not Proven	2	12	2	Site Infrastructure	3	319.6408	0.820009	4	-0.1575	1	12	2	4
1453	1451	210476	715595	320.8828	10.25382	6	0.45	320.4328	1	Not Proven	2	12	2	Site Infrastructure	3	320.9349	0.820009	4	-0.0521	1	12	2	4
1454	1452	210486	715595	322.2564	9.642861	6	0.2	322.0564	1	Not Proven	2	12	2	Site Infrastructure	3	322.4596	0.820009	4	-0.2032	1	12	2	4
1455	1453	210496	715595	323.6559	11.40256	6	0.3	323.3559	1	Not Proven	2	12	2	Site Infrastructure	3	323.7537	0.820009	4	-0.0978	1	12	2	4
1456	1454	210506	715595	325.2898	12.48718	6	0.3	324.9898	1	Not Proven	2	12	2	Site Infrastructure	3	325.178	2.146629	4	0.1118	1	12	2	4
1457	1455	210516	715595	328.0629	17.72807	8	0.3	327.7629	1	Not Proven	2	16	3	Site Infrastructure	3	325.178	11.833681	3	2.8849	1	9	1	3
1458	1456	210426	715605	318.4833	12.70752	6	0.01	318.4733	1	Not Proven	2	12	2	Site Infrastructure	3	316.4408	17.295376	3	2.0425	1	9	1	2
1459	1457	210436	715605	319.4833	12.60438	6	0.01	319.4733	1	Not Proven	2	12	2	Site Infrastructure	3	318.6408	12.352328	3	0.8425	1	9	1	2
1460	1458	210446	715605	320.4833	10.61025	6	0.95	319.5333	2	Not Proven	2	24	3	Site Infrastructure	3	319.9393	5.310482	4	0.544	1	12	2	6
1461	1459	210456	715605	320.4833	7.692554	4	0.45	320.0333	1	Not Proven	2	8	2	Site Infrastructure	3	320.2408	1.233862	4	0.2425	1	12	2	4
1462	1460	210466	715605	321.3736	8.569872	6	0.25	321.1236	1	Not Proven	2	12	2	Site Infrastructure	3	321.1971	1.233862	4	0.1765	1	12	2	4
1463	1461	210476	715605	322.2564	11.84818	6	0.1	322.1564	1	Not Proven	2	12	2	Site Infrastructure	3	322.4596	0.820009	4	-0.2032	1	12	2	4
1464	1462	210486	715605	323.3736	10.77552	6	0.9	322.4736	2	Not Proven	2	24	3	Site Infrastructure	3	323.5247	0.820009	4	-0.1511	1	12	2	6
1465	1463	210496	715605	324.8828	10.33147	6	0.8	324.0828	2	Not Proven	2	24	3	Site Infrastructure	3	324.9349	0.820009	4	-0.0521	1	12	2	6
1466	1464	210506	715605	325.4833	10.26781	6	0.9	324.5833	2	Not Proven	2	24	3	Minor Watercourse	6	326.4408	6.094556	4	-0.9575	1	24	3	9
1467	1465	210516	715605	327.6559	10.47977	6	0.95	326.7059	2	Not Proven	2	24	3	Minor Watercourse	6	327.149	10.513288	3	0.5069	1	18	2	6
1468	1466	210426	715615	320.8569	12.95991	6	0.1	320.7569	1	Not Proven	2	12	2	Site Infrastructure	3	318.6408	26.483995	3	2.2161	1	9	1	2
1469	1467	210436	715615	321.4833	10.89349	6	0.1	321.3833	1	Not Proven	2	12	2	Site Infrastructure	3	319.9393	19.417086	3	1.544	1	9	1	2
1470	1468	210446	715615	322	7.031652	4	0.1	321.9	1	Not Proven	2	8	2	Site Infrastructure	3	319.9393	13.872679	3	2.0607	1	9	1	2
1471	1469	210456	715615	321.8828	8.736363	6	0.1	321.7828	1	Not Proven	2	12	2	Site Infrastructure	3	320.8631	10.136627	3	1.0197	1	9	1	2
1472	1470	210466	715615	322.4833	10.34547	6	0.2	322.2833	1	Not Proven	2	12	2	Site Infrastructure	3	321.0121	9.954578	4	1.4712	1	12	2	4
1473	1471	210476	715615	323.8828	10.33147	6	0.1	323.7828	1	Not Proven	2	12	2	Site Infrastructure	3	323.4408	6.71202	4	0.442	1	12	2	4
1474	1472	210486	715615	325.2564	11.40299	6	0.2	325.0564	1	Not Proven	2	12	2	Site Infrastructure	3	325.2408	2.537088	4	0.0156	1	12	2	4
1475	1473	210496	715615	326.2564	10.11067	6	0.1	326.1564	1	Not Proven	2	12	2	Site Infrastructure	3	326.4596	0.820009	4	-0.2032	1	12	2	4
1476	1474	210506	715615	327	5.431707	4	0.25	326.75	1	Not Proven	2	8	2	Minor Watercourse	6	327	1.233862	4	0	1	24	3	6
1477	1475	210516	715615	327.8828	4.988851	4	0.1	327.7828	1	Not Proven	2	8	2	Minor Watercourse	6	328	2.796858	4	-0.1172	1	24	3	6
1478	1476	210426	715625	321.1726	16.16514	8	0.4	320.7726	1	Not Proven	2	16	3	Minor Watercourse	6	315.0181	26.625582	3	6.1545	1	18	2	6
1479	1477	210436	715625	323	5.838671	4	0.45	322.55	1	Not Proven	2	8	2	Site Infrastructure	3	319.9393	27.226333	3	3.0607	1	9	1	2
1480	1478	210446	715625	323	5.482481	4	0.35	322.65	1	Not Proven	2	8	2	Site Infrastructure	3	320.2408	22.752583	3	2.7592	1	9	1	2
1481	1479	210456	715625	323.4833	8.529028	6	0.45	323.0333	1	Not Proven	2	12	2	Site Infrastructure	3	320.8631	19.672346	3	2.6202	1	9	1	2
1482	1480	210466	715625	324.3736	8.76884	6	0.1	324.2736	1	Not Proven	2	12	2	Site Infrastructure	3	322.4596	19.07826	3	1.914	1	9	1	2
1483	1481	210476	715625	325.2564	10.11067	6	0.15	325.1064	1	Not Proven	2	12	2	Site Infrastructure	3	324.2596	15.565347	3	0.9968	1	9	1	2
1484	1482	210486	715625	326.3736	7.47396	4	0.3	326.0736	1	Not Proven	2	8	2	Site Infrastructure	3	325.6596	11.120504	3	0.714	1	9	1	2
1485	1483	210496	715625	327	1.740778	1	0.1	326.9	1	Not Proven	2	2	1	Site Infrastructure	3	326.8262	7.216122	4	0.1738	1	12	2	2
1486	1484	210506	715625	327.3736	5.664966	4	0.3	327.0736	1	Not Proven	2	8	2	Site Infrastructure	3	327	3.220623	4	0.3736	1	12	2	4
1487	1485	210516	715625	328	4.691345	4	0.15	327.85	1	Not Proven	2	8	2	Site Infrastructure	3	328	0.820009	4	0	1	12	2	4
1488	1486	210426	715635	320.0629	18.05701	8	0.4	319.6629	1	Not Proven	2	16	3	Minor Watercourse	6	315.0181	18.792861	3	5.0448	1	18	2	6
1489	1487	210436	715635	321.5167	12.77469	6	0.4	321.1167	1	Not Proven	2	12	2	Minor Watercourse	6	315.0181	26.992584	3	6.4986	1	18	2	4
1490	1488	210446	715635	322.5167	10.27941	6	0.4	322.1167	1	Not Proven	2	12	2	Site Infrastructure	3	320.2408	32.278941	3	2.2759	1	9	1	2
1491	1489	210456	715635	323.8904	8.120618	6	0.45	323.4404	1	Not Proven	2	12	2	Site Infrastructure	3	320.8631	29.516965	3	3.0273	1	9	1	2
1492	1490	210466	715635	324.8904	7.81697	4	0.2	324.6904	1	Not Proven	2	8	2	Site Infrastructure	3	322.4596	28.429386	3	2.4308	1	9	1	2
1493	1491	210476	715635	325.8904	4.957773	4	0.9	324.9904	2	Not Proven	2	16	3	Site Infrastructure	3	325.2408	24.484869	3	0.6496	1	9	1	3
1494	1492	210486	715635	326.7731	6.0338	4	0.3	326.4731	1	Not Proven	2	8	2	Site Infrastructure	3	326.8262	20.022348	3	-0.0531	1	9	1	2
1495	1493	210496	715635	327	3.384872	2	0.25	326.75	1	Not Proven	2	4	1	Site Infrastructure	3	327	16.438236	3	0	1	9	1	1
1496	1494	210506	715635	327.8828	3.974117	2	0.45	327.4328	1	Not Proven	2	4	1	Site Infrastructure	3	327.7106	11.983372	3	0.1722	1	9	1	1
1497	1495	210516	715635	328	4.88677	4	2.05	325.95	3	Not Proven	2	24	3	Site Infrastructure	3	328.6188	8.360695	4	-0.6188	1	12	2	6
1498	1496	210791	715168	375.6983	7.093791	4	2	373.6983	3	Not Proven	2	24	3	Site Infrastructure	3	376.8839	13.142112	3	-1.1856	1	9	1	3
1499	1497	210801	715168	376.6983	6.470575	4	1.4	375.2983	3	Not Proven	2	24	3	Site Infrastructure	3	377.0667	6.891264	4	-0.3684	1	12	2	6
1500	1498	210811	715168	377.6983	7.777843	4	0.1	377.5983	1	Not Proven	2	8	2	Site Infrastructure	3	377.6188	1.997176	4	0.0795	1	12	2	4
1501	1499	210821	715168	378.6983	8.049467	6	0.2	378.4983	1	Not Proven	2	12	2	Site Infrastructure	3	378.5936	0.501112	4	0.1047	1	12	2	4

2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove =/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1502	1500	210831	715168	379.6983	11.37252	6	1.5	378.1983	3	Not Proven	2	36	4	Site Infrastructure	3	378.8477	6.062204	4	0.8506	1	12	2	8
1503	1501	210841	715168	380.9922	10.0402	6	0.95	380.0422	2	Not Proven	2	24	3	Site Infrastructure	3	381.2342	4.066831	4	-0.242	1	12	2	6
1504	1502	210851	715168	382.6905	13.87046	6	0.2	382.4905	1	Not Proven	2	12	2	Site Infrastructure	3	382.578	0.501112	4	0.1125	1	12	2	4
1505	1503	210861	715168	383.9724	11.57348	6	0.2	383.7724	1	Not Proven	2	12	2	Site Infrastructure	3	383.9592	0.501112	4	0.0132	1	12	2	4
1506	1504	210871	715168	385.6905	11.19422	6	0.45	385.2405	1	Not Proven	2	12	2	Site Infrastructure	3	385.578	0.501112	4	0.1125	1	12	2	4
1507	1505	210881	715168	386.6983	12.73143	6	0.2	386.4983	1	Not Proven	2	12	2	Site Infrastructure	3	385.9763	6.497131	4	0.722	1	12	2	4
1508	1506	210791	715178	374.9724	6.348688	4	2	372.9724	3	Not Proven	2	24	3	Site Infrastructure	3	377.0667	20.886395	3	-2.0943	1	9	1	3
1509	1507	210801	715178	375	7.543092	4	1.5	373.5	3	Not Proven	2	24	3	Site Infrastructure	3	377.6188	15.255842	3	-2.6188	1	9	1	3
1510	1508	210811	715178	376.6983	8.645981	6	0.45	376.2483	1	Not Proven	2	12	2	Site Infrastructure	3	378.0349	9.566353	4	-1.3366	1	12	2	4
1511	1509	210821	715178	377.6983	8.049467	6	0.9	376.7983	2	Not Proven	2	24	3	Site Infrastructure	3	378.1505	4.001789	4	-0.4522	1	12	2	6
1512	1510	210831	715178	378.6983	8.049467	6	0.95	377.7483	2	Not Proven	2	24	3	Site Infrastructure	3	378.5936	0.501112	4	0.1047	1	12	2	6
1513	1511	210841	715178	379.6983	11.37252	6	0.9	378.7983	2	Not Proven	2	24	3	Site Infrastructure	3	379.5936	0.501112	4	0.1047	1	12	2	6
1514	1512	210851	715178	380.9724	11.55853	6	0.45	380.5224	1	C	2	12	2	Site Infrastructure	3	380.9592	0.501112	4	0.0132	1	12	2	4
1515	1513	210861	715178	382.6905	11.19422	6	0.45	382.2405	1	C	2	12	2	Site Infrastructure	3	382.578	0.501112	4	0.1125	1	12	2	4
1516	1514	210871	715178	383.6983	12.73143	6	0.3	383.3983	1	Not Proven	2	12	2	Site Infrastructure	3	383.5936	0.501112	4	0.1047	1	12	2	4
1517	1515	210881	715178	385.6905	11.19422	6	0.25	385.4405	1	Not Proven	2	12	2	Site Infrastructure	3	385.578	0.501112	4	0.1125	1	12	2	4
1518	1516	210791	715188	373.6983	8.116422	6	2	371.6983	3	Not Proven	2	36	4	Site Infrastructure	3	377.0667	29.239178	3	-3.3684	1	9	1	4
1519	1517	210801	715188	374.6983	8.049467	6	1.5	373.1983	3	Not Proven	2	36	4	Site Infrastructure	3	378.0349	23.669962	3	-3.3366	1	9	1	4
1520	1518	210811	715188	375.6983	8.049467	6	0.95	374.7483	2	Not Proven	2	24	3	Site Infrastructure	3	378.0349	17.612584	3	-2.3366	1	9	1	3
1521	1519	210821	715188	376.6983	8.049467	6	0.9	375.7983	2	Not Proven	2	24	3	Site Infrastructure	3	377.9926	11.356827	3	-1.2943	1	9	1	3
1522	1520	210831	715188	377.6983	8.049467	6	0.45	377.2483	1	Not Proven	2	12	2	Site Infrastructure	3	378.318	5.268009	4	-0.6197	1	12	2	4
1523	1521	210841	715188	378.6983	8.049467	6	0.8	377.8983	2	Not Proven	2	24	3	Site Infrastructure	3	378.5936	0.501112	4	0.1047	1	12	2	6
1524	1522	210851	715188	379.6983	8.049467	6	0.45	379.2483	1	C	2	12	2	Site Infrastructure	3	379.5936	0.501112	4	0.1047	1	12	2	4
1525	1523	210861	715188	380.6983	12.71604	6	0.3	380.3983	1	Not Proven	2	12	2	Site Infrastructure	3	380.5936	0.501112	4	0.1047	1	12	2	4
1526	1524	210871	715188	382.6905	11.29493	6	0.2	382.4905	1	Not Proven	2	12	2	Site Infrastructure	3	382.578	0.501112	4	0.1125	1	12	2	4
1527	1525	210881	715188	383.6905	14.683	6	0.3	383.3905	1	Not Proven	2	12	2	Site Infrastructure	3	383.578	0.501112	4	0.1125	1	12	2	4
1528	1526	210791	715198	372.6983	8.049467	6	0.1	372.5983	1	Not Proven	2	12	2	Site Infrastructure	3	377.6188	37.418989	3	-4.9205	1	9	1	2
1529	1527	210801	715198	373.6983	8.049467	6	1.9	371.7983	3	Not Proven	2	36	4	Site Infrastructure	3	378.0349	31.288258	3	-4.3366	1	9	1	4
1530	1528	210811	715198	374.6983	8.049467	6	2	372.6983	3	Not Proven	2	36	4	Site Infrastructure	3	377.9926	25.253307	3	-3.2943	1	9	1	4
1531	1529	210821	715198	375.6983	8.049467	6	1.5	374.1983	3	Not Proven	2	36	4	Site Infrastructure	3	378.318	19.403709	3	-2.6197	1	9	1	4
1532	1530	210831	715198	376.6983	8.049467	6	0.4	376.2983	1	Not Proven	2	12	2	Site Infrastructure	3	378.5936	13.74784	3	-1.8953	1	9	1	2
1533	1531	210841	715198	377.6983	8.049467	6	0.3	377.3983	1	Not Proven	2	12	2	Site Infrastructure	3	378.5675	8.075538	4	-0.8692	1	12	2	4
1534	1532	210851	715198	378.6983	8.049467	6	0.45	378.2483	1	C	2	12	2	Site Infrastructure	3	378.7557	1.997176	4	-0.0574	1	12	2	4
1535	1533	210861	715198	379.6983	8.049467	6	0.1	379.5983	1	Not Proven	2	12	2	Site Infrastructure	3	379.5936	0.501112	4	0.1047	1	12	2	4
1536	1534	210871	715198	380.6983	11.37638	6	0.45	380.2483	1	C	2	12	2	Site Infrastructure	3	380.5936	0.501112	4	0.1047	1	12	2	4
1537	1535	210881	715198	382.6905	12.46704	6	0.1	382.5905	1	Not Proven	2	12	2	Site Infrastructure	3	382.578	0.501112	4	0.1125	1	12	2	4
1538	1536	210791	715208	371.6983	8.049467	6	0.1	371.5983	1	Not Proven	2	12	2	Site Infrastructure	3	378.0349	45.251598	3	-6.3366	1	9	1	2
1539	1537	210801	715208	372.6983	8.049467	6	0.95	371.7483	2	Not Proven	2	24	3	Site Infrastructure	3	377.9926	39.325329	3	-5.2943	1	9	1	3
1540	1538	210811	715208	373.6983	8.049467	6	1.5	372.1983	3	Not Proven	2	36	4	Site Infrastructure	3	378.318	33.544834	3	-4.6197	1	9	1	4
1541	1539	210821	715208	374.6983	8.049467	6	0.95	373.7483	2	Not Proven	2	24	3	Site Infrastructure	3	378.318	27.480755	3	-3.6197	1	9	1	3
1542	1540	210831	715208	375.6983	8.049467	6	0.4	375.2983	1	Not Proven	2	12	2	Site Infrastructure	3	378.5675	21.306485	3	-2.8692	1	9	1	2
1543	1541	210841	715208	376.6983	8.049467	6	0.95	375.7483	2	Not Proven	2	24	3	Site Infrastructure	3	378.7557	15.255842	3	-2.0574	1	9	1	3
1544	1542	210851	715208	377.6983	8.049467	6	0.3	377.3983	1	Not Proven	2	12	2	Site Infrastructure	3	378.8119	8.472161	4	-1.1136	1	12	2	4
1545	1543	210861	715208	378.6983	8.049467	6	0.2	378.4983	1	Not Proven	2	12	2	Site Infrastructure	3	378.5936	0.501112	4	0.1047	1	12	2	4
1546	1544	210871	715208	379.6983	9.607853	6	0.45	379.2483	1	Not Proven	2	12	2	Site Infrastructure	3	379.5936	0.501112	4	0.1047	1	12	2	4
1547	1545	210881	715208	381.6905	10.92279	6	0.1	381.5905	1	Not Proven	2	12	2	Site Infrastructure	3	381.578	0.501112	4	0.1125	1	12	2	4
1548	1546	210791	715218	370.6983	8.049467	6	0.3	370.3983	1	Not Proven	2	12	2	Site Infrastructure	3	377.9926	53.434385	3	-7.2943	1	9	1	2
1549	1547	210801	715218	371.6983	8.049467	6	0.45	371.2483	1	Not Proven	2	12	2	Site Infrastructure	3	377.9926	47.38322	3	-6.2943	1	9	1	2
1550	1548	210811	715218	372.6983	8.049467	6	0.1	372.5983	1	Not Proven	2	12	2	Site Infrastructure	3	378.318	41.278856	3	-5.6197	1	9	1	2
1551	1549	210821	715218	373.6983	8.049467	6	0.1	373.5983	1	Not Proven	2	12	2	Site Infrastructure	3	378.5675	35.25221	3	-4.8692	1	9	1	2
1552	1550	210831	715218	374.6983	8.049467	6	0.45	374.2483	1	Not Proven	2	12	2	Site Infrastructure	3	378.7557	29.351196	3	-4.0574	1	9	1	2
1553	1551	210841	715218	375.6983	8.049467	6	1.9	373.7983	3	Not Proven	2	36	4	Site Infrastructure	3	378.5936	21.887602	3	-2.8953	1	9	1	4
1554	1552	210851	715218	376.6983	8.049467	6	0.95	375.7483	2	Not Proven	2	24	3	Site Infrastructure	3	378.5936	13.74784	3	-1.8953	1	9	1	3
1555	1553	210861	715218	377.6983	8.049467	6	0.1	377.5983	1	Not Proven	2	12	2	Site Infrastructure	3	378.5114	6.891264	4	-0.8131	1	12	2	4
1556	1554	210871	715218	378.6983	9.607853	6	0.1	378.5983	1	C	2	12	2	Site Infrastructure	3	379.0188	2.449799	4	-0.3205	1	12	2	4
1557	1555	210881	715218	379.9922	10.21938	6	0.9	379.0922	2	C	2	24	3	Site Infrastructure	3	379.9845	0.501112	4	0.0077	1	12	2	6
1558	1556	210791	715228	369.6983	8.049467	6	0.1	369.5983	1	Not Proven	2	12	2	Minor Watercourse	6	366.003	55.275788	3	3.6953	1	18	2	4
1559	1557	210801	715228	370.6983	8.049467	6	0.1	370.5983	1	Not Proven	2	12	2	Minor Watercourse	6	366.003	54.086493	3	4.6953	1	18	2	4
1560	1558	210811	715228	371.6983	8.049467	6	0.2	371.4983	1	C	2	12	2	Site Infrastructure	3	378.5675	49.309941	3	-6.8692	1	9	1	2
1561	1559	210821	715228	372.6983	8.049467	6	0.1	372.5983	1	C	2	12	2	Site Infrastructure	3	378.7557	43.476945	3	-6.0574	1	9	1	2
1562	1560	210831	715228	373.6983	8.094477	6	0.45	373.2483	1	Not Proven	2	12	2	Site Infrastructure	3	378.5936	35.606448	3	-4.8953	1	9	1	2
1563	1561	210841	715228	374.6983	8.064867	6	1.9	372.7983	3	C	2	36	4	Site Infrastructure	3	378.5936	27.888261	3	-3.8953	1	9	1	4
1564	1562	210851	715228	375.6983	8.049467	6	1.6	374.0983	3	Not Proven	2	36	4	Site Infrastructure	3	378.5114	20.886395	3	-2.8131	1	9	1	4
1565	1563	210861	715228	376.6983	8.049467	6	0.3	376.3983	1	C	2	12	2	Site Infrastructure	3	378.8119	15.826102	3	-2.1136	1	9	1	2
1566	1564	210871	715228	377.7182	8.829652	6	0.45	377.2682	1	Not Proven	2	12	2	Site Infrastructure	3	379.0188	12.028695	3	-1.3006	1	9	1	2
1567	1565	210881	715228	378.9922	9.652189	6	0.9	378.0922	2	Not Proven	2	24	3	Site Infrastructure	3	380.8188	8.09335	4	-1.8266	1	12	2	6
1568	1566	210791	715238	368.6983	8.094477	6	0.2	368.4983	1	C	2	12	2	Minor Watercourse	6	366.003	45.542296	3	2.6953	1	18	2	4
1569	1567	210801	715238	369.6983	8.255589	6	0.3	369.3983	1	C	2	12	2	Minor Watercourse	6	366.003	44.091232	3	3.6953	1	18	2	4
1570	1568	210811	715238	370.6905	10.21938	6	0.2	370.4905	1	C	2	12	2	Minor Watercourse	6	366.003	44.877307	3	4.6875	1	18	2	4
1571	1569	210821	715238	371.6905	10.17476	6	0.3	371.3905	1	C	2	12	2	Minor Watercourse	6	366.003	47.790258	3	5.6875	1	18	2	4
1572	1570	210831	715238	371.9922	9.688359	6	0.45	371.5422	1	C	2	12	2	Site Infrastructure	3	378.5936	42.029836	3	-6.6014	1	9	1	2
1573	1571	210841	715238	373.6983	8.645981	6	0.95	372.7483	2	C	2	24	3	Site Infrastructure	3	378.5114	34.999907	3	-4.8131	1	9	1	3
1574	1572	210851	715238	374.6983	8.049467	6	0.95	373.7483	2	Not Proven	2	24	3	Site Infrastructure	3	378.5114	29.239178	3	-3.8131	1	9	1	3
1575	1573	210861	715238	375.6983	8.054321	6	0.9	374.7983	2	Not Proven	2	24	3	Site Infrastructure	3	379.0188	24.767751	3	-3.3205	1	9	1	3
1576	1574	210871	715238	376.7182	10.1715	6	0.9	375.8182	2	Not Proven	2	24	3	Site Infrastructure	3	379.0188	21.985848	3	-2.3006	1	9	1	3
1577	1575	210881	715238	378.6905	10.21938	6	0.9	377.7905	2	Not Proven	2	24	3	Site Infrastructure	3	380.978	15.826102	3	-2.2875	1	9	1	3
1578	1576	210791	715248	366.9922	9.787898	6	0.1	366.8922	1	Not Proven	2	12	2	Minor Watercourse	6	366.003	35.955371	3	0.9892	1	18	2	4
1579	1577	210801	715248	367.9922	8.64964	6	0.1	367.8922	1	C	2	12	2	Minor Watercourse	6	366.003	34.098749	3	1.9892	1	18	2	4
1580	1578	210811	715248	369	6.37937	4	0.2	368.8	1	C	2	8	2	Minor Watercourse	6	366.003	35.109268	3	2.997	1	18	2	4
1581	1579	210821	715248	370.6983	7.141443	4	0.45	370.2483	1	Not Proven	2	8	2	Minor Watercourse	6	366.003	38.763342	3	4.6953	1	18	2	4
1582	1580	210831	715248	371.6983	7.762444	4	0.8	370.8983	2	C	2	16	3	Minor Watercourse	6	366.3713	42.321644	3	5.327	1	18	2	6
1583	1581	210841	715248	372.6983	8.049467	6	0.45	372.2483	1	Not Proven	2	12	2	Site Infrastructure	3	378.5114	42.938113	3	-5.8131	1	9	1	2
1584	1582	210851	715248	373.6983	8.054321	6	0.95	372.7483	2	Not Proven	2	24	3	Site Infrastructure	3	378.8119	38.182529	3	-5.1136	1	9	1	3
1585	1583	210861	715248	374.7182	8.781777	6	0.1	374.6182	1	Not Proven	2	12	2	Site Infrastructure	3	379.0188	33.943033	3	-4.3006	1	9	1	2
1586	1584	210871	715248	375.9922	8.307533	6	0.45	375.5422	1	Not Proven	2	12	2	Site Infrastructure	3	380.978	29.651602	3	-4.9858	1	9	1	2
1587	1585	210881	715248	377.6983	8.483176	6	0.7	376.9983	2	C	2	24	3	Site Infrastructure	3	381.4579	23.706369	3	-3.7596	1	9	1	3
1588	1586	210791	715258	366.6983	7.141443	4	0.2	366.4983	1	C	2	8	2	Minor Watercourse	6	366.003	26.673521	3	0.6953	1	18	2	4
1589	1587	210801	715258	367.6983	7.762444	4	0.1	367.5983	1	C	2	8	2	Minor Watercourse	6	366.003	24.112501	3	1.6953	1	18	2	4
1590	1588	210811	715258	368.6983	8.054321	6	0.45	368.2483	1	C	2	12	2	Minor Watercourse	6	366.003	25.521534	3	2.6953	1	18	2	4
1591	1589	210821	715258	369.6983	8.003272	6	0.95	368.7483	2	Not Proven	2	24	3	Minor Watercourse	6	366.3713	29.3236	3	3.327	1	18	2	6
1592	1590	210831	715258	370.7182	6.924283	4	0.95	369.7682	2	Not Proven	2	16	3	Minor Watercourse	6	367.0188	33.172252	3	3.6994	1	18	2	6
1593	1591	210841	715258	371.7182	6.37937	4	0.95	370.7682	2	Not Proven	2	16	3	Minor Watercourse	6	367.0188	37.018027	3	4.6994	1	18	2	6
1594	1592	210851	715258	372.7182	8.236865	6	1.45	371.2682	3	Not Proven	2	36	4	Minor Watercourse	6	367.0188	42.898372	3	5.6994	1	18	2	8
1595	1593	210861	715258	373.9922	8.330152	6	1.9	372.0922	3	Not Proven	2	36	4	Site Infrastructure	3	379.0188	43.483532	3	-5.0266	1	9	1	4
1596	1594	210871	715258	375.6983	8.493332	6	0.95	374.7483	2	Not Proven	2	24	3	Site Infrastructure	3	381.4579	37.825176	3	-5.7596	1	9	1	3
1597	1595	210881	715258	376.7182	8.829652	6	0.95	375.7682	2	Not Proven	2	24	3	Site Infrastructure	3	381.4579	31.948082	3	-4.7397	1	9	1	3
1598	1596	209924	714905	290.2447	13.3755	6	0.2	290.0447	1	C	2	12	2	Site Infrastructure	3	290.4188	1.214082	4	-0.1741	1	12	2	4
1599	1597	209934	714905	292.2447	12.19245	6	0.9	291.3447	2	C	2	24	3	Site Infrastructure	3	291.978	3.06222	4	0.2667	1	12	2	6
1600	1598	209944	714905	294.2447	11.79389	6	0.45	293.7947	1	C	2	12	2	Site Infrastructure	3	292.562	8.554741	4	1.6827	1	12	2	4
1601	1599	209954	714905	296.2447	10.67696	6	0.45	295.7947	1	Not Proven	2	12	2	Site Infrastructure	3	293.778	14.177094	3	2.4667	1	9	1	2
1602	1600	209964	714905	297.7732	10.28704	6	0.2	297.5732	1	Not Proven	2	12	2	Site Infrastructure	3	295.5373	18.880116	3	2.2359	1	9	1	2
1603	1601	209974	714905	299.6439	11.06725	6	0.45	299.1939	1	C	2	12	2	Site Infrastructure	3	295.9373	21.468116	3	3.7066	1	9	1	2
1604	1602	209984	714905	301.2447	11.23927	6	0.3	300.9447	1	C	2	12	2	Site Infrastructure	3	295.9373	25.757911	3	5.3074	1	9	1	2
1605	1603	209994	714905	303.2447	11.40741	6	0.3	302.9447	1	Not Proven	2	12	2	Site Infrastructure	3	295.978	31.357238	3	7.2667	1	9	1	2
1606	1604	210004	714905	305.1293	9.394773	6	0.95	304.1793	2	Not Proven	2	24	3	Site Infrastructure	3	295.978	38.16718	3	9.1513	1	9	1	3
1607	1605	210014	714905	306.1293	7.75185	4	0.9	305.2293	2	C	2	16	3	Site Infrastructure	3	295.978	45.818376	3	10.1513	2	18	2	6
1608	1606	209924	714915	289.2447	13.17925	6	0.2	289.0447	1	Not Proven	2	12	2	Site Infrastructure	3	290.3781	5.899186	4	-1.1334	1	12	2	4
1609	1607	209934	714915	291.2447	12.47974	6	0.4	290.8447	1	C	2	12	2	Site Infrastructure	3	291.4188	1.445266	4	-0.1741	1	12	2	4
1610	1608	209944	714915	293.7732	13.85133	6	0.3	293.4732	1	C	2	12	2	Site Infrastructure	3	293.778	1.214082	4	-0.0048	1	12	2	4
1611	1609	209954	714915	295.8886	12.81122	6	0.3	295.5886	1	Not Proven	2	12	2	Site Infrastructure	3	294.6188	5.768916	4	1.2698	1	12	2	4
1612	1610	209964	714915	297.2447	7.042596	4	0.4	296.8447	1	Not Proven	2	8	2	Site Infrastructure	3	295.5373	8.918116	4	1.7074	1	12	2	4
1613	1611	209974	714915	298.3741	10.94077	6	0.3	298.0741	1	Not Proven	2	12	2	Site Infrastructure	3	295.9373	11.998083	3	2.4368	1	9	1	2
1614	1612	209984	714915	300.6439	12.42565	6	0.2	300.4439	1	C	2	12	2	Site Infrastructure	3	295.978	17.428723	3	4.6659	1	9	1	2
1615	1613	209994	714915	302.2447	12.60438	6	0.45	301.7947	1	Not Proven	2	12	2	Site Infrastructure	3	295.978	24.025353	3	6.2667	1	9	1	2
1616	1614	210004	714915	304.2447	10.57361	6	0.9	303.3447	2	Not Proven	2	24	3	Site Infrastructure	3	295.978	31.934426	3	8.2667	1	9	1	3
1617	1615	210014	714915	305	3.928295	2	0.2	304.8	1	Not Proven	2	4	1	Site Infrastructure	3	297.3951	38.010751	3	7.6049	1	9	1	1
1618	1616	209924	714925	288.3741	14.59744	6	0.4	287.9741	1	Not Proven	2	12	2	Site Infrastructure	3	291.0188	14.250993	3	-2.6447	1	9	1	2
1619	1617	209934	714925	290.7732	12.60438	6	0.25	290.5232	1	Not Proven	2	12	2	Site Infrastructure	3	292.2188	8.654316	4	-1.4456	1	12	2	4
1620	1618	209944	714925	292.8886	13.59218	6	0.1	292.7886	1	Not Proven	2	12	2	Site Infrastructure	3	292.8035	2.97644	4	0.0851	1	12	2	4
1621	1619	209954	714925	294.6578	15.06477	8	0.4	294.2578	1	C	2	16	3	Site Infrastructure	3	294.5097	1.214082	4	0.1481	1	12	2	6
1622	1620	209964	714925	295.3017	18.4644	8	0.25	295.0517	1	C	2	16	3	Site Infrastructure	3	295.1373	1.214082	4	0.1644	1	12	2	6
1623	1621	209974	714925	297.043	14.54906	6	0.25	296.793	1	Not Proven	2	12	2	Site Infrastructure	3	295.578	4.230271	4	1.465	1	12	2	4
1624	1622	209984	714925	298.7732	17.45134	8	0.4	298.3732	1	Not Proven	2	16	3	Site Infrastructure	3	295.978	9.884412	4	2.7952	1	12	2	6
1625	1623	209994	714925	300.8886	16.58624	8	0.45	300.4386	1	Not Proven	2	16	3	Site Infrastructure	3	295.978	18.446994	3	4.9106	1	9	1	3
1626	1624	210004	714925	303.2447	12.52094	6	0.7	302.5447	2	Not Proven	2	24	3	Site Infrastructure	3	297.3951	24.60287	3	5.8496	1	9	1	3
1627	1625	210014	714925	305	4.852221	4	0.3	304.7	1	Not Proven	2	8	2	Site Infrastructure	3	297.3951	29.797503	3	7.6049	1	9	1	2
1628	1626	209924	714935	287.7732	13.85133	6	0.45	287.3232	1	Not Proven	2	12	2	Minor Watercourse	6	286.2188	8.554741	4	1.5544	1	24	3	6
1629	1627	209934	714935	289.7732	12.32359	6	0.2	289.5732	1	Not Proven	2	12	2	Site Infrastructure	3	290.4378	4.94348	4	-0.6646	1	12	2	4
1630	1628	209944	714935	291.1724	13.39287	6	0.3	290.8724	1	C	2	12	2	Site Infrastructure	3	290.9868	1.214082	4	0.1856	1	12	2	4
1631	1629	209954	714935	291.6439	11.7696	6	0.1	291.5439	1	C	2	12	2	Site Infrastructure	3	291.6276	1.214082	4	0.0163	1	12	2	4
1632	1630	209964	714935	292.7732	12.81929	6	0.1	292.6732	1	C	2	12	2	Site Infrastructure	3	292.778	1.214082	4	-0.0048	1	12	2	4
1633	1631	209974	714935	294.6578	15.40358	8	0.1	294.5578	1	C	2	16	3	Site Infrastructure	3	294.5097	1.214082	4	0.1481	1	12	2	6
1634	1632	209984	714935	295.9025	19.44613	8	0.2	295.7025	1	C	2	16	3	Site Infrastructure	3	294.8586	5.198845	4	1.0439	1	12	2	6
1635	1633	209994	714935	298.9025	21.33127	8	0.3	298.6025	1	C	2	16	3	Site Infrastructure	3	296.2376	11.288755	3	2.6649	1	9	1	3
1636	1634	210004	714935	301.9025	19.35373	8	0.1	301.8025	1	C	2	16	3	Site Infrastructure	3	297.3951	15.759924	3	4.5074	1	9	1	3
1637	1635	210014	714935	303.5285	11.56575	6	0.15	303.3785	1	Not Proven	2	12	2	Site Infrastructure	3	298.7173	21.358408	3	4.8112	1	9	1	2
1638	1636	209924	714945	286.7732	14.10796	6	1.95	284.8232	3	Not Proven	2	36	4	Minor Watercourse	6	287.178	1.445266	4	-0.4048	1	24	3	12
1639	1637	209934	714945	288.6439	11.22733	6	1.5	287.1439	3	Not Proven	2	36	4	Minor Watercourse	6	287.578	4.230271	4	1.0659	1	24	3	12
1640	1638	209944	714945	289.6439	8.049467	6	0.45	289.1939	1	Not Proven	2	12	2	Site Infrastructure	3	289.6276	1.214082	4	0.0163	1	12	2	4
1641	1639	209954	714945	290.6439	8.049467	6	0.35	290.2939	1	Not Proven	2	12	2	Site Infrastructure	3	290.6276	1.214082	4	0.0163	1	12	2	4
1642	1640	209964	714945	291.6439	9.199264	6	0.3	291.3439	1	Not Proven	2	12	2	Site Infrastructure	3	291.6276	1.214082	4	0.0163	1	12	2	4
1643	1641	209974	714945	292.6439	8.485754	6	0.1	292.5439	1	Not Proven	2	12	2	Site Infrastructure	3	292.6276	1.214082	4	0.0163	1	12	2	4
1644	1642	209984	714945	293.8886	14.88233	6	0.2	293.6886	1	Not Proven	2	12	2	Site Infrastructure	3	294.0464	1.214082	4	-0.1578	1	12	2	4
1645	1643	209994	714945	297.2447	17.79504	8	0.2	297.0447	1	Not Proven	2	16	3	Site Infrastructure	3	297.3951	2.97644	4	-0.1504	1	12	2	6
1646	1644	210004	714945	300.4894	18.76757	8	0.1	300.3894	1	Not Proven	2	16	3	Site Infrastructure	3	298.7173	7.527655	4	1.7721	1	12	2	6
1647	1645	210014	714945	302	5.235458	4	0.4	301.6	1	C	2	8	2	Site Infrastructure	3	299.9969	12.979676	3	2.0031	1	9	1	2
1648	1646	209924	714955	284.7732	12.63091	6	0.8	283.9732	2	C	2	24	3	Minor Watercourse	6	287.178	9.593226	4	-2.4048	1	24	3	9
1649	1647	209934	714955	286.8886	15.37417	8	2	284.8886	3	C	2	48	4	Minor Watercourse	6	287.7752	3.09367	4	-0.8866	1	24	3	12
1650	1648	209944	714955	288.6439	8.049467	6	2	286.6439	3	C	2	36	4	Site Infrastructure	3	288.6276	1.214082	4	0.0163	1	12	2	8
1651	1649	209954	714955	289.6439	8.396039	6	0.95	288.6939	2	Not Proven	2	24	3	Site Infrastructure	3	289.6276	1.214082	4	0.0163	1	12	2	6
1652	1650	209964	714955	291.2447	9.008853	6	3	288.2447	3	C	2	36	4	Site Infrastructure	3	291.4188	1.214082	4	-0.1741	1	12	2	8
1653	1651	209974	714955	292	4.081323	4	0.95	291.05	2	Not Proven	2	16	3	Site Infrastructure	3	292	1.214082	4	0	1	12	2	6
1654	1652	209984	714955	293.2447	12.56653	6	1.5	291.7447	3	C	2	36	4	Site Infrastructure	3	293.4188	1.214082	4	-0.1741	1	12	2	8
1655	1653	209994	714955	296.0179	18.9842	8	0.95	295.0679	2	C	2	32	4	Site Infrastructure	3	296.1969	1.214082	4	-0.179	1	12	2	8
1656	1654	210004	714955	299.0179	17.71931	8	0.1	298.9179	1	C	2	16	3	Site Infrastructure	3	299.1969	1.214082	4	-0.179	1	12	2	6
1657	1655	210014	714955	300.5285	11.47678	6	0.1	300.4285	1	C	2	12	2	Site Infrastructure	3	299.5592	4.976183	4	0.9693	1	12	2	4
1658	1656	209924	714965	284.2447	8.498777	6	0.1	284.1447	1	Not Proven	2	12	2	Minor Watercourse	6	287.7752	17.030995	3	-3.5305	1	18	2	4
1659	1657	209934	714965	285.7302	10.70046	6	0.2	285.5302	1	Not Proven	2	12	2	Minor Watercourse	6	288.0786	10.368799	3	-2.3484	1	18	2	4
1660	1658	209944	714965	287.6439	9.43068	6	0.45	287.1939	1	Not Proven	2	12	2	Site Infrastructure	3	288.3432	5.802378	4	-0.6993	1	12	2	4
1661	1659	209954	714965	289.2447	10.79705	6	0.45	288.7947	1	Not Proven	2	12	2	Site Infrastructure	3	289.4188	1.445266	4	-0.1741	1	12	2	4
1662	1660	209964	714965	291	5.517989	4	1.3	289.7	3	Not Proven	2	24	3	Site Infrastructure	3	291	1.214082	4	0	1	12	2	6
1663	1661	209974	714965	291.2447	7.051952	4	1.95	289.2947	3	Not Proven	2	24	3	Site Infrastructure	3	291.4188	1.214082	4	-0.1741	1	12	2	6
1664	1662	209984	714965	293.2447	12.46551	6	2	291.2447	3	Not Proven	2	36	4	Site Infrastructure	3	293.4188	1.214082	4	-0.1741	1	12	2	8
1665	1663	209994	714965	296.2447	15.6541	8	0.25	295.9947	1	Not Proven	2	16	3	Site Infrastructure	3	296.4188	1.214082	4	-0.1741	1	12	2	6
1666	1664	210004	714965	298.2447	10.22433	6	0.45	297.7947	1	Not Proven	2	12	2	Site Infrastructure	3	298.9492	4.264457	4	-0.7045	1	12	2	4
1667	1665	210014	714965	298.4131	12.638	6	0.1	298.3131	1	Not Proven	2	12	2	Site Infrastructure	3	298.0909	1.214082	4	0.3222	1	12	2	4
1668	1666	209924	714975	285.1154	10.55852	6	0.01	285.1054	1	Not Proven	2	12	2	Minor Watercourse	6	288.0786	24.248629	3	-2.9632	1	18	2	4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove =/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
1669	1667	209934	714975	286.6009	10.62169	6	0.1	286.5009	1	C	2	12	2	Minor Watercourse	6	288.0786	19.763249	3	-1.4777	1	18	2	4
1670	1668	209944	714975	287.7162	10.89527	6	0.01	287.7062	1	Not Proven	2	12	2	Site Infrastructure	3	288.3432	14.02646	3	-0.627	1	9	1	2
1671	1669	209954	714975	289.2347	8.910623	6	0.01	289.2247	1	Not Proven	2	12	2	Site Infrastructure	3	290.7592	10.93155	3	-1.5145	1	9	1	2
1672	1670	209964	714975	290.5285	5.347159	4	1.9	288.6285	3	Not Proven	2	24	3	Site Infrastructure	3	290.7592	1.445266	4	-0.2307	1	12	2	6
1673	1671	209974	714975	291.2447	9.456235	6	2.15	289.0947	3	Not Proven	2	36	4	Site Infrastructure	3	291.4188	1.214082	4	-0.1741	1	12	2	8
1674	1672	209984	714975	293.2447	12.65553	6	1.6	291.6447	3	Not Proven	2	36	4	Site Infrastructure	3	293.4188	1.214082	4	-0.1741	1	12	2	8
1675	1673	209994	714975	295.6578	16.38204	8	0.95	294.7078	2	C	2	32	4	Site Infrastructure	3	295.0887	3.335385	4	0.5691	1	12	2	8
1676	1674	210004	714975	297.1724	15.45445	8	0.95	296.2224	2	C	2	32	4	Site Infrastructure	3	296.4188	11.598413	3	0.7536	1	9	1	4
1677	1675	210014	714975	297.1544	14.23598	6	0.95	296.2044	2	Not Proven	2	24	3	Site Infrastructure	3	296.5592	7.091008	4	0.5952	1	12	2	6
1678	1676	209924	714985	286.6009	10.19339	6	0.1	286.5009	1	C	2	12	2	Minor Watercourse	6	288.0786	32.727206	3	-1.4777	1	18	2	4
1679	1677	209934	714985	287.6439	8.19001	6	0.25	287.3939	1	Not Proven	2	12	2	Site Infrastructure	3	288.3432	27.517732	3	-0.6993	1	9	1	2
1680	1678	209944	714985	288.5285	8.129046	6	0.2	288.3285	1	C	2	12	2	Site Infrastructure	3	289.0188	22.938282	3	-0.4903	1	9	1	2
1681	1679	209954	714985	289.5285	8.924779	6	0.2	289.3285	1	Not Proven	2	12	2	Site Infrastructure	3	290.7592	15.574749	3	-1.2307	1	9	1	2
1682	1680	209964	714985	289.5285	8.403506	6	1.5	288.0285	3	Not Proven	2	36	4	Site Infrastructure	3	290.2099	8.654316	4	-0.6814	1	12	2	8
1683	1681	209974	714985	289.7732	12.13046	6	0.4	289.3732	1	Not Proven	2	12	2	Site Infrastructure	3	290.978	5.2267	4	-1.2048	1	12	2	4
1684	1682	209984	714985	291.5285	13.87841	6	0.95	290.5785	2	Not Proven	2	24	3	Site Infrastructure	3	292.9773	7.24232	4	-1.4488	1	12	2	6
1685	1683	209994	714985	292.6578	16.46334	8	0.45	292.2078	1	C	2	16	3	Site Infrastructure	3	294.2974	10.49295	3	-1.6396	1	9	1	3
1686	1684	210004	714985	294.1724	16.91693	8	0.1	294.0724	1	Not Proven	2	16	3	Site Infrastructure	3	293.851	16.909902	3	0.3214	1	9	1	3
1687	1685	210014	714985	294.3991	12.74441	6	0.95	293.4491	2	Not Proven	2	24	3	Site Infrastructure	3	293.851	6.966692	4	0.5481	1	12	2	6
1688	1686	209924	714995	285.5285	14.5245	6	0.95	284.5785	2	Not Proven	2	24	3	Site Infrastructure	3	288.3432	41.44526	3	-2.8147	1	9	1	3
1689	1687	209934	714995	285.7732	13.256	6	0.3	285.4732	1	Not Proven	2	12	2	Site Infrastructure	3	288.3432	36.335927	3	-2.57	1	9	1	2
1690	1688	209944	714995	286.5285	10.8939	6	0.3	286.2285	1	Not Proven	2	12	2	Site Infrastructure	3	290.7592	29.716272	3	-4.2307	1	9	1	2
1691	1689	209954	714995	287.5285	11.48954	6	0.2	287.3285	1	Not Proven	2	12	2	Site Infrastructure	3	290.2099	22.702009	3	-2.6814	1	9	1	2
1692	1690	209964	714995	287.6439	8.984807	6	0.25	287.3939	1	Not Proven	2	12	2	Site Infrastructure	3	290.578	17.559054	3	-2.9341	1	9	1	2
1693	1691	209974	714995	288.5285	9.904778	6	0.25	288.2785	1	C	2	12	2	Site Infrastructure	3	290.978	15.178682	3	-2.4495	1	9	1	2
1694	1692	209984	714995	289.6439	12.70448	6	0.95	288.6939	2	C	2	24	3	Site Infrastructure	3	291.778	15.998325	3	-2.1341	1	9	1	3
1695	1693	209994	714995	290.7732	14.11304	6	0.45	290.3232	1	Not Proven	2	12	2	Site Infrastructure	3	294.2974	19.828666	3	-3.5242	1	9	1	2
1696	1694	210004	714995	291.6578	15.06514	8	0.45	291.2078	1	Not Proven	2	16	3	Site Infrastructure	3	293.851	20.224213	3	-2.1932	1	9	1	3
1697	1695	210014	714995	292.1724	15.60073	8	0.3	291.8724	1	Not Proven	2	16	3	Site Infrastructure	3	293.3592	12.746607	3	-1.1868	1	9	1	3
1698	1696	210310	714751	369.4757	21.61353	8	0.1	369.3757	1	Not Proven	2	16	3	Site Infrastructure	3	363.303	28.916634	3	6.1727	1	9	1	3
1699	1697	210320	714751	371.8116	19.82703	8	0.1	371.7116	1	C	2	16	3	Site Infrastructure	3	365.778	27.340456	3	6.0336	1	9	1	3
1700	1698	210330	714751	373.9591	22.72906	8	0.01	373.9491	1	Not Proven	2	16	3	Site Infrastructure	3	366.578	26.58147	3	7.3811	1	9	1	3
1701	1699	210340	714751	376.8116	19.93769	8	0.1	376.7116	1	Not Proven	2	16	3	Site Infrastructure	3	366.978	27.640668	3	9.8336	1	9	1	3
1702	1700	210350	714751	378.8116	16.46269	8	0.1	378.7116	1	C	2	16	3	Site Infrastructure	3	367.3781	31.644806	3	11.4335	2	18	2	6
1703	1701	210360	714751	380.8116	18.12255	8	0.01	380.8016	1	Not Proven	2	16	3	Site Infrastructure	3	367.778	36.315024	3	13.0336	2	18	2	6
1704	1702	210370	714751	382.8116	18.2353	8	0.01	382.8016	1	C	2	16	3	Sensitive Habitat	8	392.9788	32.416146	3	-10.1672	1	24	3	9
1705	1703	210380	714751	384.0865	19.16954	8	0.1	383.9865	1	C	2	16	3	Sensitive Habitat	8	393.1627	25.817663	3	-9.0762	1	24	3	9
1706	1704	210390	714751	386.0865	20.63438	8	0.1	385.9865	1	Not Proven	2	16	3	Sensitive Habitat	8	393.7798	19.692754	3	-7.6933	1	24	3	9
1707	1705	210400	714751	388.8116	21.33127	8	0.1	388.7116	1	C	2	16	3	Sensitive Habitat	8	393.7798	14.127793	3	-4.9682	1	24	3	9
1708	1706	210310	714761	366.8116	16.58563	8	0.15	366.6616	1	Not Proven	2	16	3	Site Infrastructure	3	363.303	19.094652	3	3.5086	1	9	1	3
1709	1707	210320	714761	368.8116	16.902	8	0.1	368.7116	1	Not Proven	2	16	3	Site Infrastructure	3	365.778	17.774548	3	3.0336	1	9	1	3
1710	1708	210330	714761	370.8116	18.10217	8	0.1	370.7116	1	Not Proven	2	16	3	Site Infrastructure	3	366.578	16.583381	3	4.2336	1	9	1	3
1711	1709	210340	714761	373.4757	22.64034	8	0.1	373.3757	1	C	2	16	3	Site Infrastructure	3	366.978	18.232952	3	6.4977	1	9	1	3
1712	1710	210350	714761	376.0865	19.64425	8	0.1	375.9865	1	C	2	16	3	Site Infrastructure	3	367.778	22.702972	3	8.3085	1	9	1	3
1713	1711	210360	714761	377.8116	16.77756	8	0.45	377.3616	1	Not Proven	2	16	3	Site Infrastructure	3	367.778	28.411528	3	10.0336	2	18	2	6
1714	1712	210370	714761	379.8116	16.6404	8	0.2	379.6116	1	Not Proven	2	16	3	Site Infrastructure	3	369.9004	30.838867	3	9.9112	1	9	1	3
1715	1713	210380	714761	381.8116	15.85345	8	0.2	381.6116	1	Not Proven	2	16	3	Sensitive Habitat	8	393.7798	33.829699	3	-11.9682	1	24	3	9
1716	1714	210390	714761	383.8116	18.39664	8	0.3	383.5116	1	C	2	16	3	Sensitive Habitat	8	393.7798	27.499792	3	-9.9682	1	24	3	9
1717	1715	210400	714761	385.8116	20.69269	8	0.95	384.8616	2	C	2	32	4	Sensitive Habitat	8	394.7373	23.817383	3	-8.9257	1	24	3	12
1718	1716	210310	714771	364.8116	15.83859	8	0.2	364.6116	1	Not Proven	2	16	3	Site Infrastructure	3	363.303	9.645711	4	1.5086	1	12	2	6
1719	1717	210320	714771	366.8116	18.12255	8	0.15	366.6616	1	Not Proven	2	16	3	Site Infrastructure	3	364.178	8.588116	4	2.6336	1	12	2	6
1720	1718	210330	714771	368.4224	18.13478	8	0.01	368.4124	1	Not Proven	2	16	3	Site Infrastructure	3	366.578	6.591096	4	1.8444	1	12	2	6
1721	1719	210340	714771	370.4757	22.22142	8	0.1	370.3757	1	C	2	16	3	Site Infrastructure	3	367.3781	9.299018	4	3.0976	1	12	2	6
1722	1720	210350	714771	373.4757	21.33529	8	0.15	373.3257	1	C	2	16	3	Site Infrastructure	3	367.778	14.277918	3	5.6977	1	9	1	3
1723	1721	210360	714771	375.8116	17.78193	8	0.2	375.6116	1	C	2	16	3	Site Infrastructure	3	369.9004	18.646172	3	5.9112	1	9	1	3
1724	1722	210370	714771	377.8116	15.79317	8	0.25	377.5616	1	Not Proven	2	16	3	Site Infrastructure	3	369.9004	21.896798	3	7.9112	1	9	1	3
1725	1723	210380	714771	379.8116	14.35163	6	0.45	379.3616	1	Not Proven	2	12	2	Site Infrastructure	3	370.3372	27.071331	3	9.4744	1	9	1	2
1726	1724	210390	714771	380.8116	15.44635	8	0.4	380.4116	1	Not Proven	2	16	3	Site Infrastructure	3	370.178	34.066954	3	10.6336	2	18	2	6
1727	1725	210400	714771	382.8116	16.902	8	0.45	382.3616	1	Not Proven	2	16	3	Sensitive Habitat	8	395.0894	32.761241	3	-12.2778	1	24	3	9
1728	1726	210310	714781	362.0865	18.28987	8	0.4	361.6865	1	Not Proven	2	16	3	Site Infrastructure	3	362.3343	2.478899	4	-0.2478	1	12	2	6
1729	1727	210320	714781	363.8116	16.77756	8	0.1	363.7116	1	Not Proven	2	16	3	Site Infrastructure	3	363.778	0.709183	4	0.0336	1	12	2	6
1730	1728	210330	714781	365.8116	16.09828	8	0.2	365.6116	1	Not Proven	2	16	3	Site Infrastructure	3	365.778	0.709183	4	0.0336	1	12	2	6
1731	1729	210340	714781	367.8116	17.55807	8	0.1	367.7116	1	Not Proven	2	16	3	Site Infrastructure	3	367.778	0.709183	4	0.0336	1	12	2	6
1732	1730	210350	714781	370.4757	21.51567	8	0.15	370.3257	1	Not Proven	2	16	3	Site Infrastructure	3	367.778	7.225188	4	2.6977	1	12	2	6
1733	1731	210360	714781	372.9591	21.33127	8	0.4	372.5591	1	Not Proven	2	16	3	Site Infrastructure	3	369.9004	8.724319	4	3.0587	1	12	2	6
1734	1732	210370	714781	375.0865	20.37321	8	0.1	374.9865	1	Not Proven	2	16	3	Site Infrastructure	3	370.3372	13.019253	3	4.7493	1	9	1	3
1735	1733	210380	714781	377.8116	17.59905	8	0.45	377.3616	1	Not Proven	2	16	3	Site Infrastructure	3	370.178	19.929911	3	7.6336	1	9	1	3
1736	1734	210390	714781	378.8116	13.42235	6	0.45	378.3616	1	Not Proven	2	12	2	Site Infrastructure	3	370.178	27.730693	3	8.6336	1	9	1	2
1737	1735	210400	714781	380.8116	15.79317	8	0.45	380.3616	1	Not Proven	2	16	3	Site Infrastructure	3	370.178	36.616681	3	10.6336	2	18	2	6
1738	1736	210310	714791	359.8116	15.80803	8	0.3	359.5116	1	Not Proven	2	16	3	Site Infrastructure	3	359.778	0.709183	4	0.0336	1	12	2	6
1739	1737	210320	714791	361.8116	15.79317	8	0.4	361.4116	1	Not Proven	2	16	3	Site Infrastructure	3	361.778	0.709183	4	0.0336	1	12	2	6
1740	1738	210330	714791	363.8116	15.79317	8	0.1	363.7116	1	C	2	16	3	Site Infrastructure	3	363.778	0.709183	4	0.0336	1	12	2	6
1741	1739	210340	714791	365.8116	16.24467	8	0.2	365.6116	1	Not Proven	2	16	3	Site Infrastructure	3	365.778	0.709183	4	0.0336	1	12	2	6
1742	1740	210350	714791	367.4757	20.56946	8	0.01	367.4657	1	Not Proven	2	16	3	Site Infrastructure	3	367.4576	0.709183	4	0.0181	1	12	2	6
1743	1741	210360	714791	369.9591	20.01744	8	0.2	369.7591	1	C	2	16	3	Site Infrastructure	3	369.8766	0.709183	4	0.0825	1	12	2	6
1744	1742	210370	714791	372.4757	20.83141	8	0.3	372.1757	1	C	2	16	3	Site Infrastructure	3	370.178	5.817675	4	2.2977	1	12	2	6
1745	1743	210380	714791	374.8116	20.43151	8	0.1	374.7116	1	Not Proven	2	16	3	Site Infrastructure	3	370.178	14.339991	3	4.6336	1	9	1	3
1746	1744	210390	714791	376.9389	19.35728	8	0.2	376.7389	1	Not Proven	2	16	3	Site Infrastructure	3	369.778	23.23131	3	7.1609	1	9	1	3
1747	1745	210400	714791	378.8116	18.7182	8	0.3	378.5116	1	Not Proven	2	16	3	Site Infrastructure	3	369.778	32.733526	3	9.0336	1	9	1	3
1748	1746	210310	714801	357.8116	15.79317	8	0.2	357.6116	1	Not Proven	2	16	3	Site Infrastructure	3	357.778	0.709183	4	0.0336	1	12	2	6
1749	1747	210320	714801	359.8116	15.83859	8	0.3	359.5116	1	Not Proven	2	16	3	Site Infrastructure	3	359.778	0.709183	4	0.0336	1	12	2	6
1750	1748	210330	714801	361.4224	17.55239	8	0.1	361.3224	1	Not Proven	2	16	3	Site Infrastructure	3	361.2578	0.709183	4	0.1646	1	12	2	6
1751	1749	210340	714801	362.9389	17.09787	8	0.1	362.8389	1	Not Proven	2	16	3	Site Infrastructure	3	362.8387	0.709183	4	0.1002	1	12	2	6
1752	1750	210350	714801	364.8116	17.57104	8	0.2	364.6116	1	Not Proven	2	16	3	Site Infrastructure	3	364.778	0.709183	4	0.0336	1	12	2	6
1753	1751	210360	714801	367.0865	20.47539	8	0.2	366.8865	1	Not Proven	2	16	3	Site Infrastructure	3	366.9371	0.709183	4	0.1492	1	12	2	6
1754	1752	210370	714801	369.8116	20.24779	8	0.3	369.5116	1	Not Proven	2	16	3	Site Infrastructure	3	369.3781	1.691432	4	0.4335	1	12	2	6
1755	1753	210380	714801	371.8116	19.82703	8	0.2	371.6116	1	Not Proven	2	16	3	Site Infrastructure	3	369.3781	11.603919	3	2.4335	1	9	1	3
1756	1754	210390	714801	373.8116	19.82703	8	0.45	373.3616	1	Not Proven	2	16	3	Site Infrastructure	3	369.3781	21.597244	3	4.4335	1	9	1	3
1757	1755	210400	714801	375.4224	19.34191	8	0.1	375.3224	1	Not Proven	2	16	3	Site Infrastructure	3	369.3781	31.594793	3	6.0443	1	9	1	3
1758	1756	210310	714811	355.8116	15.79317	8	0.2	355.6116	1	Not Proven	2	16	3	Site Infrastructure	3	356.178	1.479777	4	-0.3664	1	12	2	6
1759	1757	210320	714811	357.4224	15.21978	8	0.15	357.2724	1	Not Proven	2	16	3	Site Infrastructure	3	357.2578	0.709183	4	0.1646	1	12	2	6
1760	1758	210330	714811	358.8116	15.97887	8	0.2	358.6116	1	Not Proven	2	16	3	Site Infrastructure	3	358.778	0.709183	4	0.0336	1	12	2	6
1761	1759	210340	714811	360.8116	15.79317	8	0.1	360.7116	1	Not Proven	2	16	3	Site Infrastructure	3	360.778	0.709183	4	0.0336	1	12	2	6
1762	1760	210350	714811	362.8116	15.83859	8	0.01	362.8016	1	Not Proven	2	16	3	Site Infrastructure	3	362.778	0.709183	4	0.0336	1	12	2	6
1763	1761	210360	714811	364.4224	17.81398	8	0.15	364.2724	1	Not Proven	2	16	3	Site Infrastructure	3	364.2578	0.709183	4	0.1646	1	12	2	6
1764	1762	210370	714811	366.0865	20.9398	8	0.2	365.8865	1	Not Proven	2	16	3	Site Infrastructure	3	365.5373	1.691432	4	0.5492	1	12	2	6
1765	1763	210380	714811	368.0865	21.00017	8	0.35	367.7365	1	Not Proven	2	16	3	Site Infrastructure	3	365.5373	11.603919	3	2.5492	1	9	1	3
1766	1764	210390	714811	370.0865	21.00017	8	0.45	369.6365	1	C	2	16	3	Site Infrastructure	3	365.5373	21.597244	3	4.5492	1	9	1	3
1767	1765	210400	714811	372.0865	21.40725	8	0.45	371.6365	1	Not Proven	2	16	3	Site Infrastructure	3	363.1373	25.205859	3	8.9492	1	9	1	3
1768	1766	210310	714821	353.8116	15.28145	8	0.1	353.7116	1	Not Proven	2	16	3	Site Infrastructure	3	356.178	8.395793	4	-2.3664	1	12	2	6
1769	1767	210320	714821	354.9389	15.30303	8	0.1	354.8389	1	Not Proven	2	16	3	Site Infrastructure	3	355.9437	3.446236	4	-1.0048	1	12	2	6
1770	1768	210330	714821	356.8116	15.79317	8	0.1	356.7116	1	Not Proven	2	16	3	Site Infrastructure	3	356.778	2.132543	4	0.0336	1	12	2	6
1771	1769	210340	714821	358.8116	15.83859	8	0.3	358.5116	1	Not Proven	2	16	3	Site Infrastructure	3	358.778	0.709183	4	0.0336	1	12	2	6
1772	1770	210350	714821	360.4224	16.6939	8	0.1	360.3224	1	Not Proven	2	16	3	Site Infrastructure	3	360.2578	0.709183	4	0.1646	1	12	2	6
1773	1771	210360	714821	361.8116	16.54028	8	0.1	361.7116	1	Not Proven	2	16	3	Site Infrastructure	3	361.778	0.709183	4	0.0336	1	12	2	6
1774	1772	210370	714821	363.0865	19.3381	8	0.4	362.6865	1	Not Proven	2	16	3	Site Infrastructure	3	362.7934	5.767473	4	0.2931	1	12	2	6
1775	1773	210380	714821	365.0865	22.37954	8	4	361.0865	8	Not Proven	2	128	5	Site Infrastructure	3	364.178	14.631109	3	0.9085	1	9	1	3
1776	1774	210390	714821	367.0865	22.92171	8	0.4	366.6865	1	Not Proven	2	16	3	Site Infrastructure	3	362.3372	14.584078	3	4.7493	1	9	1	3
1777	1775	210400	714821	368.9389	20.53389	8	0.4	368.5389	1	Not Proven	2	16	3	Site Infrastructure	3	363.1373	15.613114	3	5.8016	1	9	1	3
1778	1776	210310	714831	351.4224	14.96331	6	0.15	351.2724	1	Not Proven	2	12	2	Site Infrastructure	3	356.178	16.700998	3	-4.7556	1	9	1	2
1779	1777	210320	714831	352.8116	15.6593	8	0.2	352.6116	1	Not Proven	2	16	3	Site Infrastructure	3	355.9437	13.427976	3	-3.1321	1	9	1	3
1780	1778	210330	714831	354.8116	16.71222	8	0.15	354.6616	1	Not Proven	2	16	3	Site Infrastructure	3	357.978	11.395742	3	-3.1664	1	9	1	3
1781	1779	210340	714831	356.4224	17.2763	8	0.1	356.3224	1	Not Proven	2	16	3	Site Infrastructure	3	358.5097	6.989087	4	-2.0873	1	12	2	6
1782	1780	210350	714831	357.8116	15.50069	8	1.5	356.3116	3	Not Proven	2	48	4	Site Infrastructure	3	358.178	1.479777	4	-0.3664	1	12	2	8
1783	1781	210360	714831	358.9389	16.00858	8	0.15	358.7889	1	Not Proven	2	16	3	Site Infrastructure	3	358.8387	0.709183	4	0.1002	1	12	2	6
1784	1782	210370	714831	360.4224	16.73771	8	0.35	360.0724	1	Not Proven	2	16	3	Site Infrastructure	3	359.3809	4.419518	4	1.0415	1	12	2	6
1785	1783	210380	714831	361.8116	17.77298	8	0.4	361.4116	1	Not Proven	2	16	3	Site Infrastructure	3	359.361	8.632296	4	2.4506	1	12	2	6
1786	1784	210390	714831	363.8116	19.82703	8	0.45	363.3616	1	Not Proven	2	16	3	Site Infrastructure	3	362.3372	4.596666	4	1.4744	1	12	2	6
1787	1785	210400	714831	365.4224	19.34191	8	0.45	364.9724	1	Not Proven	2	16	3	Site Infrastructure	3	363.1373	6.76761	4	2.2851	1	12	2	6
1788	1786	210310	714841	349.2749	12.60438	6	0.1	349.1749	1	Not Proven	2	12	2	Site Infrastructure	3	355.9437	25.631124	3	-6.6688	1	9	1	2
1789	1787	210320	714841	350.8116	16.24467	8	0.15	350.6616	1	Not Proven	2	16	3	Site Infrastructure	3	356.778	23.013599	3	-5.9664	1	9	1	3
1790	1788	210330	714841	351.9389	16.71443	8	0.1	351.8389	1	Not Proven	2	16	3	Site Infrastructure	3	358.3781	20.295175	3	-6.4392	1	9	1	3
1791	1789	210340	714841	353.8116	17.01734	8	0.25	353.5616	1	Not Proven	2	16	3	Site Infrastructure	3	358.178	15.454247	3	-4.3664	1	9	1	3
1792	1790	210350	714841	355.4224	17.01983	8	0.2	355.2224	1	Not Proven	2	16	3	Site Infrastructure	3	358.2259	10.402929	3	-2.8035	1	9	1	3
1793	1791	210360	714841	356.8116	15.2929	8	0.35	356.4616	1	Not Proven	2	16	3	Site Infrastructure	3	357.9592	5.582163	4	-1.1476	1	12	2	6
1794	1792	210370	714841	357.8116	15.92118	8	0.4	357.4116	1	Not Proven	2	16	3	Site Infrastructure	3	358.178	1.479777	4	-0.3664	1	12	2	6
1795	1793	210380	714841	358.9389	16.84833	8	0.3	358.6389	1	Not Proven	2	16	3	Site Infrastructure	3	358.8387	0.709183	4	0.1002	1	12	2	6
1796	1794	210390	714841	360.4224	18.75951	8	0.35	360.0724	1	Not Proven	2	16	3	Site Infrastructure	3	360.2578	0.709183	4	0.1646	1	12	2	6
1797	1795	210400	714841	362.0865	20.22889	8	0.45	361.6365	1	Not Proven	2	16	3	Site Infrastructure	3	361.9371	0.709183	4	0.1492	1	12	2	6
1798	1796	210116	716231	269.6151	10.56886	6	1.5	268.1151	3	Not Proven	2	36	4	Minor Watercourse	6	269.8188	24.986111	3	-0.2037	1	18	2	8
1799	1797	210126	716231	271.1502	9.016795	6	0.3	270.8502	1	Not Proven	2	12	2	Minor Watercourse	6	271.0188	19.716819	3	0.1314	1	18	2	4
1800	1798	210136	716231	272.6151	10.75391	6	2	270.6151	3	Not Proven	2	36	4	Minor Watercourse	6	272.6188	17.174881	3	-0.0037	1	18	2	8
1801	1799	210146	716231	274.6151	10.56886	6	0.9	273.7151	2	Not Proven	2	24	3	Minor Watercourse	6	273.4188	16.454475	3	1.1963	1	18	2	6
1802	1800	210156	716231	276.1502	10.28529	6	0.1	276.0502	1	Not Proven	2	12	2	Site Infrastructure	3	277.5114	9.028918	4	-1.3612	1	12	2	4
1803	1801	210166	716231	277.7091	10.00278	6	0.2	277.5091	1	Not Proven	2	12	2	Site Infrastructure	3	277.5114	1.069277	4	0.1977	1	12	2	4
1804	1802	210176	716231	279.6151	10.59185	6	0.3	279.3151	1	Not Proven	2	12	2	Site Infrastructure	3	278.6188	6.662864	4	0.9963	1	12	2	4
1805	1803	210186	716231	281.1502	8.168983	6	0.45	280.7002	1	Not Proven	2	12	2	Minor Watercourse	6	280.4188	8.482131	4	0.7314	1	24	3	6
1806	1804	210196	716231	282.6151	7.834236	4	0.95	281.6651	2	Not Proven	2	16	3	Minor Watercourse	6	281.2188	10.941652	3	1.3963	1	18	2	6
1807	1805	210206	716231	283.6151	9.65952	6	0.2	283.4151	1	Not Proven	2	12	2	Minor Watercourse	6	284.0188	14.730015	3	-0.4037	1	18	2	4
1808	1806	210116	716241	268.7091	9.387755	6	1.95	266.7591	3	Not Proven	2	36	4	Minor Watercourse	6	269.8188	16.60728	3	-1.1097	1	18	2	8
1809	1807	210126	716241	270.6151	10.46979	6	0.45	270.1651	1	Not Proven	2	12	2	Minor Watercourse	6	271.0188	10.965808	3	-0.4037	1	18	2	4
1810	1808	210136	716241	272.6151	10.45576	6	0.95	271.6651	2	Not Proven	2	24	3	Minor Watercourse	6	272.6188	8.15307	4	-0.0037	1	24	3	9
1811	1809	210146	716241	273.7091	9.387755	6	0.15	273.5591	1	Not Proven	2	12	2	Minor Watercourse	6	273.4188	6.499673	4	0.2903	1	24	3	6
1812	1810	210156	716241	275.6151	10.46979	6	0.45	275.1651	1	Not Proven	2	12	2	Minor Watercourse	6	275.4017	6.499673	4	0.2134	1	24	3	6
1813	1811	210166	716241	277.6151	10.45576	6	0.2	277.4151	1	Not Proven	2	12	2	Site Infrastructure	3	277.8188	1.104062	4	-0.2037	1	12	2	4
1814	1812	210176	716241	278.8593	10.53255	6	0.45	278.4093	1	C	2	12	2	Minor Watercourse	6	278.978	1.855412	4	-0.1187	1	24	3	6
1815	1813	210186	716241	280.6151	10.45946	6	0.85	279.7651	2	Not Proven	2	24	3	Minor Watercourse	6	280.4188	1.855412	4	0.1963	1	24	3	9
1816	1814	210196	716241	282.6151	11.1169	6	0.1	282.5151	1	Not Proven	2	12	2	Minor Watercourse	6	282.4188	2.616133	4	0.1963	1	24	3	6
1817	1815	210206	716241	284.6151	10.49899	6	0.1	284.5151	1	Not Proven	2	12	2	Minor Watercourse	6	284.0188	5.335668	4	0.5963	1	24	3	6
1818	1816	210116	716251	268.6151	10.33493	6	0.95	267.6651	2	Not Proven	2	24	3	Minor Watercourse	6	268.6188	8.15307	4	-0.0037	1	24	3	9
1819	1817	210126	716251	269.8593	10.53255	6	0.95	268.9093	2	Not Proven	2	24	3	Minor Watercourse	6	269.8188	2.630542	4	0.0405	1	24	3	9
1820	1818	210136	716251	271.6151	10.75391	6	1.5	270.1151	3	Not Proven	2	36	4	Minor Watercourse	6	271.4188	1.855412	4	0.1963	1	24	3	12
1821	1819	210146	716251	273.6151	10.59185	6	0.2	273.4151	1	Not Proven	2	12	2	Site Infrastructure	3	273.8188	1.104062	4	-0.2037	1	12	2	4
1822	1820	210156	716251	275.1502	8.456589	6	0.2	274.9502	1	Not Proven	2	12	2	Site Infrastructure	3	275.0667	1.069277	4	0.0835	1	12	2	4
1823	1821	210166	716251	276.6151	10.75391	6	0.95	275.6651	2	Not Proven	2	24	3	Site Infrastructure	3	276.4188	1.069277	4	0.1963	1	12	2	6
1824	1822	210176	716251	278.6151	11.18911	6	1.5	277.1151	3	Not Proven	2	36	4	Site Infrastructure	3	278.0188	3.011271	4	0.5963	1	12	2	8
1825	1823	210186	716251	280.6151	11.30993	6	0.95	279.6651	2	Not Proven	2	24	3	Minor Watercourse	6	281.2188	10.03945	3	-0.6037	1	18	2	6
1826	1824	210196	716251	282.6151	11.30993	6	0.2	282.4151	1	Not Proven	2	12	2	Minor Watercourse	6	282.4188	5.667147	4	-0.2037	1	24	3	6
1827	1825	210206	716251	284.6151	11.30993	6	0.1	284.5151	1	Not Proven	2	12	2	Minor Watercourse	6	284.4188	3.706987	4	0.1963	1	24	3	6
1828	1826	210116	716261	267.906	8.300851	6	0.95	266.956	2	Not Proven	2	24	3	Minor Watercourse	6	267.9075	1.069277	4	-0.0015	1	24	3	9
1829	1827	210126	716261	269.6151	10.81528	6	0.8	268.8151	2	Not Proven	2	24	3	Minor Watercourse	6	269.0188	4.654691	4	0.5963	1	24	3	9
1830	1828	210136	716261	271.6151	10.71268	6	0.4	271.2151	1	Not Proven	2	12	2	Site Infrastructure	3	272.4698	5.574132	4	-0.8547	1	12	2	6
1831	1829	210146	716261	273.1502	8.456589	6	0.3	272.8502	1	C	2	12	2	Site Infrastructure	3	273.0667	1.069277	4	0.0835	1	12	2	4
1832	1830	210156	716261	274.6151	10.45946	6	0.95	273.6651	2	C	2	24	3	Site Infrastructure	3	274.4188	1.069277	4	0.1963	1	12	2	6
1833	1831	210166	716261	276.6151	11.30993	6	0.3	276.3151	1	Not Proven	2	12	2	Site Infrastructure	3	276.4188	1.069277	4	0.1963	1	12	2	6
1834	1832	210176	716261	278.6151	11.30993	6	0.4	278.2151	1	Not Proven	2	12	2	Site Infrastructure	3	278.4188	1.069277	4	0.1963	1	12	2	4
1835	1833	210186	716261	280.6151	11.30993	6	0.95	279.6651	2	Not Proven	2	24	3	Site Infrastructure	3	279.2188	6.994037	4	1.3963	1	12	2	6

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
1836	1834	210196	716261	282.6151	11.30993	6	0.3	282.3151	1	Not Proven	2	12	2	Minor Watercourse	6	282.8188	15.608093	3	-0.2037	1	18	2	4
1837	1835	210206	716261	284.6151	11.30993	6	0.95	283.6651	2	Not Proven	2	24	3	Minor Watercourse	6	284.4188	13.610208	3	0.1963	1	18	2	6
1838	1836	210116	716271	268.6151	10.13874	6	1.9	266.7151	3	Not Proven	2	36	4	Minor Watercourse	6	267.6188	9.065812	4	0.9963	1	24	3	12
1839	1837	210126	716271	269.906	7.518541	4	0.95	268.956	2	Not Proven	2	16	3	Site Infrastructure	3	271.3432	13.025842	3	-1.4372	1	9	1	3
1840	1838	210136	716271	271.1502	7.324824	4	0.95	270.2002	2	Not Proven	2	16	3	Site Infrastructure	3	271.3432	3.048697	4	-0.193	1	12	2	6
1841	1839	210146	716271	272.6151	10.02475	6	0.15	272.4651	1	Not Proven	2	12	2	Site Infrastructure	3	272.4188	1.069277	4	0.1963	1	12	2	4
1842	1840	210156	716271	274.6151	11.30993	6	0.3	274.3151	1	Not Proven	2	12	2	Site Infrastructure	3	274.4188	1.069277	4	0.1963	1	12	2	4
1843	1841	210166	716271	276.6151	11.30993	6	0.25	276.3651	1	Not Proven	2	12	2	Site Infrastructure	3	276.4188	1.069277	4	0.1963	1	12	2	4
1844	1842	210176	716271	278.6151	10.71268	6	0.1	278.5151	1	Not Proven	2	12	2	Site Infrastructure	3	278.4188	1.069277	4	0.1963	1	12	2	4
1845	1843	210186	716271	280.1502	10.96418	6	0.95	279.2002	2	Not Proven	2	24	3	Site Infrastructure	3	279.6188	4.999215	4	0.5314	1	12	2	6
1846	1844	210196	716271	282.6151	13.45624	6	0.1	282.5151	1	Not Proven	2	12	2	Site Infrastructure	3	279.6188	14.987133	3	2.9963	1	9	1	2
1847	1845	210206	716271	284.6151	11.30993	6	0.2	284.4151	1	Not Proven	2	12	2	Minor Watercourse	6	284.4188	23.595206	3	0.1963	1	18	2	4
1848	1846	210116	716281	268.6151	9.714373	6	1.9	266.7151	3	Not Proven	2	36	4	Minor Watercourse	6	267.6188	18.267046	3	0.9963	1	18	2	8
1849	1847	210126	716281	270	6.473562	4	0.95	269.05	2	Not Proven	2	16	3	Site Infrastructure	3	272	15.101237	3	-2	1	9	1	3
1850	1848	210136	716281	271.6151	7.471933	4	0.15	271.4651	1	Not Proven	2	8	2	Site Infrastructure	3	272	5.260167	4	-0.3849	1	12	2	4
1851	1849	210146	716281	272.6151	9.300537	6	0.45	272.1651	1	Not Proven	2	12	2	Site Infrastructure	3	272.4188	1.069277	4	0.1963	1	12	2	4
1852	1850	210156	716281	274.6151	11.30993	6	0.1	274.5151	1	Not Proven	2	12	2	Site Infrastructure	3	274.4188	1.069277	4	0.1963	1	12	2	4
1853	1851	210166	716281	276.6151	10.71268	6	0.1	276.5151	1	Not Proven	2	12	2	Site Infrastructure	3	276.4188	1.069277	4	0.1963	1	12	2	4
1854	1852	210176	716281	278.1502	8.456589	6	0.25	277.9002	1	Not Proven	2	12	2	Site Infrastructure	3	278.0667	1.069277	4	0.0835	1	12	2	4
1855	1853	210186	716281	279.6151	10.70338	6	0.2	279.4151	1	Not Proven	2	12	2	Site Infrastructure	3	278.6557	7.156518	4	0.9594	1	12	2	4
1856	1854	210196	716281	281.7653	13.6727	6	0.4	281.3653	1	Not Proven	2	12	2	Site Infrastructure	3	279.4698	16.787226	3	2.2955	1	9	1	2
1857	1855	210206	716281	284.3241	14.95027	6	0.1	284.2241	1	Not Proven	2	12	2	Site Infrastructure	3	279.4698	26.104271	3	4.8543	1	9	1	2
1858	1856	210116	716291	269	6.00694	4	1.85	267.15	3	Not Proven	2	24	3	Site Infrastructure	3	272.3965	25.407238	3	-3.3965	1	9	1	3
1859	1857	210126	716291	270.6151	7.845761	4	0.95	269.6651	2	Not Proven	2	16	3	Site Infrastructure	3	272.3965	15.657259	3	-1.7814	1	9	1	3
1860	1858	210136	716291	271.6151	6.57905	4	0.1	271.5151	1	Not Proven	2	8	2	Site Infrastructure	3	272.3965	6.69117	4	-0.7814	1	12	2	4
1861	1859	210146	716291	272.6151	8.751722	6	0.1	272.5151	1	Not Proven	2	12	2	Site Infrastructure	3	272.4188	1.069277	4	0.1963	1	12	2	4
1862	1860	210156	716291	274.6151	10.71268	6	0.1	274.5151	1	Not Proven	2	12	2	Site Infrastructure	3	274.4188	1.069277	4	0.1963	1	12	2	4
1863	1861	210166	716291	276.1502	8.456589	6	0.45	275.7002	1	Not Proven	2	12	2	Site Infrastructure	3	276.0667	1.069277	4	0.0835	1	12	2	4
1864	1862	210176	716291	277.6151	10.45946	6	0.9	276.7151	2	Not Proven	2	24	3	Site Infrastructure	3	277.4188	1.069277	4	0.1963	1	12	2	6
1865	1863	210186	716291	279.6151	11.30993	6	0.95	278.6651	2	Not Proven	2	24	3	Site Infrastructure	3	278.2188	6.994037	4	1.3963	1	12	2	6
1866	1864	210196	716291	281.6151	11.30993	6	0.1	281.5151	1	C	2	12	2	Site Infrastructure	3	278.2188	16.986423	3	3.3963	1	9	1	2
1867	1865	210206	716291	283.6151	12.80903	6	0.1	283.5151	1	Not Proven	2	12	2	Site Infrastructure	3	278.2188	26.98445	3	5.3963	1	9	1	2
1868	1866	210116	716301	269.4648	7.52323	4	0.95	268.5148	2	Not Proven	2	16	3	Site Infrastructure	3	272.6188	25.025513	3	-3.154	1	9	1	3
1869	1867	210126	716301	270.6151	6.568392	4	0.95	269.6651	2	Not Proven	2	16	3	Site Infrastructure	3	272.6188	15.024918	3	-2.0037	1	9	1	3
1870	1868	210136	716301	271.6151	8.961374	6	0.95	270.6651	2	Not Proven	2	24	3	Site Infrastructure	3	272.6188	5.036879	4	-1.0037	1	12	2	6
1871	1869	210146	716301	273	6.00694	4	0.85	272.15	2	Not Proven	2	16	3	Site Infrastructure	3	273	1.069277	4	0	1	12	2	6
1872	1870	210156	716301	274.1502	7.324824	4	0.15	274.0002	1	Not Proven	2	8	2	Site Infrastructure	3	274.0667	1.069277	4	0.0835	1	12	2	4
1873	1871	210166	716301	275.6151	10.02475	6	0.2	275.4151	1	Not Proven	2	12	2	Site Infrastructure	3	275.4188	1.069277	4	0.1963	1	12	2	4
1874	1872	210176	716301	277.6151	11.30993	6	1.9	275.7151	3	Not Proven	2	36	4	Site Infrastructure	3	277.4188	1.069277	4	0.1963	1	12	2	8
1875	1873	210186	716301	279.6151	11.30993	6	1.4	278.2151	3	Not Proven	2	36	4	Site Infrastructure	3	278.6188	4.999215	4	0.9963	1	12	2	8
1876	1874	210196	716301	281.6151	11.30993	6	1.4	280.2151	3	Not Proven	2	36	4	Site Infrastructure	3	278.6188	14.987133	3	2.9963	1	9	1	4
1877	1875	210206	716301	283.6151	11.30993	6	0.1	283.5151	1	Not Proven	2	12	2	Site Infrastructure	3	278.6188	24.984718	3	4.9963	1	9	1	2
1878	1876	210116	716311	269.6151	7.492287	4	0.45	269.1651	1	Not Proven	2	8	2	Site Infrastructure	3	272.6188	26.788471	3	-3.0037	1	9	1	2
1879	1877	210126	716311	270.6151	7.94943	4	0.95	269.6651	2	Not Proven	2	16	3	Site Infrastructure	3	272.6188	17.811349	3	-2.0037	1	9	1	3
1880	1878	210136	716311	271.906	7.338526	4	0.15	271.756	1	Not Proven	2	8	2	Site Infrastructure	3	273	8.963445	4	-1.094	1	12	2	4
1881	1879	210146	716311	273	5.710593	4	0.3	272.7	1	Not Proven	2	8	2	Site Infrastructure	3	273.2188	3.40496	4	-0.2188	1	12	2	4
1882	1880	210156	716311	274.6151	7.845761	4	0.1	274.5151	1	Not Proven	2	8	2	Site Infrastructure	3	274.4188	1.069277	4	0.1963	1	12	2	4
1883	1881	210166	716311	275.6151	9.300537	6	0.2	275.4151	1	Not Proven	2	12	2	Site Infrastructure	3	275.4188	1.069277	4	0.1963	1	12	2	4
1884	1882	210176	716311	277.6151	11.30993	6	1.9	275.7151	3	Not Proven	2	36	4	Site Infrastructure	3	277.4188	1.069277	4	0.1963	1	12	2	8
1885	1883	210186	716311	279.6151	11.30993	6	0.95	278.6651	2	Not Proven	2	24	3	Site Infrastructure	3	279.0188	3.842987	4	0.5963	1	12	2	6
1886	1884	210196	716311	281.6151	11.30993	6	0.7	280.9151	2	Not Proven	2	24	3	Site Infrastructure	3	279.0188	13.205702	3	2.5963	1	9	1	3
1887	1885	210206	716311	283.6151	11.30993	6	0.1	283.5151	1	Not Proven	2	12	2	Site Infrastructure	3	279.0188	23.108712	3	4.5963	1	9	1	2
1888	1886	210116	716321	269.6151	8.775268	6	0.1	269.5151	1	Not Proven	2	12	2	Site Infrastructure	3	273	31.186461	3	-3.3849	1	9	1	2
1889	1887	210126	716321	270.906	7.732474	4	0.1	270.806	1	Not Proven	2	8	2	Site Infrastructure	3	273	23.069836	3	-2.094	1	9	1	2
1890	1888	210136	716321	272	5.710593	4	0.2	271.8	1	Not Proven	2	8	2	Site Infrastructure	3	273	16.297722	3	-1	1	9	1	2
1891	1889	210146	716321	273.4648	7.52323	4	0.95	272.5148	2	Not Proven	2	16	3	Site Infrastructure	3	273.2188	11.962013	3	0.246	1	9	1	3
1892	1890	210156	716321	274.6151	6.568392	4	0.1	274.5151	1	Not Proven	2	8	2	Site Infrastructure	3	274.8188	7.64302	4	-0.2037	1	12	2	4
1893	1891	210166	716321	275.6151	9.154411	6	0.1	275.5151	1	Not Proven	2	12	2	Site Infrastructure	3	275	9.065812	4	0.6151	1	12	2	4
1894	1892	210176	716321	277.6151	11.30993	6	0.45	277.1651	1	Not Proven	2	12	2	Site Infrastructure	3	278.2188	3.048697	4	-0.6037	1	12	2	4
1895	1893	210186	716321	279.6151	11.30993	6	0.25	279.3651	1	Not Proven	2	12	2	Site Infrastructure	3	279.0188	3.011271	4	0.5963	1	12	2	4
1896	1894	210196	716321	281.6151	11.30993	6	1.3	280.3151	3	C	2	36	4	Site Infrastructure	3	279.3951	12.722726	3	2.22	1	9	1	4
1897	1895	210206	716321	283.6151	11.30993	6	0.1	283.5151	1	Not Proven	2	12	2	Site Infrastructure	3	279.3951	21.942875	3	4.22	1	9	1	2
1898	1896	210741	716534	341.5392	10.75643	6	0.1	341.4392	1	Not Proven	2	12	2	Site Infrastructure	3	336.578	25.464702	3	4.9612	1	9	1	2
1899	1897	210751	716534	342.7748	10.21938	6	0.4	342.3748	1	Not Proven	2	12	2	Site Infrastructure	3	343.2188	27.958023	3	-0.444	1	9	1	2
1900	1898	210761	716534	343.9469	9.518292	6	0.4	343.5469	1	Not Proven	2	12	2	Site Infrastructure	3	343.2188	23.178677	3	0.7281	1	9	1	2
1901	1899	210771	716534	345.5922	8.480515	6	0.3	345.2922	1	Not Proven	2	12	2	Site Infrastructure	3	343.6188	22.039307	3	1.9734	1	9	1	2
1902	1900	210781	716534	346.7748	6.847138	4	0.2	346.5748	1	Not Proven	2	8	2	Site Infrastructure	3	345.0188	20.062628	3	1.756	1	9	1	2
1903	1901	210791	716534	347.7748	9.485692	6	0.1	347.6748	1	Not Proven	2	12	2	Site Infrastructure	3	345.0188	21.865705	3	2.756	1	9	1	2
1904	1902	210801	716534	349.7748	10.54897	6	0.1	349.6748	1	Not Proven	2	12	2	Site Infrastructure	3	346.6188	24.522052	3	3.156	1	9	1	2
1905	1903	210811	716534	351.1826	8.24098	6	0.01	351.1726	1	Not Proven	2	12	2	Site Infrastructure	3	347.3781	29.305171	3	3.8045	1	9	1	2
1906	1904	210821	716534	352.1826	8.049467	6	0.1	352.0826	1	Not Proven	2	12	2	Minor Watercourse	6	350.6188	27.562348	3	1.5638	1	18	2	4
1907	1905	210831	716534	353.1826	8.049467	6	0.1	353.0826	1	Not Proven	2	12	2	Minor Watercourse	6	353.0045	22.910021	3	0.1781	1	18	2	4
1908	1906	210741	716544	340.5392	10.85877	6	0.2	340.3392	1	Not Proven	2	12	2	Site Infrastructure	3	337.0188	16.546995	3	3.5204	1	9	1	2
1909	1907	210751	716544	341.7748	10.58807	6	0.2	341.5748	1	C	2	12	2	Site Infrastructure	3	342.8188	20.696933	3	-1.044	1	9	1	2
1910	1908	210761	716544	343.5922	8.470318	6	0.95	342.6422	2	Not Proven	2	24	3	Site Infrastructure	3	343.2188	14.026441	3	0.3734	1	9	1	3
1911	1909	210771	716544	344.5922	9.730757	6	0.45	344.1422	1	Not Proven	2	12	2	Site Infrastructure	3	343.6188	12.05077	3	0.9734	1	9	1	2
1912	1910	210781	716544	345.9469	8.538088	6	0.45	345.4969	1	C	2	12	2	Site Infrastructure	3	345.0188	10.099458	3	0.9281	1	9	1	2
1913	1911	210791	716544	347.5392	12.06733	6	0.1	347.4392	1	Not Proven	2	12	2	Site Infrastructure	3	346.6188	12.05077	3	0.9204	1	9	1	2
1914	1912	210801	716544	349.5392	12.60438	6	0.1	349.4392	1	Not Proven	2	12	2	Site Infrastructure	3	347.3781	15.578288	3	2.1611	1	9	1	2
1915	1913	210811	716544	351.5392	11.52383	6	0.1	351.4392	1	Not Proven	2	12	2	Site Infrastructure	3	347.3781	21.800575	3	4.1611	1	9	1	2
1916	1914	210821	716544	352.9469	7.955245	4	0.2	352.7469	1	Not Proven	2	8	2	Site Infrastructure	3	350.4188	24.963835	3	2.5281	1	9	1	2
1917	1915	210831	716544	354.1826	9.864865	6	0.1	354.0826	1	Not Proven	2	12	2	Site Infrastructure	3	351.2188	28.994052	3	2.9638	1	9	1	2
1918	1916	210741	716554	339.5392	12.60438	6	0.2	339.3392	1	Not Proven	2	12	2	Site Infrastructure	3	337.8188	7.691232	4	1.7204	1	12	2	4
1919	1917	210751	716554	340.9469	10.21938	6	0.2	340.7469	1	C	2	12	2	Site Infrastructure	3	339.178	12.940674	3	1.7689	1	9	1	2
1920	1918	210761	716554	342.5922	8.582706	6	0.9	341.6922	2	Not Proven	2	24	3	Site Infrastructure	3	342.8188	6.591893	4	-0.2266	1	12	2	6
1921	1919	210771	716554	343.7748	8.73974	6	1.95	341.8248	3	Not Proven	2	36	4	Site Infrastructure	3	343.6188	2.170495	4	0.156	1	12	2	8
1922	1920	210781	716554	344.9469	8.609936	6	0.95	343.9969	2	Not Proven	2	24	3	Site Infrastructure	3	345.0188	1.220266	4	-0.0719	1	12	2	6
1923	1921	210791	716554	346.7748	10.92378	6	0.2	346.5748	1	Not Proven	2	12	2	Site Infrastructure	3	346.6188	2.170495	4	0.156	1	12	2	4
1924	1922	210801	716554	348.7748	11.74977	6	0.1	348.6748	1	Not Proven	2	12	2	Site Infrastructure	3	347.3781	7.691232	4	1.3967	1	12	2	4
1925	1923	210811	716554	350.7748	11.38667	6	0.1	350.6748	1	Not Proven	2	12	2	Site Infrastructure	3	349.6188	14.047172	3	1.156	1	9	1	2
1926	1924	210821	716554	352.7748	11.30993	6	0.1	352.6748	1	Not Proven	2	12	2	Site Infrastructure	3	350.4188	15.578288	3	2.356	1	9	1	2
1927	1925	210831	716554	354.7748	11.30993	6	0.2	354.5748	1	Not Proven	2	12	2	Site Infrastructure	3	351.2188	20.49744	3	3.556	1	9	1	2
1928	1926	210741	716564	338.5392	12.60438	6	0.1	338.4392	1	Not Proven	2	12	2	Site Infrastructure	3	338.3781	0.780417	4	0.1611	1	12	2	4
1929	1927	210751	716564	339.9469	10.02369	6	0.1	339.8469	1	Not Proven	2	12	2	Site Infrastructure	3	339.2188	4.892142	4	0.7281	1	12	2	4
1930	1928	210761	716564	341.5922	10.11719	6	0.4	341.1922	1	Not Proven	2	12	2	Site Infrastructure	3	341.778	1.220266	4	-0.1858	1	12	2	4
1931	1929	210771	716564	342.9469	9.079034	6	0.45	342.4969	1	Not Proven	2	12	2	Site Infrastructure	3	342.9082	0.780417	4	0.0387	1	12	2	4
1932	1930	210781	716564	344.5922	10.33878	6	0.95	343.6422	2	C	2	24	3	Site Infrastructure	3	344.4698	0.780417	4	0.1224	1	12	2	6
1933	1931	210791	716564	345.9469	10.21362	6	0.1	345.8469	1	Not Proven	2	12	2	Site Infrastructure	3	345.9082	0.780417	4	0.0387	1	12	2	4
1934	1932	210801	716564	347.7748	14.02349	6	0.1	347.6748	1	Not Proven	2	12	2	Site Infrastructure	3	347.6188	2.170495	4	0.156	1	12	2	4
1935	1933	210811	716564	350.5392	13.0679	6	0.1	350.4392	1	Not Proven	2	12	2	Site Infrastructure	3	349.6188	4.100372	4	0.9204	1	12	2	4
1936	1934	210821	716564	352.5392	12.60438	6	0.1	352.4392	1	Not Proven	2	12	2	Site Infrastructure	3	351.2188	6.635891	4	1.3204	1	12	2	4
1937	1935	210831	716564	354.7217	13.4022	6	0.45	354.2717	1	Not Proven	2	12	2	Site Infrastructure	3	351.6188	13.439384	3	3.1029	1	9	1	2
1938	1936	210741	716574	337.5392	13.11393	6	0.35	337.1892	1	Not Proven	2	12	2	Site Infrastructure	3	338.4188	5.115178	4	-0.8796	1	12	2	4
1939	1937	210751	716574	339.5392	10.75643	6	0.2	339.3392	1	Not Proven	2	12	2	Site Infrastructure	3	339.3781	0.780417	4	0.1611	1	12	2	4
1940	1938	210761	716574	340.7748	9.156884	6	0.2	340.5748	1	Not Proven	2	12	2	Site Infrastructure	3	340.6188	0.780417	4	0.156	1	12	2	4
1941	1939	210771	716574	341.9469	9.750279	6	0.45	341.4969	1	Not Proven	2	12	2	Site Infrastructure	3	341.9082	0.780417	4	0.0387	1	12	2	4
1942	1940	210781	716574	343.7748	10.45139	6	0.45	343.3248	1	Not Proven	2	12	2	Site Infrastructure	3	343.6188	0.780417	4	0.156	1	12	2	4
1943	1941	210791	716574	345.7748	11.2311	6	0.95	344.8248	2	Not Proven	2	24	3	Site Infrastructure	3	345.6188	0.780417	4	0.156	1	12	2	6
1944	1942	210801	716574	347.7748	11.61501	6	0.8	346.9748	2	C	2	24	3	Site Infrastructure	3	347.6188	0.780417	4	0.156	1	12	2	6
1945	1943	210811	716574	349.7748	11.74977	6	0.2	349.5748	1	Not Proven	2	12	2	Site Infrastructure	3	349.6188	0.780417	4	0.156	1	12	2	4
1946	1944	210821	716574	351.7748	11.38667	6	0.2	351.5748	1	Not Proven	2	12	2	Site Infrastructure	3	351.6188	0.780417	4	0.156	1	12	2	4
1947	1945	210831	716574	353.7748	12.76242	6	0.4	353.3748	1	Not Proven	2	12	2	Site Infrastructure	3	352.0188	9.658833	4	1.756	1	12	2	4
1948	1946	210741	716584	336.367	15.18959	8	0.1	336.267	1	Not Proven	2	16	3	Site Infrastructure	3	338.8188	13.062812	3	-2.4518	1	9	1	3
1949	1947	210751	716584	338.5392	11.5979	6	0.1	338.4392	1	Not Proven	2	12	2	Site Infrastructure	3	339.7854	7.933666	4	-1.2462	1	12	2	4
1950	1948	210761	716584	339.7748	11.14101	6	0.45	339.3248	1	Not Proven	2	12	2	Site Infrastructure	3	340.175	2.321002	4	-0.4002	1	12	2	4
1951	1949	210771	716584	341.7748	11.08878	6	0.45	341.3248	1	Not Proven	2	12	2	Site Infrastructure	3	341.6188	0.780417	4	0.156	1	12	2	4
1952	1950	210781	716584	343.1826	9.26375	6	0.2	342.9826	1	C	2	12	2	Site Infrastructure	3	343.149	0.780417	4	0.0336	1	12	2	4
1953	1951	210791	716584	344.9469	11.18788	6	0.9	344.0469	2	Not Proven	2	24	3	Site Infrastructure	3	344.9082	0.780417	4	0.0387	1	12	2	6
1954	1952	210801	716584	347.0105	12.03929	6	0.95	346.0605	2	Not Proven	2	24	3	Site Infrastructure	3	346.8596	0.780417	4	0.1509	1	12	2	6
1955	1953	210811	716584	349.0105	12.13812	6	0.4	348.6105	1	C	2	12	2	Site Infrastructure	3	348.8596	0.780417	4	0.1509	1	12	2	4
1956	1954	210821	716584	351.5392	12.35813	6	0.1	351.4392	1	Not Proven	2	12	2	Site Infrastructure	3	351.3781	0.780417	4	0.1611	1	12	2	4
1957	1955	210831	716584	353.5392	12.29931	6	0.8	352.7392	2	Not Proven	2	24	3	Site Infrastructure	3	352.0188	9.637689	4	1.5204	1	12	2	6
1958	1956	210741	716594	334.5392	15.79317	8	0.2	334.3392	1	Not Proven	2	16	3	Site Infrastructure	3	339.3713	21.188937	3	-4.8321	1	9	1	3
1959	1957	210751	716594	336.5392	16.189	8	0.2	336.3392	1	Not Proven	2	16	3	Site Infrastructure	3	340.4188	15.438946	3	-3.8796	1	9	1	3
1960	1958	210761	716594	339.5497	16.30457	8	0.2	339.3497	1	C	2	16	3	Site Infrastructure	3	340.8188	7.933666	4	-1.2691	1	12	2	6
1961	1959	210771	716594	341.7748	11.44852	6	1.3	340.4748	3	Not Proven	2	36	4	Site Infrastructure	3	341.6188	2.122981	4	0.156	1	12	2	8
1962	1960	210781	716594	343.7748	6.946086	4	0.45	343.3248	1	Not Proven	2	8	2	Site Infrastructure	3	343.6188	0.780417	4	0.156	1	12	2	4
1963	1961	210791	716594	344.7748	14.30729	6	0.2	344.5748	1	Not Proven	2	12	2	Site Infrastructure	3	344.6188	0.780417	4	0.156	1	12	2	4
1964	1962	210801	716594	347.7748	12.5235	6	0.3	347.4748	1	Not Proven	2	12	2	Site Infrastructure	3	347.6188	0.780417	4	0.156	1	12	2	4
1965	1963	210811	716594	349.7748	10.54897	6	0.45	349.3248	1	Not Proven	2	12	2	Site Infrastructure	3	349.6188	0.780417	4	0.156	1	12	2	4
1966	1964	210821	716594	351.7748	11.98527	6	0.3	351.4748	1	Not Proven	2	12	2	Site Infrastructure	3	351.4596	2.122981	4	0.3152	1	12	2	4
1967	1965	210831	716594	353.7748	12.29931	6	1.35	352.4248	3	Not Proven	2	36	4	Site Infrastructure	3	351.4596	9.637689	4	2.3152	1	12	2	8
1968	1966	210741	716604	332.7748	12.73915	6	0.9	331.8748	2	Not Proven	2	24	3	Site Infrastructure	3	340.4188	29.364112	3	-7.644	1	9	1	3
1969	1967	210751	716604	335.5497	19.65599	8	0.45	335.0997	1	Not Proven	2	16	3	Site Infrastructure	3	340.8188	22.064294	3	-5.2691	1	9	1	3
1970	1968	210761	716604	339.5497	19.37629	8	0.4	339.1497	1	C	2	16	3	Site Infrastructure	3	341.6188	15.112811	3	-2.0691	1	9	1	3
1971	1969	210771	716604	342.6027	11.66063	6	0.45	342.1527	1	Not Proven	2	12	2	Site Infrastructure	3	342.4188	10.481367	3	0.1839	1	9	1	2
1972	1970	210781	716604	343	5.420846	4	0.45	342.55	1	C	2	8	2	Site Infrastructure	3	343.6188	8.012556	4	-0.6188	1	12	2	4
1973	1971	210791	716604	344.7748	15.26453	8	0.3	344.4748	1	Not Proven	2	16	3	Site Infrastructure	3	345.0376	4.157529	4	-0.2628	1	12	2	6
1974	1972	210801	716604	347.7748	12.5235	6	0.45	347.3248	1	Not Proven	2	12	2	Site Infrastructure	3	347.6188	0.780417	4	0.156	1	12	2	4
1975	1973	210811	716604	349.7748	11.30993	6	0.45	349.3248	1	Not Proven	2	12	2	Site Infrastructure	3	349.6188	0.780417	4	0.156	1	12	2	4
1976	1974	210821	716604	351.7748	11.30993	6	0.1	351.6748	1	Not Proven	2	12	2	Site Infrastructure	3	350.8188	6.216514	4	0.956	1	12	2	4
1977	1975	210831	716604	353.9574	13.40496	6	0.3	353.6574	1	Not Proven	2	12	2	Site Infrastructure	3	352.4188	12.102853	3	1.5386	1	9	1	2
1978	1976	210741	716614	331.5392	17.66063	8	0.1	331.4392	1	Not Proven	2	16	3	Site Infrastructure	3	340.8188	36.203909	3	-9.2796	1	9	1	3
1979	1977	210751	716614	335.314	20.56817	8	0.1	335.214	1	Not Proven	2	16	3	Site Infrastructure	3	341.6188	29.193956	3	-6.3048	1	9	1	3
1980	1978	210761	716614	338.5497	21.56658	8	0.4	338.1497	1	Not Proven	2	16	3	Site Infrastructure	3	341.6188	23.830381	3	-3.0691	1	9	1	3
1981	1979	210771	716614	341.7748	12.42906	6	0.1	341.6748	1	Not Proven	2	12	2	Site Infrastructure	3	343.6188	20.201264	3	-1.844	1	9	1	2
1982	1980	210781	716614	343	5.824994	4	0.4	342.6	1	Not Proven	2	8	2	Site Infrastructure	3	345.0376	17.921357	3	-2.0376	1	9	1	2
1983	1981	210791	716614	344.7748	15.25512	8	0.95	343.8248	2	Not Proven	2	32	4	Site Infrastructure	3	346.6376	13.062812	3	-1.8628	1	9	1	4
1984	1982	210801	716614	347.7748	12.71798	6	0.95	346.8248	2	Not Proven	2	24	3	Site Infrastructure	3	348.8188	7.933666	4	-1.044	1	12	2	6
1985	1983	210811	716614	349.7748	11.61501	6	0.2	349.5748	1	Not Proven	2	12	2	Site Infrastructure	3	350.0188	2.321002	4	-0.244	1	12	2	4
1986	1984	210821	716614	351.7748	11.61501	6	0.1	351.6748	1	Not Proven	2	12	2	Site Infrastructure	3	351.6188	0.780417	4	0.156	1	12	2	4
1987	1985	210831	716614	353.7748	13.20226	6	0.2	353.5748	1	Not Proven	2	12	2	Site Infrastructure	3	353.2188	3.439629	4	0.556	1	12	2	4
1988	1986	210741	716624	330.367	18.45921	8	0.1	330.267	1	Not Proven	2	16	3	Site Infrastructure	3	341.6188	43.314859	3	-11.2518	1	9	1	3
1989	1987	210751	716624	334.314	22.93381	8	0.1	334.214	1	Not Proven	2	16	3	Site Infrastructure	3	341.6188	37.306528	3	-7.3048	1	9	1	3
1990	1988	210761	716624	338.1313	21.23495	8	0.1	338.0313	1	Not Proven	2	16	3	Site Infrastructure	3	342.4188	32.760327	3	-4.2875	1	9	1	3
1991	1989	210771	716624	341.314	16.25773	8	0.1	341.214	1	Not Proven	2	16	3	Site Infrastructure	3	343.6188	29.454729	3	-2.3048	1	9	1	3
1992	1990	210781	716624	342.5392	12.12906	6	0.3	342.2392	1	Not Proven	2	12	2	Site Infrastructure	3	345.0376	26.470078	3	-2.4984	1	9	1	2
1993	1991	210791	716624	344.5392	14.43949	6	0.35	344.1892	1	Not Proven	2	12	2	Site Infrastructure	3	348.0188	21.188937	3	-3.4796	1	9	1	2
1994	1992	210801	716624	346.5392	15.81326	8	0.2	346.3392	1	Not Proven	2	16	3	Site Infrastructure	3	349.2188	15.729433	3	-2.6796	1	9	1	3
1995	1993	210811	716624	348.5392	15.79317	8	0.2	348.4392	1	Not Proven	2	16	3	Site Infrastructure	3	351.2188	10.757372	3	-2.6796	1	9	1	3
1996	1994	210821	716624	350.5392	15.81448	8	0.1	350.4392	1	Not Proven	2	16	3	Site Infrastructure	3	351.978	6.097791	4	-1.4388	1	12	2	6
1997	1995	210831	716624	352.7217	16.78883	8	0.1	352.6217	1	Not Proven	2	16	3	Site Infrastructure	3	353.0331	1.220266	4	-0.3114	1	12	2	6
1998	1996	211316	716595	393.5286	5.585433	4	0.35	393.1786	1	Not Proven	2	8	2	Site Infrastructure	3	392	13.752462	3	1.5286	1	9	1	2
1999	1997	211326	716595	392.7159	7.26215	4	0.8	391.9159	2	Not Proven	2	16	3	Site Infrastructure	3	392	7.442728	4	0.7159	1	12	2	6
2000	1998	211336	716595	392	2.295733	2	1.3	390.7	3	Not Proven	2	12	2	Site Infrastructure	3	392	1.077126	4	0	1	12	2	4
2001	1999	211346	716595	392.6027	5.673686	4	0.95	391.6527	2	Not Proven	2	16	3	Site Infrastructure	3	392.0181	3.883581	4	0.5846	1	12	2	6
2002	2000	211356	716595	393	0.425211	1	2.2	390.8	3	Not Proven	2	6	2	Minor Watercourse	6	393	3.40003	4	0	1	24	3	6

ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove =/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
2001	211366	716595	393	0.645094	1	2	391	3	Not Proven	2	6	2	Minor Watercourse	6	393	1.077126	4	0	1	24	3	6
2002	211376	716595	392.6814	5.299807	4	3	389.6814	3	Not Proven	2	24	3	Minor Watercourse	6	392.9412	3.883581	4	-0.2598	1	24	3	9
2003	211386	716595	392	2.779561	2	2	390	3	Not Proven	2	12	2	Minor Watercourse	6	391.8992	8.610238	4	0.1008	1	24	3	6
2004	211396	716595	391.6814	5.69094	4	2.8	388.8814	3	Not Proven	2	24	3	Minor Watercourse	6	391	10.600953	3	0.6814	1	18	2	6
2005	211406	716595	392	6.142081	4	0.9	391.1	2	Not Proven	2	16	2	Minor Watercourse	6	391	15.191122	3	1	1	18	2	6
2006	211316	716605	394	3.214606	2	0.1	393.9	1	Not Proven	2	4	1	Site Infrastructure	3	394.2362	11.109645	3	-0.2362	1	9	1	1
2007	211326	716605	393.7159	6.199289	4	0.2	393.5159	1	Not Proven	2	8	2	Site Infrastructure	3	394	4.687238	4	-0.2841	1	12	2	4
2008	211336	716605	392.7159	7.482628	4	0.1	392.6159	1	Not Proven	2	8	2	Site Infrastructure	3	392.8495	1.077126	4	-0.1336	1	12	2	4
2009	211346	716605	392	4.524087	4	0.1	391.9	1	Not Proven	2	8	2	Site Infrastructure	3	392	1.077126	4	0	1	12	2	4
2010	211356	716605	393	4.300007	4	1.5	391.5	3	Not Proven	2	24	3	Site Infrastructure	3	392.6188	6.708517	4	0.3812	1	12	2	6
2011	211366	716605	392.4714	5.438883	4	1.3	391.1714	3	Not Proven	2	24	3	Minor Watercourse	6	392.9748	9.008341	4	-0.5034	1	24	3	9
2012	211376	716605	392	2.779561	2	0.8	391.2	2	Not Proven	2	8	2	Minor Watercourse	6	392	4.616947	4	0	1	24	3	6
2013	211386	716605	391.6814	5.299807	4	0.45	391.2314	1	Not Proven	2	8	2	Minor Watercourse	6	391.4753	1.217457	4	0.2061	1	24	3	6
2014	211396	716605	391	3.017534	2	0.95	390.05	2	Not Proven	2	8	2	Minor Watercourse	6	391	1.077126	4	0	1	24	3	6
2015	211406	716605	390.6814	7.221742	4	1.6	389.0814	3	Not Proven	2	24	3	Minor Watercourse	6	390.9035	8.287473	4	-0.2221	1	24	3	9
2016	211316	716615	395	3.527205	2	0.1	394.9	1	Not Proven	2	4	1	Site Infrastructure	3	395	6.827459	4	0	1	12	2	2
2017	211326	716615	394.21	5.483443	4	0.1	394.11	1	Not Proven	2	8	2	Site Infrastructure	3	394.3724	1.077126	4	-0.1624	1	12	2	4
2018	211336	716615	393.3973	6.37937	4	0.2	393.1973	1	Not Proven	2	8	2	Site Infrastructure	3	393.5812	1.077126	4	-0.1839	1	12	2	4
2019	211346	716615	392.3973	4.160375	4	0.3	392.0973	1	Not Proven	2	8	2	Site Infrastructure	3	392.5812	1.077126	4	-0.1839	1	12	2	4
2020	211356	716615	392.1873	3.813047	2	0.45	391.7373	1	Not Proven	2	4	1	Site Infrastructure	3	392.2088	1.077126	4	-0.0215	1	12	2	2
2021	211366	716615	392	1.024323	1	2	390	3	Not Proven	2	6	2	Site Infrastructure	3	392	8.2005	4	0	1	12	2	4
2022	211376	716615	391.6814	5.299807	4	0.95	390.7314	2	Not Proven	2	16	2	Minor Watercourse	6	392	12.516477	3	-0.3186	1	18	2	6
2023	211386	716615	391	2.134466	2	0.4	390.6	1	Not Proven	2	4	1	Minor Watercourse	6	391.4753	9.500642	4	-0.4753	1	24	3	3
2024	211396	716615	390.6814	5.081118	4	0.95	389.7314	2	C	2	16	2	Minor Watercourse	6	390.5931	3.40003	4	0.0883	1	24	3	9
2025	211406	716615	390	2.134466	2	1.45	388.55	3	Not Proven	2	12	2	Minor Watercourse	6	390.1369	4.951384	4	-0.1369	1	24	3	6
2026	211316	716625	395	1.861143	1	0.2	394.8	1	Not Proven	2	2	1	Site Infrastructure	3	395	3.131166	4	0	1	12	2	2
2027	211326	716625	394.6814	5.994518	4	0.1	394.5814	1	Not Proven	2	8	2	Site Infrastructure	3	394.7316	1.077126	4	-0.0502	1	12	2	4
2028	211336	716625	393.6814	9.667387	6	0.01	393.6714	1	Not Proven	2	12	2	Site Infrastructure	3	393.7316	1.077126	4	-0.0502	1	12	2	4
2029	211346	716625	392.1873	7.335118	4	0.1	392.0873	1	Not Proven	2	8	2	Site Infrastructure	3	392.2088	1.077126	4	-0.0215	1	12	2	4
2030	211356	716625	392	0.425211	1	0.35	391.65	1	Not Proven	2	2	1	Site Infrastructure	3	392	1.077126	4	0	1	12	2	2
2031	211366	716625	392	3.741939	2	0.4	391.6	1	Not Proven	2	4	1	Site Infrastructure	3	392	1.077126	4	0	1	12	2	2
2032	211376	716625	391	2.719321	2	0.95	390.05	2	Not Proven	2	8	2	Site Infrastructure	3	391.2132	6.708517	4	-0.2132	1	12	2	4
2033	211386	716625	391	2.015414	2	0.45	390.55	1	Not Proven	2	4	1	Site Infrastructure	3	391	14.490003	3	0	1	9	1	1
2034	211396	716625	390.1873	4.463842	4	0.95	389.2373	2	Not Proven	2	16	2	Minor Watercourse	6	390	7.87148	4	0.1873	1	24	3	9
2035	211406	716625	390	1.337132	1	0.45	389.55	1	Not Proven	2	2	1	Minor Watercourse	6	390	1.7995	4	0	1	24	3	3
2036	211316	716635	394.0741	9.306571	6	0.3	393.7741	1	Not Proven	2	12	2	Site Infrastructure	3	394.816	4.616947	4	-0.7419	1	12	2	4
2037	211326	716635	393.4714	10.83033	6	0.1	393.3714	1	Not Proven	2	12	2	Site Infrastructure	3	393.3592	1.077126	4	0.1122	1	12	2	4
2038	211336	716635	391.8687	12.03656	6	0.1	391.7687	1	Not Proven	2	12	2	Site Infrastructure	3	391.9404	1.077126	4	-0.0717	1	12	2	4
2039	211346	716635	391	4.436214	4	0.45	390.55	1	Not Proven	2	8	2	Site Infrastructure	3	391	1.077126	4	0	1	12	2	4
2040	211356	716635	391.4714	5.585876	4	0.2	391.2714	1	Not Proven	2	8	2	Site Infrastructure	3	391.3592	1.077126	4	0.1122	1	12	2	4
2041	211366	716635	391.1873	4.509372	4	0.3	390.8873	1	Not Proven	2	8	2	Site Infrastructure	3	391.2088	1.077126	4	-0.0215	1	12	2	4
2042	211376	716635	391	0.379229	1	0.2	390.8	1	Not Proven	2	2	1	Site Infrastructure	3	391	1.077126	4	0	1	12	2	2
2043	211386	716635	390.6814	5.173425	4	0.4	390.2814	1	Not Proven	2	8	2	Site Infrastructure	3	391	10.933901	3	-0.3186	1	9	1	2
2044	211396	716635	390	1.916879	1	0.2	389.8	1	Not Proven	2	2	1	Minor Watercourse	6	390	15.190135	3	0	1	18	2	2
2045	211406	716635	390.6027	4.759138	4	0.95	389.6527	2	Not Proven	2	16	2	Minor Watercourse	6	390.0155	9.008341	4	0.5872	1	24	3	9
2046	211316	716645	392.4714	10.2047	6	0.3	392.1714	1	Not Proven	2	12	2	Site Infrastructure	3	392.9829	11.738577	3	-0.5115	1	9	1	2
2047	211326	716645	391.8687	12.939	6	0.2	391.6687	1	Not Proven	2	12	2	Site Infrastructure	3	391.9404	7.442728	4	-0.0717	1	12	2	4
2048	211336	716645	390.4714	7.898193	4	0.3	390.1714	1	Not Proven	2	8	2	Site Infrastructure	3	390.3592	1.077126	4	0.1122	1	12	2	4
2049	211346	716645	390.4714	5.710593	4	0.45	390.0214	1	Not Proven	2	8	2	Site Infrastructure	3	390.3592	1.077126	4	0.1122	1	12	2	4
2050	211356	716645	390.4714	5.585433	4	0.8	389.6714	2	Not Proven	2	16	2	Site Infrastructure	3	390.3592	1.077126	4	0.1122	1	12	2	6
2051	211366	716645	391	3.538174	2	0.4	390.6	1	Not Proven	2	4	1	Site Infrastructure	3	391	1.077126	4	0	1	12	2	2
2052	211376	716645	391	3.806903	2	0.35	390.65	1	Not Proven	2	4	1	Site Infrastructure	3	391	1.077126	4	0	1	12	2	2
2053	211386	716645	390.1873	4.395621	4	0.45	389.7373	1	Not Proven	2	8	2	Site Infrastructure	3	390.7493	7.378225	4	-0.562	1	12	2	4
2054	211396	716645	390	3.103665	2	0.4	389.6	1	Not Proven	2	4	1	Site Infrastructure	3	390	15.498523	3	0	1	9	1	1
2055	211406	716645	391	3.834037	2	0.1	390.9	1	C	2	4	1	Minor Watercourse	6	390.0155	18.163981	3	0.9845	1	18	2	2
2056	211316	716655	390.5714	8.604675	6	0.9	389.5714	2	Not Proven	2	24	3	Site Infrastructure	3	392.9829	19.66149	3	-2.5115	1	9	1	3
2057	211326	716655	389.8687	9.724713	6	0.8	389.0687	2	Not Proven	2	24	3	Site Infrastructure	3	390	10.58481	3	-0.1313	1	9	1	3
2058	211336	716655	390	3.695032	2	0.1	389.9	1	Not Proven	2	4	1	Site Infrastructure	3	390	3.131166	4	0	1	12	2	2
2059	211346	716655	390	3.018505	2	0.1	389.9	1	Not Proven	2	4	1	Site Infrastructure	3	390	1.077126	4	0	1	12	2	2
2060	211356	716655	390	3.59384	2	0.95	389.05	2	Not Proven	2	8	2	Site Infrastructure	3	390	1.077126	4	0	1	12	2	4
2061	211366	716655	390	5.487655	4	0.85	389.15	2	Not Proven	2	16	2	Site Infrastructure	3	390	1.077126	4	0	1	12	2	6
2062	211376	716655	390	5.372369	4	0.1	389.9	1	Not Proven	2	8	2	Site Infrastructure	3	390	1.707689	4	0	1	12	2	4
2063	211386	716655	390	3.018501	2	0.1	389.9	1	Not Proven	2	4	1	Site Infrastructure	3	389.9592	2.721066	4	0.0408	1	12	2	2
2064	211396	716655	390.3186	4.581129	4	0.1	390.2186	1	Not Proven	2	8	2	Site Infrastructure	3	389.3432	9.535523	4	0.9754	1	12	2	4
2065	211406	716655	390.6814	5.862352	4	0.35	390.3314	1	Not Proven	2	8	2	Site Infrastructure	3	389.0181	18.019218	3	1.6633	1	9	1	2
2066	211316	716665	389.4714	7.270094	4	0.4	389.0714	1	Not Proven	2	8	2	Site Infrastructure	3	390	24.544413	3	-0.5286	1	9	1	2
2067	211326	716665	389	5.292072	4	0.2	388.8	1	Not Proven	2	8	2	Site Infrastructure	3	390	16.130536	3	-1	1	9	1	2
2068	211336	716665	389	5.487655	4	0.1	388.9	1	Not Proven	2	8	2	Site Infrastructure	3	389.9592	9.008341	4	-0.9592	1	12	2	4
2069	211346	716665	389	5.710593	4	0.1	388.9	1	Not Proven	2	8	2	Site Infrastructure	3	389.1592	4.616947	4	-0.1592	1	12	2	4
2070	211356	716665	389	5.710593	4	0.9	388.1	2	Not Proven	2	16	2	Site Infrastructure	3	389	1.7995	4	0	1	12	2	6
2071	211366	716665	389	5.710593	4	0.95	388.05	2	Not Proven	2	16	2	Site Infrastructure	3	389.1592	3.559804	4	-0.1592	1	12	2	6
2072	211376	716665	389	5.710593	4	0.45	388.55	1	Not Proven	2	8	2	Site Infrastructure	3	389.5592	7.442728	4	-0.5592	1	12	2	4
2073	211386	716665	389	5.119913	4	0.15	388.85	1	Not Proven	2	8	2	Site Infrastructure	3	389	1.217457	4	0	1	12	2	4
2074	211396	716665	389.79	6.623934	4	0.4	389.39	1	Not Proven	2	8	2	Site Infrastructure	3	389.0181	3.883581	4	0.7719	1	12	2	4
2075	211406	716665	389.6814	6.750402	4	0.4	389.2814	1	Not Proven	2	8	2	Site Infrastructure	3	389	11.007734	3	0.6814	1	9	1	2
2076	211316	716675	388.1873	7.208542	4	0.95	387.2373	2	Not Proven	2	16	2	Site Infrastructure	3	390	30.175888	3	-1.8127	1	9	1	3
2077	211326	716675	388	5.710593	4	0.45	387.55	1	Not Proven	2	8	2	Site Infrastructure	3	389.9592	23.055156	3	-1.9592	1	9	1	2
2078	211336	716675	388	5.710593	4	0.9	387.1	2	Not Proven	2	16	2	Site Infrastructure	3	389.5592	17.911399	3	-1.5592	1	9	1	3
2079	211346	716675	388	5.710593	4	0.2	387.8	1	Not Proven	2	8	2	Site Infrastructure	3	389.1592	13.787538	3	-1.1592	1	9	1	2
2080	211356	716675	388	5.710593	4	0.8	387.2	2	Not Proven	2	16	2	Site Infrastructure	3	389	9.928958	4	-1	1	12	2	6
2081	211366	716675	388	5.710593	4	0.95	387.05	2	Not Proven	2	16	2	Site Infrastructure	3	389	11.703598	3	-1	1	9	1	3
2082	211376	716675	388	5.33136	4	0.95	387.05	2	Not Proven	2	16	2	Site Infrastructure	3	388.9926	13.346018	3	-0.9926	1	9	1	3
2083	211386	716675	388.2841	5.693295	4	0.2	388.0841	1	C	2	8	2	Site Infrastructure	3	389	6.134998	4	-0.7159	1	12	2	4
2084	211396	716675	389	5.200809	4	0.1	388.9	1	Not Proven	2	8	2	Site Infrastructure	3	389	1.077126	4	0	1	12	2	4
2085	211406	716675	389	4.440414	4	0.3	388.7	1	Not Proven	2	8	2	Site Infrastructure	3	388.9592	3.883581	4	0.0408	1	12	2	4
2086	211316	716685	387	3.887645	2	0.1	386.9	1	C	2	4	1	Site Infrastructure	3	389.9592	37.174322	3	-2.9592	1	9	1	1
2087	211326	716685	387	5.460623	4	1.45	385.55	3	Not Proven	2	24	3	Site Infrastructure	3	389.9592	31.310065	3	-2.9592	1	9	1	3
2088	211336	716685	387	5.710593	4	2	385	3	C	2	24	3	Site Infrastructure	3	389.1592	26.841874	3	-2.1592	1	9	1	3
2089	211346	716685	387	5.710593	4	1.4	385.6	3	Not Proven	2	24	3	Site Infrastructure	3	389	23.430198	3	-2	1	9	1	3
2090	211356	716685	387	5.710593	4	2.1	384.9	3	Not Proven	2	24	3	Site Infrastructure	3	389	19.68157	3	-2	1	9	1	3
2091	211366	716685	387	5.710593	4	0.95	386.05	2	Not Proven	2	16	2	Site Infrastructure	3	389	20.633812	3	-2	1	9	1	3
2092	211376	716685	387	6.113678	4	0.95	386.05	2	C	2	16	2	Site Infrastructure	3	389	20.199708	3	-2	1	9	1	3
2093	211386	716685	387.4714	6.37937	4	2	385.4714	3	Not Proven	2	24	3	Site Infrastructure	3	389	13.097717	3	-1.5286	1	9	1	3
2094	211396	716685	388	5.976285	4	1.5	386.5	3	Not Proven	2	24	3	Site Infrastructure	3	388.1592	6.134998	4	-0.1592	1	12	2	6
2095	211406	716685	388	5.710593	4	0.1	387.9	1	Not Proven	2	8	2	Site Infrastructure	3	388	1.077126	4	0	1	12	2	4
2096	210324	716824	270.5086	8.523617	6	0.4	270.1086	1	Not Proven	2	12	2	Site Infrastructure	3	271.4596	6.992857	4	-0.951	1	12	2	4
2097	210334	716824	272	7.548104	4	0.3	271.7	1	Not Proven	2	8	2	Site Infrastructure	3	272	0.673833	4	0	1	12	2	4
2098	210344	716824	273	8.112565	6	0.1	272.9	1	Not Proven	2	12	2	Site Infrastructure	3	272.2188	5.657566	4	0.7812	1	12	2	4
2099	210354	716824	274.5981	14.49232	6	0.3	274.2981	1	Not Proven	2	12	2	Site Infrastructure	3	274.6596	3.472989	4	-0.0615	1	12	2	4
2100	210364	716824	276.5981	14.22816	6	0.1	276.4981	1	Not Proven	2	12	2	Site Infrastructure	3	276.2596	1.426482	4	0.3385	1	12	2	4
2101	210374	716824	278.2979	11.33312	6	0.1	278.1979	1	Not Proven	2	12	2	Site Infrastructure	3	278.4188	1.807111	4	-0.1209	1	12	2	4
2102	210384	716824	279.5981	12.16555	6	0.45	279.1481	1	Not Proven	2	12	2	Site Infrastructure	3	279.6596	0.673833	4	-0.0615	1	12	2	4
2103	210394	716824	281.3002	12.21882	6	0.45	280.8502	1	Not Proven	2	12	2	Site Infrastructure	3	281.6596	5.023828	4	-0.3594	1	12	2	4
2104	210404	716824	281.5086	9.78818	6	0.1	281.4086	1	Not Proven	2	12	2	Site Infrastructure	3	282.8408	10.678186	3	-1.3322	1	9	1	2
2105	210414	716824	282	5.710593	4	0.3	281.7	1	Not Proven	2	8	2	Site Infrastructure	3	283.6408	17.787334	3	-1.6408	1	9	1	2
2106	210324	716834	271.5086	8.100969	6	0.9	270.6086	2	Not Proven	2	24	3	Site Infrastructure	3	272.0171	12.333501	3	-0.5085	1	9	1	3
2107	210334	716834	272.5086	8.049467	6	0.35	272.1586	1	Not Proven	2	12	2	Site Infrastructure	3	272.6884	3.472989	4	-0.1798	1	12	2	4
2108	210344	716834	273.5981	11.13272	6	0.01	273.5881	1	C	2	12	2	Site Infrastructure	3	273.2596	1.426482	4	0.3385	1	12	2	4
2109	210354	716834	275.5981	13.50343	6	0.1	275.4981	1	Not Proven	2	12	2	Site Infrastructure	3	276.8596	6.611479	4	-1.2615	1	12	2	4
2110	210364	716834	277.5981	12.50697	6	0.45	277.1481	1	Not Proven	2	12	2	Site Infrastructure	3	277.6596	0.673833	4	-0.0615	1	12	2	4
2111	210374	716834	279.5981	13.29826	6	0.1	279.4981	1	Not Proven	2	12	2	Site Infrastructure	3	279.6596	0.673833	4	-0.0615	1	12	2	4
2112	210384	716834	281.2979	11.87204	6	0.1	281.1979	1	Not Proven	2	12	2	Site Infrastructure	3	281.4188	0.673833	4	-0.1209	1	12	2	4
2113	210394	716834	283.0894	10.53767	6	0.3	282.7894	1	Not Proven	2	12	2	Site Infrastructure	3	283.1008	0.673833	4	-0.0114	1	12	2	4
2114	210404	716834	283.3002	10.67737	6	0.3	283.0002	1	Not Proven	2	12	2	Site Infrastructure	3	283.6408	3.798322	4	-0.3406	1	12	2	4
2115	210414	716834	283.3002	9.420975	6	0.1	283.2002	1	Not Proven	2	12	2	Site Infrastructure	3	283.6408	13.503009	3	-0.3406	1	9	1	2
2116	210324	716844	272.2979	9.150147	6	0.2	272.0979	1	Not Proven	2	12	2	Site Infrastructure	3	272.6884	17.609647	3	-0.3905	1	9	1	2
2117	210334	716844	273.2979	6.963436	4	0.45	272.8479	1	Not Proven	2	8	2	Site Infrastructure	3	273.6344	9.125615	4	-0.3365	1	12	2	4
2118	210344	716844	274.5086	8.826838	6	0.2	274.3086	1	Not Proven	2	12	2	Site Infrastructure	3	274.5587	0.673833	4	-0.0501	1	12	2	4
2119	210354	716844	276.2979	11.08329	6	0.1	276.1979	1	Not Proven	2	12	2	Site Infrastructure	3	275.6188	3.798322	4	0.6791	1	12	2	4
2120	210364	716844	278.2979	11.43923	6	0.2	278.0979	1	Not Proven	2	12	2	Site Infrastructure	3	278.4188	0.673833	4	-0.1209	1	12	2	4
2121	210374	716844	280.2873	12.99523	6	0.1	280.1873	1	Not Proven	2	12	2	Site Infrastructure	3	280.5197	0.673833	4	-0.1324	1	12	2	4
2122	210384	716844	282.3873	13.28423	6	0.1	282.2873	1	Not Proven	2	12	2	Site Infrastructure	3	282.5197	0.673833	4	-0.1324	1	12	2	4
2123	210394	716844	284.5086	10.48823	6	0.2	284.3086	1	Not Proven	2	12	2	Site Infrastructure	3	284.5587	0.673833	4	-0.0501	1	12	2	4
2124	210404	716844	284.7916	5.295278	4	0.1	284.6916	1	Not Proven	2	8	2	Site Infrastructure	3	284.9857	1.426482	4	-0.1941	1	12	2	4
2125	210414	716844	284.3002	5.909795	4	0.45	283.8502	1	Not Proven	2	8	2	Site Infrastructure	3	284.9857	11.399072	3	-0.6855	1	9	1	2
2126	210324	716854	272.2979	9.43107	6	0.2	272.0979	1	Not Proven	2	12	2	Site Infrastructure	3	274.5587	23.034497	3	-2.2608	1	9	1	2
2127	210334	716854	273.2979	7.705976	4	0.4	272.8979	1	C	2	8	2	Site Infrastructure	3	275.0334	14.090225	3	-1.7355	1	9	1	2
2128	210344	716854	275.2979	10.56806	6	0.4	274.8979	1	Not Proven	2	12	2	Site Infrastructure	3	275.6596	6.298353	4	-0.3617	1	12	2	4
2129	210354	716854	277.0894	10.22851	6	0.1	276.9894	1	Not Proven	2	12	2	Site Infrastructure	3	277.1008	0.673833	4	-0.0114	1	12	2	4
2130	210364	716854	278.5981	13.1843	6	0.2	278.3981	1	Not Proven	2	12	2	Site Infrastructure	3	278.6596	0.673833	4	-0.0615	1	12	2	4
2131	210374	716854	281.2979	13.94553	6	0.1	281.1979	1	Not Proven	2	12	2	Site Infrastructure	3	281.4188	0.673833	4	-0.1209	1	12	2	4
2132	210384	716854	283.2979	11.11464	6	0.1	283.1979	1	Not Proven	2	12	2	Site Infrastructure	3	283.4188	0.673833	4	-0.1209	1	12	2	4
2133	210394	716854	284.7892	5.40323	4	0.2	284.5892	1	Not Proven	2	8	2	Site Infrastructure	3	284.8601	0.673833	4	-0.0709	1	12	2	4
2134	210404	716854	285	1.133843	1	0.1	284.9	1	Not Proven	2	2	1	Site Infrastructure	3	285	1.426482	4	0	1	12	2	2
2135	210414	716854	285	0.422068	1	0.3	284.7	1	Not Proven	2	2	1	Site Infrastructure	3	285	6.543673	4	0	1	12	2	2
2136	210324	716864	272	6.893505	4	0.4	271.6	1	Not Proven	2	8	2	Site Infrastructure	3	275.0334	27.86705	3	-3.0334	1	9	1	2
2137	210334	716864	273.2979	10.67857	6	0.45	272.8479	1	Not Proven	2	12	2	Site Infrastructure	3	276.6188	19.538415	3	-3.3209	1	9	1	2
2138	210344	716864	275.2979	11.30993	6	0.25	275.0479	1	Not Proven	2	12	2	Site Infrastructure	3	277.4188	11.442327	3	-2.1209	1	9	1	2
2139	210354	716864	277.2979	11.30993	6	0.2	277.0979	1	Not Proven	2	12	2	Site Infrastructure	3	277.8188	2.621689	4	-0.5209	1	12	2	4
2140	210364	716864	279.2979	11.30993	6	0.3	278.9979	1	Not Proven	2	12	2	Site Infrastructure	3	279.0188	1.426482	4	0.2791	1	12	2	4
2141	210374	716864	281.2084	9.445683	6	0.95	280.2584	2	Not Proven	2	24	3	Site Infrastructure	3	281.318	0.673833	4	-0.1096	1	12	2	6
2142	210384	716864	282.9977	11.49261	6	0.01	282.9877	1	C	2	12	2	Site Infrastructure	3	283.178	0.673833	4	-0.1803	1	12	2	4
2143	210394	716864	284	4.678444	4	0.1	283.9	1	Not Proven	2	8	2	Site Infrastructure	3	284	0.673833	4	0	1	12	2	4
2144	210404	716864	284.2084	5.790494	4	0.95	283.2584	2	Not Proven	2	16	2	Site Infrastructure	3	284.318	0.673833	4	-0.1096	1	12	2	6
2145	210414	716864	285	2.743781	2	0.9	284.1	2	Not Proven	2	8	2	Site Infrastructure	3	285	1.426482	4	0	1	12	2	4
2146	210324	716874	271.2979	7.766747	4	0.1	271.1979	1	Not Proven	2	8	2	Site Infrastructure	3	276.6188	33.463228	3	-5.3209	1	9	1	2
2147	210334	716874	273.2979	11.30993	6	0.45	272.8479	1	Not Proven	2	12	2	Site Infrastructure	3	277.8188	24.839631	3	-4.5209	1	9	1	2
2148	210344	716874	275.2979	11.30993	6	0.45	274.8479	1	Not Proven	2	12	2	Site Infrastructure	3	277.8188	16.276094	3	-2.5209	1	9	1	2
2149	210354	716874	277.2979	11.30993	6	0.1	277.1979	1	Not Proven	2	12	2	Site Infrastructure	3	278.6188	7.879623	4	-1.3209	1	12	2	4
2150	210364	716874	279.2979	10.50156	6	0.1	279.1979	1	Not Proven	2	12	2	Site Infrastructure	3	279.4188	0.673833	4	-0.1209	1	12	2	4
2151	210374	716874	280.7892	7.293407	4	0.1	280.6892	1	Not Proven	2	8	2	Site Infrastructure	3	281	2.375384	4	-0.2108	1	12	2	4
2152	210384	716874	282.2979	9.725947	6	0.25	282.0479	1	Not Proven	2	12	2	Site Infrastructure	3	282.4188	0.673833	4	-0.1209	1	12	2	4
2153	210394	716874	283	4.865231	4	0.3	282.7	1	Not Proven	2	8	2	Site Infrastructure	3	283	0.673833	4	0	1	12	2	4
2154	210404	716874	283.7892	5.63557	4	0.3	283.4892	1	C	2	8	2	Site Infrastructure	3	283.8601	0.673833	4	-0.0709	1	12	2	4
2155	210414	716874	284	4.420496	4	0.4	283.6	1	Not Proven	2	8	2	Site Infrastructure	3	284.1592	2.687611	4	-0.1592	1	12	2	4
2156	210324	716884	271.2979	10.67857	6	0.25	271.0479	1	Not Proven	2	12	2	Site Infrastructure	3	277.8188	38.406318	3	-6.5209	1	9	1	2
2157	210334	716884	273.2979	11.30993	6	0.45	272.8479	1	Not Proven	2	12	2	Site Infrastructure	3	278.6188	30.203021	3	-5.3209	1	9	1	2
2158	210344	716884	275.2979	11.30993	6	0.3	274.9979	1	Not Proven	2	12	2	Site Infrastructure	3	278.6188	21.911788	3	-3.3209	1	9	1	2
2159	210354	716884	277.2979	10.50156	6	0.95	276.3479	2	Not Proven	2	24	3	Site Infrastructure	3	279.4579	13.317134	3	-2.16	1	9	1	3
2160	210364	716884	278.7892	8.448604	6	2	276.7892	3	Not Proven	2	36	4	Site Infrastructure	3	279.4579	5.024943	4	-0.6687	1	12	2	8
2161	210374	716884	280.2979	10.56367	6	0.95	279.3479	2	Not Proven	2	24	3	Site Infrastructure	3	280.4188	0.673833	4	-0.1209	1	12	2	6
2162	210384	716884	282	6.037454	4	0.25	281.75	1	Not Proven	2	8	2	Site Infrastructure	3	282	0.673833	4	0	1	12	2	4
2163	210394	716884	282.2979	5.631451	4	0.45	281.8479	1	Not Proven	2	8	2	Site Infrastructure	3	282.4188	0.673833	4	-0.1209	1	12	2	4
2164	210404	716884	283	2.835293	2	0.95	282.05	2	Not Proven	2	8	2	Site Infrastructure	3	283	1.426482	4	0	1	12	2	4
2165	210414	716884	284	5.125698	4	0.2	283.8	1	Not Proven	2	8	2	Site Infrastructure	3	283.1304	7.743749	4	0.8696	1	12	2	4
2166	210324	716894	271.2979	11.30993	6	0.9	270.3979	2	Not Proven	2	24	3	Site Infrastructure	3	278.6188	43.934729	3	-7.3209	1	9	1	3
2167	210334	716894	273.2979	11.30993	6	0.95	272.3479	2	Not Proven	2	24	3	Site Infrastructure	3	279.4579	35.601686	3	-6.16	1	9	1	3

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
2170	2168	210344	716894	275.2979	10.50156	6	0.3	274.9979	1	Not Proven	2	12	2	Site Infrastructure	3	279.4579	26.746664	3	-4.16	1	9	1	2
2171	2169	210354	716894	276.7892	8.448604	6	0.95	275.8392	2	Not Proven	2	24	3	Site Infrastructure	3	279.6188	18.562361	3	-2.8296	1	9	1	3
2172	2170	210364	716894	278.2979	10.56367	6	1.9	276.3979	3	Not Proven	2	36	4	Site Infrastructure	3	279.6188	10.604964	3	-1.3209	1	9	1	4
2173	2171	210374	716894	280.2084	9.144435	6	0.9	279.3084	2	Not Proven	2	24	3	Site Infrastructure	3	280.4188	2.375384	4	-0.2104	1	12	2	6
2174	2172	210384	716894	281.2979	7.481713	4	0.1	281.1979	1	Not Proven	2	8	2	Site Infrastructure	3	281.4188	0.673833	4	-0.1209	1	12	2	4
2175	2173	210394	716894	282.2084	4.973757	4	0.25	281.9584	1	Not Proven	2	8	2	Site Infrastructure	3	282	5.657566	4	0.2084	1	12	2	4
2176	2174	210404	716894	283	3.648676	2	0.1	282.9	1	Not Proven	2	4	1	Site Infrastructure	3	283	10.391191	3	0	1	9	1	1
2177	2175	210414	716894	284	5.604154	4	0.45	283.55	1	Not Proven	2	8	2	Site Infrastructure	3	283.1304	14.349483	3	0.8696	1	9	1	2
2178	2176	210324	716904	271.2979	11.30993	6	0.15	271.1479	1	Not Proven	2	12	2	Site Infrastructure	3	279.4579	49.046081	3	-8.16	1	9	1	2
2179	2177	210334	716904	273.2979	10.50156	6	0.45	272.8479	1	Not Proven	2	12	2	Site Infrastructure	3	279.4579	40.662293	3	-6.16	1	9	1	2
2180	2178	210344	716904	274.7892	8.448604	6	0.1	274.6892	1	Not Proven	2	12	2	Site Infrastructure	3	279.6188	32.289306	3	-4.8296	1	9	1	2
2181	2179	210354	716904	276.2979	9.87019	6	0.95	275.3479	2	Not Proven	2	24	3	Site Infrastructure	3	280.4188	23.995342	3	-4.1209	1	9	1	3
2182	2180	210364	716904	277.9977	10.49473	6	2	275.9977	3	Not Proven	2	36	4	Site Infrastructure	3	280.2941	15.090489	3	-2.2964	1	9	1	4
2183	2181	210374	716904	279.2979	9.01591	6	1.8	277.4979	3	Not Proven	2	36	4	Site Infrastructure	3	280.6188	6.992857	4	-1.3209	1	12	2	8
2184	2182	210384	716904	280.7892	8.071691	6	0.9	279.8892	2	Not Proven	2	24	3	Site Infrastructure	3	280.8601	0.673833	4	-0.0709	1	12	2	6
2185	2183	210394	716904	281.7892	6.219742	4	0.45	281.3392	1	Not Proven	2	8	2	Site Infrastructure	3	281.3713	2.201466	4	0.4179	1	12	2	4
2186	2184	210404	716904	282.7892	6.37937	4	0.4	282.3892	1	Not Proven	2	8	2	Site Infrastructure	3	281.3713	11.521738	3	1.4179	1	9	1	2
2187	2185	210414	716904	283.7892	5.726484	4	0.1	283.6892	1	Not Proven	2	8	2	Site Infrastructure	3	282.4995	12.886662	3	1.2897	1	9	1	2
2188	2186	210324	716914	271.2979	10.83283	6	0.15	271.1479	1	Not Proven	2	12	2	Site Infrastructure	3	279.6188	54.522777	3	-8.3209	1	9	1	2
2189	2187	210334	716914	272.7892	8.355599	6	0.45	272.3392	1	Not Proven	2	12	2	Site Infrastructure	3	279.6188	46.267021	3	-6.8296	1	9	1	2
2190	2188	210344	716914	274.2084	9.32373	6	1.9	272.3084	3	Not Proven	2	36	4	Site Infrastructure	3	280.2941	37.387924	3	-6.0857	1	9	1	4
2191	2189	210354	716914	275.7892	9.818007	6	0.95	274.8392	2	Not Proven	2	24	3	Site Infrastructure	3	280.2941	29.081968	3	-4.5049	1	9	1	3
2192	2190	210364	716914	277.2084	9.039246	6	0.95	276.2584	2	Not Proven	2	24	3	Site Infrastructure	3	280.6188	20.662479	3	-3.4104	1	9	1	3
2193	2191	210374	716914	278.2979	10.27783	6	0.95	277.3479	2	Not Proven	2	24	3	Site Infrastructure	3	280.4188	12.333501	3	-2.1209	1	9	1	3
2194	2192	210384	716914	280.2084	8.212471	6	0.1	280.1084	1	Not Proven	2	12	2	Site Infrastructure	3	280.8188	3.472989	4	-0.6104	1	12	2	4
2195	2193	210394	716914	281.2084	6.902581	4	0.45	280.7584	1	Not Proven	2	8	2	Site Infrastructure	3	281.318	0.673833	4	-0.1096	1	12	2	4
2196	2194	210404	716914	282.2084	6.37937	4	0.45	281.7584	1	Not Proven	2	8	2	Site Infrastructure	3	282.1505	1.807111	4	0.0579	1	12	2	4
2197	2195	210414	716914	283.2084	6.37937	4	0.45	282.7584	1	Not Proven	2	8	2	Site Infrastructure	3	282.4995	5.657566	4	0.7089	1	12	2	4
2198	2196	210920	717140	315	3.835572	2	0.95	314.05	2	Not Proven	2	8	2	Site Infrastructure	3	315	1.10734	4	0	1	12	2	4
2199	2197	210930	717140	315	3.329192	2	0.3	314.7	1	Not Proven	2	4	1	Site Infrastructure	3	315	1.054041	4	0	1	12	2	2
2200	2198	210940	717140	315.1971	5.508045	4	0.95	314.2471	2	Not Proven	2	16	3	Site Infrastructure	3	314.8601	6.132194	4	0.337	1	12	2	6
2201	2199	210950	717140	316	4.753544	4	0.45	315.55	1	Not Proven	2	8	2	Site Infrastructure	3	315.0105	11.856365	3	0.9895	1	9	1	2
2202	2200	210960	717140	317	4.987929	4	2.6	314.4	3	Not Proven	2	24	3	Site Infrastructure	3	314.978	17.466144	3	2.022	1	9	1	3
2203	2201	210970	717140	317.6932	5.351054	4	1.8	315.8932	3	Not Proven	2	24	3	Site Infrastructure	3	314.5592	23.495442	3	3.134	1	9	1	3
2204	2202	210980	717140	318.1971	5.072132	4	3.1	315.0971	8	Not Proven	2	64	5	Site Infrastructure	3	315.3592	26.522937	3	2.8379	1	9	1	5
2205	2203	210990	717140	319	5.057528	4	4	315	8	Not Proven	2	64	5	Site Infrastructure	3	314.9592	30.487411	3	4.0408	1	9	1	5
2206	2204	211000	717140	319.6932	5.330184	4	3.8	315.8932	8	Not Proven	2	64	5	Site Infrastructure	3	314.9592	35.90134	3	4.734	1	9	1	5
2207	2205	211010	717140	320	3.127129	2	3.25	316.75	8	Not Proven	2	32	4	Site Infrastructure	3	314.6557	42.836647	3	5.3443	1	9	1	4
2208	2206	210920	717150	313.6478	22.21071	8	0.01	313.6378	1	Not Proven	2	16	3	Site Infrastructure	3	314.8029	9.512466	4	-1.1551	1	12	2	6
2209	2207	210930	717150	314	10.01665	6	0.1	313.9	1	Not Proven	2	12	2	Site Infrastructure	3	314.0188	3.870375	4	-0.0188	1	12	2	4
2210	2208	210940	717150	315	6.195509	4	0.2	314.8	1	Not Proven	2	8	2	Site Infrastructure	3	315	1.054041	4	0	1	12	2	4
2211	2209	210950	717150	315.6932	7.510508	4	0.95	314.7432	2	Not Proven	2	16	3	Site Infrastructure	3	314.978	3.719436	4	0.7152	1	12	2	6
2212	2210	210960	717150	316.1971	6.584894	4	1.2	314.9971	3	Not Proven	2	24	3	Site Infrastructure	3	314.5592	10.04011	3	1.6379	1	9	1	3
2213	2211	210970	717150	317	5.661269	4	0.25	316.75	1	Not Proven	2	8	2	Site Infrastructure	3	314.7592	13.911398	3	2.2408	1	9	1	2
2214	2212	210980	717150	317.6932	6.340443	4	1.4	316.2932	3	Not Proven	2	24	3	Site Infrastructure	3	315.3592	17.078003	3	2.334	1	9	1	3
2215	2213	210990	717150	318.1971	6.584894	4	0.95	317.2471	2	Not Proven	2	16	3	Site Infrastructure	3	314.9592	21.855759	3	3.2379	1	9	1	3
2216	2214	211000	717150	319	4.318948	4	2	317	3	Not Proven	2	24	3	Site Infrastructure	3	314.6557	28.697996	3	4.3443	1	9	1	3
2217	2215	211010	717150	319	3.2947	2	2	317	3	Not Proven	2	12	2	Site Infrastructure	3	314.6795	36.131369	3	4.3205	1	9	1	2
2218	2216	210920	717160	308.5836	26.90183	8	0.1	308.4836	1	Not Proven	2	16	3	Site Infrastructure	3	309.062	8.980902	4	-0.4784	1	12	2	6
2219	2217	210930	717160	311.5836	21.31832	8	0.1	311.4836	1	Not Proven	2	16	3	Site Infrastructure	3	312.01	1.10734	4	-0.4264	1	12	2	6
2220	2218	210940	717160	313.4773	11.02179	6	0.45	313.0273	1	Not Proven	2	12	2	Site Infrastructure	3	313.5592	1.054041	4	-0.0819	1	12	2	4
2221	2219	210950	717160	314.1971	9.472571	6	0.1	314.0971	1	Not Proven	2	12	2	Site Infrastructure	3	314.1224	1.054041	4	0.0747	1	12	2	4
2222	2220	210960	717160	314.8904	10.49736	6	0.1	314.7904	1	Not Proven	2	12	2	Site Infrastructure	3	314.3781	1.863492	4	0.5123	1	12	2	4
2223	2221	210970	717160	315.6932	9.665829	6	0.4	315.2932	1	Not Proven	2	12	2	Site Infrastructure	3	314.7592	4.660365	4	0.934	1	12	2	4
2224	2222	210980	717160	316.4773	9.497905	6	0.2	316.2773	1	Not Proven	2	12	2	Site Infrastructure	3	314.9592	8.151209	4	1.5181	1	12	2	4
2225	2223	210990	717160	317.1971	9.25213	6	0.1	317.0971	1	Not Proven	2	12	2	Site Infrastructure	3	314.6557	14.571994	3	2.5414	1	9	1	2
2226	2224	211000	717160	318.1971	8.790364	6	0.1	318.0971	1	Not Proven	2	12	2	Site Infrastructure	3	314.6795	22.231595	3	3.5176	1	9	1	2
2227	2225	211010	717160	319	4.087692	4	0.9	318.1	2	Not Proven	2	16	3	Site Infrastructure	3	314.3781	30.272321	3	4.6219	1	9	1	3
2228	2226	210920	717170	305.3034	19.56423	8	0.35	304.9534	1	Not Proven	2	16	3	Site Infrastructure	3	307.2122	5.045454	4	-1.9088	1	12	2	6
2229	2227	210930	717170	308.7807	23.89822	8	0.1	308.6807	1	Not Proven	2	16	3	Site Infrastructure	3	308.5561	1.054041	4	0.2246	1	12	2	6
2230	2228	210940	717170	311.8904	15.98952	8	0.2	311.6904	1	Not Proven	2	16	3	Site Infrastructure	3	311.778	1.054041	4	0.1124	1	12	2	6
2231	2229	210950	717170	312.6932	8.487407	6	0.1	312.5932	1	Not Proven	2	12	2	Site Infrastructure	3	312.6557	1.054041	4	0.0375	1	12	2	4
2232	2230	210960	717170	313.4773	8.642069	6	0.25	313.2273	1	Not Proven	2	12	2	Site Infrastructure	3	313.5592	1.054041	4	-0.0819	1	12	2	4
2233	2231	210970	717170	314.1971	9.472571	6	0.45	313.7471	1	Not Proven	2	12	2	Site Infrastructure	3	314.1224	1.054041	4	0.0747	1	12	2	4
2234	2232	210980	717170	314.6932	9.105669	6	0.1	314.5932	1	Not Proven	2	12	2	Site Infrastructure	3	314.6557	1.054041	4	0.0375	1	12	2	4
2235	2233	210990	717170	315.6932	9.085165	6	0.1	315.5932	1	Not Proven	2	12	2	Site Infrastructure	3	314.3713	8.935894	4	1.3219	1	12	2	4
2236	2234	211000	717170	316.6932	9.085165	6	0.1	316.5932	1	Not Proven	2	12	2	Site Infrastructure	3	314.3781	16.284391	3	2.3151	1	9	1	2
2237	2235	211010	717170	317.6932	8.758286	6	0.1	317.5932	1	Not Proven	2	12	2	Site Infrastructure	3	313.778	22.453307	3	3.9152	1	9	1	2
2238	2236	210920	717180	304.1971	10.53813	6	0.2	303.9971	1	Not Proven	2	12	2	Site Infrastructure	3	304.978	5.045454	4	-0.7809	1	12	2	4
2239	2237	210930	717180	306.0875	18.53671	8	0.2	305.8875	1	Not Proven	2	16	3	Site Infrastructure	3	305.9004	1.054041	4	0.1871	1	12	2	6
2240	2238	210940	717180	309.3034	22.53229	8	0.45	308.8534	1	Not Proven	2	16	3	Site Infrastructure	3	308.9969	1.054041	4	0.3065	1	12	2	6
2241	2239	210950	717180	311.4773	11.39003	6	0.3	311.1773	1	Not Proven	2	12	2	Site Infrastructure	3	311.5592	1.054041	4	-0.0819	1	12	2	4
2242	2240	210960	717180	312.1971	9.033765	6	0.2	311.9971	1	Not Proven	2	12	2	Site Infrastructure	3	312.1224	1.054041	4	0.0747	1	12	2	4
2243	2241	210970	717180	312.6932	8.487407	6	0.35	312.3432	1	Not Proven	2	12	2	Site Infrastructure	3	312.6557	1.054041	4	0.0375	1	12	2	4
2244	2242	210980	717180	313.4773	9.301198	6	0.3	313.1773	1	Not Proven	2	12	2	Site Infrastructure	3	313.5592	1.054041	4	-0.0819	1	12	2	4
2245	2243	210990	717180	314.6932	10.27626	6	0.15	314.5432	1	Not Proven	2	12	2	Site Infrastructure	3	313.978	3.370074	4	0.7152	1	12	2	4
2246	2244	211000	717180	315.4773	9.301198	6	0.1	315.3773	1	Not Proven	2	12	2	Site Infrastructure	3	314.3592	8.935894	4	1.1181	1	12	2	4
2247	2245	211010	717180	316.4773	10.26891	6	0.2	316.2773	1	Not Proven	2	12	2	Site Infrastructure	3	313.7592	14.471068	3	2.7181	1	9	1	2
2248	2246	210920	717190	303.4131	8.642069	6	0.95	302.4631	2	Not Proven	2	24	3	Site Infrastructure	3	304.8188	8.297506	4	-1.4057	1	12	2	6
2249	2247	210930	717190	304.6932	9.200724	6	0.95	303.7432	2	Not Proven	2	24	3	Site Infrastructure	3	304.9681	2.597961	4	-0.2749	1	12	2	6
2250	2248	210940	717190	306.6102	18.29062	8	0.95	305.6602	2	Not Proven	2	32	4	Site Infrastructure	3	306.3412	1.054041	4	0.269	1	12	2	8
2251	2249	210950	717190	309.6932	15.06084	8	0.1	309.5932	1	Not Proven	2	16	3	Site Infrastructure	3	309.6557	1.054041	4	0.0375	1	12	2	6
2252	2250	210960	717190	310.4773	10.10812	6	0.15	310.3273	1	Not Proven	2	12	2	Site Infrastructure	3	310.5592	1.054041	4	-0.0819	1	12	2	4
2253	2251	210970	717190	311.4773	9.560247	6	0.1	311.3773	1	Not Proven	2	12	2	Site Infrastructure	3	311.5592	1.054041	4	-0.0819	1	12	2	4
2254	2252	210980	717190	312.1971	8.661377	6	0.2	311.9971	1	Not Proven	2	12	2	Site Infrastructure	3	312.1224	1.054041	4	0.0747	1	12	2	4
2255	2253	210990	717190	313.1971	10.00887	6	0.2	312.9971	1	Not Proven	2	12	2	Site Infrastructure	3	313.3461	1.10734	4	-0.149	1	12	2	4
2256	2254	211000	717190	313.8904	10.49736	6	0.1	313.7904	1	Not Proven	2	12	2	Site Infrastructure	3	313.778	1.054041	4	0.1124	1	12	2	4
2257	2255	211010	717190	314.4773	10.57549	6	0.1	314.3773	1	Not Proven	2	12	2	Site Infrastructure	3	313.7592	6.132194	4	0.7181	1	12	2	4
2258	2256	210920	717200	302.6932	8.443012	6	0.9	301.7932	2	Not Proven	2	24	3	Site Infrastructure	3	304.9681	15.346576	3	-2.2749	1	9	1	3
2259	2257	210930	717200	304.1971	8.487407	6	0.95	303.2471	2	Not Proven	2	24	3	Site Infrastructure	3	305.0188	10.841282	3	-0.8217	1	9	1	3
2260	2258	210940	717200	305.4131	10.2743	6	0.1	305.3131	1	Not Proven	2	12	2	Site Infrastructure	3	307.4722	8.297506	4	-2.0591	1	12	2	4
2261	2259	210950	717200	307.0875	15.59938	8	0.95	306.1375	2	Not Proven	2	32	4	Site Infrastructure	3	307.5241	1.10734	4	-0.4366	1	12	2	8
2262	2260	210960	717200	309.1971	10.11235	6	0.45	308.7471	1	Not Proven	2	12	2	Site Infrastructure	3	309.1224	1.054041	4	0.0747	1	12	2	4
2263	2261	210970	717200	309.8904	10.34037	6	0.45	309.4404	1	Not Proven	2	12	2	Site Infrastructure	3	309.778	1.054041	4	0.1124	1	12	2	4
2264	2262	210980	717200	310.6932	10.04546	6	0.9	309.7932	2	Not Proven	2	24	3	Site Infrastructure	3	310.6557	1.054041	4	0.0375	1	12	2	6
2265	2263	210990	717200	311.4773	10.94215	6	0.1	311.3773	1	Not Proven	2	12	2	Site Infrastructure	3	312.178	8.111461	4	-0.7007	1	12	2	4
2266	2264	211000	717200	312.4773	11.14822	6	0.1	312.3773	1	Not Proven	2	12	2	Site Infrastructure	3	312.9592	3.870375	4	-0.4819	1	12	2	4
2267	2265	211010	717200	312.8904	11.62301	6	0.2	312.6904	1	Not Proven	2	12	2	Site Infrastructure	3	312.9592	3.825468	4	-0.0688	1	12	2	4
2268	2266	210920	717210	302.4131	8.94348	6	0.1	302.3131	1	Not Proven	2	12	2	Site Infrastructure	3	304.9681	24.160079	3	-2.555	1	9	1	2
2269	2267	210930	717210	303.4131	7.680053	4	0.25	303.1631	1	Not Proven	2	8	2	Site Infrastructure	3	305.0188	20.633114	3	-1.6057	1	9	1	2
2270	2268	210940	717210	305.1971	8.348598	6	0.2	304.9971	1	Not Proven	2	12	2	Site Infrastructure	3	307.5241	15.16556	3	-2.327	1	9	1	2
2271	2269	210950	717210	306.4131	9.631428	6	0.3	306.1131	1	Not Proven	2	12	2	Site Infrastructure	3	307.3501	8.9384	4	-0.937	1	12	2	4
2272	2270	210960	717210	307.4773	9.951124	6	0.1	307.3773	1	Not Proven	2	12	2	Site Infrastructure	3	308.7592	6.482762	4	-1.2819	1	12	2	4
2273	2271	210970	717210	308.4773	10.58844	6	0.95	307.5273	2	Not Proven	2	24	3	Site Infrastructure	3	309.1661	6.482764	4	-0.6888	1	12	2	6
2274	2272	210980	717210	308.8904	12.60438	6	1.5	307.3904	3	Not Proven	2	36	4	Site Infrastructure	3	309.3592	5.317199	4	-0.4688	1	12	2	8
2275	2273	210990	717210	309.4773	11.84462	6	0.45	309.0273	1	Not Proven	2	12	2	Site Infrastructure	3	309.3592	13.700241	3	0.1181	1	9	1	2
2276	2274	211000	717210	310.4773	12.0697	6	0.8	309.6773	2	Not Proven	2	24	3	Site Infrastructure	3	312.5592	11.560649	3	-2.0819	1	9	1	3
2277	2275	211010	717210	310.8904	12.60438	6	0.1	310.7904	1	Not Proven	2	12	2	Site Infrastructure	3	312.5592	11.53571	3	-1.6688	1	9	1	2
2278	2276	210920	717220	302.1971	8.348598	6	0.2	301.9971	1	Not Proven	2	12	2	Site Infrastructure	3	305.0188	33.083129	3	-2.8217	1	9	1	2
2279	2277	210930	717220	303.1971	8.173226	6	0.2	302.9971	1	Not Proven	2	12	2	Site Infrastructure	3	307.5241	29.304645	3	-4.327	1	9	1	2
2280	2278	210940	717220	304.1971	9.18368	6	0.4	303.7971	1	Not Proven	2	12	2	Site Infrastructure	3	307.3501	22.553559	3	-3.153	1	9	1	2
2281	2279	210950	717220	305.1971	10.00887	6	0.2	304.9971	1	Not Proven	2	12	2	Site Infrastructure	3	308.4405	17.851583	3	-3.2434	1	9	1	2
2282	2280	210960	717220	305.8904	10.49736	6	0.45	305.4404	1	Not Proven	2	12	2	Site Infrastructure	3	308.7592	16.438315	3	-2.8688	1	9	1	2
2283	2281	210970	717220	306.4773	10.94996	6	0.4	306.0773	1	Not Proven	2	12	2	Site Infrastructure	3	309.3592	15.261894	3	-2.8819	1	9	1	2
2284	2282	210980	717220	306.8904	12.60438	6	0.45	306.4404	1	Not Proven	2	12	2	Site Infrastructure	3	309.3592	14.712736	3	-2.4688	1	9	1	2
2285	2283	210990	717220	307.4773	11.84462	6	0.2	307.2773	1	Not Proven	2	12	2	Site Infrastructure	3	309.3592	19.387847	3	-1.8819	1	9	1	2
2286	2284	211000	717220	308.4773	12.0697	6	0.2	308.2773	1	Not Proven	2	12	2	Site Infrastructure	3	312.5592	21.020005	3	-4.0819	1	9	1	2
2287	2285	211010	717220	308.8904	12.60438	6	0.2	308.6904	1	Not Proven	2	12	2	Site Infrastructure	3	312.5592	21.006299	3	-3.6688	1	9	1	2
2288	2286	210920	717230	300.8904	10.34037	6	0.3	300.5904	1	Not Proven	2	12	2	Minor Watercourse	6	295.9592	35.90134	3	4.9312	1	18	2	4
2289	2287	210930	717230	301.6932	10.04546	6	0.45	301.2432	1	Not Proven	2	12	2	Site Infrastructure	3	307.3501	36.570904	3	-5.6569	1	9	1	2
2290	2288	210940	717230	302.6932	10.21938	6	0.2	302.4932	1	Not Proven	2	12	2	Site Infrastructure	3	307.3501	31.25468	3	-4.6569	1	9	1	2
2291	2289	210950	717230	303.4773	10.94215	6	0.15	303.3273	1	Not Proven	2	12	2	Site Infrastructure	3	308.4405	27.328941	3	-4.9632	1	9	1	2
2292	2290	210960	717230	304.4773	11.14822	6	0.2	304.2773	1	Not Proven	2	12	2	Site Infrastructure	3	308.7592	26.427452	3	-4.2819	1	9	1	2
2293	2291	210970	717230	304.6932	9.338562	6	0.1	304.5932	1	Not Proven	2	12	2	Site Infrastructure	3	309.3592	24.922227	3	-4.666	1	9	1	2
2294	2292	210980	717230	305.1971	8.84195	6	0.1	305.0971	1	Not Proven	2	12	2	Site Infrastructure	3	309.3592	24.589766	3	-4.1621	1	9	1	2
2295	2293	210990	717230	305.4773	11.78376	6	0.1	305.3773	1	Not Proven	2	12	2	Site Infrastructure	3	309.3592	27.642008	3	-3.8819	1	9	1	2
2296	2294	211000	717230	306.1705	13.11862	6	0.1	306.0705	1	Not Proven	2	12	2	Site Infrastructure	3	312.5592	30.822599	3	-6.3887	1	9	1	2
2297	2295	211010	717230	306.8904	13.36312	6	0.95	305.9404	2	Not Proven	2	24	3	Site Infrastructure	3	312.5592	30.813254	3	-5.6688	1	9	1	3
2298	2296	211179	716978	348.3378	7.231459	4	0.5	347.8378	1	Not Proven	2	8	2	Minor Watercourse	6	348.9592	3.181069	4	-0.6214	1	24	3	6
2299	2297	211189	716978	348.8679	9.614706	6	0.4	348.4679	1	Not Proven	2	12	2	Minor Watercourse	6	349.318	6.588171	4	-0.4501	1	24	3	6
2300	2298	211199	716978	349.3378	7.736197	4	0.2	349.1378	1	Not Proven	2	8	2	Minor Watercourse	6	349.318	15.506192	3	0.0198	1	18	2	4
2301	2299	211209	716978	349.8679	8.121399	6	0.2	349.6679	1	Not Proven	2	12	2	Minor Watercourse	6	349.318	25.248366	3	0.5499	1	18	2	4
2302	2300	211219	716978	350	7.495275	4	0.45	349.55	1	Not Proven	2	8	2	Site Infrastructure	3	347.1592	23.558608	3	2.8408	1	9	1	2
2303	2301	211229	716978	350.9193	9.932646	6	0.95	349.9693	2	Not Proven	2	24	3	Site Infrastructure	3	347.1592	23.715303	3	3.7601	1	9	1	3
2304	2302	211239	716978	352.257	11.13524	6	0.45	351.807	1	Not Proven	2	12	2	Site Infrastructure	3	347.7735	26.44624	3	4.4835	1	9	1	2
2305	2303	211249	716978	353.257	9.157859	6	0.1	353.157	1	Not Proven	2	12	2	Site Infrastructure	3	347.7735	30.601333	3	5.4835	1	9	1	2
2306	2304	211259	716978	353	6.190532	4	0.1	352.9	1	Not Proven	2	8	2	Site Infrastructure	3	347.1592	34.23587	3	5.8408	1	9	1	2
2307	2305	211269	716978	353.3378	7.284951	4	0.9	352.4378	2	Not Proven	2	16	3	Site Infrastructure	3	346.8601	35.872831	3	6.4777	1	9	1	3
2308	2306	211179	716988	346.9193	9.511161	6	0.2	346.7193	1	Not Proven	2	12	2	Minor Watercourse	6	346.9845	1.235637	4	-0.0652	1	24	3	6
2309	2307	211189	716988	347.8679	7.160116	4	0.6	347.2679	2	Not Proven	2	16	3	Minor Watercourse	6	347.7638	8.173836	4	0.1041	1	24	3	9
2310	2308	211199	716988	347.9193	8.21405	6	0.1	347.8193	1	Not Proven	2	12	2	Site Infrastructure	3	346.1592	13.569967	3	1.7601	1	9	1	2
2311	2309	211209	716988	348.3378	7.231459	4	0.1	348.2378	1	Not Proven	2	8	2	Site Infrastructure	3	346.1661	15.566528	3	2.1717	1	9	1	2
2312	2310	211219	716988	348.9193	8.660134	6	0.3	348.6193	1	Not Proven	2	12	2	Site Infrastructure	3	347.1592	13.569967	3	1.7601	1	9	1	2
2313	2311	211229	716988	349.8679	9.099015	6	0.4	349.4679	1	Not Proven	2	12	2	Site Infrastructure	3	347.1592	13.840217	3	2.7087	1	9	1	2
2314	2312	211239	716988	350.9193	9.525238	6	0.3	350.6193	1	Not Proven	2	12	2	Site Infrastructure	3	347.7735	16.986453	3	3.1458	1	9	1	2
2315	2313	211249	716988	351.8679	9.17339	6	0.95	350.9179	2	Not Proven	2	24	3	Site Infrastructure	3	347.0105	22.606592	3	4.8574	1	9	1	3
2316	2314	211259	716988	351.8679	11.30993	6	0.3	351.5679	1	Not Proven	2	12	2	Site Infrastructure	3	347.1592	24.520008	3	4.7087	1	9	1	2
2317	2315	211269	716988	351.8679	11.30993	6	1.8	350.0679	3	Not Proven	2	36	4	Site Infrastructure	3	346.8601	25.999923	3	5.0078	1	9	1	4
2318	2316	211179	716998	345.3378	10.24325	6	0.2	345.1378	1	Not Proven	2	12	2	Minor Watercourse	6	345.5936	1.235637	4	-0.2558	1	24	3	6
2319	2317	211189	716998	345.9193	9.511161	6	0.25	345.6693	1	Not Proven	2	12	2	Site Infrastructure	3	345.6557	1.762725	4	0.2636	1	12	2	4
2320	2318	211199	716998	346.8679	9.107307	6	0.25	346.6179	1	Not Proven	2	12	2	Site Infrastructure	3	346.1592	3.644173	4	0.7087	1	12	2	4
2321	2319	211209	716998	346.9193	9.211486	6	0.2	346.7193	1	Not Proven	2	12	2	Site Infrastructure	3	346.1661	5.60828	4	0.7532	1	12	2	4
2322	2320	211219	716998	347.8679	8.881396	6	0.3	347.5679	1	Not Proven	2	12	2	Site Infrastructure	3	347.1592	3.644173	4	0.7087	1	12	2	4
2323	2321	211229	716998	348.257	10.39399	6	0.45	347.807	1	Not Proven	2	12	2	Site Infrastructure	3	347.1592	4.548362	4	1.0978	1	12	2	4
2324	2322	211239	716998	349.3378	10.76769	6	0.4	348.9378	1	Not Proven	2	12	2	Site Infrastructure	3	347.7735	8.813376	4	1.5643	1	12	2	4
2325	2323	211249	716998	349.8679	11.42664	6	0.3	349.5679	1	Not Proven	2	12	2	Site Infrastructure	3	347.0105	13.423636	3	2.8574	1	9	1	2
2326	2324	211259	716998	349.8679	11.30993	6	0.4	349.4679	1	Not Proven	2	12	2	Site Infrastructure	3	347.1592	15.177839	3	2.7087	1	9	1	2
2327	2325	211269	716998	349.8679	10.84865	6	1.5	348.3679	3	Not Proven	2	36	4	Site Infrastructure	3	346.8601	16.282874	3	3.0078	1	9	1	4
2328	2326	211179	717008	343.8679	10.16751	6	0.95	342.9179	2	Not Proven	2	24	3	Minor Watercourse	6	343.96	3.181069	4	-0.0921	1	24	3	9
2329	2327	211189	717008	344.3378	10.39867	6	0.8	343.5378	2	Not Proven	2	24	3	Site Infrastructure	3	345.3592	3.993294	4	-1.0214	1	12	2	6
2330	2328	211199	717008	344.9193	9.511161	6	0.1	344.8193	1	Not Proven	2	12	2	Site Infrastructure	3	345.3592	2.600308	4	-0.4399	1	12	2	4
2331	2329	211209	717008	345.8679	9.17339	6	0.1	345.7679	1	Not Proven	2	12	2	Site Infrastructure	3	345.7679	0.966644	4	-0.0913	1	12	2	4
2332	2330	211219	717008	346.257	10.18119	6	0.1	346.157	1	Not Proven	2	12	2	Site Infrastructure	3	346.178	0.966644	4	0.079	1	12	2	4
2333	2331	211229	717008	346.8679	9.213881	6	0.3	346.5679	1	Not Proven	2	12	2	Site Infrastructure	3	346.9592	0.966644	4	-0.0913	1	12	2	4
2334	2332	211239	717008	346.9193	13.18442	6	0.1	346.8193	1	Not Proven	2	12	2	Site Infrastructure	3	346.6557	1.762725	4	0.2636	1	12	2	4
2335	2333	211249	717008	347.8679	11.38577	6	0.1	347.7679	1	Not Proven	2	12	2	Site Infrastructure	3	347.1592	3.644173	4	0.7087	1	12	2	4
2336	2334	211259	717008	347.8679	11.24385	6	0.45	347.4179	1	Not Proven	2	12	2	Site Infrastructure	3	346.7592	5.60828	4	1.1087	1	12	2	4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
2337	2335	211269	717008	347.9193	9.861889	6	0.95	346.9693	2	Not Proven	2	24	3	Site Infrastructure	3	346.8601	7.366682	4	1.0592	1	12	2	6
2338	2336	211179	717018	341.8679	11.85169	6	0.95	340.9179	2	Not Proven	2	24	3	Minor Watercourse	6	343.178	6.809258	4	-1.3101	1	24	3	9
2339	2337	211189	717018	342.8679	12.37395	6	1.5	341.3679	3	Not Proven	2	36	4	Minor Watercourse	6	342.778	2.888252	4	0.0899	1	24	3	12
2340	2338	211199	717018	343.2056	13.96741	6	2	341.2056	3	Not Proven	2	36	4	Site Infrastructure	3	342.9053	1.923434	4	0.3003	1	12	2	8
2341	2339	211209	717018	343.8679	12.24045	6	0.15	343.7179	1	Not Proven	2	12	2	Site Infrastructure	3	343.9592	0.966644	4	-0.0913	1	12	2	4
2342	2340	211219	717018	344.257	12.60438	6	0.45	343.807	1	Not Proven	2	12	2	Site Infrastructure	3	344.178	0.966644	4	0.079	1	12	2	4
2343	2341	211229	717018	344.8679	11.19743	6	0.45	344.4179	1	Not Proven	2	12	2	Site Infrastructure	3	344.9592	0.966644	4	-0.0913	1	12	2	4
2344	2342	211239	717018	345.8679	10.4023	6	0.25	345.6179	1	Not Proven	2	12	2	Site Infrastructure	3	345.9592	0.966644	4	-0.0913	1	12	2	4
2345	2343	211249	717018	345.8679	11.24385	6	0.2	345.6679	1	Not Proven	2	12	2	Site Infrastructure	3	345.9592	0.966644	4	-0.0913	1	12	2	4
2346	2344	211259	717018	345.9193	9.211486	6	0.45	345.4693	1	Not Proven	2	12	2	Site Infrastructure	3	345.9681	0.966644	4	-0.0488	1	12	2	4
2347	2345	211269	717018	346.8679	9.17339	6	1.9	344.9679	3	Not Proven	2	36	4	Site Infrastructure	3	346.9592	0.966644	4	-0.0913	1	12	2	8
2348	2346	211179	717028	339.8679	11.91503	6	0.15	339.7179	1	Not Proven	2	12	2	Minor Watercourse	6	340.8586	9.472254	4	-0.9907	1	24	3	6
2349	2347	211189	717028	340.257	14.16062	6	1.9	338.357	3	Not Proven	2	36	4	Minor Watercourse	6	340.578	1.235637	4	-0.321	1	24	3	12
2350	2348	211199	717028	340.8679	11.58737	6	1.4	339.4679	3	Not Proven	2	36	4	Site Infrastructure	3	340.9592	1.235637	4	-0.0913	1	12	2	8
2351	2349	211209	717028	341.8679	11.49203	6	0.45	341.4179	1	Not Proven	2	12	2	Site Infrastructure	3	341.9592	0.966644	4	-0.0913	1	12	2	4
2352	2350	211219	717028	342.3378	10.39867	6	0.3	342.0378	1	Not Proven	2	12	2	Site Infrastructure	3	342.2099	0.966644	4	0.1279	1	12	2	4
2353	2351	211229	717028	342.8679	11.81373	6	0.3	342.5679	1	Not Proven	2	12	2	Site Infrastructure	3	342.9592	0.966644	4	-0.0913	1	12	2	4
2354	2352	211239	717028	343.8679	12.10058	6	0.2	343.6679	1	Not Proven	2	12	2	Site Infrastructure	3	343.9592	0.966644	4	-0.0913	1	12	2	4
2355	2353	211249	717028	343.9193	9.511161	6	0.1	343.8193	1	Not Proven	2	12	2	Site Infrastructure	3	343.9681	0.966644	4	-0.0488	1	12	2	4
2356	2354	211259	717028	344.8679	9.17339	6	0.4	344.4679	1	Not Proven	2	12	2	Site Infrastructure	3	344.9592	0.966644	4	-0.0913	1	12	2	4
2357	2355	211269	717028	344.8679	11.24385	6	0.95	343.9179	2	Not Proven	2	24	3	Site Infrastructure	3	344.9592	4.873356	4	-0.0913	1	12	2	6
2358	2356	211179	717038	337.8679	12.49178	6	0.45	337.4179	1	Not Proven	2	12	2	Minor Watercourse	6	339.778	12.88295	3	-1.9101	1	18	2	4
2359	2357	211189	717038	338.257	12.60438	6	0.95	337.307	2	Not Proven	2	24	3	Minor Watercourse	6	339.778	6.558079	4	-1.521	1	24	3	9
2360	2358	211199	717038	339.257	10.83159	6	0.3	338.957	1	Not Proven	2	12	2	Site Infrastructure	3	340.2941	7.558518	4	-1.0371	1	12	2	4
2361	2359	211209	717038	339.8679	11.1326	6	0.35	339.5179	1	Not Proven	2	12	2	Site Infrastructure	3	339.9592	0.966644	4	-0.0913	1	12	2	4
2362	2360	211219	717038	340.8679	12.10058	6	0.2	340.6679	1	Not Proven	2	12	2	Site Infrastructure	3	340.9592	0.966644	4	-0.0913	1	12	2	4
2363	2361	211229	717038	340.8679	11.81373	6	0.45	340.4179	1	Not Proven	2	12	2	Site Infrastructure	3	340.9592	0.966644	4	-0.0913	1	12	2	4
2364	2362	211239	717038	341.8679	12.10058	6	0.1	341.7679	1	Not Proven	2	12	2	Site Infrastructure	3	341.9592	0.966644	4	-0.0913	1	12	2	4
2365	2363	211249	717038	342.257	12.60438	6	0.3	341.957	1	Not Proven	2	12	2	Site Infrastructure	3	342.178	0.966644	4	0.079	1	12	2	4
2366	2364	211259	717038	342.8679	11.30993	6	0.4	342.4679	1	Not Proven	2	12	2	Site Infrastructure	3	342.9592	0.966644	4	-0.0913	1	12	2	4
2367	2365	211269	717038	342.9193	9.511161	6	0.1	342.8193	1	Not Proven	2	12	2	Site Infrastructure	3	342.9592	6.86711	4	-0.0399	1	12	2	4
2368	2366	211179	717048	335.8679	11.49203	6	0.1	335.7679	1	Not Proven	2	12	2	Minor Watercourse	6	335.178	10.392074	3	0.6899	1	18	2	4
2369	2367	211189	717048	336.3378	10.39867	6	0.4	335.9378	1	Not Proven	2	12	2	Minor Watercourse	6	335.178	8.064316	4	1.1598	1	24	3	6
2370	2368	211199	717048	337.257	12.60438	6	0.1	337.157	1	Not Proven	2	12	2	Site Infrastructure	3	339.9592	13.89361	3	-2.7022	1	9	1	2
2371	2369	211209	717048	337.8679	11.81373	6	0.1	337.7679	1	Not Proven	2	12	2	Site Infrastructure	3	339.578	8.257917	4	-1.7101	1	12	2	4
2372	2370	211219	717048	338.8679	12.10058	6	0.2	338.6679	1	Not Proven	2	12	2	Site Infrastructure	3	340.1592	6.512757	4	-1.2913	1	12	2	4
2373	2371	211229	717048	338.8679	11.81373	6	0.95	337.9179	2	Not Proven	2	24	3	Site Infrastructure	3	340.1592	6.512757	4	-1.2913	1	12	2	6
2374	2372	211239	717048	339.8679	12.10058	6	0.4	339.4679	1	Not Proven	2	12	2	Site Infrastructure	3	339.9592	0.966644	4	-0.0913	1	12	2	4
2375	2373	211249	717048	340.257	12.60438	6	0.25	340.007	1	Not Proven	2	12	2	Site Infrastructure	3	340.178	0.966644	4	0.079	1	12	2	4
2376	2374	211259	717048	340.8679	11.30993	6	0.1	340.7679	1	Not Proven	2	12	2	Site Infrastructure	3	341.7592	5.291162	4	-0.8913	1	12	2	4
2377	2375	211269	717048	341.257	12.60438	6	0.1	341.157	1	Not Proven	2	12	2	Site Infrastructure	3	342.5592	10.884209	3	-1.3022	1	9	1	2
2378	2376	211179	717058	334	5.301667	4	0.95	333.05	2	Not Proven	2	16	3	Minor Watercourse	6	334.7854	7.162681	4	-0.7854	1	24	3	9
2379	2377	211189	717058	334.8679	10.19293	6	2	332.8679	3	Not Proven	2	36	4	Minor Watercourse	6	334.7854	2.888252	4	0.0825	1	24	3	12
2380	2378	211199	717058	335.257	12.16263	6	0.1	335.157	1	Not Proven	2	12	2	Minor Watercourse	6	334.7854	12.860016	3	0.4716	1	18	2	4
2381	2379	211209	717058	335.8679	11.81373	6	0.1	335.7679	1	Not Proven	2	12	2	Site Infrastructure	3	339.578	17.243236	3	-3.7101	1	9	1	2
2382	2380	211219	717058	336.8679	12.10058	6	0.1	336.7679	1	Not Proven	2	12	2	Site Infrastructure	3	340.1592	16.478835	3	-3.2913	1	9	1	2
2383	2381	211229	717058	336.8679	11.81373	6	0.95	335.9179	2	Not Proven	2	24	3	Site Infrastructure	3	339.9592	13.89361	3	-3.0913	1	9	1	3
2384	2382	211239	717058	337.8679	12.10058	6	0.25	337.6179	1	Not Proven	2	12	2	Site Infrastructure	3	339.5592	9.023746	4	-1.6913	1	12	2	4
2385	2383	211249	717058	338.257	12.60438	6	0.25	338.007	1	Not Proven	2	12	2	Site Infrastructure	3	339.778	8.4996	4	-1.521	1	12	2	4
2386	2384	211259	717058	338.8679	10.84865	6	0.1	338.7679	1	Not Proven	2	12	2	Site Infrastructure	3	340.178	12.242287	3	-1.3101	1	9	1	2
2387	2385	211269	717058	339.3378	10.39867	6	0.1	339.2378	1	Not Proven	2	12	2	Site Infrastructure	3	341.7592	19.343485	3	-2.4214	1	9	1	2
2388	2386	211179	717068	334	0	1	2.1	331.9	3	Not Proven	2	6	2	Minor Watercourse	6	334	3.181069	4	0	1	24	3	6
2389	2387	211189	717068	334	0.104137	1	2.1	331.9	3	Not Proven	2	6	2	Minor Watercourse	6	334	3.644173	4	0	1	24	3	6
2390	2388	211199	717068	334	3.258684	2	0.45	333.55	1	Not Proven	2	4	1	Minor Watercourse	6	334	9.534695	4	0	1	24	3	3
2391	2389	211209	717068	334	6.66305	4	0.4	333.6	1	Not Proven	2	8	2	Minor Watercourse	6	333.3205	16.179444	3	0.6795	1	18	2	4
2392	2390	211219	717068	334.8679	10.92519	6	0.95	333.9179	2	Not Proven	2	24	3	Minor Watercourse	6	333	20.62832	3	1.8679	1	18	2	6
2393	2391	211229	717068	334.8679	11.81373	6	2	332.8679	3	Not Proven	2	36	4	Site Infrastructure	3	339.9592	22.409114	3	-5.0913	1	9	1	4
2394	2392	211239	717068	335.8679	12.0345	6	2.4	333.4679	3	Not Proven	2	36	4	Site Infrastructure	3	339.5592	18.723354	3	-3.6913	1	9	1	4
2395	2393	211249	717068	336.257	12.31805	6	0.1	336.157	1	Not Proven	2	12	2	Site Infrastructure	3	339.778	18.47645	3	-3.521	1	9	1	2
2396	2394	211259	717068	336.8679	11.58737	6	0.15	336.7179	1	Not Proven	2	12	2	Site Infrastructure	3	340.178	20.469724	3	-3.3101	1	9	1	2
2397	2395	211269	717068	337.8679	11.49203	6	0.15	337.7179	1	Not Proven	2	12	2	Site Infrastructure	3	340.178	26.382714	3	-2.3101	1	9	1	2
2398	2396	210394	716948	278.873	8.179993	6	0.1	278.773	1	Not Proven	2	12	2	Site Infrastructure	3	279.96	8.434204	4	-1.087	1	12	2	4
2399	2397	210986	717183	313.5852	11.14115	6	0.1	313.4852	1	Not Proven	2	12	2	Site Infrastructure	3	313.6217	0.942832	4	-0.0365	1	12	2	4
2400	2398	210848	716631	355.045	5.019905	4	0.1	354.945	1	Not Proven	2	8	2	Site Infrastructure	3	355.1224	1.098118	4	-0.0774	1	12	2	4
2401	2399	211359	717034	352.1435	12.04173	6	0.45	351.6935	1	Not Proven	2	12	2	Site Infrastructure	3	351.978	0.879574	4	0.1655	1	12	2	4
2402	2400	211323	716564	393	4.251029	4	0.95	392.05	2	Not Proven	2	16	3	Site Infrastructure	3	392.6188	4.990866	4	0.3812	1	12	2	6
2403	2401	210877	715981	383.0899	12.41517	6	0.3	382.7899	1	Not Proven	2	12	2	Site Infrastructure	3	382.978	0.439121	4	0.1119	1	12	2	4
2404	2402	210512	716007	334.9888	2.809977	2	0.9	334.0888	2	Not Proven	2	8	2	Site Infrastructure	3	335	1.065955	4	-0.0112	1	12	2	4
2405	2403	210194	716404	280.303	12.55642	6	0.15	280.153	1	Not Proven	2	12	2	Site Infrastructure	3	280.4188	0.636222	4	-0.1158	1	12	2	4
2406	2404	210858	715665	383.4486	15.84548	8	0.1	383.3486	1	Not Proven	2	16	3	Site Infrastructure	3	383.4596	1.322647	4	-0.011	1	12	2	6
2407	2405	210785	715148	376.8763	9.662713	6	0.45	376.4263	1	Not Proven	2	12	2	Site Infrastructure	3	376.9592	2.028325	4	-0.0829	1	12	2	4
2408	2406	210414	714855	360.9419	21.45264	8	0.1	360.8419	1	Not Proven	2	16	3	Site Infrastructure	3	359.1373	5.307944	4	1.8046	1	12	2	6
2409	2407	209996	714952	297.3479	19.03109	8	0.95	296.3979	2	Not Proven	2	32	4	Site Infrastructure	3	297.6665	0.885318	4	-0.3186	1	12	2	8
2410	2408	209661	714856	231.8902	19.01429	8	0.25	231.6402	1	Not Proven	2	16	3	Site Infrastructure	3	231.5969	0.758358	4	0.2933	1	12	2	6
2411	2409	210417	716938	281.9959	6.423227	4	0.01	281.9859	1	Not Proven	2	8	2	Site Infrastructure	3	281.3432	10.063542	3	0.6527	1	9	1	2
2412	2410	211000	717163	317.9683	10.21938	6	0.45	317.5183	1	Not Proven	2	12	2	Site Infrastructure	3	314.6795	21.590555	3	3.2888	1	9	1	2
2413	2411	210861	716609	358	1.651976	1	0.45	357.55	1	Not Proven	2	2	1	Site Infrastructure	3	356.9763	10.609423	3	1.0237	1	9	1	1
2414	2412	211364	717009	355.1939	8.475858	6	0.95	354.2439	2	Not Proven	2	24	3	Site Infrastructure	3	353.1592	22.585421	3	2.0347	1	9	1	3
2415	2413	211303	716578	392	0.690639	1	2.8	389.2	3	Not Proven	2	6	2	Site Infrastructure	3	392	3.607931	4	0	1	12	2	4
2416	2414	210855	715993	380.5843	6.232879	4	2	378.5843	3	Not Proven	2	24	3	Site Infrastructure	3	382	18.479631	3	-1.4157	1	9	1	3
2417	2415	210516	715982	332	5.710593	4	0.9	331.1	2	C	2	16	3	Site Infrastructure	3	334.8408	19.616673	3	-2.8408	1	9	1	3
2418	2416	210219	716400	286.4865	16.55261	8	0.2	286.2865	1	Not Proven	2	16	3	Site Infrastructure	3	288.0188	6.804604	4	-1.5323	1	12	2	6
2419	2417	210866	715641	380.364	16.31486	8	0.8	379.564	2	Not Proven	2	32	4	Site Infrastructure	3	380.5292	0.429108	4	-0.1652	1	12	2	8
2420	2418	210768	715167	373.1231	6.37937	4	1.5	371.6231	3	Not Proven	2	24	3	Site Infrastructure	3	376.9082	26.345019	3	-3.7851	1	9	1	3
2421	2419	210429	714834	370.9111	21.02946	8	0.1	370.8111	1	Not Proven	2	16	3	Site Infrastructure	3	367.3848	25.416679	3	3.5263	1	9	1	3
2422	2420	209982	714973	292.9268	11.32914	6	1.4	291.5268	3	Not Proven	2	36	4	Site Infrastructure	3	293.0188	1.017651	4	-0.092	1	12	2	8
2423	2421	209595	714876	218.5437	10.55531	6	0.45	218.0937	1	Not Proven	2	12	2	Roads and Tracks	3	219.0188	9.430477	4	-0.4751	1	12	2	4
2424	2422	210372	716959	275.4743	10.61958	6	0.4	275.0743	1	Not Proven	2	12	2	Site Infrastructure	3	279.96	33.031613	3	-4.4857	1	9	1	2
2425	2423	210971	717204	309.6234	10.53458	6	0.8	308.8234	2	Not Proven	2	24	3	Site Infrastructure	3	309.4698	0.907174	4	0.1536	1	12	2	6
2426	2424	210835	716652	351.5248	13.68476	6	0.1	351.4248	1	Not Proven	2	12	2	Minor Watercourse	6	351.4188	2.405708	4	0.106	1	24	3	6
2427	2425	211355	717058	347.4138	11.19859	6	0.9	346.5138	2	Not Proven	2	24	3	Site Infrastructure	3	349.3781	10.65387	3	-1.9643	1	9	1	3
2428	2426	211344	716549	394.7137	5.636555	4	1.8	392.9137	3	Not Proven	2	24	3	Site Infrastructure	3	392.6188	29.704985	3	2.0949	1	9	1	3
2429	2427	210899	715969	390.1062	19.41671	8	0.1	390.0062	1	Not Proven	2	16	3	Site Infrastructure	3	385.8114	14.743089	3	4.2948	1	9	1	3
2430	2428	210508	716031	334.2962	6.595759	4	0.1	334.1962	1	Not Proven	2	8	2	Site Infrastructure	3	334.4579	2.19226	4	-0.1617	1	12	2	4
2431	2429	210169	716408	275.3628	11.39348	6	0.2	275.1628	1	Not Proven	2	12	2	Site Infrastructure	3	277.5936	11.280626	3	-2.2308	1	9	1	2
2432	2430	210849	715688	385.0291	8.918855	6	2	383.0291	3	Not Proven	2	36	4	Site Infrastructure	3	384.2596	22.709932	3	0.7695	1	9	1	4
2433	2431	210801	715129	381.4566	11.52756	6	0.4	381.0566	1	Not Proven	2	12	2	Site Infrastructure	3	378.3592	16.380866	3	3.0974	1	9	1	2
2434	2432	210400	714875	352.4724	15.06996	8	0.1	352.3724	1	Not Proven	2	16	3	Site Infrastructure	3	357.0069	14.964674	3	-4.5345	1	9	1	3
2435	2433	210009	714931	304.134	12.56369	6	0.35	303.784	1	Not Proven	2	12	2	Site Infrastructure	3	297.3951	22.528604	3	6.7389	1	9	1	2
2436	2434	209678	714831	243.0082	14.40674	6	0.1	242.9082	1	Not Proven	2	12	2	Minor Watercourse	6	237.0775	17.306525	3	5.9307	1	18	2	4
2437	2435	209896	714917	281.4646	17.29994	8	0.45	281.0146	1	Not Proven	2	16	3	Minor Watercourse	6	280.6376	22.636352	3	0.827	1	18	2	6
2438	2436	209850	714896	272.5181	15.14808	8	0.25	272.2681	1	Not Proven	2	16	3	Site Infrastructure	3	275.778	22.656283	3	-3.2599	1	9	1	3
2439	2437	209800	714884	264.1316	12.90114	6	0.3	263.8316	1	Not Proven	2	12	2	Site Infrastructure	3	266.4188	22.729718	3	-2.2872	1	9	1	2
2440	2438	209748	714880	251.6229	27.75854	8	0.01	251.6129	1	Not Proven	2	16	3	Minor Watercourse	6	246.1224	19.801176	3	5.5005	1	18	2	6
2441	2439	209697	714880	239.4057	18.88395	8	0.01	239.3957	1	Not Proven	2	16	3	Minor Watercourse	6	240.8206	14.782142	3	-1.4149	1	18	2	6
2442	2440	209645	714881	228.2289	17.05297	8	0.1	228.1289	1	Not Proven	2	16	3	Site Infrastructure	3	227.0596	4.164669	4	1.1693	1	12	2	6
2443	2441	209910	714896	287.4491	15.15568	8	0.1	287.3491	1	Not Proven	2	16	3	Site Infrastructure	3	287.6188	0.946717	4	-0.1697	1	12	2	6
2444	2442	209864	714874	278.2865	14.6948	6	0.2	278.0865	1	Not Proven	2	12	2	Site Infrastructure	3	278.4188	0.70483	4	-0.1323	1	12	2	4
2445	2443	209814	714862	268.3499	11.30993	6	0.1	268.2499	1	C	2	12	2	Site Infrastructure	3	268.4188	0.345812	4	-0.0689	1	12	2	4
2446	2444	209764	714854	259.7342	11.13659	6	0.2	259.5342	1	Not Proven	2	12	2	Site Infrastructure	3	259.8601	0.990462	4	-0.1259	1	12	2	4
2447	2445	209713	714855	246.0292	21.3032	8	0.1	245.9292	1	Not Proven	2	16	3	Site Infrastructure	3	245.7493	0.681814	4	0.2799	1	12	2	6
2448	2446	209611	714854	220.3455	16.39385	8	0.1	220.2455	1	C	2	16	3	Site Infrastructure	3	220.2376	0.365377	4	0.1079	1	12	2	6
2449	2447	209923	714875	292.0827	10.19135	6	0.15	291.9327	1	Not Proven	2	12	2	Minor Watercourse	6	291.9763	2.80275	4	0.1064	1	24	3	6
2450	2448	209878	714852	284.1648	14.48267	6	0.25	283.9148	1	C	2	12	2	Minor Watercourse	6	281.978	21.966163	3	2.1868	1	18	2	4
2451	2449	209829	714840	271.3129	13.44902	6	0.45	270.8629	1	Not Proven	2	12	2	Minor Watercourse	6	271.2188	0.475584	4	0.0941	1	24	3	6
2452	2450	209779	714829	261.1013	6.573302	4	0.2	260.9013	1	Not Proven	2	8	2	Minor Watercourse	6	261.0188	11.895506	3	0.0825	1	18	2	4
2453	2451	209728	714830	251.8499	20.99582	8	0.2	251.6499	1	Not Proven	2	16	3	Minor Watercourse	6	250.0188	22.471869	3	1.8311	1	18	2	6
2454	2452	209628	714831	227.3852	9.197236	6	0.25	227.1352	1	C	2	12	2	Minor Watercourse	6	227.3432	0.538506	4	0.042	1	24	3	6
2455	2453	210068	715028	290.9672	13.57504	6	0.4	290.5672	1	Not Proven	2	12	2	Site Infrastructure	3	292.978	10.723531	3	-2.0108	1	9	1	2
2456	2454	210025	715000	290.8484	16.48923	8	0.8	290.0484	2	Not Proven	2	32	4	Site Infrastructure	3	293	11.245554	3	-2.1516	1	9	1	4
2457	2455	209939	714945	289.1816	8.658968	6	0.45	288.7316	1	Not Proven	2	12	2	Site Infrastructure	3	289.1661	1.295539	4	0.0155	1	12	2	4
2458	2456	210082	715007	295.8811	13.4938	6	0.45	295.4311	1	Not Proven	2	12	2	Site Infrastructure	3	295.5936	1.111743	4	0.2875	1	12	2	4
2459	2457	210039	714979	295.3306	15.46348	8	1.45	293.8806	3	Not Proven	2	48	4	Site Infrastructure	3	295.2149	0.318516	4	0.1157	1	12	2	8
2460	2458	209953	714924	294.7714	13.59378	6	0.45	294.3214	1	Not Proven	2	12	2	Site Infrastructure	3	294.7735	0.244957	4	-0.0021	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	296.3781	22.785992	3	5.4169	1	9	1	3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	295.9437	22.534492	3	5.82	1	9	1	3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	295.5373	21.180382	3	3.1637	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	356.178	0.38145	4	-0.1016	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	357.9592	10.145198	3	-2.5233	1	9	1	3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	359.9553	20.126634	3	-9.5345	1	9	1	3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	362.978	0.277512	4	0.0675	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	362.7934	9.74008	4	-0.3156	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	362.3561	1.481481	4	0.424	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	367.778	8.007412	4	2.9967	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	368.7373	18.518363	3	3.2721	1	9	1	3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	367.4576	20.174764	3	5.5324	1	9	1	3
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	382.178	1.025057	4	-0.0741	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	382.178	7.502461	4	-0.8147	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	381.5592	16.217973	3	0.8556	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	378.5114	4.99261	4	-0.6338	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	377.9926	5.466483	4	-0.7693	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	376.8188	0.78946	4	-0.0889	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	378.5114	29.985428	3	-4.2004	1	9	1	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	377.9926	30.465644	3	-4.1099	1	9	1	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	376.0188	21.714939	3	-4.5875	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	381.0158	22.423037	3	-2.8277	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	382	22.566289	3	1	1	9	1	1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	394.6813	22.518789	3	1.1249	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	381.0008	1.185574	4	-0.0008	1	12	2	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	381.7777	1.346057	4	0.1494	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	396.5197	1.163487	4	0.0933	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	379.8776	4.964288	4	-0.6754	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	379.6408	12.443996	3	-1.5183	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	391.4408	0.457697	4	-0.0502	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	389.978	5.934302	4	1.0282	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	392.5418	0.93099	4	0.2055	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	385.778	14.910999	3	3.1438	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	386	0.940945	4	0	1	12	2	6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	386.0188	0.934316	4	-0.1794	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	384.3713	1.220157	4	-0.3379	1	12	2	4
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	385.4698	18.217151	3	-1.4698	1	9	1	1
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	384.9763	18.056581	3	-1.9763	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	382.8477	18.091618	3	-3.3568	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	313	31.071662	3	0.5658	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	321.6188	27.005573	3	-0.0505	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	329.9926	24.112385	3	1.6379	1	9	1	2
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Site Infrastructure	3	312.6188	6.417916	4	0.027	1	12	2	6

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove =/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
2504	2502	210411	715990	321.7393	10.79784	6	0.1	321.6393	1	C	2	12	2	Site Infrastructure	3	321.6188	2.022848	4	0.1205	1	12	2	4
2505	2503	210462	715998	329.6811	10.33138	6	0.35	329.3311	1	Not Proven	2	12	2	Site Infrastructure	3	329.96	1.082916	4	-0.2789	1	12	2	4
2506	2504	210357	716006	311.8167	5.710593	4	0.2	311.6167	1	Not Proven	2	8	2	Site Infrastructure	3	311.8188	0.237628	4	-0.0021	1	12	2	4
2507	2505	210407	716014	320.9102	11.30993	6	0.45	320.4602	1	Not Proven	2	12	2	Site Infrastructure	3	321.2188	6.897578	4	-0.3086	1	12	2	4
2508	2506	210458	716023	327.0037	11.30993	6	0.2	326.8037	1	Not Proven	2	12	2	Site Infrastructure	3	326.8188	1.217229	4	0.1849	1	12	2	4
2509	2507	210146	716256	273.6279	9.366359	6	0.25	273.3779	1	Not Proven	2	12	2	Site Infrastructure	3	273.8188	1.046258	4	-0.1909	1	12	2	4
2510	2508	210154	716307	274.173	9.060271	6	0.15	274.023	1	Not Proven	2	12	2	Site Infrastructure	3	274.0121	1.364062	4	0.1609	1	12	2	4
2511	2509	210161	716357	274.7845	9.239358	6	0.4	274.3845	1	Not Proven	2	12	2	Minor Watercourse	6	275.0188	2.711122	4	-0.2343	1	24	3	6
2512	2510	210170	716252	277.5681	11.26709	6	0.95	276.6181	2	Not Proven	2	24	3	Site Infrastructure	3	277.6188	0.626418	4	-0.0507	1	12	2	6
2513	2511	210178	716303	278.1464	11.30993	6	2	276.1464	3	Not Proven	2	36	4	Site Infrastructure	3	278.2188	0.936479	4	-0.0724	1	12	2	8
2514	2512	210186	716353	279.131	11.81676	6	0.45	278.681	1	Not Proven	2	12	2	Site Infrastructure	3	279.1971	0.55809	4	-0.0661	1	12	2	4
2515	2513	210195	716248	282.5083	11.30993	6	0.2	282.3083	1	Not Proven	2	12	2	Minor Watercourse	6	282.8188	3.129942	4	-0.3105	1	24	3	6
2516	2514	210203	716299	283.0866	11.30993	6	0.1	282.9866	1	C	2	12	2	Site Infrastructure	3	278.6188	22.503641	3	4.4678	1	9	1	2
2517	2515	210211	716350	284.2551	10.4829	6	0.95	283.3051	2	Not Proven	2	24	3	Minor Watercourse	6	282.8839	7.468704	4	1.3712	1	24	3	9
2518	2516	210327	716867	272	7.157804	4	0.45	271.55	1	Not Proven	2	8	2	Site Infrastructure	3	276.6188	26.818613	3	-4.6188	1	9	1	2
2519	2517	210349	716913	275.2658	10.5116	6	0.95	274.3158	2	Not Proven	2	24	3	Site Infrastructure	3	280.2941	32.238416	3	-5.0283	1	9	1	3
2520	2518	210394	717005	273.1108	9.799996	6	0.3	272.8108	1	Not Proven	2	12	2	Site Infrastructure	3	276.5936	27.854167	3	-3.4828	1	9	1	2
2521	2519	210350	716856	276.4717	10.65518	6	0.1	276.3717	1	Not Proven	2	12	2	Site Infrastructure	3	276.6188	2.611416	4	-0.1471	1	12	2	4
2522	2520	210372	716902	279.0299	8.475664	6	0.95	278.0799	2	Not Proven	2	24	3	Site Infrastructure	3	280.2188	8.036442	4	-1.1889	1	12	2	6
2523	2521	210416	716995	276.5828	7.615009	4	0.8	275.7828	2	Not Proven	2	16	3	Site Infrastructure	3	277.0349	3.645604	4	-0.4521	1	12	2	6
2524	2522	210372	716845	279.9783	14.5201	6	0.2	279.7783	1	Not Proven	2	12	2	Site Infrastructure	3	280.0309	0.381705	4	-0.0526	1	12	2	4
2525	2523	210395	716892	282.4118	5.370314	4	0.25	282.1618	1	Not Proven	2	8	2	Site Infrastructure	3	282.0188	4.279681	4	0.393	1	12	2	4
2526	2524	210439	716984	279.7487	7.956917	4	0.2	279.5487	1	Not Proven	2	8	2	Site Infrastructure	3	279.1224	11.068937	3	0.6263	1	9	1	2
2527	2525	210748	716599	334.785	16.0074	8	0.2	334.585	1	Not Proven	2	16	3	Site Infrastructure	3	340.4188	21.392897	3	-5.6338	1	9	1	3
2528	2526	210791	716625	344.1945	15.06871	8	0.2	343.9945	1	Not Proven	2	16	3	Site Infrastructure	3	348.0188	22.682914	3	-3.8243	1	9	1	3
2529	2527	210879	716679	360.0621	8.714066	6	0.95	359.1121	2	Not Proven	2	24	3	Site Infrastructure	3	359.0089	23.118415	3	1.0532	1	9	1	3
2530	2528	210761	716577	340.6399	10.21137	6	0.2	340.4399	1	Not Proven	2	12	2	Site Infrastructure	3	340.578	0.253736	4	0.0619	1	12	2	4
2531	2529	210804	716604	348.3824	11.30993	6	0.4	347.9824	1	Not Proven	2	12	2	Site Infrastructure	3	348.4188	0.42223	4	-0.0364	1	12	2	4
2532	2530	210892	716657	358.9949	8.312569	6	0.1	358.8949	1	Not Proven	2	12	2	Site Infrastructure	3	359.0588	0.854672	4	-0.0639	1	12	2	4
2533	2531	210774	716556	344.0663	8.438892	6	1.9	342.1663	3	Not Proven	2	36	4	Site Infrastructure	3	344.1505	0.986304	4	-0.0842	1	12	2	8
2534	2532	210817	716583	350.9202	13.18011	6	0.1	350.8202	1	Not Proven	2	12	2	Site Infrastructure	3	350.4841	1.271199	4	0.4361	1	12	2	4
2535	2533	210905	716636	359.1445	6.607488	4	0.2	358.9445	1	Not Proven	2	8	2	Minor Watercourse	6	359.1505	0.348432	4	-0.006	1	24	3	6
2536	2534	211363	716661	389.2543	5.710593	4	0.95	388.3043	2	Not Proven	2	16	3	Site Infrastructure	3	389.1592	0.4939	4	0.0951	1	12	2	6
2537	2535	211333	716620	393.8583	6.139135	4	0.1	393.7583	1	Not Proven	2	8	2	Site Infrastructure	3	393.9895	0.276343	4	-0.0312	1	12	2	4
2538	2536	211273	716537	394.1914	10.31755	6	0.1	394.0914	1	Not Proven	2	12	2	Site Infrastructure	3	394.3592	3.545597	4	-0.1678	1	12	2	4
2539	2537	211383	716647	390.1535	5.722118	4	0.45	389.7035	1	Not Proven	2	8	2	Site Infrastructure	3	390.7493	4.562006	4	-0.5958	1	12	2	4
2540	2538	211353	716605	393	4.464344	4	0.95	392.05	2	Not Proven	2	16	3	Site Infrastructure	3	392.2188	5.276046	4	0.7812	1	12	2	6
2541	2539	211293	716522	397.1088	11.26203	6	0.95	396.1588	2	Not Proven	2	24	3	Site Infrastructure	3	396.3592	4.713415	4	0.7496	1	12	2	6
2542	2540	211403	716632	390.1519	4.310527	4	0.45	389.7019	1	Not Proven	2	8	2	Minor Watercourse	6	390	8.246445	4	0.1519	1	24	3	6
2543	2541	211373	716590	393	1.8408	1	2.8	390.2	3	Not Proven	2	6	2	Minor Watercourse	6	393	7.139516	4	0	1	24	3	6
2544	2542	211314	716507	399.0261	12.43237	6	0.95	398.0761	2	Not Proven	2	24	3	Site Infrastructure	3	396.3592	29.540207	3	2.6669	1	9	1	3
2545	2543	211204	717031	340.6212	11.11837	6	0.95	339.6712	2	Not Proven	2	24	3	Site Infrastructure	3	340.578	1.0756	4	0.0432	1	12	2	6
2546	2544	211254	717040	342.4976	12.13908	6	0.8	341.6976	2	Not Proven	2	24	3	Site Infrastructure	3	342.5592	0.427876	4	-0.0616	1	12	2	6
2547	2545	211305	717049	343.6638	10.76547	6	1.5	342.1638	3	Not Proven	2	36	4	Site Infrastructure	3	345.3781	11.477413	3	-1.7143	1	9	1	4
2548	2546	211208	717006	346.0465	8.534755	6	0.35	345.6965	1	Not Proven	2	12	2	Site Infrastructure	3	346.0786	0.568264	4	-0.0321	1	12	2	4
2549	2547	211259	717015	346.4167	10.1659	6	0.95	345.4667	2	Not Proven	2	24	3	Site Infrastructure	3	346.3592	0.34031	4	0.0575	1	12	2	6
2550	2548	211309	717025	347.9077	11.6095	6	0.1	347.8077	1	Not Proven	2	12	2	Site Infrastructure	3	347.978	1.028923	4	-0.0703	1	12	2	4
2551	2549	211213	716982	349.2373	8.257593	6	0.25	348.9873	1	Not Proven	2	12	2	Site Infrastructure	3	347.1592	20.842597	3	2.0781	1	9	1	2
2552	2550	211263	716991	351.3358	11.30993	6	0.3	351.0358	1	Not Proven	2	12	2	Site Infrastructure	3	346.7638	22.892362	3	4.572	1	9	1	2
2553	2551	211314	717000	352.6119	10.18834	6	0.1	352.5119	1	Not Proven	2	12	2	Site Infrastructure	3	348.3781	22.284049	3	4.2338	1	9	1	2
2554	2552	210874	717075	317	6.81888	4	0.45	316.55	1	Not Proven	2	8	2	Site Infrastructure	3	317	0.82641	4	0	1	12	2	4
2555	2553	210916	717104	317	1.857059	1	0.4	316.6	1	Not Proven	2	2	1	Site Infrastructure	3	315.8188	22.093393	3	1.1812	1	9	1	1
2556	2554	210958	717133	317	4.432345	4	2.1	314.9	3	Not Proven	2	24	3	Site Infrastructure	3	314.978	22.610497	3	2.022	1	9	1	3
2557	2555	210860	717095	311.5562	20.03465	8	0.1	311.4562	1	Not Proven	2	16	3	Site Infrastructure	3	311.5969	0.844339	4	-0.0407	1	12	2	6
2558	2556	210902	717124	314.9656	7.815407	4	0.45	314.5156	1	Not Proven	2	8	2	Site Infrastructure	3	315.0188	0.867812	4	-0.0532	1	12	2	4
2559	2557	210944	717154	314.7499	8.60885	6	0.15	314.5999	1	Not Proven	2	12	2	Site Infrastructure	3	314.7592	0.652074	4	-0.0093	1	12	2	4
2560	2558	210846	717115	302.6111	22.81996	8	0.95	301.6611	2	Not Proven	2	32	4	Site Infrastructure	3	304.8387	6.104099	4	-2.2276	1	12	2	8
2561	2559	210888	717145	304.6701	32.10173	8	0.1	304.5701	1	Not Proven	2	16	3	Site Infrastructure	3	312.5153	11.413262	3	-7.8452	1	9	1	3
2562	2560	210930	717174	307.4926	22.82359	8	0.2	307.2926	1	Not Proven	2	16	3	Site Infrastructure	3	307.1969	1.123828	4	0.2957	1	12	2	6
2563	2561	209290	714186	141.998	23.93843	8	0.01	141.988	1	Not Proven	2	16	3	Site Infrastructure	3	149.1968	16.671007	3	-7.1988	1	9	1	3
2564	2562	209315	714186	147.7205	22.73463	8	0.01	147.7105	1	Not Proven	2	16	3	Site Infrastructure	3	148.6784	2.80558	4	-0.9579	1	12	2	6
2565	2563	209340	714186	153.675	22.91756	8	0.01	153.665	1	Not Proven	2	16	3	Site Infrastructure	3	153.9004	0.785926	4	-0.2254	1	12	2	6
2566	2564	209365	714186	161.1409	28.32297	8	0.01	161.1309	1	Not Proven	2	16	3	Site Infrastructure	3	161.7531	4.181206	4	-0.6122	1	12	2	6
2567	2565	209290	714211	150.0704	19.51827	8	0.01	150.0604	1	Not Proven	2	16	3	Site Infrastructure	3	150.0596	1.120571	4	0.0108	1	12	2	6
2568	2566	209315	714211	158.2796	32.29525	8	0.01	158.2696	1	Not Proven	2	16	3	Site Infrastructure	3	159.2872	5.822687	4	-1.0076	1	12	2	6
2569	2567	209340	714211	164.2796	28.05174	8	0.01	164.2696	1	Not Proven	2	16	3	Site Infrastructure	3	163.9412	1.120571	4	0.3384	1	12	2	6
2570	2568	209365	714211	167.8862	25.44176	8	0.01	167.8762	1	Not Proven	2	16	3	Site Infrastructure	3	164.7194	9.783235	4	3.1668	1	12	2	6
2571	2569	209315	714236	169.7862	18.03838	8	0.1	169.6862	1	Not Proven	2	16	3	Site Infrastructure	3	167.5572	19.50473	3	2.329	1	9	1	3
2572	2570	209340	714236	174.675	24.09484	8	0.01	174.665	1	Not Proven	2	16	3	Site Infrastructure	3	167.6209	16.620881	3	7.0541	1	9	1	3
2573	2571	209365	714236	180.675	25.24562	8	0.01	180.665	1	Not Proven	2	16	3	Site Infrastructure	3	166.0039	30.499221	3	14.6711	2	18	2	6
2574	2572	209265	716361	124	2.660337	2	0.35	123.65	1	Not Proven	2	4	1	Minor Watercourse	6	123.0408	52.819524	3	0.9592	1	18	2	2
2575	2573	209290	716361	125.4659	5.710593	4	0.45	125.0159	1	Not Proven	2	8	2	Minor Watercourse	6	123.0408	58.537698	3	2.4251	1	18	2	4
2576	2574	209315	716361	128	3.56451	2	0.95	127.05	2	Not Proven	2	8	2	Minor Watercourse	6	123.0408	72.893224	3	4.9592	1	18	2	4
2577	2575	209340	716361	129.7888	4.810453	4	0.1	129.6888	1	Not Proven	2	8	2	Minor Watercourse	6	123.0408	91.924872	3	6.748	1	18	2	4
2578	2576	209265	716386	124	3.502589	2	0.9	123.1	2	Not Proven	2	8	2	Minor Watercourse	6	123.0408	77.819355	3	0.9592	1	18	2	4
2579	2577	209290	716386	125.4659	5.591296	4	2.95	122.5159	3	Not Proven	2	24	3	Minor Watercourse	6	123.0408	81.808386	3	2.4251	1	18	2	6
2580	2578	209315	716386	128	3.050256	2	0.1	127.9	1	Not Proven	2	4	1	Minor Watercourse	6	123.0408	92.6249	3	4.9592	1	18	2	2
2581	2579	209340	716386	130	5.375327	4	0.1	129.9	1	Not Proven	2	4	1	Site Infrastructure	3	133.9564	81.285123	3	-3.9564	1	9	1	1
2582	2580	209265	716411	125	0	1	2.4	122.6	3	Not Proven	2	6	2	Site Infrastructure	3	127	72.224891	3	-2	1	9	1	2
2583	2581	209290	716411	125.7888	4.705542	4	2.1	123.6888	3	Not Proven	2	24	3	Site Infrastructure	3	127	76.01587	3	-1.2112	1	9	1	3
2584	2582	209315	716411	127.4659	5.632568	4	0.7	126.7659	2	Not Proven	2	16	3	Site Infrastructure	3	127.4188	79.839778	3	0.0471	1	9	1	3
2585	2583	209340	716411	129.6771	5.053599	4	0.1	129.5771	1	Not Proven	2	4	1	Site Infrastructure	3	133	63.826957	3	-3.3229	1	9	1	1
2586	2584	209265	716436	126	2.305662	2	2.9	123.1	3	Not Proven	2	12	2	Site Infrastructure	3	127	47.774312	3	-1	1	9	1	2
2587	2585	209290	716436	126	3.997639	2	2.5	123.5	3	Not Proven	2	12	2	Site Infrastructure	3	127	51.423365	3	-1	1	9	1	2
2588	2586	209315	716436	128	3.56451	2	2	126	3	Not Proven	2	12	2	Site Infrastructure	3	127.4188	55.139279	3	0.5812	1	9	1	2
2589	2587	209340	716436	129.4659	5.514549	4	3	126.4659	3	Not Proven	2	24	3	Site Infrastructure	3	131.9082	49.557418	3	-2.4423	1	9	1	3
2590	2588	209265	716461	127	3.053226	2	1.9	125.1	3	Not Proven	2	12	2	Site Infrastructure	3	127	23.182193	3	0	1	9	1	2
2591	2589	209290	716461	127	0	1	3.1	123.9	8	Not Proven	2	16	3	Site Infrastructure	3	127	27.191758	3	0	1	9	1	3
2592	2590	209315	716461	128	3.050256	2	1.7	126.3	3	Not Proven	2	12	2	Site Infrastructure	3	127.4188	30.92394	3	0.5812	1	9	1	2
2593	2591	209340	716461	129	2.660337	2	3.1	125.9	8	Not Proven	2	32	4	Site Infrastructure	3	130	31.850759	3	-1	1	9	1	4
2594	2592	209265	716486	127	0	1	0.4	126.6	1	Not Proven	2	2	1	Site Infrastructure	3	127	0.296783	4	0	1	12	2	2
2595	2593	209290	716486	127	0	1	2.5	124.5	3	Not Proven	2	6	2	Site Infrastructure	3	127	2.311207	4	0	1	12	2	4
2596	2594	209315	716486	128	0.427672	1	0.95	127.05	2	Not Proven	2	4	1	Site Infrastructure	3	128	6.185473	4	0	1	12	2	2
2597	2595	209265	716511	127	0	1	0.2	126.8	1	Not Proven	2	2	1	Site Infrastructure	3	127	0.852103	4	0	1	12	2	2
2598	2596	209290	716511	127	0	1	0.4	126.6	1	Not Proven	2	2	1	Site Infrastructure	3	127	1.120571	4	0	1	12	2	2
2599	2597	209315	716511	128	0	1	0.4	127.6	1	Not Proven	2	2	1	Site Infrastructure	3	128	14.820866	3	0	1	9	1	1
2600	2598	209265	716536	126	2.258083	2	0.1	125.9	1	Not Proven	2	2	1	Site Infrastructure	3	127	16.260827	3	-1	1	9	1	1
2601	2599	209290	716536	126.1842	4.821825	4	2.1	124.0842	3	Not Proven	2	24	3	Site Infrastructure	3	127	12.743315	3	-0.8158	1	9	1	3
2602	2600	209315	716536	127.1842	4.489	4	2.1	125.0842	3	Not Proven	2	24	3	Site Infrastructure	3	127	21.730423	3	0.1842	1	9	1	3
2603	2601	209240	716361	123.3304	5.196693	4	0.3	123.0304	1	Not Proven	2	8	2	Minor Watercourse	6	123.0408	58.166562	3	0.2896	1	18	2	4
2604	2602	209240	716386	124	0	1	0.95	123.05	2	Not Proven	2	4	1	Minor Watercourse	6	123.0408	81.543234	3	0.9592	1	18	2	2
2605	2603	209240	716411	125	2.676065	2	0.9	124.1	2	Not Proven	2	8	2	Site Infrastructure	3	127	68.977075	3	-2	1	9	1	2
2606	2604	209240	716436	125	0.668949	1	0.45	124.55	1	Not Proven	2	2	1	Site Infrastructure	3	127	44.211358	3	-2	1	9	1	1
2607	2605	209240	716461	126	2.048579	2	0.4	125.6	1	Not Proven	2	4	1	Site Infrastructure	3	127	19.250822	3	-1	1	9	1	1
2608	2606	209240	716486	127	0	1	0.15	126.85	1	Not Proven	2	2	1	Site Infrastructure	3	127	1.854652	4	0	1	12	2	2
2609	2607	209240	716511	127	0	1	0.2	126.8	1	Not Proven	2	2	1	Site Infrastructure	3	127	13.403706	3	0	1	9	1	1
2610	2608	209240	716536	125.3954	5.467857	4	0.1	125.2954	1	Not Proven	2	8	2	Site Infrastructure	3	127	23.358282	3	-1.6046	1	9	1	2
2611	2609	209340	716486	129	1.137223	1	0.45	128.55	1	Not Proven	2	2	1	Site Infrastructure	3	129	7.883818	4	0	1	12	2	2
2612	2610	209289	714161	129.725	28.8485	8	0.01	129.715	1	Not Proven	2	16	3	Site Infrastructure	3	147.3989	37.231526	3	-17.6739	1	9	1	3
2613	2611	209314	714161	137.9174	38.5379	8	0.01	137.9074	1	Not Proven	2	16	3	Site Infrastructure	3	150	23.940796	3	-12.0826	1	9	1	3
2614	2612	209339	714161	145.1924	18.94005	8	0.01	145.1824	1	Not Proven	2	16	3	Site Infrastructure	3	148.8754	11.051558	3	-3.683	1	9	1	3
2615	2613	209364	714161	151.0939	19.07565	8	0.01	151.0839	1	Not Proven	2	16	3	Site Infrastructure	3	151.2596	0.619141	4	-0.1657	1	12	2	6
2616	2614	209391	714185	166.8788	19.30409	8	0.01	166.8688	1	Not Proven	2	16	3	Site Infrastructure	3	167.0373	0.94119	4	-0.1585	1	12	2	6
2617	2615	209391	714210	174.129	31.65656	8	0.01	174.119	1	Not Proven	2	16	3	Site Infrastructure	3	169.4596	13.988347	3	4.6694	1	9	1	3
2618	2616	209391	714235	191.373	34.12748	8	0.01	191.363	1	Not Proven	2	16	3	Site Infrastructure	3	169.4596	37.897676	3	21.9134	2	18	2	6
2619	2617	209391	714161	152.2226	13.69561	6	0.01	152.2126	1	Not Proven	2	12	2	Site Infrastructure	3	152.168	0.945784	4	0.0546	1	12	2	4
2620	2618	210312	715973	307.8364	9.83894	6	0.9	306.9364	2	Not Proven	2	24	3	Site Infrastructure	3	308	10.385919	3	-0.1636	1	9	1	3
2621	2619	210215	716502	271.0745	10.31382	6	0.25	270.8245	1	Not Proven	2	12	2	Site Infrastructure	3	271.0667	0.107543	4	0.0078	1	12	2	4
2622	2620	210370	716355	311.237	6.033336	4	0.01	311.227	1	Not Proven	2	8	2	Site Infrastructure	3	311.1661	1.254213	4	0.0709	1	12	2	4
2623	2621	210966	716724	362	2.276617	2	0.1	361.9	1	Not Proven	2	4	1	Site Infrastructure	3	362	0.926966	4	0	1	12	2	2
2624	2622	210458	717085	275.6309	14.30235	6	0.1	275.5309	1	Not Proven	2	12	2	Site Infrastructure	3	275.578	1.055045	4	0.0529	1	12	2	4
2625	2623	210812	717061	302.7832	14.85409	6	0.4	302.3832	1	Not Proven	2	12	2	Site Infrastructure	3	303.0188	1.236664	4	-0.2356	1	12	2	4
2626	2624	211264	716481	398.0791	6.37937	4	0.1	397.9791	1	Not Proven	2	8	2	Site Infrastructure	3	397.3432	5.487994	4	0.7359	1	12	2	4
2627	2625	210785	715858	378.5649	15.75745	8	0.3	378.2649	1	Not Proven	2	16	3	Site Infrastructure	3	378.4596	0.69033	4	0.1053	1	12	2	6
2628	2626	210637	715654	356.6335	16.75172	8	0.15	356.4835	1	Not Proven	2	16	3	Site Infrastructure	3	356.6376	0.147474	4	-0.0041	1	12	2	6
2629	2627	210126	715029	300.2676	9.701012	6	0.95	299.3176	2	Not Proven	2	24	3	Site Infrastructure	3	300.3781	0.78446	4	-0.1105	1	12	2	6
2630	2628	210499	714915	361.5435	29.51597	8	0.1	361.4435	1	Not Proven	2	16	3	Site Infrastructure	3	361.1561	0.898761	4	0.3874	1	12	2	6
2631	2629	210576	715651	342.1795	18.38783	8	0.1	342.0795	1	Not Proven	2	16	3	Site Infrastructure	3	342.3781	0.876798	4	-0.1986	1	12	2	6
2632	2630	211409	717041	359.076	8.938557	6	0.45	358.626	1	Not Proven	2	12	2	Site Infrastructure	3	359.1224	0.989035	4	-0.0464	1	12	2	4
2633	2631	210397	716397	310.9001	10.21938	6	0.3	310.6001	1	Not Proven	2	12	2	Site Infrastructure	3	310.778	1.036049	4	0.1221	1	12	2	4
2634	2632	210670	715571	371.4235	11.93531	6	0.1	371.3235	1	Not Proven	2	12	2	Site Infrastructure	3	371.5203	0.485376	4	-0.0968	1	12	2	4
2635	2633	209843	716152	216.0237	12.60586	6	0.1	215.9237	1	Not Proven	2	12	2	Site Infrastructure	3	216.0188	0.373784	4	0.0049	1	12	2	4
2636	2634	210020	715920	250.801	8.668403	6	0.4	250.401	1	Not Proven	2	12	2	Site Infrastructure	3	250.832	0.291316	4	-0.031	1	12	2	4
2637	2635	210319	715949	310	6.815326	4	0.1	309.9	1	Not Proven	2	8	2	Site Infrastructure	3	308.1661	34.50887	3	1.8339	1	9	1	2
2638	2636	210190	716507	266.6453	15.64327	8	0.3	266.3453	1	Not Proven	2	16	3	Site Infrastructure	3	270.9845	22.553224	3	-4.3392	1	9	1	3
2639	2637	210338	716359	308.0248	9.349244	6	0.2	307.8248	1	Not Proven	2	12	2	Site Infrastructure	3	307.3713	22.549117	3	0.6535	1	9	1	2
2640	2638	210952	716747	360	0.184483	1	0.3	359.7	1	Not Proven	2	2	1	Site Infrastructure	3	361.3432	22.611335	3	-1.3432	1	9	1	1
2641	2639	210436	717098	268.7612	18.97919	8	0.1	268.6612	1	Not Proven	2	16	3	Site Infrastructure	3	274.8188	22.463498	3	-6.0576	1	9	1	3
2642	2640	210797	717081	301.9656	11.30164	6	0.1	301.8656	1	Not Proven	2	12	2	Site Infrastructure	3	303.2596	23.084426	3	-1.294	1	9	1	2
2643	2641	211250	716432	397.4949	5.28829	4	0.2	397.2949	1	Not Proven	2	8	2	Minor Watercourse	6	398	16.683742	3	-0.5051	1	18	2	4
2644	2642	210842	715880	384.5289	10.33519	6	0.1	384.4289	1	Not Proven	2	12	2	Site Infrastructure	3	384.1505	23.597432	3	0.3784	1	9	1	2
2645	2643	210653	715603	364.9983	19.32495	8	0.1	364.8983	1	Not Proven	2	16	3	Site Infrastructure	3	355.7969	22.906294	3	9.2014	1	9	1	3
2646	2644	210161	715053	297.7932	22.81804	8	0.01	297.7832	1	Not Proven	2	16	3	Site Infrastructure	3	304.178	23.378425	3	-6.3848	1	9	1	3
2647	2645	210521	714972	353.5555	16.80211	8	0.1	353.4555	1	Not Proven	2	16	3	Site Infrastructure	3	359.178	22.493826	3	-5.6225	1	9	1	3
2648	2646	210642	715653	357.8091	15.86699	8	0.1	357.7091	1	Not Proven	2	16	3	Site Infrastructure	3	357.2188	2.964218	4	0.5903	1	12	2	6
2649	2647	211405	717066	356.6099	9.804675	6	0.95	355.6599	2	Not Proven	2	24	3	Site Infrastructure	3	358.318	22.267407	3	-1.7081	1	9	1	3
2650	2648	210416	716455	308.3163	9.395897	6	0.95	307.3663	2	Not Proven	2	24	3	Site Infrastructure	3	312.5675	22.829687	3	-4.2512	1	9	1	3
2651	2649	210629	715575	362.691	19.82703	8	0.1	362.591	1	Not Proven	2	16	3	Site Infrastructure	3	357.3781	18.016912	3	5.3129	1	9	1	3
2652	2650	209857	716176	220.9852	11.42974	6	0.01	220.9752	1	Not Proven	2	12	2	Site Infrastructure	3	216.2188	22.410899	3	4.7664	1	9	1	2
2653	2651	210024	715946	248.2903	5.955286	4	0.95	247.3403	2	Not Proven	2	16	3	Minor Watercourse	6	247.0408	21.657018	3	1.2495	1	18	2	6
2654	2652	210305	715998	305.4181	10.45683	6	0.2	305.2181	1	Not Proven	2	12	2	Site Infrastructure	3	306.4188	9.816901	4	-1.0007	1	12	2	4
2655	2653	210226	716450	284.3392	17.4988	8	0.01	284.3292	1	Not Proven	2	16	3	Site Infrastructure	3	281.3781	21.952152	3	2.9611	1	9	1	3
2656	2654	210371	716396	307.7745	8.070427	6	0.01	307.7645	1	Not Proven	2	12	2	Roads and Tracks	3	308.2941	5.665955	4	-0.5196	1	12	2	4
2657	2655	210947	716663	363.0034	9.66457	6	0.8	362.2034	2	Not Proven	2	24	3	Minor Watercourse	6	361.6408	8.045948	4	1.3626	1	24	3	9
2658	2656	210481	717076	281.1566	14.53853	6	0.01	281.1466	1	Not Proven	2	12	2	Site Infrastructure	3	276.0188	22.336918	3	5.1378	1	9	1	2
2659	2657	210826	717040	302.7213	11.93954	6	0.2	302.5213	1	Not Proven	2	12	2	Site Infrastructure	3	303.4596	12.817739	3	-0.7383	1	9	1	2
2660	2658	211206	716465	394.5852	7.056388	4	0.01	394.5752	1	Not Proven	2	8	2	Minor Watercourse	6	394.8119	22.461659	3	-0.2267	1	18	2	4
2661	2659	210801	715909	378.6553	12.7457	6	0.3	378.3553	1	Not Proven	2	12	2	Site Infrastructure	3	383.578	22.861028	3	-4.9227	1	9	1	2
2662	2660	210612	715652	349.812	11.30993	6	0.15	349.662	1	Not Proven	2	12	2	Site Infrastructure	3	348.8188	10.899076	3	0.9932	1	9	1	2
2663	2661	210191	715001	310.9264	7.911269	4	0.45	310.4764	1	Not Proven	2	8	2	Site Infrastructure	3	308.3781	23.024319	3	2.5483	1	9	1	2
2664	2662	210513	714894	373.8011	15.66547	8	0.1	373.7011	1	Not Proven	2	16	3	Site Infrastructure	3	362.8574	22.728915	3	10.9437	2	18	2	6
2665	2663	210601	715689	340.7137	28.88627	8	0.2	340.5137	1	Not Proven	2	16	3	Site Infrastructure	3	349.0188	22.561908	3	-8.3051	1	9	1	3
2666	2664	211441	716979	369.6968	11.39515	6	0.2	369.4968	1	Not Proven	2	12	2	Site Infrastructure	3	369.2188	2.539621	4	0.478	1	12	2	4
2667	2665	210449	716415	317.263	10.46371	6	0.2	317.063	1	Not Proven	2	12	2	Site Infrastructure	3	313.578	22.268412	3	3.685	1	9	1	2
2668	2666	210650	715529	363.6968	5.737099	4	0.9	362.7968	2	Not Proven	2	16	3	Site Infrastructure	3	364.4408	23.053135	3	-0.744	1	9	1	3
2669	2667	209826	716128	210.7306	11.25004	6	0.01	210.7206	1	Not Proven	2	12	2	Roads and Tracks	3	210.0188	5.864376	4	0.7118	1	12	2	4
2670	2668	210015	715891	253.4523	10.94169	6	0.95	252.5023	2	Not Proven	2	24	3	Site Infrastructure	3	253	22.800434	3	0.4523	1	9	1	3

2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove +/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
2671	2669	210268	715954	300.141	11.30993	6	2.9	297.241	3	Not Proven	2	36	4	Site Infrastructure	3	298.6188	10.811486	3	1.5222	1	9	1	4
2672	2670	210281	715932	302.7007	11.30993	6	0.2	302.5007	1	Not Proven	2	12	2	Site Infrastructure	3	297.6188	31.818759	3	5.0819	1	9	1	2
2673	2671	210255	715976	298	5.710593	4	0.01	297.99	1	Not Proven	2	8	2	Site Infrastructure	3	298	2.166562	4	0	1	12	2	4
2674	2672	210227	715967	293.8247	11.30993	6	0.4	293.4247	1	Not Proven	2	12	2	Site Infrastructure	3	294.6188	22.013613	3	-0.7941	1	9	1	2
2675	2673	210180	715950	284.4755	12.97101	6	0.1	284.3755	1	Not Proven	2	12	2	Site Infrastructure	3	289	22.550236	3	-4.5245	1	9	1	2
2676	2674	210151	715910	280.6843	11.49879	6	0.01	280.6743	1	Not Proven	2	12	2	Site Infrastructure	3	284.6188	22.973529	3	-3.9345	1	9	1	2
2677	2675	210124	715868	275.3883	16.41627	8	0.01	275.3783	1	Not Proven	2	16	3	Site Infrastructure	3	279.6188	23.213549	3	-4.2305	1	9	1	3
2678	2676	210079	715866	264.2273	11.86368	6	0.15	264.0773	1	Not Proven	2	12	2	Site Infrastructure	3	261.0376	22.878171	3	3.1897	1	9	1	2
2679	2677	210061	715912	256.659	13.06564	6	0.95	255.709	2	Not Proven	2	24	3	Site Infrastructure	3	254.0985	22.784514	3	2.5605	1	9	1	3
2680	2678	210221	715942	292.6713	9.469542	6	0.45	292.2213	1	Not Proven	2	12	2	Site Infrastructure	3	292.6188	0.26687	4	0.0525	1	12	2	4
2681	2679	210181	715913	286.6706	11.30993	6	0.1	286.5706	1	Not Proven	2	12	2	Site Infrastructure	3	286.6188	0.342867	4	0.0518	1	12	2	4
2682	2680	210158	715869	282.1469	9.612192	6	0.1	282.0469	1	Not Proven	2	12	2	Site Infrastructure	3	282.2188	0.536607	4	-0.0719	1	12	2	4
2683	2681	210122	715836	275.5031	12.27601	6	0.45	275.0531	1	Not Proven	2	12	2	Site Infrastructure	3	275.6596	0.919213	4	-0.1565	1	12	2	4
2684	2682	210073	715839	264.1793	12.22146	6	0.1	264.0793	1	Not Proven	2	12	2	Site Infrastructure	3	264.0188	1.277607	4	0.1605	1	12	2	4
2685	2683	210046	715879	256.5322	9.431506	6	0.2	256.3322	1	Not Proven	2	12	2	Site Infrastructure	3	256.4579	1.134696	4	0.0743	1	12	2	4
2686	2684	210215	715914	292.598	10.03169	6	0.1	292.498	1	Not Proven	2	12	2	Site Infrastructure	3	295.0188	17.646494	3	-2.4208	1	9	1	2
2687	2685	210189	715873	287.2979	8.621933	6	0.2	287.0979	1	Not Proven	2	12	2	Site Infrastructure	3	284.4069	22.637044	3	2.891	1	9	1	2
2688	2686	210160	715833	281.4814	10.21938	6	0.1	281.3814	1	Not Proven	2	12	2	Site Infrastructure	3	280.4188	22.643722	3	1.0626	1	9	1	2
2689	2687	210117	715808	272.1602	10.67328	6	0.2	271.9602	1	Not Proven	2	12	2	Site Infrastructure	3	272.6596	23.063263	3	-0.4994	1	9	1	2
2690	2688	210069	715813	264.1651	15.93042	8	0.1	264.0651	1	Not Proven	2	16	3	Site Infrastructure	3	265.4377	22.79618	3	-1.2726	1	9	1	3
2691	2689	210032	715845	258.2148	16.24198	8	0.2	258.0148	1	Not Proven	2	16	3	Site Infrastructure	3	258.6188	22.392692	3	-0.404	1	9	1	3
2692	2690	209969	715909	240.5121	15.84606	8	0.1	240.4121	1	Not Proven	2	16	3	Site Infrastructure	3	239.1939	22.657224	3	1.3182	1	9	1	3
2693	2691	209921	715935	231.6558	10.86503	6	0.1	231.5558	1	Not Proven	2	12	2	Minor Watercourse	6	231.2408	12.553478	3	0.415	1	18	2	4
2694	2692	209899	715985	222.9515	12.07212	6	0.95	222.0015	2	Not Proven	2	24	3	Minor Watercourse	6	220.2507	16.944971	3	2.7008	1	18	2	6
2695	2693	209871	716029	223.4881	10.43717	6	0.15	223.3381	1	Not Proven	2	12	2	Site Infrastructure	3	225.8188	23.364692	3	-2.3307	1	9	1	2
2696	2694	209844	716076	215.4349	15.95904	8	0.2	215.2349	1	Not Proven	2	16	3	Roads and Tracks	3	213.8188	7.018511	4	1.6161	1	12	2	6
2697	2695	209789	716168	207.3292	8.785087	6	0.2	207.1292	1	Not Proven	2	12	2	Roads and Tracks	3	208.8188	9.315163	4	-1.4896	1	12	2	4
2698	2696	209976	715933	240.1513	16.77481	8	0.01	240.1413	1	Not Proven	2	16	3	Site Infrastructure	3	240.4405	0.951814	4	-0.2892	1	12	2	6
2699	2697	209932	715962	232.6854	17.03148	8	0.1	232.5854	1	Not Proven	2	16	3	Site Infrastructure	3	233.0218	0.977813	4	-0.3364	1	12	2	6
2700	2698	209919	716014	228.5692	15.24743	8	0.1	228.4692	1	Not Proven	2	16	3	Site Infrastructure	3	228.4596	0.390838	4	0.1096	1	12	2	6
2701	2699	209882	716052	223.9266	14.79135	6	0.1	223.8266	1	Not Proven	2	12	2	Site Infrastructure	3	224.1939	0.891372	4	-0.2673	1	12	2	4
2702	2700	209863	716103	219.1859	15.88833	8	0.4	218.7859	1	Not Proven	2	16	3	Site Infrastructure	3	219.1939	0.951919	4	-0.008	1	12	2	6
2703	2701	209803	716189	211.0334	8.703869	6	0.8	210.2334	2	Not Proven	2	24	3	Site Infrastructure	3	211.0083	1.000738	4	0.0251	1	12	2	6
2704	2702	209982	715958	239.9952	15.40592	8	0.1	239.8952	1	Not Proven	2	16	3	Minor Watercourse	6	240.0188	6.184426	4	-0.0236	1	24	3	9
2705	2703	209949	715993	236.5334	14.2405	6	0.1	236.4334	1	Not Proven	2	12	2	Site Infrastructure	3	230.6376	22.439755	3	5.8958	1	9	1	2
2706	2704	209932	716041	230.6341	7.575921	4	0.1	230.5341	1	Not Proven	2	8	2	Minor Watercourse	6	230.0588	3.490993	4	0.5753	1	24	3	6
2707	2705	209895	716079	226.4004	12.61303	6	0.1	226.3004	1	Not Proven	2	12	2	Site Infrastructure	3	222.0188	22.586865	3	4.3816	1	9	1	2
2708	2706	209881	716129	224.5173	19.14157	8	0.15	224.3673	1	Not Proven	2	16	3	Site Infrastructure	3	218.6188	20.496954	3	5.8985	1	9	1	3
2709	2707	209817	716210	213.918	11.35957	6	0.35	213.568	1	Not Proven	2	12	2	Site Infrastructure	3	211.3609	22.489735	3	2.5571	1	9	1	2
2710	2708	211160	717038	336.958	11.92138	6	0.2	336.758	1	Not Proven	2	12	2	Site Infrastructure	3	339.3781	22.714269	3	-2.4201	1	9	1	2
2711	2709	211114	717056	331	4.635598	4	0.45	330.55	1	Not Proven	2	8	2	Site Infrastructure	3	331.9082	22.51646	3	-0.9082	1	9	1	2
2712	2710	211064	717056	326.2219	5.710593	4	0.1	326.1219	1	Not Proven	2	8	2	Site Infrastructure	3	326.8188	22.29489	3	-0.5969	1	9	1	2
2713	2711	211016	717065	323	0	1	1.9	321.1	3	Not Proven	2	6	2	Site Infrastructure	3	323	22.527859	3	0	1	9	1	2
2714	2712	210976	717096	320.8232	5.493505	4	0.95	319.8732	2	Not Proven	2	16	3	Site Infrastructure	3	320.4188	22.892563	3	0.4044	1	9	1	3
2715	2713	210926	717104	317	4.208147	4	0.45	316.55	1	Not Proven	2	8	2	Site Infrastructure	3	318	23.916259	3	-1	1	9	1	2
2716	2714	210876	717101	314.6052	10.39199	6	0.95	313.6552	2	Not Proven	2	24	3	Site Infrastructure	3	314.4188	1.054843	4	0.1864	1	12	2	6
2717	2715	210828	717084	307.0774	9.1127	6	0.95	306.1274	2	Not Proven	2	24	3	Site Infrastructure	3	307.6188	8.283133	4	-0.5414	1	12	2	6
2718	2716	210781	717066	297.4537	10.65375	6	4.8	292.6537	8	Not Proven	2	96	5	Site Infrastructure	3	296.2188	19.974033	3	1.2349	1	9	1	5
2719	2717	210743	717094	296	0.757568	1	2	294	3	Not Proven	2	6	2	Site Infrastructure	3	297	22.78154	3	-1	1	9	1	2
2720	2718	210724	717140	295.339	5.67772	4	0.1	295.239	1	Not Proven	2	8	2	Site Infrastructure	3	297.9812	22.739081	3	-2.6422	1	9	1	2
2721	2719	210704	717187	294.0356	9.343675	6	0.2	293.8356	1	Not Proven	2	12	2	Site Infrastructure	3	295	22.644934	3	-0.9644	1	9	1	2
2722	2720	210677	717230	285.5931	11.80794	6	0.1	285.4931	1	Not Proven	2	12	2	Site Infrastructure	3	287.7592	22.723126	3	-2.1661	1	9	1	2
2723	2721	210630	717248	280.9357	8.556561	6	0.1	280.8357	1	Not Proven	2	12	2	Minor Watercourse	6	278.3781	20.561564	3	2.5576	1	18	2	4
2724	2722	210582	717236	275.924	11.58119	6	0.1	275.824	1	Not Proven	2	12	2	Minor Watercourse	6	272.578	20.275108	3	3.346	1	18	2	4
2725	2723	210539	717209	269.9806	19.93116	8	0.1	269.8806	1	Not Proven	2	16	3	Minor Watercourse	6	265.978	11.555793	3	4.0026	1	18	2	6
2726	2724	210502	717175	268.3333	16.27866	8	0.1	268.2333	1	Not Proven	2	16	3	Minor Watercourse	6	262.578	19.40275	3	5.7553	1	18	2	6
2727	2725	210470	717136	268.7981	16.45265	8	0.1	268.6981	1	Not Proven	2	16	3	Site Infrastructure	3	275.3781	23.266367	3	-6.58	1	9	1	3
2728	2726	210416	717051	271.6031	9.581166	6	1.9	269.7031	3	Not Proven	2	36	4	Site Infrastructure	3	274.8188	23.243162	3	-3.2157	1	9	1	4
2729	2727	211159	717008	342.8299	9.024143	6	0.1	342.7299	1	Not Proven	2	12	2	Site Infrastructure	3	342.9592	0.772591	4	-0.1293	1	12	2	4
2730	2728	211115	717030	332	4.697504	4	0.8	331.2	2	Not Proven	2	16	3	Site Infrastructure	3	332	0.812365	4	0	1	12	2	6
2731	2729	211067	717031	326.9004	8.76966	6	0.2	326.7004	1	Not Proven	2	12	2	Site Infrastructure	3	326.8477	0.771411	4	0.0527	1	12	2	4
2732	2730	211018	717033	324	4.772571	4	0.3	323.7	1	Not Proven	2	8	2	Site Infrastructure	3	324	0.464538	4	0	1	12	2	4
2733	2731	210980	717063	321.4339	5.710593	4	0.95	320.4839	2	Not Proven	2	16	3	Site Infrastructure	3	321.6188	1.019517	4	-0.1849	1	12	2	6
2734	2732	210934	717078	319	5.363378	4	0.1	318.9	1	Not Proven	2	8	2	Site Infrastructure	3	319	1.192793	4	0	1	12	2	4
2735	2733	210884	717078	317	2.149827	2	0.01	316.99	1	Not Proven	2	4	1	Site Infrastructure	3	317	0.298489	4	0	1	12	2	2
2736	2734	210838	717061	308.0691	11.54654	6	0.4	307.6691	1	Not Proven	2	12	2	Site Infrastructure	3	308.0965	1.085327	4	-0.0274	1	12	2	4
2737	2735	210792	717043	296.9181	9.913501	6	0.45	296.4681	1	Not Proven	2	12	2	Site Infrastructure	3	297.0188	0.626432	4	-0.1007	1	12	2	4
2738	2736	210744	717050	296	0	1	7.2	288.8	8	Not Proven	2	16	3	Site Infrastructure	3	296	0.187613	4	0	1	12	2	6
2739	2737	210717	717090	297	0.003312	1	0.3	296.7	1	Not Proven	2	2	1	Site Infrastructure	3	297	0.97488	4	0	1	12	2	2
2740	2738	210698	717136	297.8748	5.330202	4	0.25	297.6248	1	Not Proven	2	8	2	Site Infrastructure	3	297.8598	0.117703	4	0.015	1	12	2	4
2741	2739	210679	717181	294.0996	7.819464	4	0.35	293.7496	1	Not Proven	2	8	2	Site Infrastructure	3	294.0349	1.006284	4	0.0647	1	12	2	4
2742	2740	210649	717218	286.0834	10.23774	6	0.15	285.9334	1	Not Proven	2	12	2	Site Infrastructure	3	286.178	0.518204	4	-0.0946	1	12	2	4
2743	2741	210600	717218	281.5863	14.64512	6	0.1	281.4863	1	Not Proven	2	12	2	Site Infrastructure	3	281.578	0.180638	4	0.0083	1	12	2	4
2744	2742	210559	717192	278.3695	14.17439	6	0.1	278.2695	1	Not Proven	2	12	2	Site Infrastructure	3	278.3781	0.191627	4	-0.0086	1	12	2	4
2745	2743	210522	717160	276.287	17.16897	8	0.4	275.887	1	Not Proven	2	16	3	Site Infrastructure	3	276.578	0.912045	4	-0.291	1	12	2	6
2746	2744	210491	717122	275.7687	10.80295	6	0.2	275.5687	1	Not Proven	2	12	2	Site Infrastructure	3	275.6795	0.521624	4	0.0892	1	12	2	4
2747	2745	210438	717040	275.061	11.01384	6	0.9	274.161	2	Not Proven	2	24	3	Site Infrastructure	3	275.2188	0.881414	4	-0.1578	1	12	2	6
2748	2746	211158	716982	347.1558	13.07201	6	0.1	347.0558	1	Not Proven	2	12	2	Site Infrastructure	3	343.7592	22.961616	3	3.3966	1	9	1	2
2749	2747	211113	717004	335.6999	17.02873	8	0.2	335.4999	1	Not Proven	2	16	3	Site Infrastructure	3	332.978	22.537562	3	2.7219	1	9	1	3
2750	2748	211064	717005	328.6449	15.33454	8	0.1	328.5449	1	Not Proven	2	16	3	Minor Watercourse	6	325.1505	19.271793	3	3.4944	1	18	2	6
2751	2749	211014	717008	323.0242	2.983695	2	0.3	322.7242	1	Not Proven	2	4	1	Site Infrastructure	3	324	22.77237	3	-0.9758	1	9	1	1
2752	2750	210973	717037	321	2.735435	2	0.01	320.99	1	Not Proven	2	4	1	Site Infrastructure	3	322	22.473565	3	-1	1	9	1	1
2753	2751	210927	717054	315.9617	8.049467	6	0.1	315.8617	1	Not Proven	2	12	2	Site Infrastructure	3	318.7912	23.304016	3	-2.8295	1	9	1	2
2754	2752	210877	717049	311.5102	14.86983	6	0.25	311.2602	1	Not Proven	2	12	2	Site Infrastructure	3	315.6596	22.698139	3	-4.1494	1	9	1	2
2755	2753	210830	717031	302.2782	14.17702	6	0.2	302.0782	1	Not Proven	2	12	2	Site Infrastructure	3	303.4596	22.880499	3	-1.1814	1	9	1	2
2756	2754	210782	717016	296.9828	3.479913	2	5.5	291.4828	8	Not Proven	2	32	4	Site Infrastructure	3	296.0105	23.817124	3	0.9723	1	9	1	4
2757	2755	210734	717027	296	4.205167	4	6.8	289.2	8	Not Proven	2	64	5	Site Infrastructure	3	296	22.783668	3	0	1	9	1	5
2758	2756	210701	717065	298	6.234101	4	0.1	297.9	1	Not Proven	2	8	2	Site Infrastructure	3	297	22.507335	3	1	1	9	1	2
2759	2757	210682	717111	298.8885	5.024033	4	0.2	298.6885	1	Not Proven	2	8	2	Site Infrastructure	3	298.9812	22.644638	3	-0.0927	1	9	1	2
2760	2758	210662	717158	294.9986	4.201556	4	0.95	294.0486	2	Not Proven	2	16	3	Site Infrastructure	3	295	22.698442	3	-0.0014	1	9	1	3
2761	2759	210633	717197	287.1656	8.090928	6	3	284.1656	3	Not Proven	2	36	4	Site Infrastructure	3	285.9592	22.397703	3	1.2064	1	9	1	4
2762	2760	210588	717181	284.492	10.789	6	0.95	283.542	2	Not Proven	2	24	3	Site Infrastructure	3	280.3781	23.048089	3	4.1139	1	9	1	3
2763	2761	210546	717152	282.7425	8.93173	6	0.3	282.4425	1	Not Proven	2	12	2	Site Infrastructure	3	276.7969	22.378305	3	5.9456	1	9	1	2
2764	2762	210517	717112	279.1371	10.3015	6	0.2	278.9371	1	Not Proven	2	12	2	Site Infrastructure	3	275.6033	22.710126	3	3.5338	1	9	1	2
2765	2763	210461	717030	279.6217	11.30993	6	0.2	279.4217	1	Not Proven	2	12	2	Site Infrastructure	3	275.6188	21.500467	3	4.0029	1	9	1	2
2766	2764	211433	716673	387	4.497935	4	0.1	386.9	1	Not Proven	2	8	2	Site Infrastructure	3	387.7438	24.825928	3	-0.7438	1	9	1	2
2767	2765	211450	716719	384	3.537511	2	0.1	383.9	1	Not Proven	2	4	1	Site Infrastructure	3	384	22.929422	3	0	1	9	1	1
2768	2766	211460	716768	382.4201	5.959671	4	0.95	381.4701	2	Not Proven	2	16	3	Site Infrastructure	3	382	22.765596	3	0.4201	1	9	1	3
2769	2767	211470	716817	383.4885	5.94846	4	0.95	382.5385	2	Not Proven	2	16	3	Site Infrastructure	3	382	22.630546	3	1.4885	1	9	1	3
2770	2768	211480	716866	383	1.591748	1	0.95	382.05	2	Not Proven	2	4	1	Site Infrastructure	3	380.2188	22.526772	3	2.7812	1	9	1	1
2771	2769	211490	716915	381.8237	7.108201	4	0.4	381.4237	1	Not Proven	2	8	2	Site Infrastructure	3	378.6557	22.45457	3	3.168	1	9	1	2
2772	2770	211498	716964	378.0222	9.528046	6	0.95	377.0722	2	Not Proven	2	24	3	Site Infrastructure	3	375.8601	23.055091	3	2.1621	1	9	1	3
2773	2771	211481	717010	371.8018	8.134273	6	0.3	371.5018	1	Not Proven	2	12	2	Site Infrastructure	3	370.6188	22.677498	3	1.183	1	9	1	2
2774	2772	211451	717050	364.7206	9.434234	6	0.45	364.2706	1	Not Proven	2	12	2	Site Infrastructure	3	363.4188	23.033127	3	1.3018	1	9	1	2
2775	2773	211412	716687	388	4.610291	4	0.1	387.9	1	Not Proven	2	8	2	Site Infrastructure	3	387.96	0.942272	4	0.04	1	12	2	4
2776	2774	211427	716733	383.8771	4.793007	4	2.3	381.5771	3	Not Proven	2	24	3	Site Infrastructure	3	383.7592	0.89647	4	0.1179	1	12	2	6
2777	2775	211437	716781	381.2977	5.004341	4	0.95	380.3477	2	Not Proven	2	16	3	Site Infrastructure	3	381.1304	0.98966	4	0.1673	1	12	2	6
2778	2776	211447	716829	381.6983	6.943593	4	0.2	381.4983	1	Not Proven	2	8	2	Site Infrastructure	3	381.4579	1.117905	4	0.2404	1	12	2	4
2779	2777	211457	716877	379.924	8.574627	6	0.9	379.024	2	Not Proven	2	24	3	Site Infrastructure	3	379.8839	0.913273	4	0.0401	1	12	2	6
2780	2778	211467	716924	377.9599	8.515791	6	0.1	377.8599	1	Not Proven	2	12	2	Site Infrastructure	3	377.9564	0.69738	4	0.0035	1	12	2	4
2781	2779	211471	716972	374.7006	8.049467	6	0.7	374.0006	2	Not Proven	2	24	3	Site Infrastructure	3	374.6795	0.850243	4	0.0211	1	12	2	6
2782	2780	211449	717016	366.7363	11.42724	6	0.1	366.6363	1	Not Proven	2	12	2	Site Infrastructure	3	366.578	0.635393	4	0.1583	1	12	2	4
2783	2781	211391	716701	386.2649	4.778254	4	0.95	385.3149	2	Not Proven	2	16	3	Site Infrastructure	3	388	20.082635	3	-1.7351	1	9	1	3
2784	2782	211405	716747	383	4.57921	4	2.9	380.1	3	Not Proven	2	24	3	Site Infrastructure	3	383	22.59454	3	0	1	9	1	3
2785	2783	211414	716793	380.4008	5.97688	4	1.7	378.7008	3	Not Proven	2	24	3	Site Infrastructure	3	381	22.670595	3	-0.5992	1	9	1	3
2786	2784	211424	716840	377.7043	8.366682	6	0.3	377.4043	1	Not Proven	2	12	2	Site Infrastructure	3	380.4579	22.780463	3	-2.7536	1	9	1	2
2787	2785	211433	716886	376.1927	8.724593	6	0.4	375.7927	1	Not Proven	2	12	2	Site Infrastructure	3	379.4188	22.702143	3	-3.2261	1	9	1	2
2788	2786	211443	716932	374.1228	6.698957	4	0.4	373.7228	1	Not Proven	2	8	2	Site Infrastructure	3	376.5675	20.772519	3	-2.4447	1	9	1	2
2789	2787	211412	717015	360.8458	10.37266	6	0.1	360.7458	1	Not Proven	2	12	2	Site Infrastructure	3	361.2223	22.858877	3	-0.3765	1	9	1	2
2790	2788	211481	716897	381.7437	7.341577	4	0.45	381.2937	1	Not Proven	2	8	2	Site Infrastructure	3	379.4188	16.735084	3	2.3249	1	9	1	2
2791	2789	211441	716911	375.7069	7.901031	4	0.2	375.5069	1	Not Proven	2	8	2	Site Infrastructure	3	378.6188	20.206792	3	-2.9119	1	9	1	2
2792	2790	211428	716953	371.0934	10.20728	6	0.1	370.9934	1	Not Proven	2	12	2	Site Infrastructure	3	371.0188	22.309631	3	0.0746	1	9	1	2
2793	2791	211383	716948	365.9034	11.73112	6	0.45	365.4534	1	Not Proven	2	12	2	Site Infrastructure	3	362.4579	22.451701	3	3.4455	1	9	1	2
2794	2792	211338	716929	364.6845	11.30993	6	0.2	364.4845	1	Not Proven	2	12	2	Site Infrastructure	3	360.5592	22.671905	3	4.1253	1	9	1	2
2795	2793	211293	716910	367.0883	10.2505	6	0.1	366.9883	1	Not Proven	2	12	2	Site Infrastructure	3	362.578	22.405852	3	4.5103	1	9	1	2
2796	2794	211249	716891	364.2641	11.37519	6	0.95	363.3141	2	Not Proven	2	24	3	Site Infrastructure	3	360.318	23.006769	3	3.9461	1	9	1	3
2797	2795	211204	716872	361.028	6.678371	4	1.7	359.328	3	Not Proven	2	24	3	Minor Watercourse	6	361.0786	5.664662	4	-0.0506	1	24	3	9
2798	2796	211160	716853	362.88	10.15509	6	0.95	361.93	2	Not Proven	2	24	3	Site Infrastructure	3	360.7592	22.500896	3	2.1208	1	9	1	3
2799	2797	211115	716832	365.0254	8.433031	6	0.45	364.5754	1	Not Proven	2	12	2	Site Infrastructure	3	361.178	22.818279	3	3.8474	1	9	1	2
2800	2798	211079	716801	368.302	14.32535	6	0.2	368.102	1	Not Proven	2	12	2	Site Infrastructure	3	362.4794	22.537659	3	5.8226	1	9	1	2
2801	2799	211038	716775	368.6638	17.30627	8	0.4	368.2638	1	Not Proven	2	16	3	Site Infrastructure	3	361.1969	22.770311	3	7.4669	1	9	1	3
2802	2800	211008	716737	364.3099	15.18712	8	0.4	363.9099	1	Not Proven	2	16	3	Site Infrastructure	3	360.7592	22.56079	3	3.5507	1	9	1	3
2803	2801	210978	716700	363.6483	5.080741	4	3.9	359.7483	8	Not Proven	2	64	5	Site Infrastructure	3	362	22.557648	3	1.6483	1	9	1	5
2804	2802	211466	716938	376.9615	8.334986	6	0.1	376.8615	1	Not Proven	2	12	2	Site Infrastructure	3	376.9763	0.985686	4	-0.0148	1	12	2	4
2805	2803	211439	716975	369.7921	11.39553	6	0.8	368.9921	2	Not Proven	2	24	3	Site Infrastructure	3	369.578	0.770525	4	0.2141	1	12	2	6
2806	2804	211390	716979	362.437	11.78909	6	0.2	362.237	1	Not Proven	2	12	2	Site Infrastructure	3	362.5936	0.877693	4	-0.1566	1	12	2	4
2807	2805	211344	716959	360.2462	8.049467	6	0.45	359.7962	1	Not Proven	2	12	2	Site Infrastructure	3	360.2342	0.899267	4	0.012	1	12	2	4
2808	2806	211298	716939	361.7322	11.34824	6	0.2	361.5322	1	Not Proven	2	12	2	Site Infrastructure	3	361.778	1.007734	4	-0.0458	1	12	2	4
2809	2807	211251	716919	360.4865	11.74281	6	0.2	360.2865	1	Not Proven	2	12	2	Site Infrastructure	3	360.3461	0.836337	4	0.1404	1	12	2	4
2810	2808	211205	716900	358.3038	6.056231	4	0.95	357.3538	2	Not Proven	2	16	3	Site Infrastructure	3	358.325	0.352264	4	-0.0212	1	12	2	6
2811	2809	211158	716880	360	3.845243	2	0.45	359.55	1	C	2	4	1	Site Infrastructure	3	360	0.134229	4	0	1	12	2	2
2812	2810	211112	716860	360.4836	11.28193	6	0.3	360.1836	1	Not Proven	2	12	2	Site Infrastructure	3	360.5592	0.451414	4	-0.0756	1	12	2	4
2813	2811	211073	716828	361.1429	10.78902	6	0.45	360.6929	1	Not Proven	2	12	2	Site Infrastructure	3	361.0181	0.877947	4	0.1248	1	12	2	4
2814	2812	211030	716802	361.6327	15.85699	8	0.1	361.5327	1	Not Proven	2	16	3	Site Infrastructure	3	361.778	0.518141	4	-0.1453	1	12	2	6
2815	2813	210997	716764	358.7296	11.91667	6	1.3	357.4296	3	Not Proven	2	36	4	Site Infrastructure	3	358.7592	0.706672	4	-0.0296	1	12	2	8
2816	2814	210934	716685	362.6824	5.677747	4	0.1	362.5824	1	Not Proven	2	8	2	Site Infrastructure	3	362.6276	0.597249	4	0.0548	1	12	2	4
2817	2815	211462	716917	377.826	8.848023	6	0.35	377.476	1	Not Proven	2	12	2	Site Infrastructure	3	378.0188	1.944047	4	-0.1928	1	12	2	4
2818	2816	211491	716934	380.558	8.372345	6	0.1	380.458	1	Not Proven	2	12	2	Site Infrastructure	3	378	19.58496	3	2.558	1	9	1	2
2819	2817	211474	716978	374.3109	8.049467	6	0.8	373.5109	2	Not Proven	2	24	3	Site Infrastructure	3	374.3713	2.413026	4	-0.0604	1	12	2	6
2820	2818	211432	717005	365.4316	10.34499	6	0.2	365.2316	1	Not Proven	2	12	2	Site Infrastructure	3	367.3432	17.684637	3	-1.9116	1	9	1	2
2821	2819	211382	717002	358.0613	10.21938	6	0.95	357.1113	2	Not Proven	2	24	3	Site Infrastructure	3	361.9201	22.914664	3	-3.8588	1	9	1	3
2822	2820	211335	716982	357.0215	9.454847	6	0.45	356.5715	1	Not Proven	2	12	2	Site Infrastructure	3	360.0667	22.568538	3	-3.0452	1	9	1	2
2823	2821	211289	716962	357.0274	11.57389	6	0.95	356.0774	2	Not Proven	2	24	3	Site Infrastructure	3	361.3781	22.966839	3	-4.3507	1	9	1	3
2824	2822	211242	716942	356.8471	10.32343	6	0.9	355.9471	2	Not Proven	2	24	3	Site Infrastructure	3	360.0985	22.528481	3	-3.2514	1	9	1	3
2825	2823	211195	716922	357	6.029332	4	0.3	356.7	1	Not Proven	2	8	2	Minor Watercourse	6	358	11.580024	3	-1	1	18	2	4
2826	2824	211148	716903	357.1087	8.08591	6	0.1	357.0087	1	Not Proven	2	12	2	Site Infrastructure	3	360	22.49336	3	-2.8913	1	9	1	2
2827	2825	211101	716883	355.9863	11.17942	6	0.1	355.8863	1	Not Proven	2	12	2	Site Infrastructure	3	360.1592	22.792304	3	-4.1729	1	9	1	2
2828	2826	211062	716851	355.071	15.79901	8	0.95	354.121	2	Not Proven	2	32	4	Site Infrastructure	3	360.578	23.032453	3	-5.507	1	9	1	4
2829	2827	211019	716824	353.8314	14.50043	6	0.1	353.7314	1	Not Proven	2	12	2	Site Infrastructure	3	360.978	22.99088	3	-7.1466	1	9	1	2
2830	2828	210984	716787	355.3232	6.37937	4	0.25	355.0732	1	Not Proven	2	8	2	Site Infrastructure	3	358.0985	22.776584	3	-2.7753	1	9	1	2
2831	2829	210921	716708	362	0	1	0.95	361.05	2	Not Proven	2	4	1	Site Infrastructure	3	362.1304	22.504572	3	-0.1304	1	9	1	1
2832	2830	210305	716822	268.3478	6.551267	4	0.25	268.0978	1	Not Proven	2	8	2	Site Infrastructure	3	267.9349	19.964223	3	0.4129	1	9	1	2
2833	2831	210264	716792	262.1992	10.60237	6	0.1	262.0992	1	Not Proven	2	12	2	Site Infrastructure	3	262.149	24.339606	3	0.0502	1	9	1	2
2834	2832	210246	716745	257.2726	10.12401	6	0.4	256.8726	1	Not Proven	2	12	2	Site Infrastructure	3	258	8.826383	4	-0.7274	1	12	2	4
2835	2833	210240	716696	261.9014	11.93553	6	1.9	260.0014	3	Not Proven	2	36	4	Site Infrastructure	3	261.578	1.760533	4	0.3234	1	12	2	8
2836	2834	210218	716651	264.1732	15.06996	8	0.1	264.0732	1	Not Proven	2	16	3	Site Infrastructure	3	265.978	8.429057	4	-1.8048	1	12	2	6
2837	2835	210199	716604	263.5728	14.78178	6	0.3	263.2728	1	Not Proven	2	12	2	Site Infrastructure	3	270.0188	23.322171	3	-6.446	1	9	1	2

	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove =/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
2838	2836	210205	716555	262.7061	7.346596	4	0.2	262.5061	1	Not Proven	2	8	2	Minor Watercourse	6	262.7912	0.747919	4	-0.0851	1	24	3	6
2839	2837	210177	716458	271.7869	15.79317	8	0.4	271.3869	1	Not Proven	2	16	3	Site Infrastructure	3	277.3781	22.551231	3	-5.5912	1	9	1	3
2840	2838	210328	716811	269.7229	8.049467	6	0.8	268.9229	2	Not Proven	2	24	3	Site Infrastructure	3	269.8756	0.991389	4	-0.1527	1	12	2	6
2841	2839	210289	716781	263.9726	10.91827	6	0.2	263.7726	1	Not Proven	2	12	2	Site Infrastructure	3	264.0596	0.495723	4	-0.087	1	12	2	4
2842	2840	210270	716736	259.7292	9.543209	6	0.1	259.6292	1	C	2	12	2	Minor Watercourse	6	259.6217	4.3971	4	0.1075	1	24	3	6
2843	2841	210265	716688	266.4326	12.60438	6	2.9	263.5326	3	Not Proven	2	36	4	Site Infrastructure	3	261.578	26.151032	3	4.8546	1	9	1	4
2844	2842	210243	716643	271.0849	13.72842	6	0.4	270.6849	1	Not Proven	2	12	2	Site Infrastructure	3	267.3849	14.415231	3	3.7	1	9	1	2
2845	2843	210224	716598	269.2831	10.24487	6	0.4	268.8831	1	Not Proven	2	12	2	Site Infrastructure	3	269.4596	0.976003	4	-0.1765	1	12	2	4
2846	2844	210229	716549	267.3458	10.74265	6	0.9	266.4458	2	Not Proven	2	24	3	Site Infrastructure	3	267.2188	1.012744	4	0.127	1	12	2	6
2847	2845	210202	716454	277.563	15.79317	8	0.4	277.163	1	Not Proven	2	16	3	Site Infrastructure	3	277.3781	0.991281	4	0.1849	1	12	2	6
2848	2846	210351	716800	270.8427	9.66373	6	0.3	270.5427	1	Not Proven	2	12	2	Site Infrastructure	3	272.9075	12.05455	3	-2.0648	1	9	1	2
2849	2847	210315	716769	265	5.181812	4	0.1	264.9	1	Not Proven	2	8	2	Minor Watercourse	6	264.7912	3.260833	4	0.2088	1	24	3	6
2850	2848	210294	716727	264.7034	15.69696	8	0.95	263.7534	2	Not Proven	2	32	4	Minor Watercourse	6	261.4188	20.709715	3	3.2846	1	18	2	8
2851	2849	210289	716679	270.174	10.66216	6	0.1	270.074	1	Not Proven	2	12	2	Site Infrastructure	3	261.1592	51.425522	3	9.0148	1	9	1	2
2852	2850	210268	716635	276.4339	10.12708	6	0.8	275.6339	2	Not Proven	2	24	3	Site Infrastructure	3	268.578	39.226279	3	7.8559	1	9	1	3
2853	2851	210248	716591	271	5.883304	4	0.2	270.8	1	Not Proven	2	8	2	Minor Watercourse	6	269.0408	12.994066	3	1.9592	1	18	2	4
2854	2852	210254	716543	272.2328	12.13743	6	0.95	271.2828	2	Not Proven	2	24	3	Site Infrastructure	3	268.0188	22.073561	3	4.214	1	9	1	3
2855	2853	210239	716497	275.5424	13.22747	6	0.2	275.3424	1	Not Proven	2	12	2	Site Infrastructure	3	271.0786	22.59061	3	4.4638	1	9	1	2
2856	2854	210190	716411	279.2216	14.10892	6	0.25	278.9716	1	Not Proven	2	12	2	Site Infrastructure	3	279.2983	1.076963	4	-0.0767	1	12	2	4
2857	2855	210231	716374	286.607	10.65671	6	0.1	286.507	1	Not Proven	2	12	2	Minor Watercourse	6	287.0188	4.794302	4	-0.4118	1	24	3	6
2858	2856	210285	716364	297.4449	11.70676	6	0.4	297.0449	1	Not Proven	2	12	2	Site Infrastructure	3	296.4017	23.671461	3	1.0432	1	9	1	2
2859	2857	210211	716425	285.022	16.09709	8	0.01	285.012	1	Not Proven	2	16	3	Site Infrastructure	3	285.0154	0.228715	4	0.0066	1	12	2	6
2860	2858	210246	716395	289.8225	9.015225	6	0.45	289.3725	1	Not Proven	2	12	2	Site Infrastructure	3	289.7912	1.056819	4	0.0313	1	12	2	4
2861	2859	210292	716390	297.426	10.97396	6	0.45	296.976	1	Not Proven	2	12	2	Site Infrastructure	3	297.5592	0.890456	4	-0.1332	1	12	2	4
2862	2860	210338	716388	304.1038	8.083845	6	0.1	304.0038	1	Not Proven	2	12	2	Site Infrastructure	3	304.2099	0.575426	4	-0.1061	1	12	2	4
2863	2861	210233	716436	288.5566	20.13915	8	0.1	288.4566	1	Not Proven	2	16	3	Site Infrastructure	3	285.978	22.369639	3	2.5786	1	9	1	3
2864	2862	210276	716415	293.7855	9.52599	6	0.95	292.8355	2	Not Proven	2	24	3	Site Infrastructure	3	293.978	22.909206	3	-0.1925	1	9	1	3
2865	2863	210326	716416	301.9216	8.098399	6	0.95	300.9716	2	Not Proven	2	24	3	Site Infrastructure	3	301.318	22.440743	3	0.6036	1	9	1	3
2866	2864	210396	716354	314.6319	11.27972	6	0.2	314.4319	1	Not Proven	2	12	2	Site Infrastructure	3	311.9564	19.065812	3	2.6755	1	9	1	2
2867	2865	210701	716576	329.2331	10.81028	6	0.2	329.0331	1	Not Proven	2	12	2	Site Infrastructure	3	332.4188	22.438539	3	-3.1857	1	9	1	2
2868	2866	210649	716568	323.8967	9.906611	6	0.45	323.4467	1	Not Proven	2	12	2	Minor Watercourse	6	323.9592	9.408398	4	-0.0625	1	24	3	6
2869	2867	210597	716558	323.9484	10.24013	6	0.1	323.8484	1	Not Proven	2	12	2	Site Infrastructure	3	326	22.846076	3	-2.0516	1	9	1	2
2870	2868	210549	716536	317.106	10.21938	6	0.3	316.806	1	C	2	12	2	Site Infrastructure	3	321.578	22.26428	3	-4.472	1	9	1	2
2871	2869	210501	716514	312.8239	10.94193	6	0.1	312.7239	1	Not Proven	2	12	2	Site Infrastructure	3	317.1592	22.744482	3	-4.2353	1	9	1	2
2872	2870	210453	716492	310.2542	10.21938	6	0.9	309.3542	2	Not Proven	2	24	3	Site Infrastructure	3	314.0667	23.086986	3	-3.8125	1	9	1	3
2873	2871	210381	716416	307.2213	5.938454	4	0.01	307.2113	1	C	2	8	2	Roads and Tracks	3	307.2223	0.174142	4	-0.001	1	12	2	4
2874	2872	210715	716553	334.4968	12.60438	6	0.1	334.3968	1	Not Proven	2	12	2	Site Infrastructure	3	334.4188	0.932713	4	0.078	1	12	2	4
2875	2873	210664	716545	326.5206	8.516545	6	0.1	326.4206	1	C	2	12	2	Site Infrastructure	3	326.3592	1.214872	4	0.1614	1	12	2	4
2876	2874	210612	716536	326.284	7.09389	4	0.85	325.434	2	Not Proven	2	16	3	Site Infrastructure	3	326.3713	0.833257	4	-0.0873	1	12	2	6
2877	2875	210564	716515	322.7475	13.52858	6	0.45	322.2975	1	Not Proven	2	12	2	Site Infrastructure	3	322.778	0.968543	4	-0.0305	1	12	2	4
2878	2876	210516	716493	318.5932	12.82882	6	0.15	318.4432	1	Not Proven	2	12	2	Site Infrastructure	3	318.578	0.633423	4	0.0152	1	12	2	4
2879	2877	210469	716471	314.4718	10.21938	6	0.4	314.0718	1	C	2	12	2	Site Infrastructure	3	314.3781	0.331818	4	0.0937	1	12	2	4
2880	2878	210432	716435	312.942	10.30634	6	0.1	312.842	1	Not Proven	2	12	2	Site Infrastructure	3	313.0068	0.865454	4	-0.0648	1	12	2	4
2881	2879	210729	716531	339.2646	13.53638	6	0.4	338.8646	1	Not Proven	2	12	2	Site Infrastructure	3	335.778	22.395544	3	3.4866	1	9	1	2
2882	2880	210678	716522	330.2609	16.55528	8	0.2	330.0609	1	Not Proven	2	16	3	Minor Watercourse	6	330.3781	2.405481	4	-0.1172	1	24	3	9
2883	2881	210627	716514	330.588	8.439856	6	0.1	330.488	1	Not Proven	2	12	2	Site Infrastructure	3	327.3592	22.091303	3	3.2288	1	9	1	2
2884	2882	210579	716494	327.1353	8.516779	6	0.4	326.7353	1	Not Proven	2	12	2	Site Infrastructure	3	323.578	22.75621	3	3.5573	1	9	1	2
2885	2883	210531	716473	323.7413	10.27217	6	0.3	323.4413	1	Not Proven	2	12	2	Site Infrastructure	3	318.778	22.778472	3	4.9633	1	9	1	2
2886	2884	210485	716451	319.1091	10.15743	6	0.1	319.0091	1	Not Proven	2	12	2	Site Infrastructure	3	315.5114	22.809543	3	3.5977	1	9	1	2
2887	2885	210413	716378	315.1085	13.77645	6	0.85	314.2585	2	Not Proven	2	24	3	Site Infrastructure	3	311.0188	22.668662	3	4.0897	1	9	1	3
2888	2886	210930	716127	383.4998	5.928503	4	2	381.4998	3	Not Proven	2	24	3	Site Infrastructure	3	385.0143	18.439935	3	-1.5145	1	9	1	3
2889	2887	210954	716170	381.6119	9.753229	6	0.95	380.6619	2	Not Proven	2	24	3	Site Infrastructure	3	383.9082	18.038003	3	-2.2963	1	9	1	3
2890	2888	210978	716213	381.0535	9.271848	6	0.1	380.9535	1	Not Proven	2	12	2	Site Infrastructure	3	384.178	18.768234	3	-3.1245	1	9	1	2
2891	2889	211011	716250	383.6388	10.59193	6	0.2	383.4388	1	Not Proven	2	12	2	Minor Watercourse	6	383.778	13.688036	3	-0.1392	1	18	2	4
2892	2890	211047	716284	389.886	5.759753	4	0.8	389.086	2	Not Proven	2	16	3	Minor Watercourse	6	390	3.336342	4	-0.114	1	24	3	9
2893	2891	211081	716319	392.3978	7.321721	4	0.4	391.9978	1	Not Proven	2	8	2	Site Infrastructure	3	394.6217	22.333787	3	-2.2239	1	9	1	2
2894	2892	211099	716365	394	5.710593	4	0.9	393.1	2	C	2	16	3	Site Infrastructure	3	396.6188	22.673087	3	-2.6188	1	9	1	3
2895	2893	211126	716406	394	6.254166	4	0.45	393.55	1	Not Proven	2	8	2	Site Infrastructure	3	397.2941	23.021646	3	-3.2941	1	9	1	2
2896	2894	211166	716436	397	4.34242	4	0.45	396.55	1	Not Proven	2	8	2	Site Infrastructure	3	398	22.27723	3	-1	1	9	1	2
2897	2895	211244	716496	394.2523	6.415494	4	0.45	393.8023	1	Not Proven	2	8	2	Site Infrastructure	3	396.8188	15.186727	3	-2.5665	1	9	1	2
2898	2896	210951	716114	385.908	5.116301	4	1.9	384.008	3	Not Proven	2	24	3	Site Infrastructure	3	385.8119	2.819903	4	0.0961	1	12	2	6
2899	2897	210975	716158	385.5629	12.85638	6	0.45	385.1129	1	Not Proven	2	12	2	Site Infrastructure	3	384.978	2.766488	4	0.5849	1	12	2	4
2900	2898	210999	716200	385.7694	12.60438	6	0.25	385.5194	1	Not Proven	2	12	2	Site Infrastructure	3	385.3781	1.444169	4	0.3913	1	12	2	4
2901	2899	211033	716236	387.2689	10.24867	6	0.95	386.3189	2	Not Proven	2	24	3	Site Infrastructure	3	387.3781	0.813932	4	-0.1092	1	12	2	6
2902	2900	211068	716271	392	6.241114	4	0.35	391.65	1	Not Proven	2	8	2	Site Infrastructure	3	392	0.96418	4	0	1	12	2	4
2903	2901	211102	716306	394.9811	9.062789	6	1.4	393.5811	3	Not Proven	2	36	4	Site Infrastructure	3	395.0188	0.301979	4	-0.0377	1	12	2	8
2904	2902	211121	716351	396.721	8.335563	6	0.1	396.621	1	Not Proven	2	12	2	Site Infrastructure	3	396.6795	0.320034	4	0.0415	1	12	2	4
2905	2903	211148	716391	397.3017	8.427623	6	0.3	397.0017	1	Not Proven	2	12	2	Site Infrastructure	3	397.3432	0.772912	4	-0.0415	1	12	2	4
2906	2904	211187	716421	397.0417	4.553117	4	0.7	396.3417	2	Not Proven	2	16	3	Site Infrastructure	3	397.1812	1.135001	4	-0.1395	1	12	2	6
2907	2905	211228	716448	395.8765	5.703798	4	0.95	394.8765	2	Not Proven	2	16	3	Site Infrastructure	3	395.9681	0.94723	4	-0.1416	1	12	2	6
2908	2906	210973	716102	388.179	6.037988	4	1.45	386.729	3	Not Proven	2	24	3	Site Infrastructure	3	385.8119	27.080109	3	2.3671	1	9	1	3
2909	2907	210997	716145	391.3956	12.60438	6	0.45	390.9456	1	Not Proven	2	12	2	Site Infrastructure	3	384.978	27.503083	3	6.4176	1	9	1	2
2910	2908	211021	716188	390.637	10.21938	6	1.5	389.137	3	Not Proven	2	36	4	Site Infrastructure	3	386.0188	25.644998	3	4.6182	1	9	1	4
2911	2909	211055	716223	392.4608	10.21334	6	0.9	391.5608	2	Not Proven	2	24	3	Site Infrastructure	3	389.003	22.575424	3	3.4578	1	9	1	3
2912	2910	211090	716257	394	5.771868	4	1.9	392.1	3	Not Proven	2	24	3	Minor Watercourse	6	394.8188	10.771966	3	-0.8188	1	18	2	6
2913	2911	211124	716293	397.2588	7.159478	4	0.9	396.3588	2	Not Proven	2	16	3	Site Infrastructure	3	396	22.90994	3	1.2588	1	9	1	3
2914	2912	211143	716337	400	5.384518	4	0.2	399.8	1	C	2	8	2	Site Infrastructure	3	397	22.603384	3	3	1	9	1	2
2915	2913	211170	716376	399.5612	5.093511	4	0.85	398.7112	2	Not Proven	2	16	3	Site Infrastructure	3	398.003	22.947893	3	1.5582	1	9	1	3
2916	2914	211209	716406	400.0966	8.415382	6	0.45	399.6466	1	Not Proven	2	12	2	Site Infrastructure	3	397.1592	22.79984	3	2.9374	1	9	1	2
2917	2915	211284	716467	400.0601	3.933172	2	0.2	399.8601	1	Not Proven	2	4	1	Site Infrastructure	3	397.3432	29.854869	3	2.7169	1	9	1	1
2918	2916	210111	715509	288.6584	9.145965	6	0.2	288.4584	1	Not Proven	2	12	2	Site Infrastructure	3	286.6376	22.23387	3	2.0208	1	9	1	2
2919	2917	210158	715501	289.9882	2.756616	2	1.9	288.0882	3	Not Proven	2	12	2	Site Infrastructure	3	289	23.311311	3	0.9882	1	9	1	2
2920	2918	210206	715505	292.3294	8.496603	6	0.45	291.8794	1	Not Proven	2	12	2	Site Infrastructure	3	293.6884	23.180647	3	-1.309	1	9	1	2
2921	2919	210253	715517	296.1796	6.111413	4	0.2	295.9796	1	Not Proven	2	8	2	Site Infrastructure	3	296.6408	22.779542	3	-0.4612	1	9	1	2
2922	2920	210296	715539	301.7047	6.758326	4	0.95	300.7547	2	Not Proven	2	16	3	Site Infrastructure	3	302.2408	22.475836	3	-0.5361	1	9	1	3
2923	2921	210336	715566	307	6.613708	4	0.45	306.55	1	Not Proven	2	8	2	Site Infrastructure	3	306.7912	22.361053	3	0.2088	1	9	1	2
2924	2922	210379	715588	312	4.540051	4	0.45	311.55	1	Not Proven	2	8	2	Site Infrastructure	3	312	22.055036	3	0	1	9	1	2
2925	2923	210423	715609	319.3172	12.53387	6	0.1	319.2172	1	Not Proven	2	12	2	Site Infrastructure	3	316.4408	22.504483	3	2.8764	1	9	1	2
2926	2924	210468	715629	325.0043	7.516389	4	0.2	324.8043	1	Not Proven	2	8	2	Site Infrastructure	3	322.4596	22.463428	3	2.5447	1	9	1	2
2927	2925	210512	715649	328.6286	6.530407	4	0.4	328.2286	1	Not Proven	2	8	2	Site Infrastructure	3	328.6188	22.967708	3	0.0098	1	9	1	2
2928	2926	210556	715669	332.7811	14.33129	6	0.1	332.6811	1	Not Proven	2	12	2	Site Infrastructure	3	339.3781	22.774606	3	-6.597	1	9	1	2
2929	2927	210084	715502	281.3371	14.26808	6	0.01	281.3271	1	C	2	12	2	Site Infrastructure	3	281.4855	0.6313	4	-0.1484	1	12	2	4
2930	2928	210125	715477	289	0.157017	2	3.1	285.9	3	Not Proven	2	16	3	Site Infrastructure	3	289	0.994115	4	0	1	12	2	6
2931	2929	210174	715477	290.2576	5.574223	4	0.45	289.8076	1	Not Proven	2	8	2	Site Infrastructure	3	290.4188	1.162768	4	-0.1612	1	12	2	4
2932	2930	210223	715482	292.8392	12.78071	6	0.4	292.4392	1	Not Proven	2	12	2	Site Infrastructure	3	292.8408	0.151007	4	-0.0016	1	12	2	4
2933	2931	210270	715496	297.6236	13.28825	6	0.45	297.1736	1	Not Proven	2	12	2	Site Infrastructure	3	297.5038	0.992406	4	0.1198	1	12	2	4
2934	2932	210312	715520	301.9746	6.216073	4	0.1	301.8746	1	Not Proven	2	8	2	Site Infrastructure	3	302	0.369046	4	-0.0254	1	12	2	4
2935	2933	210353	715547	307.084	5.762384	4	0.25	306.834	1	Not Proven	2	8	2	Site Infrastructure	3	307.0588	0.925225	4	0.0252	1	12	2	4
2936	2934	210397	715569	312.2146	6.191677	4	1.2	311.0146	3	Not Proven	2	24	3	Site Infrastructure	3	312.0334	1.111474	4	0.1812	1	12	2	6
2937	2935	210442	715590	317.3199	11.41188	6	0.95	316.3699	2	Not Proven	2	24	3	Site Infrastructure	3	317.4408	1.037932	4	-0.1209	1	12	2	6
2938	2936	210487	715610	324.3487	11.90933	6	0.95	323.3987	2	Not Proven	2	24	3	Site Infrastructure	3	324.2596	0.48746	4	0.0891	1	12	2	6
2939	2937	210532	715630	331.2646	16.05707	8	0.4	330.8646	1	Not Proven	2	16	3	Site Infrastructure	3	330.8916	1.140196	4	0.373	1	12	2	6
2940	2938	210621	715671	350.707	14.46737	6	0.15	350.557	1	Not Proven	2	12	2	Site Infrastructure	3	350.6188	0.989417	4	0.0882	1	12	2	4
2941	2939	210059	715496	277.2297	6.007044	4	0.1	277.1297	1	C	2	8	2	Site Infrastructure	3	278.2188	11.878985	3	-0.9891	1	9	1	2
2942	2940	210093	715461	286.0361	6.126013	4	0.2	285.8361	1	Not Proven	2	8	2	Site Infrastructure	3	287.8438	22.997561	3	-1.8077	1	9	1	2
2943	2941	210141	715451	288.9234	3.679577	2	1.9	287.0234	3	Not Proven	2	12	2	Site Infrastructure	3	289	22.425393	3	-0.0766	1	9	1	2
2944	2942	210191	715453	288.1178	13.24131	6	2.8	285.3178	3	Not Proven	2	36	4	Site Infrastructure	3	292	22.6149	3	-3.8822	1	9	1	4
2945	2943	210240	715461	289.3561	13.86643	6	0.3	289.0561	1	Not Proven	2	12	2	Minor Watercourse	6	289.1971	1.418386	4	0.159	1	24	3	6
2946	2944	210287	715476	298.9059	10.35758	6	0.1	298.8059	1	Not Proven	2	12	2	Minor Watercourse	6	298.5587	8.539339	4	0.3472	1	24	3	6
2947	2945	210329	715501	301.9016	7.79217	4	0.25	301.6516	1	Not Proven	2	8	2	Minor Watercourse	6	301.0588	9.06343	4	0.8428	1	24	3	6
2948	2946	210371	715528	307.6655	6.373778	4	0.45	307.2155	1	Not Proven	2	8	2	Minor Watercourse	6	307	19.874813	3	0.6655	1	18	2	4
2949	2947	210415	715550	314.5804	8.0603	6	0.1	314.4804	1	Not Proven	2	12	2	Site Infrastructure	3	313	22.691862	3	1.5804	1	9	1	2
2950	2948	210460	715571	318.1736	8.149457	6	0.15	318.0236	1	Not Proven	2	12	2	Site Infrastructure	3	318.0985	0.716332	4	0.0751	1	12	2	4
2951	2949	210506	715591	325.81	15.41902	8	0.4	325.41	1	Not Proven	2	16	3	Site Infrastructure	3	325.4855	1.267179	4	0.3245	1	12	2	6
2952	2950	210551	715612	334.7484	11.457	6	0.45	334.2984	1	Not Proven	2	12	2	Minor Watercourse	6	334.6188	9.904627	4	0.1296	1	24	3	6
2953	2951	210597	715632	345.7856	10.2157	6	0.35	345.4356	1	Not Proven	2	12	2	Minor Watercourse	6	345.578	6.803474	4	0.2076	1	24	3	6
2954	2952	210638	715722	352.0233	15.21361	8	0.1	351.9233	1	Not Proven	2	16	3	Minor Watercourse	6	349.8596	16.638825	3	2.1637	1	18	2	6
2955	2953	210664	715766	357.3069	9.981853	6	0.1	357.2069	1	Not Proven	2	12	2	Minor Watercourse	6	357.0256	1.198462	4	0.2813	1	24	3	6
2956	2954	210684	715814	361.8489	3.967387	2	0.3	361.5489	1	Not Proven	2	4	1	Site Infrastructure	3	362.4188	22.596849	3	-0.5699	1	9	1	1
2957	2955	210716	715854	363.6129	11.30993	6	0.45	363.1629	1	Not Proven	2	12	2	Site Infrastructure	3	364.8596	22.641852	3	-1.2467	1	9	1	2
2958	2956	210763	715873	373.1944	12.99341	6	0.45	372.7444	1	Not Proven	2	12	2	Site Infrastructure	3	376.8596	22.826134	3	-3.6652	1	9	1	2
2959	2957	210657	715706	358.1863	16.43874	8	0.1	358.0863	1	Not Proven	2	16	3	Site Infrastructure	3	358.1129	0.666887	4	0.0734	1	12	2	6
2960	2958	210684	715750	362.4216	7.521687	4	0.25	362.1716	1	Not Proven	2	8	2	Site Infrastructure	3	362.5592	0.832589	4	-0.1376	1	12	2	4
2961	2959	210705	715798	362.071	6.37937	4	1.3	360.771	3	Not Proven	2	24	3	Site Infrastructure	3	362.0171	0.611683	4	0.0539	1	12	2	6
2962	2960	210737	715838	366.9591	14.31545	6	0.3	366.6591	1	Not Proven	2	12	2	Site Infrastructure	3	366.8188	0.720234	4	0.1403	1	12	2	4
2963	2961	210821	715895	383.9173	10.34564	6	0.3	383.6173	1	Not Proven	2	12	2	Site Infrastructure	3	383.9082	1.231682	4	0.0091	1	12	2	4
2964	2962	210677	715690	363.8277	11.57715	6	0.1	363.7277	1	Not Proven	2	12	2	Site Infrastructure	3	358.978	22.383015	3	4.8497	1	9	1	2
2965	2963	210705	715735	365	6.389986	4	1.5	363.5	3	Not Proven	2	24	3	Site Infrastructure	3	362.7912	22.811781	3	2.2088	1	9	1	3
2966	2964	210725	715783	364.5502	8.970914	6	0.1	364.4502	1	Not Proven	2	12	2	Minor Watercourse	6	362.5575	14.923367	3	1.9927	1	18	2	4
2967	2965	210760	715819	369.7786	11.66466	6	0.2	369.5786	1	Not Proven	2	12	2	Site Infrastructure	3	370.0596	22.642657	3	-0.281	1	9	1	2
2968	2966	210806	715842	378.9944	11.77791	6	0.1	378.8944	1	Not Proven	2	12	2	Site Infrastructure	3	379.2596	22.961664	3	-0.2652	1	9	1	2
2969	2967	210544	715484	345.1004	9.331128	6	0.35	344.7504	1	Not Proven	2	12	2	Site Infrastructure	3	346.5587	22.485006	3	-1.4583	1	9	1	2
2970	2968	210561	715527	350.7165	13.01638	6	0.1	350.6165	1	Not Proven	2	12	2	Site Infrastructure	3	354.4596	22.570332	3	-3.7431	1	9	1	2
2971	2969	210571	715572	345.4506	19.63451	8	0.1	345.3506	1	Not Proven	2	16	3	Site Infrastructure	3	353.3901	22.414165	3	-7.9395	1	9	1	3
2972	2970	210595	715611	346.5597	13.99539	6	0.01	346.5497	1	Not Proven	2	12	2	Minor Watercourse	6	344.8767	13.113077	3	1.703	1	18	2	4
2973	2971	210566	715471	346.5677	9.430643	6	0.45	346.1177	1	Not Proven	2	12	2	Site Infrastructure	3	346.6884	0.54061	4	-0.1207	1	12	2	4
2974	2972	210585	715517	354.3958	13.81884	6	0.35	354.0458	1	Not Proven	2	12	2	Site Infrastructure	3	354.4596	0.396526	4	-0.0638	1	12	2	4
2975	2973	210595	715566	354.274	18.21646	8	0.3	353.974	1	Not Proven	2	16	3	Site Infrastructure	3	354.0464	0.751986	4	0.2276	1	12	2	6
2976	2974	210625	715606	354.4384	23.00307	8	0.01	354.4284	1	Not Proven	2	16	3	Site Infrastructure	3	354.1969	0.547485	4	0.2415	1	12	2	6
2977	2975	210588	715459	344.8058	15.56189	8	0.1	344.7058	1	Not Proven	2	16	3	Site Infrastructure	3	346.8059	12.897853	3	-2.0001	1	9	1	3
2978	2976	210608	715508	355.27	13.08251	6	0.1	355.17	1	Not Proven	2	12	2	Site Infrastructure	3	354.0596	22.368848	3	1.2104	1	9	1	2
2979	2977	210620	715560	362.1641	16.49942	8	0.2	361.9641	1	Not Proven	2	16	3	Site Infrastructure	3	362.2188	4.057502	4	-0.0547	1	12	2	6
2980	2978	210662	715655	362.8187	16.16236	8	0.35	362.4687	1	Not Proven	2	16	3	Site Infrastructure	3	357.2188	23.006387	3	5.5999	1	9	1	3
2981	2979	210706	715634	373.4417	9.611888	6	0.4	373.0417	1	Not Proven	2	12	2	Site Infrastructure	3	377	23.142214	3	-3.5583	1	9	1	2
2982	2980	210668	715604	369.7873	20.33885	8	0.01	369.7773	1	Not Proven	2	16	3	Site Infrastructure	3	376.0171	23.353762	3	-6.2298	1	9	1	3
2983	2981	210712	715609	377	4.42835	4	0.45	376.55	1	Not Proven	2	8	2	Site Infrastructure	3	377.0188	0.982394	4	-0.0188	1	12	2	4
2984	2982	210620	715550	362.5589	10.75553	6	0.2	362.3589	1	Not Proven	2	12	2	Site Infrastructure	3	362.6188	0.629024	4	-0.0599	1	12	2	4
2985	2983	210725	715588	377.0222	4.963928	4	0.7	376.3222	2	Not Proven	2	16	3	Site Infrastructure	3	377.4188	22.258575	3	-0.3966	1	9	1	3
2986	2984	210689	715555	369.5543	11.88633	6	0.45	369.1043	1	Not Proven	2	12	2	Site Infrastructure	3	371.8596	23.557552	3	-2.3053	1	9	1	2
2987	2985	210603	715528	358.8901	8.301418	6	0.1	358.7901	1	Not Proven	2	12	2	Site Infrastructure	3	355.778	13.318929	3	3.1121	1	9	1	2
2988	2986	210615	715013	364.0012	14.79042	6	0.1	363.9012	1	Not Proven	2	12	2	Site Infrastructure	3	363.5693	2.574671	4	0.4319	1	12	2	4
2989	2987	210647	715050	366.9108	11.3234	6	0.8	366.1108	2	Not Proven	2	24	3	Site Infrastructure	3	367.578	4.7091	4	-0.6672	1	12	2	6
2990	2988	210681	715084	366.6822	14.97338	6	0.45	366.2322	1	Not Proven	2	12	2	Site Infrastructure	3	368.978	13.622498	3	-2.2958	1	9	1	2
2991	2989	210697	715131	365.9165	10.21991	6	0.9	365.0165	2	Not Proven	2	24	3	Site Infrastructure	3	361.739	22.350343	3	4.1775	1	9	1	3
2992	2990	210720	715175	367.4924	10.62848	6	0.3	367.1924	1	Not Proven	2	12	2	Site Infrastructure	3	363.3432	22.517259	3	4.1492	1	9	1	2
2993	2991	210724	715223	362.1544	14.30284	6	0.1	362.0544	1	Not Proven	2	12	2	Site Infrastructure	3	359.978	22.283183	3	2.1764	1	9	1	2
2994	2992	210700	715265	367.6996	9.360901	6	0.1	367.6696	1	Not Proven	2	12	2	Site Infrastructure	3	364.4408	23.247333	3	3.3288	1	9	1	2
2995	2993	210674	715304	366.0238	12.38858	6	0.4	365.6238	1	Not Proven	2	12	2	Site Infrastructure	3	361.578	22.484007	3	4.4458	1	9	1	2
2996	2994	210699	715346	365.1063	9.399368	6	1.3	363.8063	3	Not Proven	2	36	4	Site Infrastructure	3	361.0188	22.929268	3	4.0875	1	9	1	4
2997	2995	210718	715391	363.0345	11.98159	6	0.95	362.0845	2	Not Proven	2	24	3	Site Infrastructure	3	359.5114	23.080273	3	3.5231	1	9	1	3
2998	2996	210706	715439	363.2299	6.050915	4	0.2	363.0299	1	Not Proven	2	8	2	Site Infrastructure	3	361.0408	22.579212	3	2.1891	1	9	1	2
2999	2997	210670	715471	356.3167	12.93097	6	0.4	355.9167	1	Not Proven	2	12	2	Site Infrastructure	3	355.5969	22.390485	3	0.7198	1	9	1	2
3000	2998	210627	715494	356.1962	15.79317	8	0.4	355.7962	1	Not Proven	2	16	3	Site Infrastructure	3	350.0596	23.005177	3	6.1366	1	9	1	3
3001	2999	210578	715497	350.07	8.519636	6	0.4	349.67	1	Not Proven	2	12	2	Site Infrastructure	3	350.2596	0.850285	4	-0.1896	1	12	2	4
3002	3000	210537	715511	342.8127	10.66599	6	0.4	342.4127	1	Not Proven	2	12	2	Site Infrastructure	3	344.2108	22.192463	3	-1.3981	1	9	1	2
3003	3001	210509	715431	332.2262	11.171	6	0.1	332.1262	1	Not Proven	2	12	2	Site Infrastructure	3	337.1224	22.792125	3	-4.8962	1	9	1	2
3004	3002	210489	715386	326.5677	16.91652	8	0.1	326.4677	1	Not Proven	2	16	3	Site Infrastructure	3	334.0309	23.675515	3	-7.4632	1	9	1	3

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
2	ID	X	Y	Z	SLOPE	Slope Co-efficient	PEAT DEPTH	Peat Level	Peat Co-efficient	Gen Substrate	Substrate Co-eff.	Risk Rating Coefficient	Risk Rating Normalisation	Receptor	Receptor Co-eff.	Z Receptor	Distance	Receptor Dist Co-eff.	Z Difference (remove =/-)	Receptor elevation Co-eff	Impact Rating	Impact Rating Normalisation	Hazard Ranking
3005	3003	210491	715337	324.6289	14.52484	6	0.15	324.4789	1	Not Proven	2	12	2	Site Infrastructure	3	331.4188	23.968041	3	-6.7899	1	9	1	2
3006	3004	210485	715288	324.5331	9.153708	6	0.2	324.3331	1	Not Proven	2	12	2	Site Infrastructure	3	326.1505	22.650092	3	-1.6174	1	9	1	2
3007	3005	210458	715248	320.2385	10.40363	6	0.4	319.8385	1	Not Proven	2	12	2	Site Infrastructure	3	320.5114	22.782608	3	-0.2729	1	9	1	2
3008	3006	210420	715218	317.3715	14.12901	6	0.1	317.2715	1	Not Proven	2	12	2	Site Infrastructure	3	322.1592	23.362905	3	-4.7877	1	9	1	2
3009	3007	210395	715175	318	6.37937	4	0.95	317.05	2	Not Proven	2	16	3	Site Infrastructure	3	319.4188	22.56707	3	-1.4188	1	9	1	3
3010	3008	210367	715135	314.9721	4.648371	4	0.3	314.6721	1	Not Proven	2	8	2	Minor Watercourse	6	313.9349	8.928163	4	1.0372	1	24	3	6
3011	3009	210337	715096	313.846	10.39928	6	0.2	313.646	1	Not Proven	2	12	2	Minor Watercourse	6	310.3432	17.929991	3	3.5028	1	18	2	4
3012	3010	210306	715058	314.6444	6.763844	4	0.45	314.1944	1	Not Proven	2	8	2	Site Infrastructure	3	316.7854	22.679251	3	-2.141	1	9	1	2
3013	3011	210259	715046	310.1025	10.30971	6	0.9	309.2025	2	Not Proven	2	24	3	Minor Watercourse	6	310.4188	5.779217	4	-0.3163	1	24	3	9
3014	3012	210210	715049	306.6021	9.475255	6	0.1	306.5021	1	Not Proven	2	12	2	Site Infrastructure	3	308.96	22.966264	3	-2.3579	1	9	1	2
3015	3013	210111	715052	294.8749	12.25803	6	0.7	294.1749	2	Not Proven	2	24	3	Site Infrastructure	3	298.4188	22.592704	3	-3.5439	1	9	1	3
3016	3014	210587	715015	359.994	8.049467	6	0.95	359.044	2	Not Proven	2	24	3	Site Infrastructure	3	359.8839	0.891053	4	0.1101	1	12	2	6
3017	3015	210614	715056	359.5429	13.31969	6	0.1	359.4429	1	Not Proven	2	12	2	Site Infrastructure	3	359.778	0.840388	4	-0.2351	1	12	2	4
3018	3016	210652	715087	361.998	10.22765	6	0.1	361.898	1	Not Proven	2	12	2	Site Infrastructure	3	362.0068	0.896933	4	-0.0088	1	12	2	4
3019	3017	210671	715132	361.1259	9.312739	6	0.1	361.0259	1	Not Proven	2	12	2	Site Infrastructure	3	361.0985	0.679669	4	0.0274	1	12	2	4
3020	3018	210693	715176	363.0209	12.55444	6	0.1	362.9209	1	Not Proven	2	12	2	Site Infrastructure	3	363.0188	0.014573	4	0.0021	1	12	2	4
3021	3019	210698	715223	359.1511	9.81233	6	0.01	359.1411	1	Not Proven	2	12	2	Site Infrastructure	3	359.2408	0.552039	4	-0.0897	1	12	2	4
3022	3020	210667	715259	364.2234	15.79317	8	0.1	364.1234	1	Not Proven	2	16	3	Site Infrastructure	3	364.2596	0.364718	4	-0.0362	1	12	2	6
3023	3021	210649	715304	361.3524	14.86267	6	0.1	361.2524	1	Not Proven	2	12	2	Site Infrastructure	3	361.2188	0.697932	4	0.1336	1	12	2	4
3024	3022	210669	715348	359.9127	10.20261	6	2	357.9127	3	Not Proven	2	36	4	Site Infrastructure	3	359.9681	0.942254	4	-0.0554	1	12	2	8
3025	3023	210693	715391	359.3052	8.811041	6	1.5	357.8052	3	Not Proven	2	36	4	Site Infrastructure	3	359.175	0.713341	4	0.1302	1	12	2	8
3026	3024	210677	715436	361	4.847793	4	0.1	360.9	1	Not Proven	2	8	2	Site Infrastructure	3	361	0.451666	4	0	1	12	2	4
3027	3025	210635	715462	351.4329	14.03478	6	0.2	351.2329	1	Not Proven	2	12	2	Site Infrastructure	3	351.2596	0.843814	4	0.1733	1	12	2	4
3028	3026	210589	715474	347.321	12.89943	6	0.45	346.871	1	Not Proven	2	12	2	Site Infrastructure	3	347.2408	0.700739	4	0.0802	1	12	2	4
3029	3027	210550	715447	340.494	17.36653	8	0.1	340.394	1	Not Proven	2	16	3	Site Infrastructure	3	340.5625	1.340256	4	-0.0685	1	12	2	6
3030	3028	210522	715406	336.983	15.5932	8	0.1	336.883	1	Not Proven	2	16	3	Site Infrastructure	3	337.0188	0.807853	4	-0.0358	1	12	2	6
3031	3029	210515	715359	332.9288	16.91652	8	0.2	332.7288	1	Not Proven	2	16	3	Site Infrastructure	3	332.8376	1.016478	4	0.0912	1	12	2	6
3032	3030	210516	715310	329.9257	17.26155	8	0.1	329.8257	1	Not Proven	2	16	3	Site Infrastructure	3	330.1797	0.913181	4	-0.254	1	12	2	6
3033	3031	210502	715263	326.8745	6.369344	4	0.2	326.6745	1	Not Proven	2	8	2	Site Infrastructure	3	327	1.070977	4	-0.1255	1	12	2	4
3034	3032	210471	715226	320.7716	8.795827	6	0.95	319.8216	2	Not Proven	2	24	3	Site Infrastructure	3	320.7557	0.25782	4	0.0159	1	12	2	6
3035	3033	210433	715194	323.0588	8.04496	6	0.4	322.6588	1	Not Proven	2	12	2	Site Infrastructure	3	323.0143	0.837048	4	0.0445	1	12	2	4
3036	3034	210411	715151	318	6.37937	4	1.95	316.05	3	Not Proven	2	24	3	Site Infrastructure	3	318	0.96485	4	0	1	12	2	6
3037	3035	210381	715112	315.165	8.543215	6	0.2	314.965	1	Not Proven	2	12	2	Site Infrastructure	3	315.1592	0.444946	4	0.0058	1	12	2	4
3038	3036	210351	715073	317.5701	5.842176	4	0.35	317.2201	1	Not Proven	2	8	2	Site Infrastructure	3	317.4698	0.753904	4	0.1003	1	12	2	4
3039	3037	210319	715036	317	5.227368	4	0.45	316.55	1	Not Proven	2	8	2	Site Infrastructure	3	317	0.08404	4	0	1	12	2	4
3040	3038	210273	715020	315	4.020772	4	1.4	313.6	3	Not Proven	2	24	3	Site Infrastructure	3	315	0.347678	4	0	1	12	2	6
3041	3039	210224	715023	310.8174	9.947561	6	0.95	309.8674	2	Not Proven	2	24	3	Site Infrastructure	3	310.7592	0.916998	4	0.0582	1	12	2	6
3042	3040	210175	715027	305.1017	10.13282	6	0.95	304.1517	2	Not Proven	2	24	3	Site Infrastructure	3	304.9763	0.712982	4	0.1254	1	12	2	6
3043	3041	210561	715018	356.7183	11.09724	6	0.1	356.6183	1	Not Proven	2	12	2	Minor Watercourse	6	358.6557	17.413378	3	-1.9374	1	18	2	4
3044	3042	210586	715062	352.9635	15.86719	8	0.9	352.0635	2	Not Proven	2	32	4	Minor Watercourse	6	355.178	19.108063	3	-2.2145	1	18	2	8
3045	3043	210624	715095	355.7207	15.68389	8	0.45	355.2707	1	Not Proven	2	16	3	Site Infrastructure	3	361.3461	22.859874	3	-5.6254	1	9	1	3
3046	3044	210647	715139	355.6737	15.27571	8	0.1	355.5737	1	Not Proven	2	16	3	Site Infrastructure	3	361.0349	22.434276	3	-5.3612	1	9	1	3
3047	3045	210669	715184	356.2608	14.84768	6	0.2	356.0608	1	Not Proven	2	12	2	Site Infrastructure	3	362.2188	22.451481	3	-5.958	1	9	1	2
3048	3046	210663	715231	358.0151	10.14711	6	0.3	357.7151	1	Not Proven	2	12	2	Site Infrastructure	3	363.8596	22.814655	3	-5.8445	1	9	1	2
3049	3047	210631	715268	357.659	14.18001	6	0.2	357.459	1	Not Proven	2	12	2	Site Infrastructure	3	363.6188	23.024591	3	-5.9598	1	9	1	2
3050	3048	210626	715318	355.7166	8.867387	6	1.4	354.3166	3	Not Proven	2	36	4	Site Infrastructure	3	359.578	22.604668	3	-3.8614	1	9	1	4
3051	3049	210649	715363	357	3.168199	2	0.8	356.2	2	Not Proven	2	8	2	Site Infrastructure	3	359.3432	22.474017	3	-2.3432	1	9	1	2
3052	3050	210666	715407	358.6694	10.14456	6	3.8	354.8694	8	Not Proven	2	96	5	Site Infrastructure	3	360	22.8441	3	-1.3306	1	9	1	5
3053	3051	210627	715438	353.2906	6.728535	4	0.3	352.9906	1	Not Proven	2	8	2	Site Infrastructure	3	351.6188	22.559235	3	1.6718	1	9	1	2
3054	3052	210579	715443	348.4993	16.28499	8	0.1	348.3993	1	Not Proven	2	16	3	Site Infrastructure	3	341.0786	23.875141	3	7.4207	1	9	1	3
3055	3053	210550	715403	343.4933	15.11987	8	0.95	342.5433	2	Not Proven	2	32	4	Site Infrastructure	3	337.9082	22.360292	3	5.5851	1	9	1	4
3056	3054	210540	715355	339.5637	13.79633	6	0.1	339.4637	1	Not Proven	2	12	2	Site Infrastructure	3	333.3435	23.743997	3	6.2202	1	9	1	2
3057	3055	210541	715304	336.8311	17.5484	8	0.15	336.6811	1	Not Proven	2	16	3	Site Infrastructure	3	329.6813	24.073025	3	7.1498	1	9	1	3
3058	3056	210526	715256	328.6763	11.92754	6	0.9	327.7763	2	Not Proven	2	24	3	Site Infrastructure	3	326.9926	22.764292	3	1.6837	1	9	1	3
3059	3057	210497	715214	324.3571	14.8098	6	0.95	323.4071	2	Not Proven	2	24	3	Site Infrastructure	3	321.2728	22.749658	3	3.0843	1	9	1	3
3060	3058	210457	715184	323.9428	8.202455	6	0.4	323.5428	1	Not Proven	2	12	2	Site Infrastructure	3	322.2132	22.353768	3	1.7296	1	9	1	2
3061	3059	210433	715139	320.1023	8.67335	6	2.7	317.4023	3	Not Proven	2	36	4	Site Infrastructure	3	318.0188	23.062816	3	2.0835	1	9	1	4
3062	3060	210402	715098	318.9444	8.049467	6	0.45	318.4944	1	Not Proven	2	12	2	Minor Watercourse	6	318.2223	19.263872	3	0.7721	1	18	2	4
3063	3061	210371	715058	320	4.562675	4	0.4	319.6	1	Not Proven	2	8	2	Site Infrastructure	3	317.8601	22.445968	3	2.1399	1	9	1	2
3064	3062	210338	715019	319.0732	5.36012	4	0.4	318.6732	1	Not Proven	2	8	2	Site Infrastructure	3	317.0068	22.455321	3	2.0664	1	9	1	2
3065	3063	210293	714997	318.0063	7.934037	4	0.45	317.5563	1	Not Proven	2	8	2	Minor Watercourse	6	317.2099	4.374821	4	0.7964	1	24	3	6
3066	3064	210242	714997	315.0956	6.894624	4	0.95	314.1456	2	Not Proven	2	16	3	Site Infrastructure	3	312.5592	22.709618	3	2.5364	1	9	1	3
3067	3065	210141	715004	306.3872	13.16959	6	0.8	305.5872	2	Not Proven	2	24	3	Site Infrastructure	3	301.5936	23.360371	3	4.7936	1	9	1	3
3068	3066	210689	715100	366.403	15.16985	8	0.3	366.103	1	Not Proven	2	16	3	Site Infrastructure	3	371.778	22.655602	3	-5.375	1	9	1	3
3069	3067	210645	715071	363.9081	14.08557	6	0.2	363.7081	1	Not Proven	2	12	2	Site Infrastructure	3	362.3781	5.514782	4	1.53	1	12	2	4
3070	3068	210602	715040	359.472	10.45075	6	0.3	359.172	1	Not Proven	2	12	2	Site Infrastructure	3	359.578	0.472213	4	-0.106	1	12	2	4
3071	3069	210561	715007	357.7702	8.620718	6	0.2	357.5702	1	Not Proven	2	12	2	Site Infrastructure	3	360.7854	17.927243	3	-3.0152	1	9	1	2
3072	3070	210484	714935	350.1195	10.71455	6	0.1	350.0195	1	Not Proven	2	12	2	Site Infrastructure	3	360.3561	22.882591	3	-10.2366	1	9	1	2
3073	3071	210705	715081	372.8418	14.97791	6	0.45	372.3918	1	Not Proven	2	12	2	Site Infrastructure	3	372.578	0.93654	4	0.2638	1	12	2	4
3074	3072	210661	715051	368.9851	10.14808	6	0.1	368.8851	1	Not Proven	2	12	2	Site Infrastructure	3	368.778	0.75923	4	0.2071	1	12	2	4
3075	3073	210618	715021	364.0776	12.23761	6	0.4	363.6776	1	Not Proven	2	12	2	Site Infrastructure	3	364.2188	1.075539	4	-0.1412	1	12	2	4
3076	3074	210577	714987	361.8172	8.180042	6	0.45	361.3672	1	Not Proven	2	12	2	Site Infrastructure	3	361.7854	0.623163	4	0.0318	1	12	2	4
3077	3075	210536	714952	359.9564	20.45235	8	0.8	359.1564	2	Not Proven	2	32	4	Site Infrastructure	3	360.1084	0.366368	4	-0.152	1	12	2	8
3078	3076	210722	715062	378.9425	15.06996	8	0.1	378.8425	1	Not Proven	2	16	3	Site Infrastructure	3	374.2983	22.608212	3	4.6442	1	9	1	3
3079	3077	210677	715032	373.0929	10.04965	6	0.1	372.9929	1	Not Proven	2	12	2	Minor Watercourse	6	373.8601	8.753756	4	-0.7672	1	24	3	6
3080	3078	210634	715001	368.6514	15.39503	8	0.3	368.3514	1	Not Proven	2	16	3	Minor Watercourse	6	367.4377	8.837733	4	1.2137	1	24	3	9
3081	3079	210592	714967	366.9026	15.36205	8	1.3	365.6026	3	Not Proven	2	48	4	Site Infrastructure	3	361.9564	22.376033	3	4.9462	1	9	1	4
3082	3080	210552	714932	369.1308	14.87815	6	0.1	369.0308	1	Not Proven	2	12	2	Site Infrastructure	3	360.7798	23.244136	3	8.351	1	9	1	2
3083	3081	209778	716295	203.2192	20.02025	8	0.1	203.1192	1	Not Proven	2	16	3	Site Infrastructure	3	203.0775	1.114109	4	0.1417	1	12	2	6
3084	3082	209783	716350	197.6706	13.36603	6	0.15	197.5206	1	Not Proven	2	12	2	Site Infrastructure	3	202.4188	22.790209	3	-4.7482	1	9	1	2
3085	3083	209825	716323	209.075	15.22866	8	0.45	208.625	1	Not Proven	2	16	3	Site Infrastructure	3	202.4855	22.583181	3	6.5895	1	9	1	3
3086	3084	209133	716508	112	2.766228	2	0.1	111.9	1	Not Proven	2	4	1	Major Watercourse	8	112	2.882786	4	0	1	32	4	4
3087	3085	209179	716499	118.109	27.52533	8	0.1	118.009	1	Not Proven	2	16	3	Site Infrastructure	3	121.2188	22.919732	3	-3.1098	1	9	1	3
3088	3086	209229	716506	127	0	1	0.1	126.9	1	Not Proven	2	2	1	Site Infrastructure	3	127	22.476404	3	0	1	9	1	1
3089	3087	209278	716514	127	0	1	0.15	126.85	1	Not Proven	2	2	1	Site Infrastructure	3	127	0.594073	4	0	1	12	2	2
3090	3088	209327	716521	128	3.240531	2	0.4	127.6	1	Not Proven	2	4	1	Site Infrastructure	3	128	23.112229	3	0	1	9	1	1
3091	3089	209375	716509	131	3.365629	2	0.4	130.6	1	Not Proven	2	4	1	Site Infrastructure	3	130.0105	22.747381	3	0.9895	1	9	1	1
3092	3090	209407	716473	135	5.710593	4	0.2	134.8	1	Not Proven	2	8	2	Site Infrastructure	3	135	1.166739	4	0	1	12	2	4
3093	3091	209451	716460	142	3.107465	2	0.1	141.9	1	Not Proven	2	4	1	Site Infrastructure	3	142	0.605203	4	0	1	12	2	2
3094	3092	209485	716495	144	0	1	0.45	143.55	1	Not Proven	2	2	1	Site Infrastructure	3	144	0.255131	4	0	1	12	2	2
3095	3093	209518	716532	145.5994	2.53462	2	0.45	145.1494	1	Not Proven	2	4	1	Site Infrastructure	3	146	6.39897	4	-0.0006	1	12	2	2
3096	3094	209554	716567	146	2.374616	2	0.2	145.8	1	Not Proven	2	4	1	Site Infrastructure	3	145.8408	22.832375	3	0.1592	1	9	1	1
3097	3095	209599	716587	149.947	6.77843	4	0.3	149.647	1	Not Proven	2	8	2	Site Infrastructure	3	147.2408	23.448967	3	2.7062	1	9	1	2
3098	3096	209647	716577	153.7775	15.79317	8	0.2	153.5775	1	Not Proven	2	16	3	Site Infrastructure	3	149.4188	22.954263	3	4.3587	1	9	1	3
3099	3097	209685	716545	154.9867	13.92577	6	0.4	154.5867	1	Not Proven	2	12	2	Minor Watercourse	6	153.6475	12.407791	3	1.3392	1	18	2	4
3100	3098	209721	716512	163.7138	20.14456	8	0.1	163.6138	1	Not Proven	2	16	3	Site Infrastructure	3	160.5693	23.229559	3	3.1445	1	9	1	3
3101	3099	209766	716496	177.7495	14.05002	6	0.8	176.9495	2	Not Proven	2	24	3	Site Infrastructure	3	179.8188	22.717164	3	-2.0693	1	9	1	3
3102	3100	209814	716493	186.363	13.49934	6	0.2	186.163	1	Not Proven	2	12	2	Site Infrastructure	3	186.8188	22.315588	3	-0.4558	1	9	1	2
3103	3101	209852	716461	203.0239	24.02952	8	0.2	202.8239	1	Not Proven	2	16	3	Site Infrastructure	3	195.0376	22.391554	3	7.9863	1	9	1	3
3104	3102	209864	716414	208.838	10.29712	6	0.15	208.688	1	Not Proven	2	12	2	Minor Watercourse	6	209.178	14.344465	3	-0.34	1	18	2	4
3105	3103	209851	716366	209.81	10.23757	6	0.1	209.71	1	Not Proven	2	12	2	Site Infrastructure	3	205.6188	22.739923	3	4.1912	1	9	1	2
3106	3104	209799	716281	207.0809	7.891268	4	0.3	206.7809	1	Not Proven	2	8	2	Site Infrastructure	3	204.3432	22.870566	3	2.7377	1	9	1	2
3107	3105	209109	716498	115	2.753647	2	0.1	114.9	1	Not Proven	2	4	1	Site Infrastructure	3	115	0.761348	4	0	1	12	2	2
3108	3106	209151	716471	111.2272	8.999214	6	0.1	111.1272	1	Not Proven	2	12	2	Site Infrastructure	3	111.0985	0.923742	4	0.1287	1	12	2	4
3109	3107	209201	716477	125.6247	6.668564	4	0.8	124.8247	2	Not Proven	2	16	3	Site Infrastructure	3	125.3965	1.154278	4	0.2282	1	12	2	6
3110	3108	209252	716484	127	0	1	0.4	126.6	1	Not Proven	2	2	1	Site Infrastructure	3	127	0.981403	4	0	1	12	2	2
3111	3109	209302	716492	127	5.599236	4	2	125	3	Not Proven	2	24	3	Site Infrastructure	3	127.0188	0.379171	4	-0.0188	1	12	2	6
3112	3110	209353	716492	130	5.356252	4	0.95	129.05	2	Not Proven	2	16	3	Site Infrastructure	3	130	0.451984	4	0	1	12	2	6
3113	3111	209388	716457	133	5.575487	4	0.45	132.55	1	Not Proven	2	8	2	Site Infrastructure	3	133	1.074678	4	0	1	12	2	4
3114	3112	209430	716430	139.529	6.145689	4	0.95	138.579	2	Not Proven	2	16	3	Site Infrastructure	3	139.6188	0.889966	4	-0.0898	1	12	2	6
3115	3113	209476	716449	144	1.467737	1	0.1	143.9	1	Not Proven	2	2	1	Site Infrastructure	3	144	1.029854	4	0	1	12	2	2
3116	3114	209510	716486	144	2.084213	2	0.45	143.55	1	Not Proven	2	4	1	Site Infrastructure	3	144	0.786559	4	0	1	12	2	2
3117	3115	209544	716524	145	3.18605	2	0.3	144.7	1	Not Proven	2	4	1	Site Infrastructure	3	145	0.620761	4	0	1	12	2	2
3118	3116	209583	716557	146	5.343857	4	0.25	145.75	1	Not Proven	2	8	2	Site Infrastructure	3	146.0408	0.876326	4	-0.0408	1	12	2	4
3119	3117	209633	716556	149.0576	6.903397	4	0.2	148.8576	1	Not Proven	2	8	2	Site Infrastructure	3	149.0121	0.63907	4	0.0455	1	12	2	4
3120	3118	209672	716523	151	3.097479	2	0.1	150.9	1	Not Proven	2	4	1	Site Infrastructure	3	151	1.058068	4	0	1	12	2	2
3121	3119	209709	716489	163.056	19.32598	8	0.3	162.756	1	Not Proven	2	16	3	Site Infrastructure	3	162.778	0.983959	4	0.278	1	12	2	6
3122	3120	209755	716469	177.217	14.34408	6	0.1	177.117	1	Not Proven	2	12	2	Site Infrastructure	3	177.0938	0.671142	4	0.1232	1	12	2	4
3123	3121	209805	716469	186.5099	12.74893	6	0.25	186.2599	1	Not Proven	2	12	2	Site Infrastructure	3	186.4188	0.536551	4	0.0911	1	12	2	4
3124	3122	209837	716432	199.0825	24.25482	8	0.4	198.6825	1	Not Proven	2	16	3	Site Infrastructure	3	198.7969	0.904634	4	0.2856	1	12	2	6
3125	3123	209830	716383	204.9935	10.22128	6	0.3	204.6935	1	Not Proven	2	12	2	Site Infrastructure	3	205.0985	0.893756	4	-0.105	1	12	2	4
3126	3124	209805	716338	202.569	11.30993	6	0.2	202.369	1	Not Proven	2	12	2	Site Infrastructure	3	202.4188	0.801522	4	0.1502	1	12	2	4
3127	3125	209085	716490	116.4863	12.12276	6	0.01	116.4763	1	Not Proven	2	12	2	Roads and Tracks	3	116.5812	0.784691	4	-0.0949	1	12	2	4
3128	3126	209119	716455	111.6146	5.488744	4	0.1	111.5146	1	Not Proven	2	8	2	Major Watercourse	8	111	3.282425	4	0.6146	1	32	4	8
3129	3127	209168	716446	120.1406	19.22738	8	0.01	120.1306	1	Not Proven	2	16	3	Site Infrastructure	3	117.4376	23.415349	3	2.703	1	9	1	3
3130	3128	209217	716454	125	1.179122	1	0.2	124.8	1	Not Proven	2	2	1	Site Infrastructure	3	126.6475	22.428191	3	-1.6475	1	9	1	1
3131	3129	209267	716461	127	1.495542	1	1.5	125.5	3	Not Proven	2	6	2	Site Infrastructure	3	127	22.481517	3	0	1	9	1	2
3132	3130	209316	716469	128	1.296647	1	2.3	125.7	3	Not Proven	2	6	2	Site Infrastructure	3	128	22.836252	3	0	1	9	1	2
3133	3131	209360	716453	130.4826	6.779718	4	0.4	130.0826	1	Not Proven	2	8	2	Site Infrastructure	3	131.9082	22.775553	3	-1.4256	1	9	1	2
3134	3132	209393	716417	136	3.311799	2	0.95	135.05	2	Not Proven	2	8	2	Site Infrastructure	3	135.0188	22.644849	3	0.9812	1	9	1	2
3135	3133	209441	716405	139.4012	5.450923	4	0.8	138.6012	2	Not Proven	2	16	3	Site Infrastructure	3	140.2188	22.359264	3	-0.8176	1	9	1	3
3136	3134	209487	716424	143.0525	7.305389	4	0.1	142.9525	1	Not Proven	2	8	2	Site Infrastructure	3	143.8438	22.52799	3	-0.7913	1	9	1	2
3137	3135	209521	716461	141	6.002344	4	0.1	140.9	1	Not Proven	2	8	2	Site Infrastructure	3	143	22.909574	3	-2	1	9	1	2
3138	3136	209554	716498	143.0751	5.344023	4	0.3	142.7751	1	Not Proven	2	8	2	Site Infrastructure	3	144.1523	22.422198	3	-1.0772	1	9	1	2
3139	3137	209589	716532	145	0.82266	1	0.95	144.05	2	Not Proven	2	4	1	Site Infrastructure	3	146	22.734696	3	-1	1	9	1	1
3140	3138	209635	716523	149.4813	9.039113	6	0.01	149.4713	1	Not Proven	2	12	2	Minor Watercourse	6	151.7438	16.214111	3	-2.2625	1	18	2	4
3141	3139	209672	716489	154.6441	15.17649	8	0.2	154.4441	1	Not Proven	2	16	3	Minor Watercourse	6	156.5373	12.762062	3	-1.8932	1	18	2	6
3142	3140	209710	716457	166.4115	12.48022	6	0.4	166.0115	1	Not Proven	2	12	2	Minor Watercourse	6	166.2188	3.001671	4	0.1927	1	24	3	6
3143	3141	209757	716444	177.9858	14.76152	6	0.1	177.8858	1	Not Proven	2	12	2	Minor Watercourse	6	177.113	11.357713	3	0.8728	1	18	2	4
3144	3142	209805	716440	190.4781	13.01956	6	0.1	190.3781	1	Not Proven	2	12	2	Minor Watercourse	6	189.378	12.081856	3	1.1001	1	18	2	4
3145	3143	209808	716394	198.8115	18.45601	8	0.35	198.4615	1	Not Proven	2	16	3	Site Infrastructure	3	203.4188	17.91869	3	-4.6073	1	9	1	3
3146	3144	209757	716308	196.7674	11.03766	6	0.25	196.5174	1	Not Proven	2	12	2	Site Infrastructure	3	201.778	22.39914	3	-5.0106	1	9	1	2

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Environmental Impact Assessment – Technical Appendix 11.2: Outline Peat Management Plan

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

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TABLE OF CONTENTS

1 INTRODUCTION

1.1 Background

This outline Peat Management Plan (oPMP) has been prepared by Environmental Resources Management Ltd (ERM) to assess the estimated peat excavation and re-use potential as well as the proposed peat and soil management methodologies to be employed during the construction of Ladyfield Renewable Energy Park (the Development).

The oPMP has been prepared as a technical appendix to an Environmental Impact Assessment Report (EIA Report) and should be read in conjunction with Chapter 11: Geology, Soils and Peat of the EIA Report. The oPMP will ensure that the construction of the Development will comply with good practice in accordance with Scottish Renewables (SR) and Scottish Environment Protection Agency (SEPA) guidance.

The purpose of the oPMP is to:

- Define the materials that will be excavated during the construction of the Development, focussing specifically on the excavation of peat;
- Report on detailed investigations into peat depths during within the Development, including peat probing and scoring results;
- Detail proposals for the management of excavated peat and other soils;
- Consider the potential effect of the Development on Ground Water Dependent Terrestrial Ecosystems (GWDTEs);
- Determine volumes of excavated peat at the Site and proposals for re-use or reinstatement using excavated materials;
- Assess the potential for peatland restoration at the Site, and;
- Provide details of general and specific mitigation measures.

The oPMP has been produced in accordance with SR and SEPA guidance on peat excavations and management[1]. It is expected that this document will evolve throughout the different phases of the development and will therefore be subject to continued review to address:

- Requirements to adhere to future planning conditions;
- Detailed ground investigations and design development;
- Unforeseen conditions encountered during construction;
- Changes in best practice during the life of the wind farm, and;
- Changes resulting from the construction methods used by the contractor(s).

Whilst this oPMP provides a base standard for good practice, the contractor will implement any methods or improvements to current practices which will avoid or minimise risks to the environment, where possible, and will correspond with SR and SEPA guidance.

The oPMP is accompanied by the following appendices:

- Appendix A – Figures, and;
- Appendix B – Excavation and Re-use Volumes and Calculations.

1.2 The Site

The Site is situated approximately 4.7 km north of Inveraray, centred on National Grid References (NGR) 210197, 715498. The Site covers an area of approximately 790 hectares (ha) with the

[1] SR and SEPA (2012) Guidance on the Assessment of Peat volumes, Re-use of Excavated Peat and the Minimisation of Waste [Online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2014/07/assessment-of-peat-volumes-reuse-of-excavated-peat-and-minimisation-of-waste-guidance/documents/guidance-on-the-assessment-of-peat-volumes-reuse-of-excavated-peat-and-the-minimisation-of-waste/guidance-on-the-assessment-of-peat-volumes-reuse-of-excavated-peat-and-the-minimisation-of-waste/govscot%3Adocument/Guidance%2Bon%2Bthe%2Bassessment%2Bof%2Bpeat%2Bvolumes%252C%2Breuse%2Bof%2Bexcavated%2Bpeat%252C%2Band%2Bthe%2Bminimisation%2Bof%2Bwaste.pdf (Accessed 02.10.23)

extent and location shown on Figure 1.1 as the Site Boundary. The Site lies wholly within the administrative boundary of Argyll and Bute Council (the Council).

The predominant land use within the Site consists of private forestry plantation used for commercial purposes with areas of upland moorland also present in the south and east of the Site.

The elevation of the Site ranges from 470 metres (m) Above Ordnance Datum (AOD) in the east of the Site and falls to around 100 m AOD in the west of the Site. There are a number of notable hilltops and ridges within and surrounding the Site including:

- Ceann Chreagan, in the south of the Site;
- Stuc Scardan, directly east of the Site; and
- Tom an Fheidh, directly north to the Site.

There are a number of watercourses within the Site, as well a number of small lochans within and surrounding the Site. These include:

- River Aray, flowing north to south in the west of the Site;
- Allt Sheileachan, in the north of the Site;
- Allt a' Mhadaidh. in the centre of the Site;
- Lochan Mhadaidh, in the east of the Site; and
- Lochan Sheileachan, directly east of the northeast area of the Site.

As well as Allt Sheileachan and Allt a' Mhadaidh, there are also numerous unnamed tributaries draining into the River Aray, flowing from the east of the Site to the west.

1.3 The Development

The Development comprises of the following main components:

- 13 turbines, each with a tip height of up to 180 m. Each turbine may require a small transformer located at its base. Each turbine will have a foundation with an approximate diameter of 25 m;
- Access track to serve the construction and operation of the wind farm with width approximately 5.5 m, this will consist of a combination of upgraded track and newly construction track. New tracks will be constructed of a graded stone or floated, as appropriate for the ground conditions;
- A substation and control building will be located approximately 0.66 km west of T6;
- The project will have a battery energy storage system located adjacent to the on-site substation;
- Crane hardstandings will be required adjacent to each turbine, this will consist of an area of approximately 3,450 m^2 at each turbine;
- Two temporary construction compounds will be required during the construction of the Development, forming an area of hardstanding providing space for temporary welfare, parking, lay down areas and potentially concrete batching;
- The project will include a 50m x 40m extension to the existing quarry located at NGR 209387, 714173; and
- The Development will require the felling of existing forestry. There will be replanting on-site and compensatory planting will also be required (see Chapter 14: Forestry).

The layout of the Development has evolved throughout the EIA process with details of the final layout provided in Chapter 3: Development Description.

The Site layout is displayed in Figure 11.2.1: Site Layout, which is included in Appendix A.

1.4 Consultation

Peat excavation and disturbance within the Site, as well as the reinstatement and restoration potential, were considered throughout the EIA for the Development and the outcomes of studies are reported in the EIA Report. The EIA Report forms part of the planning application submitted to the Scottish Government's Energy Consent Unit (ECU) and made available to all consultees, including SEPA.

2 OBJECTIVES

2.1 Introduction

Desk-based assessments, detailed peat survey work and completion of technical assessments such as the Peat Slide Risk Assessment (PSRA) for the EIA Report allows a consistent approach for managing peat.

The preparation of an oPMP is in response to the 2022 Scoping Responses (April 2022 – June 2022) as well as the intent to deliver a construction project that complies with good practice in accordance with SR and SEPA.

In addition to the technical assessments, an outline civil design of the Site has been undertaken. The overall objective in the design of the Development has been to minimise the excavation and disturbance of peat where possible. The access tracks and turbines have been placed in areas of shallower peat or avoiding peat altogether as far as possible. Chapter 3: Site Selection and Design details the design process and how peat was avoided in the development.

The objective of the oPMP is achieved by:

- Ensuring the characteristics of the Site are understood through extensive peat probing and assessing the Site topography;
- Understanding the site layout and how peat will be excavated and stored;
- Modelling the peat depth profile based on probing and a digital terrain modelling in 3D;
- Considering the best practice guidance for peat reinstatement, and;
- Developing practical peat restoration opportunities for the improvement of habitats and peatlands.

The oPMP has been compiled in accordance with the following best practice guidance:

- Guidance on Developments on Peatland: Peatland Survey (2017)[2];
- Guidance on Developments on Peatland: Guidance on the Assessment of Peat Volumes, Re-use of Excavated Peat and Minimisation of Waste;
- Floating Roads on Peat Guidance[3];
- Good Practice During Wind Farm Construction[4]; and
- SEPA Regulatory Position Statement – Developments on Peat[5].

2.2 Approach to Minimising Peat Excavation

The following steps have been taken during the outline design stage of the Development to minimise the effect on peat:

- The development of an access track design which avoids deeper peat where practicable;
- The development of an access track design that uses existing tracks where possible, where gradients permit, and can be floated through sections where peat is 1.0 m or greater;

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[2] SNH (2017) Guidance on Developments on Peatland: Peatland Survey (2017) [Online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2018/12/peatland-survey-guidance/documents/peatland-survey-guidance-2017/peatland-survey-guidance-2017/govscot%3Adocument/Guidance%2Bon%2Bdevelopments%2Bon%2Bpeatland%2B-%2Bpeatland%2Bsurvey%2B-%2B2017.pdf (Accessed 02.10.23)

[3] SNH (2010) Floating Roads on Peat [Online] Available at: http://www.roadex.org/wp-content/uploads/2014/01/FCE-SNH-Floating-Roads-on-Peat-report.pdf (Accessed 02.10.23)

[4] Scottish Renewables et al. (2019) Good Practice during Wind Farm Construction [Online] Available at: Guidance - Good practice during Wind Farm construction | NatureScot (Accessed 02.10.23)

[5] SEPA (2010) SEPA Regulatory Position Statement – Developments on Peat [Online] Available at: https://www.sepa.org.uk/media/143822/peat_position_statement.pdf (Accessed 02.10.23)

- The design and orientation of turbines and crane hardstandings considers local topography, peat depth and other environmental constraints; and
- Consideration of a borrow pit location in an area of shallow peat cover.

These steps will be further supplemented by taking the following measures to minimise disturbance:

- Maximisation of batter angles in cuttings;
- Utilisation of existing access tracks, and;
- The use of appropriate construction plant to avoid unnecessary disturbance of the ground surface (e.g. low ground pressure excavators).

The oPMP is based upon the fundamental principle that achieving a successful materials strategy is contingent on gaining a thorough understanding of the Site through investigation and developing a design that achieves the materials management objectives. For the Development, this principle is achieved by undertaking significant peat probe investigations prior to preparing the outline civil design layout in 3D and the preparation of this oPMP based on the available information.

2.3 Aims and Objectives

2.3.1 Need for a Peat Management Plan

Peatlands are considered to be a significant natural resource due to the wildlife habitats that they provide and their ability to absorb carbon, as such they are protected by various legislation, policy and local, national and international initiatives such as:

- United Kingdom Biodiversity Action Plan (UKBAP)[6];
- Scotland's National Peatland Plan (2015)[7];
- Scottish Biodiversity List (SBL)[8];
- Scotland's 2018-2032 Climate Change Plan[9], and;
- Scottish Soil Framework (2009).[10]

SEPA has a statutory duty to ensure that where peat spoil is generated during construction, it is stored, re-used, treated or disposed of correctly, which may require authorisation or permits.

SEPA's policy on the management of peat is set out in their SEPA Regulatory Position Statement – Developments on Peat. This highlights that the best management option for peat spoil is the prevention of its production, by seeking to minimise peat excavation and disturbance. Where this is unavoidable, developers should attempt to re-use as much of the peat produced on-site as possible, in justifiable and environmentally beneficial ways.

The oPMP is prepared to demonstrate to local authorities, SEPA and other consultees that the construction of the Development will progress in a manner that is planned, in accordance with good practice and achieves the aim of being environmentally sustainable.

Therefore, the oPMP is prepared in accordance with the SR and SEPA guidance. It details how:

- The Development has been structured and designed to reduce the volumes of peat excavated as far as is reasonably practicable.
- Volumes of peat excavated during construction have been considered in the design, and;

[6] Joint Nature Conservation Committee: UKBAP [online] Available at: UK BAP | JNCC - Adviser to Government on Nature Conservation (Accessed 02.10.23).

[7] NatureScot - Scotland's National Peatland Plan: Working for our future [online] Available at: Scotland's National Peatland Plan: Working for our future | NatureScot (Accessed 02.10.23)

[8] NatureScot – Scottish Biodiversity List [online] Available at: Scottish Biodiversity List | NatureScot (Accessed 02.10.23)

[9] Scottish Government – "Securing a green recovery on a path to net zero: climate change plan 2018–2032 – update" [online] Available at: Chapter 6 Land Use, Land Use Change and Forestry - 3.6. Land Use, Land Use Change and Forestry - Securing a green recovery on a path to net zero: climate change plan 2018–2032 - update - gov.scot (www.gov.scot) (Accessed 02.10.23)

[10] Scottish Government – "The Scottish Soil Framework" [online] Available at: The Scottish Soil Framework - gov.scot (www.gov.scot) (Accessed 02.10.23).

- Excavated peat will be managed.

2.3.2 Objectives of the oPMP

The main objective of the oPMP is to outline how peat and peaty soils proposed to be excavated will be managed and re-used during the construction of the Development and proposed restoration plans.

This is achieved through responding of the following objectives:

- Providing details of the extent and depth of the peat on Site and how this was determined;
- Estimation of peat volumes to be excavated and re-used;
- Classification of excavated materials;
- Consideration of the use of appropriate construction methods;
- Describing how excavated peat will be handled to ensure suitability for re-use;
- Determining if temporary storage of peat will be required during construction and how this will be done to ensure suitability for re-use, and;
- Considering the potential volume of peat which may not be suitable for re-use and any requirement for a Waste Management Plan for the Development.

The response to these objectives is provided within the following sections.

3 PEAT INVESTIGATIONS, EXCAVATIONS, RE-USE AND MANAGEMENT

3.1 Peat Classification and Published Geology

3.1.1 General Peat Classification

Acrotelmic peat is the upper layer of peat consisting of living and partially decayed materials with a higher hydraulic conductivity and a variable water table. These deposits are generally found to exist in the upper 0.5 m of peat deposits and are typically suitable for reinstatement because they contain viable plant life to assist in the regeneration of peatland vegetation and carbon sequestration.

Catotelmic peat is variable in characteristic, with decomposition of fibres generally increasing with depth. Water content can be highly variable and affects the structural strength of the material. Suitability for re-use generally depends on fibre and water content. The upper catotelm is commonly deemed as being appropriate for use in restoration due to its relatively high fibre content.

Generally, excavated semi fibrous catotelmic peat from the Site will have sufficient structural strength to be able to be used in the lower layers of verge restoration as it will not be 'fluid'.

The catotelmic peat would be capped with a surface layer of acrotelm to re-establish the peat vegetation. If any fluid like wet catotelmic peat is encountered then it would be placed in more appropriate locations such as low-lying sections of the borrow pits or concave deposition areas.

The following assumptions have been made in classifying peat excavated during the construction work:

- Where the total peat depth was found to be less than 0.5 m, this peat material is assumed to be 100% acrotelmic;
- Where the total peat depth is between 0.5 m and 1.0 m, the upper acrotelmic peat is at least 0.5 m deep; and
- Where the total peat depth is found to be greater than 1.0 m, acrotelmic peat is assumed to account for at least 30% of total depth but generally applying a minimum of 0.5 m thick.

Existing topography and permitted track gradients drive the design of the infrastructure with due consideration given to potential construction risk and effects on environmentally sensitive receptors including deep peat, watercourse buffers and any GWDTEs. Further micro-siting post-consent would take place in such a way as to avoid where possible the excavation of deep peat.

3.1.2 Published Geology

Published mapping by the BGS[11] provides information on the soils and geology present at the Site location. The bedrock geology maps show that the Site is underlain by various sedimentary and igneous groups.

Throughout the majority of the Site the main bedrock geology is Quartzite from the Crinan Grit Formation. There are smaller areas of Metagabbro and Metamicrogabbro from the Daldrian Supergroup in the central and north western portions of the Site.

Throughout the Site there are isolated occurrences of the following bedrock geology:

- Mafite from the North Britain Siluro-Devonian Calc-Alkaline Dyke Suite;
- Metalimestone and Pelite from the Argyll Group;
- Phyllitic Semipelite and Quartzite from the Ardshaig Phyllite Formation;
- Quartz-Microgabbro from the Central Scotland Late Carboniferous Tholeiitic Dyke Swarm;
- Felsite from the Scottish Highland Siluro-Devonian Calc-Alkaline Minor Intrusion Suite;
- Graphitic Pelite from the Tayvallich Slate and Limestone Formation.

Information of the superficial soils present at the Site is also provided by BGS, the superficial soils are localised pockets of Devensian-Diamicton Till, Hummocky Glacial deposits of Diamicton, and Alluvium in isolated areas on the Site. There are no recorded superficial peat deposits on the Site.

The carbon and Peatland Map 2016[12] details that the Site is mostly underlain by class 5 peat. The eastern areas of the Site is underlain by small portions of class 2 and class 3 peat, on the steep slopes located in the south eastern portions of the Site. The peat classes on the Site are defined as follows:

- Class 2 peat is described as "*Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential*."
- Class 3 peat is described as "*Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat*."
- Class 5 peat is described as "*Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat*."

3.1.3 Investigations

The existing peat depths across the Site have been determined through a phased survey approach. The survey was initiated to inform the EIA and Site design work while supporting the PSRA. The total number of probes sunk during peat investigations was 3,145.

Phase one of the peat depth surveys was carried out to inform Public Consultation Layout 2. This survey comprised of a 100 m grid covering the whole Site, where possible. This rationale of probing is in accordance with the phase one approach as detailed in the Scottish Government guidance for investigating peat.

Phase two peat probing was carried out between February and April 2023. The probe locations for this survey were focussed on the proposed turbines, access tracks and other associated

[11] BGS – GeoIndex [online] Available at (Accessed 18/07/2022): GeoIndex - British Geological Survey (bgs.ac.uk) (Accessed 02.10.23)

[12] Scotland's Environment, Carbon & Peatland 2016. Available at: https://map.environment.gov.scot/Soil_maps/?layer=10 (Accessed 02.10.23)

infrastructure. Peat depths were measured along the proposed access tracks at 50 m centres with offsets of approximately 25 m on each side of the centre line and at 10 m centres across the proposed turbine locations. Where deeper peat was found close to infrastructure, a higher density of probes was captured in order to improve effectiveness of micrositing.

The peat depths are illustrated in Figure 11.2.2: Recorded Peat Depths within Appendix A of this oPMP.

3.1.4 Summary of Peat Depths

Peat depths ranged from 0.0 m to 7.2 m across the Site with an average depth of 0.5 m. The deeper areas of peat were in isolated pockets with only 102 of the 3,145 probes confirming peat in excess of 2 m.

The deepest peat was recorded in the northern area of the Site at an area of proposed track leading to T1. Peat up to 7.2 m has been recorded with a further three probes recording depths of 4.8 m or greater in the area. Site observations, wider peat depths and aerial imagery confirm that this is an isolated low-lying boggy area surrounded by forestry plantation. The use of floating track will be required to prevent disturbance of deep peat in this area.

Figure 11.2.3: Interpolated Peat Depths included within Appendix A of this oPMP illustrates the peat depths recorded across the Project as well as the distribution of peat deposits along the proposed access tracks and infrastructure.

3.2 Excavation and Re-use Calculation

Excavated peat volumes have been estimated through the production of a peat levels 3D surface derived from the peat depth data recorded during peat probing. This is compared to a 3D surface developed from the outline civil design of site infrastructure whilst some assumptions have been adopted.

The estimated peat excavation volumes are included in Table 1 using the anticipated construction activities that will generate excavated soils.

Table 1: Peat Excavation Volumes Based on Construction Activity

Development Component	Estimated Volume of Excavated Peat (m^3)	Estimated Volume of Acrotelmic Peat (m^3)	Estimated Volume of Catotelmic Peat (m^3)
Turbines and associated earthworks	23,794	20,996	2,799
New windfarm tracks, turning heads, passing places, existing rack upgrades and associated earthworks	47,686	47,686	0
Site Compound	203	203	0
BESS Compound	2,333	2,333	0
Borrow Pits	0	0	0
SUB-TOTAL	74,016	71,217	2,799
+10% Bulk Factor Contingency	7,402	7,122	280
TOTAL	81,417	78,339	3,078

A detailed assessment of excavated volumes by location within the Site is provided in Appendix B of this oPMP.

3.2.1 Estimation of Peat Re-use Requirements

The principles of reinstating peat and peat soils should be adhered to for all elements of the Development, comprising of the following:

- Peat and peaty soils will be reinstated on access track and infrastructure verges with turves placed on the upper horizons, encouraging revegetation;
- All peat, soil and turves excavated from beneath infrastructure (excluding floated access tracks) will be reinstated in the vicinity of its original location;
- Any wet catotelmic peat will be placed at the bottom of any restoration profile, followed by semi-fibrous catotelmic peat and acrotelmic peat should be placed at the top;
- It is proposed that a large proportion of excavated peat will be utilised in peatland restoration activities in line with the outline techniques discussed in the oHMP, and;
- Peatland restoration activities will be overseen by the Ecological Clerk of Works (ECoW) to ensure methods are properly adhered to.

3.2.2 Peatland Restoration Potential

The outline objectives in proposing restoration of peatlands on Site are to:

- Ensure residual volumes of excavated peat from the Development are re-used in areas where ecological benefits and maintained or increased carbon sequestration can be delivered;
- Promote the re-use of excavated peat materials and avoid their disposal to landfill;
- Promote use of best practices and guidance to ensure that benefit is made from reusing peat and peaty soils for ecological enhancement, and;
- Complement planned mitigation identified in the oHMP.

Table 2 shows the opportunities for the re-use of peat within the Site including the demand for acrotelm and catotelm peat, while Table 3 summarises the total peat balance estimated during construction of the Development.

Table 2: Peat Re-use Volumes Based on Construction Activity

Development Area	Total Demand Estimate (m^3)	Acrotelm Demand (m^3)	Catotelm Demand (m^3)	Reinstatement Thickness (max) (m)	Assumptions
Turbines and associated earthworks	9,341	9,341	0	0.5 m	Towers and associated earthworks will be dressed off with up to 0.5 m of peat and peaty soils.
New windfarm tracks, turning heads, passing places, existing rack upgrades and associated earthworks	58,059	58,059	0	0.5 m	Where new permanent tracks are proposed, peat will be reinstated along verges and associated earthworks with peat up to 0.5 m thick with verges not expected to exceed 3 m on either side. Average peat depths suggest only acrotelmic peat will need to be reused.
Temporary Construction Compound	203	203	0	0.5 m	Temporary Construction Compound area and associated earthworks will be dressed off with up to 0.5 m of peat and peaty soils as the in-situ peat depths allow.

Development Area	Total Demand Estimate (m^3)	Acrotelm Demand (m^3)	Catotelm Demand (m^3)	Reinstatement Thickness (max) (m)	Assumptions
					Average peat depths suggest only acrotelmic peat will need to be reused
BESS Compound	344	344	0	0.5 m	BESS Compound area and associated earthworks will be dressed off with up to 0.5 m of peat and peaty soils as the in-situ peat depths allow. Average peat depths suggest only acrotelmic peat will need to be reused
Borrow Pits	0	0	0	0.0 m	Borrow Pit area and associated earthworks will be dressed off with up to 0.5 m of peat and peaty soils as the in-situ peat depths allow. Since the in-situ peat depths were measured as 0 m, no reinstatement will take place here.
Peat Re-use in Habitat Management Plan	13,470	10,392	3,078		
Total	81,417	78,339	3,078		

Table 2 is presented as a summary of the assessment of peat reinstatement volumes. A detailed assessment is provided in Appendix B of this oPMP.

The following assumptions have been made in assessing peat re-use:

Excavated peat will be temporarily placed adjacent to where it is excavated. However, where this is not possible, temporary peat storage areas have been identified. These are areas of previous disturbance area where peat was less than 0.5 m, areas out with 50 m buffer of watercourses and where topography permits.

The proposed temporary peat storage areas can be viewed in Figure 11.2.4 Proposed Temporary Peat Storage Areas in Appendix A. The proposed storage provides for approximately half of the total volume of peat excavated throughout the development. Since the development will be phased and everything will not take place at the same time it is proposed that this will be sufficient.

Table 3: Peat Balance Calculations

Peat Description	Total Peat Demand Estimate for Reinstatement (m^3)	Total Peat Supply from Excavation (m^3)	Surplus (+) or Deficit (-) (m^3)
Acrotelm	78,339	78,339	0
Catotelm	3,078	3,078	0
Total	**81,417**	**81,417**	**0**

Table 3 demonstrates that there is a balance of peat in the development as peat will be reused in the development itself, as outlined within TA 8.4: Outline Biodiversity Enhancement Management

Plan (OBEMP). Peat will be reused in deep peatland where erosion has been observed, further details are available within the OBEMP.

3.2.3 Handling and Storage of Peat

It will be necessary for the contractor to prescribe methods and timing involved in the excavation, handling and storage of peat for use in reinstatement. The contractor will be responsible for appointing a geotechnical engineer who will monitor any potential stability risks. Construction methods will be based on the following principles:

- The surface layer of peat (acrotelm) and vegetation will be stripped separately from the catotelmic peat. This will typically be an excavation depth of up to 0.5 m;
- Acrotelmic material will be stored separately from catotelmic material;
- Careful handling is essential to retain any existing structure and integrity of the excavated materials and thereby maximise the potential for excavated material to be re-used;
- Less humified catotelmic peat which maintains its structure upon excavation should be kept separate from any highly humified amorphous or wet catotelmic peat;
- Acrotelmic material will be replaced as intact as possible once construction progresses/as it is complete;
- To minimise handling and transportation of peat, acrotelmic and catotelmic will be replaced, as far as is reasonably practicable, in the locality from which it was removed. Acrotelmic material is to be placed on the surface of reinstatement areas;
- Temporary storage of peat will be minimised, with restoration occurring in parallel with other works;
- Suitable storage areas should be sited in locations with lower ecological value, low stability risk and at a suitable distance from water courses;
- Peat should be stored in stockpiles no greater than 2 m in height;
- Reinstatement will, in all instances, be undertaken at the earliest opportunity to minimise storage of turves and other materials;
- Managing the construction work as much as possible to avoid periods when peat materials are likely to be wetter i.e. high rainfall events;
- Temporary storage and replacement of any peat excavated from the borrow pit should occur adjacent to and within the source pit; and
- Transport of peat on Site from excavation to temporary storage and restoration site should be minimised.

3.2.4 Waste Management Plan Requirements

Based on the calculations carried out, no waste management plan will be required as no material will be moved off the Site. Peat material will be reused and restored on the Site itself.

4 MITIGATION

4.1 General Mitigation

General mitigation measures will be implemented in accordance with the peat excavation, handling and storage, and reinstatement methods detailed in Section 3 of this oPMP and in accordance with best practice guidance as included in the outline Construction Environmental Management Plan (oCEMP). The oCEMP outlines best practice in relation to implementation of drainage and pollution prevention.

4.2 Specific Mitigation

Along with the general mitigation measures presented in section 4.1 and principles outlined in Section 3.2 on this oPMP, additional mitigation measures will be implemented in specific areas of the Site where the potential impact on peat is considered to be the greatest.

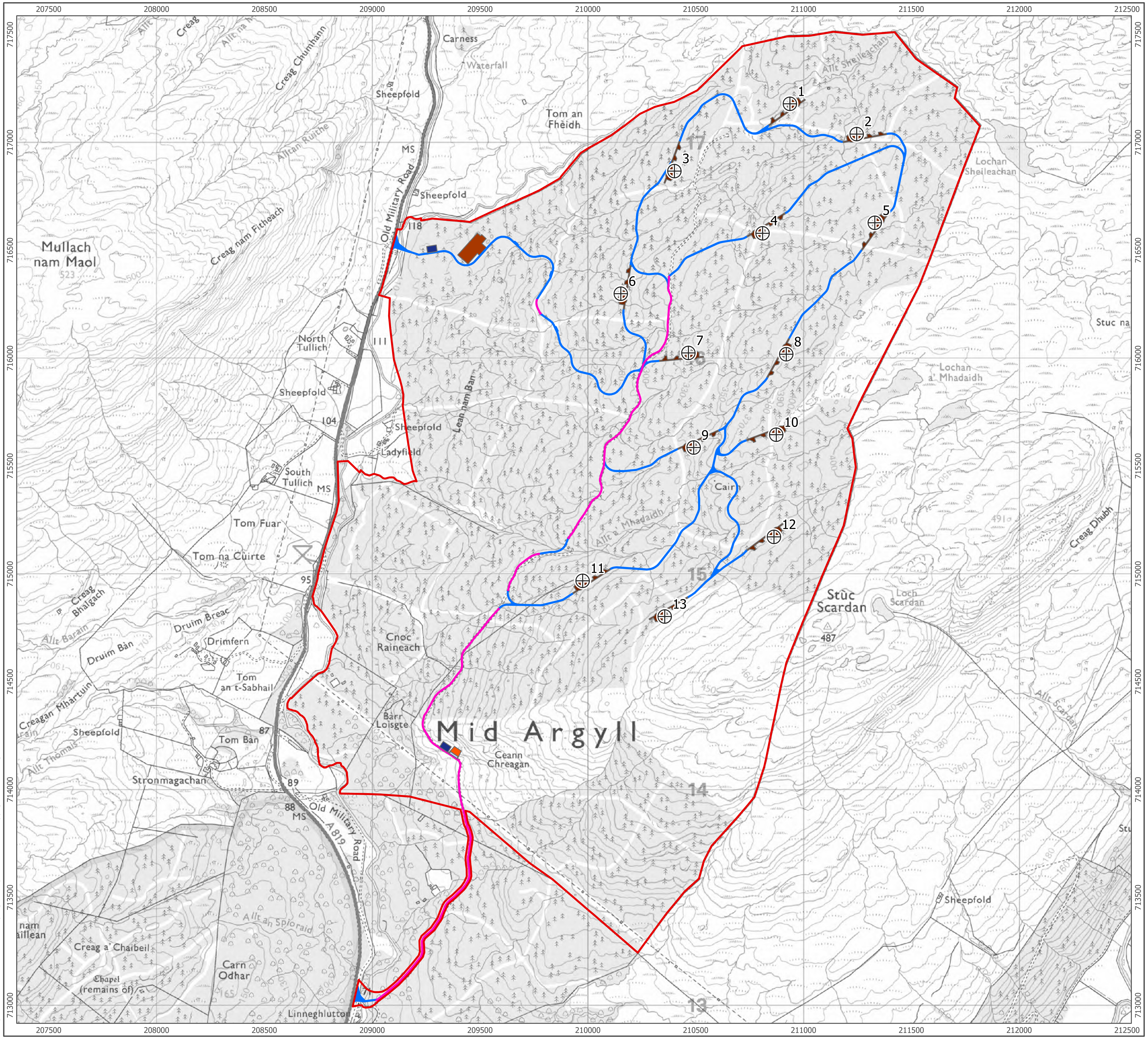
There is one area of peat ranging from 4.8 – 7.2 m depths. This deep peat lies beneath proposed access tracks. Floating access tracks will have to be considered in this area to protect the area of deeper peat.

5 CONCLUSION

The following conclusions are drawn regarding the management of peat and excavated materials within the site:

- The Site design minimises the disturbance of deep peat wherever possible.
- As a result of the peat excavation and re-use estimates, all of the peat will be reused on the Site itself.
- Excavated peat will be reused on Site as detailed within the outline Biodiversity Enhancement Management Plan.
- The estimates of excavated peat provided in this report are likely to be higher than those that occur during construction, as micro-siting will allow for the avoidance of localised pockets of deeper peat,
- Sufficient methods have been defined to ensure that peat can be sensitively handled and stored on Site to allow for effective re-use; and
- No waste licence is required for the construction work.

APPENDIX A – FIGURES



RIDGE CLEAN ENERGY

ERM

- Turbine
- Temporary Construction Compound
- Quarry Extension
- Hardstandings
- Existing Quarry
- BESS and Substation Compound
- New Road
- Upgraded Road
- Site Boundary

1:17,000 Scale @ A3

0 400 800 m

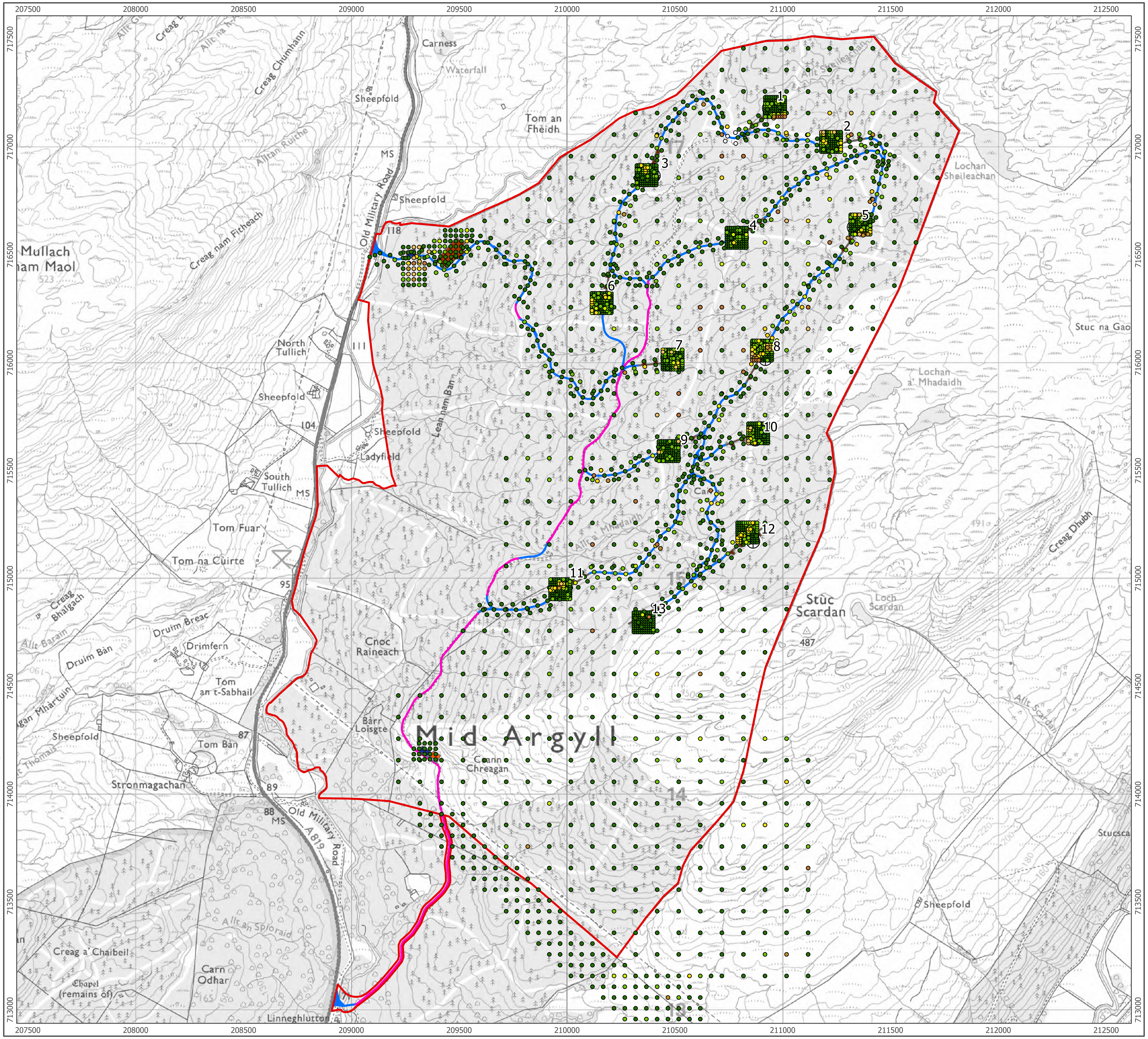
NORTH

Produced By: MV	Ref: 4378-REP-018
Checked By: GH	Date: 08/09/2023

Site Layout Plan
Figure 11.2.1

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-018 Fig 11.2.1 Site Layout Plan



Peat Depth (m)

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 4.00
- >4.01

Site Data

- Turbine
- Temporary Construction Compound
- Quarry Extension
- New Road
- Hardstandings
- Existing Quarry
- BESS and Substation Compound
- Upgraded Road
- Site Boundary

1:17,000 Scale @ A3

0 400 800 m

NORTH

Produced By: MV	Ref: 4378-REP-019
Checked By: GH	Date: 08/09/2023

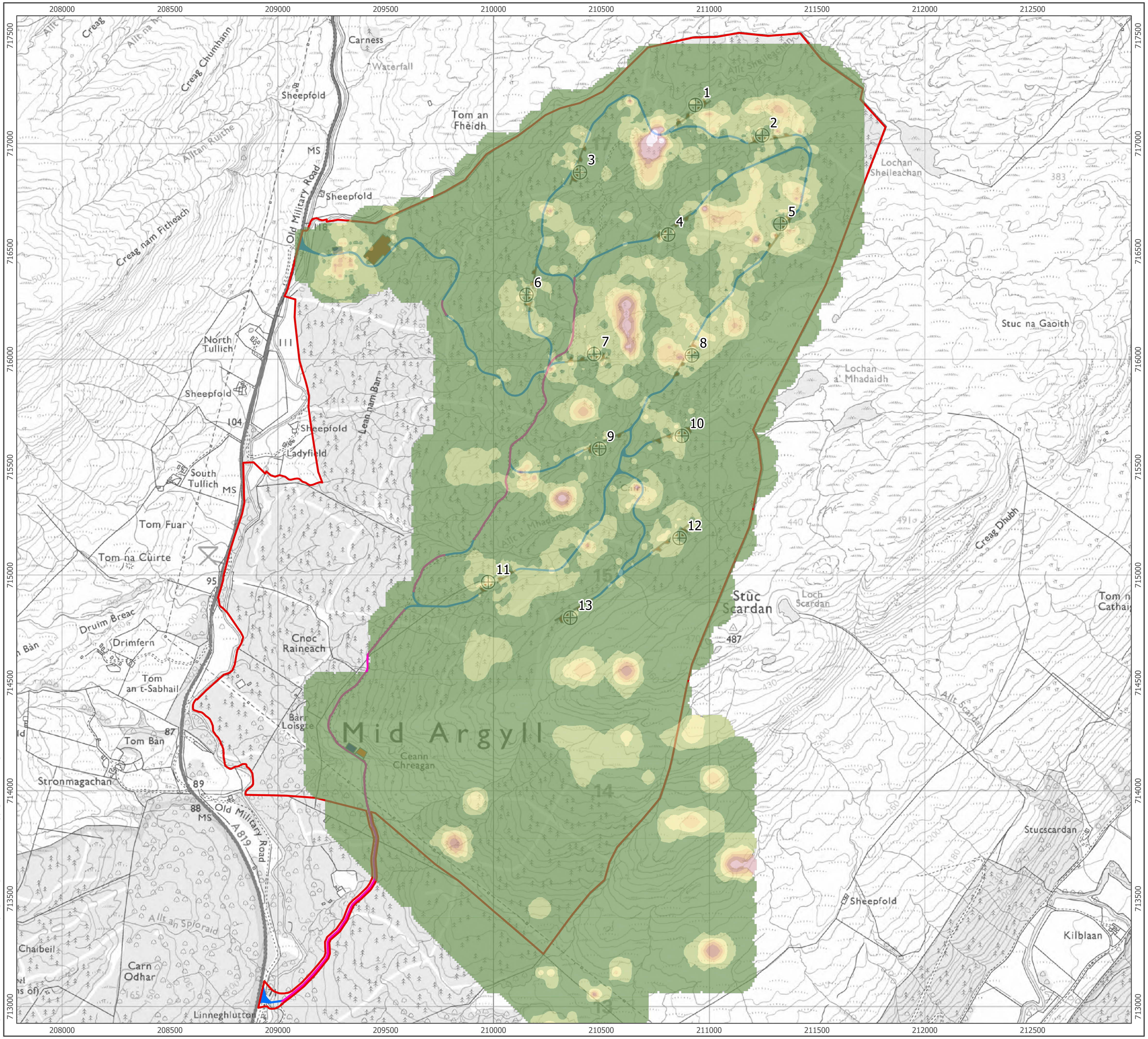
Peat Depths
Figure 11.2.2

Ladyfield Renewable Energy Park
EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-019 Fig 11.2.2 Peat Depths

RIDGE CLEAN ENERGY

ERM



Peat Depths (m)

- 0.00 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 4.00
- >4.00

Site Data

- Turbine
- Temporary Construction Compound
- Quarry Extension
- New Road
- Hardstandings
- Existing Quarry
- BESS and Substation Compound
- Upgraded Road
- Site Boundary

1:17,000 Scale @ A3

0 400 800 m

NORTH

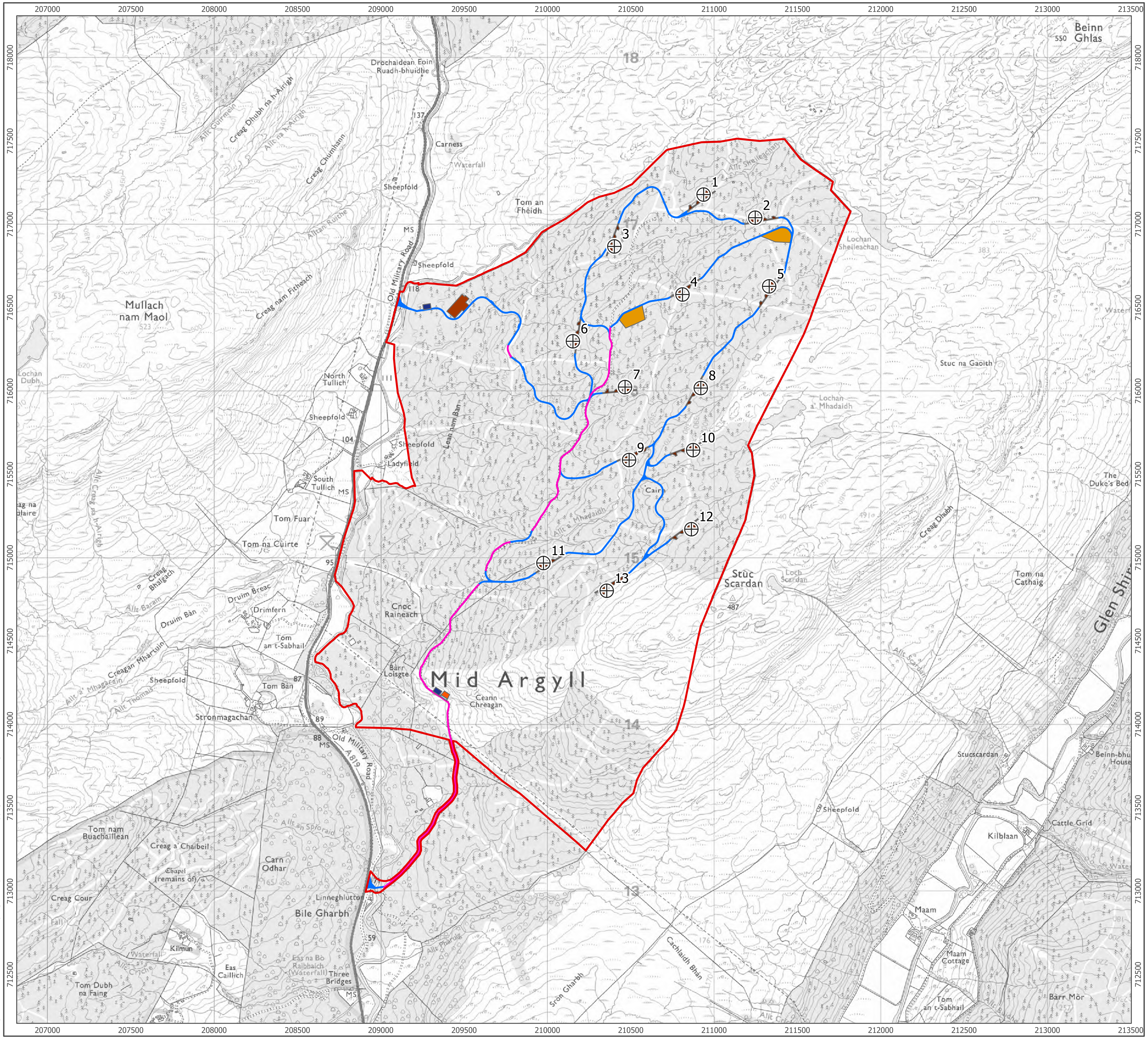
Produced By: MV	Ref: 4378-REP-020
Checked By: GH	Date: 08/09/2023

Interpolated Peat Depths

Figure 11.2.3

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-020 Fig 11.2.3 Interpolated Peat Depths



RIDGE CLEAN ENERGY

ERM

- Turbine
- Temporary Construction Compound
- Quarry Extension
- New Road
- Hardstandings
- Existing Quarry
- BESS and Substation Compound
- Upgraded Road
- Temporary Peat Storage Areas
- Site Boundary

1:22,000 Scale @ A3

0 500 1,000 m

NORTH

Produced By: MV	Ref: 4378-REP-032
Checked By: GH	Date: 08/09/2023

Proposed Temporary Peat Storage Areas
Figure 11.2.4

Ladyfield Renewable Energy Park EIA Report

\\UKSPRDGISFS01\Data\Arcus\GIS-CAD\GIS\Engineering\Projects\4378 Ladyfield Wind Farm\4378 Ladyfield Wind Farm.aprx\4378-REP-032 Fig 11.2.4 Temporary Peat Storage Areas

APPENDIX B – EXCAVATION AND RE-USE VOLUMES AND CALCULATIONS

Ladyfield - Peat Excavation and Re-Use Calculations

Infrastructure	Total Area	Average Peat Depth	Peat Cut Volume	Total Acrotelm Excavation Est.	Total Catotelm Excavation Est.	Areas of Reinstament	Total Peat Re-use Est.	Total Acrotelm Re-use Est.	Total Catotelm Re-use Est.	Surplus(+) Deficit (-) by Infrastructure
Turbines and Hardstandings										
T1	3637	0.41	1506	1506	0	1558	779	779	0	727
T2	3566	0.47	1676	1676	0	1528	718	718	0	958
T3	3566	0.41	1451	1451	0	1528	764	764	0	687
T4	3566	0.40	1432	1432	0	1528	614	614	0	818
T5	3597	0.54	1928	1799	130	1529	820	820	0	1109
T6	3566	0.63	2254	1783	471	1528	764	764	0	1490
T7	3641	0.57	2064	1820	244	1557	779	779	0	1286
T8	3597	0.83	2975	1799	1176	1530	765	765	0	2210
T9	3566	0.36	1300	1300	0	1528	557	557	0	743
T10	3641	0.57	2079	1820	259	1557	779	779	0	1300
T11	3559	0.65	2299	1780	520	1528	764	764	0	1535
T12	3647	0.50	1805	1805	0	1557	779	779	0	1027
T13	3461	0.30	1024	1024	0	1557	461	461	0	563
SUB-TOTAL	**46612**		**23794**	**20996**	**2799**	**20015**	**9341**	**9341**	**0**	**14453**
Permananent Tracks										
New Access Tracks	106442	0.45	47686	47686	0	116118	58059	58059	0	**-10373.23724**
SUB-TOTAL	**106442**		**47686**	**47686**	**0**	**116118**	**58059**	**58059**	**0**	**10373**
Borrow Pits										
Borrow Pits	**1309**	**0.00**	0	0	0	1309	0	0	0	**0**
SUB-TOTAL	**1309**		**0**	**0**	**0**	**1309**	**0**	**0**	**0**	**0**
Site Compound										
Site Compound	1350	0.15	203	203	0	1350	203	203	0	
SUB-TOTAL	**1350**		**203**	**203**	**0**	**1350**	**203**	**203**	**0**	**0**
BESS Compound										
BESS Compound	9149	0.26	2333	2333	0	1324	344	344	0	
SUB-TOTAL	**9149**		**2333**	**2333**	**0**	**1324**	**344**	**344**	**0**	**1989**
TOTAL Excavation Volume			**74016**	**71217**	**2799**	**140116**	**67947**	**67947**	**0**	
. +10% contingency for Bullking			**7402**	**7122**	**280**					**7402**
TOTAL			**81417**	**78339**	**3078**					
Peat Re-use in Habitat Management Plan							13470	10392	3078	
SUB-TOTAL							13470	10392	3078	
TOTAL PEAT EXCAVATION and REUSE	**164861**		**81417**	**78339**	**3078**	**140116**	**81417**	**78339**	**3078**	**34217**

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Environmental Impact Assessment – Technical Appendix 11.3: Preliminary Borrow Pit Assessment

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

ERM

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1 INTRODUCTION

1.1 Preparation of the Borrow Pit Assessment

This Preliminary Borrow Pit Assessment (BPA) for Ladyfield Renewable Energy Park (the Development) has been prepared initially to provide details of potential borrow pit locations or aggregate extraction areas required for the construction of the Development.

It is anticipated that all of the turbine bases will be founded on bedrock composed of in-situ sedimentary rock types.

The purpose of the BPA is to:

- Assess potential borrow pit locations;
- Estimate available aggregate from the source location;
- Identify overlying superficial soils and define the materials that will be excavated as a result of the Development;
- Identify underlying rock types;
- Set out proposals for adequate intrusive investigations; and

National Planning Framework 4[1] states that "*Development proposals for borrow pits will only be supported where: the proposal is tied to a specific project and is time-limited; the proposal complies with the above mineral extraction criteria taking into account the temporary nature of the development; and appropriate restoration proposals are enforceable.*" In the case of this particular development, progressing on-site borrowing provides significant environmental gains as the traffic volume on local roads (B class, C class and unclassified) would be significantly reduced.

1.2 The Development Site

The Site covers an area of approximately 790 hectares (ha), as shown on Figure 1.2 of the Environmental Impact Assessment Report (EIAR). The Site is situated approximately 4.7 km north of Inveraray, centred on National Grid References (NGR) 210197, 715498. The Site lies wholly within the administrative boundary of Argyll and Bute Council (the Council).

The predominant land use within the Site consists of private forestry plantation used for commercial purposes with areas of upland moorland also present in the south and east of the Site.

The elevation of the Site ranges from 470 metres (m) Above Ordnance Datum (AOD) in the east of the Site and falls to around 100 m AOD in the west of the Site.

The closest main road to the Site is the A819. This road runs from Inveraray towards the Site and runs along the western boundary of the Site. There are unnamed forestry tracks that run from the A819 onto the Site.

The Development comprises of the following infrastructure:

- 13 turbines, each with a tip height of up to 180 m. Each turbine may require a small transformer located at its base. Each turbine will have a foundation with an approximate diameter of 25 m;
- Access track to serve the construction and operation of the wind farm with width approximately 5.5 m, this will consist of a combination of upgraded track and newly construction track. New tracks will be constructed of a graded stone or floated, as appropriate for the ground conditions;
- A substation and control building will be located approximately 0.66 km west of T6;
- The project will have a battery energy storage system (BESS) located adjacent to the on-site substation;
- Crane hardstandings will be required adjacent to each turbine, this will consist of an area of approximately 3,450 m^2 at each turbine;

[1] The Scottish Government (2023) National Planning Framework 4 [Online] Available at: National Planning Framework 4 (www.gov.scot) (Accessed 03.10.23)

- Two temporary construction compounds will be required during the construction of the Development, forming an area of hardstanding providing space for temporary welfare, parking, lay down areas and potentially concrete batching;
- The project will include a 50m x 40m extension to the existing quarry located at NGR 209387, 714173; and
- The Development will require the felling of existing forestry in necessary areas. There will be replanting on-site and compensatory planting may be required.

There is one borrow pit location proposed for this development. The proposed borrow pit is an extension of the existing quarry in the southern area of the Site. The borrow pit is located adjacent to the proposed Temporary Construction Compound, located in the south of the Site, adjacent to the existing MoD kiosk. The assessment has been completed through a targeted desk-based review of geological maps, Ordnance Survey (OS) contour data, and from aerial photography.

2 GEOLOGY

2.1 Superficial Soils

Published geological mapping[2] indicates that there are localised pockets of Devensian-Diamicton Till, Hummocky Glacial deposits of Diamicton, and Alluvium in isolated areas on the Site. There are no recorded superficial peat deposits on the Site.

Figure 11.1 included in the EIAR Volume One illustrates the superficial soils across the site area.

2.2 Bedrock Geology

Published bedrock geology mapping[3] indicates that the Site is underlain by various sedimentary and igneous groups.

Throughout the majority of the Site the main bedrock geology is Quartzite from the Crinan Grit Formation. There are smaller areas of Metagabbro and Metamicrogabbro from the Daldrian Supergroup in the central and north western portions of the Site.

Throughout the Site there are isolated occurrences of the following bedrock geology:

- Mafite from the North Britain Siluro-Devonian Calc-Alkaline Dyke Suite;
- Metalimestone and Pelite from the Argyll Group;
- Phyllitic Semipelite and Quartzite from the Ardshaig Phyllite Formation;
- Quartz-Microgabbro from the Central Scotland Late Carboniferous Tholeiitic Dyke Swarm;
- Felsite from the Scottish Highland Siluro-Devonian Calc-Alkaline Minor Intrusion Suite;
- Graphitic Pelite from the Tayvallich Slate and Limestone Formation.

Figure 11.2 included in the EIAR Volume One illustrates the bedrock geology across the site area.

2.3 Peat

Peat depths ranged from 0 m to 7.2 m depths across the Site with an average depth of 0.5 m. The deeper areas of peat were in isolated areas with only 102 of the 3,145 probes confirming peat in excess of 2 m.

The deepest peat was recorded in the northern area of the Site in the vicinity of an area of proposed track leading to T1. Peat up to 7.2 m has been recorded in this area, with a further three probes recording depths of 4.8 m or greater. Site observations, wider peat depths and aerial imagery confirm that this is an isolated low-lying boggy area surrounded by forestry plantation.

[2] British Geological Survey GeoIndex (2020) [online] Available at: GeoIndex - British Geological Survey (bgs.ac.uk) (Accessed 03.10.23)
[3] British Geological Survey GeoIndex (2020) [online] Available at: GeoIndex - British Geological Survey (bgs.ac.uk) (Accessed 03.10.23)

The proposed track layout encroaches on this deeper area of peat, but floating tracks will be used in this section in order to minimise the disturbance of deep peat in this area.

Figure 11.2.2 included in the EIAR Volume 1 illustrates the 'Recorded Peat Depths' across the site area.

2.4 Hydrogeology

The groundwater units underlying the Site are identified by Scotland's Environment mapping service as the Oban and Kintyre body[4]. These units have an overall SEPA classification of 'Good'.

BGS 1:625,000 digital mapping and the BGS GeoIndex mapper shows the bedrock aquifer underlying the majority of the Core Study Area to consist of Argyll Group – psammite, semipelite and pelite which dominates the central and northern area of the Core Study Area.

The BGS groundwater vulnerability[5] ranges between 4a to 5 defining the underlying rocks as vulnerable to pollutants not readily adsorbed.

Groundwater vulnerability classes range from 1 to 5, with 5 being most vulnerable. Class 4 is subdivided into 4a and 4b. It is the hydrogeological characteristics within the pathway rather than the 'importance' of a particular aquifer that results in the final vulnerability classification. The methodology behind the classification assumes that where contaminants move through unsaturated fractured bedrock, no attenuation of pollutants can take place. Large parts of Scotland show areas of Classes 4 and 5, reflecting the widespread occurrence of rocks dominated by fracture flow. Rocks which are not exposed at the surface and are overlain by superficial deposits have a reduced potential for attenuation of contaminants.

Further details of the hydrogeology are included in Chapter 10 - Hydrology & Hydrogeology of the EIAR.

2.5 Mining and Quarrying

The Coal Authority interactive map viewer[6] indicates that no portion of the Site falls within a coal mining reporting area.

There is a history of quarrying at the Site. The proposed borrow pit is an extension of an existing quarry on the Site. There is no information of further quarries on Site, no evidence of additional quarrying was observed from the desktop assessments or Site walkovers.

3 BORROW PIT ASSESSMENT

3.1 General

This section of the BPA identifies potential borrow pit locations within the Development site boundary that could be utilised in provision of aggregate for construction. This will be used in the construction of site access tracks, crane hardstanding areas, upgrades of existing forestry tracks and potentially concrete batching.

The proposed quarry extension that will be used as a borrow pit location has been selected based on the:

- Topography;
- Previous land uses;
- Accessibility from existing or proposed access tracks;
- Orientation with respect to visibility;

[4] SEPA (undated) Groundwater classification [Online] Available at: https://map.environment.gov.scot/sewebmap/ (Accessed: 03.10.23)

[5] BGS (2015) Groundwater Vulnerability (Scotland) GIS dataset, Version 2 [Online] Available at: http://nora.nerc.ac.uk/id/eprint/509618/1/OR15002.pdf (Accessed: 03.10.23)

[6] The Coal Authority (2020) Interactive Map Viewer [online] Available at: http://mapapps2.bgs.ac.uk/coalauthority/home.html (Accessed 03.10.23)

- Potential aggregate volume; and
- Proximity of rock to the surface.

Steeper topography is preferable for quarrying, where soils coverage will be limited. Careful consideration was given to landscape and visualisation impacts.

Other considerations included proximity to watercourses, places of archaeological interest, areas of recorded coal mining and forestry. The borrow pit location is in an area where the peat cover is thin or vacant, and where bedrock outcrops and aggregate reserves are expected to occur near the surface.

The location has been previously used to quarry stone which has limited overburden, bed rock is exposed and appears to be hard of an igneous or metamorphic nature, which is free from clay or other intrusions and should provide good quality aggregate with minimal wastage. No intrusive site investigation works have been undertaken into the quality of rock that might be recovered at the time of preparing this BPA. However, it is anticipated that a full ground investigation will take place in advance of construction of the Development. The investigation will include the testing of material from within the proposed borrow pit area to assess its suitability for reuse.

3.2 Borrow Pit Locations and Considerations

One borrow pit search area was initially identified from a combination of desk-based assessment of mapping and topography and site walkover survey. Other environmental constraints were also considered, including watercourse buffers and peat depths.

A summary of the considered borrow pit location is given below.

3.2.1 Borrow Pit Location

Borrow Pit 1 is located in the southern sector of the Site, at approximate grid reference E 209399, N 714167. The site was selected as it is on the location of a previously used quarry and is in close proximity to the access track. Furthermore, previous quarrying activities have taken place in the area meaning that, bedrock can be accessed more readily and the effects of the borrow pit are minimised.

The BGS superficial soils information indicates that this area of the Site does not have recorded superficial soil information. Peat Probing in the area indicates that the area where peat cover is found it is thin or vacant. The solid geology mapping indicates that the bedrock in this area is Metalimestone and Pelite from the Argyll Group, and Quartzite from the Crinan Grit Formation.

No geological faulting is present within the borrow pit search area. The location does not encroach any other environmental development constraints.

3.3 Findings and Recommendations

The ground modelling of Borrow Pit 1 informs the assessment summary as set out in section 3.4. It should be noted that further investigations would be required to fully understand the feasibility of these options which would comprise rotary percussive drilling and rock sampling through coring and suitable geotechnical testing.

3.4 Design

Based on the identified search area, a three-dimensional outline design was undertaken to establish the target capacity required from the proposed borrow pits. This involved a civil design taking account of the overall proposed site layout levels and both existing and proposed access tracks in order to develop a viable borrow area. The outline design of the borrow pit included a main worked area with earthwork batters and indicative drainage cut-off ditches, and therefore was finalised as a total area situated within the initial search area. The details of the outline borrow pit design is summarised in Table 3.1 below.

Table 3.1: Borrow Pit - Assessment Summary

Borrow Pit No.	Surface Area (m^2)	3D Model Total Cut Volume (m^3)	Interpolated Peat Depth (m)	Estimated Peat Volume (m^3)	Estimated Aggregate Available (m^3)
1	1,774	24,847	0	0	24,847
TOTAL	**1,774**	**24,847**	**-**	**0**	**24,847**

For the purposes of this outline borrow pit assessment, the volumes indicated in the table above are based on the following parameter:

- Borrow Pit floor levels taken from the levels associated with the existing access track; and
- The Outline Borrow Pit Design Figure, included in Appendix A shows the proposed earthworks and design for the Borrow Pit.
- The Borrow Pit is located on an existing quarry and therefore no peat at the location. There is therefore a large volume of estimated aggregate available.

4 METHODS OF WORKING

The requirement to produce various grades of aggregate will necessitate the use of mobile quarrying plant and equipment. This operation will comprise a number of different elements which are summarised in the following sections.

It is possible that the quarried material will require blasting methods should testing prove relatively high strengths and competencies. Where this is required, it is proposed that a lightweight crawler mounted blast hole drill rig is employed together with an attendant compressor. Explosives will need to be considered in detail by the Contractor at construction stage relating to safe operation, transportation and storage. The Contractor may also wish to consider alternative methods suitable to the quality of the rock. All aggregate materials won in borrow pits will be subject to crushing and screening. The primary component of this operation will consist of a mobile crushing and screening system.

The Contractor will provide a plant setup that meets the Development requirements processing the rock to produce the quantities, quality and sizes of the material required. The construction of the Development access tracks will be undertaken utilising the majority of the aggregate produced from the borrow pit operations. It is intended that the access tracks will be constructed on the basis of normal best practice for the accommodation of wind turbine components.

The Contractor should undertake testing of the materials as the borrow pits are worked to ensure material quality is maintained, with particular reference to the ability of the materials to resist freezing/thawing and wetting/drying, and therefore serve the lifespan of the Development.

The appointed Contractor will provide a detailed risk assessment and method statement to cover the working methods employed within the borrow pits for approval during the construction phase.

4.1 Overburden Handling

Prior to progressing works at borrow pits, the areas will require to be stripped of superficial material which lies above bedrock. Material storage areas should be identified and the superficial soils carefully placed in segregated stockpiles within the appropriate storage area. Temporary peat storage areas are identified within Technical Appendix A11.2: Outline Peat Management Plan. Details on the requirements for temporary storage areas are also included in Technical Appendix A11.4: Outline Construction Environmental Management Plan.

Access routes to the borrow pits will form part of the enabling works prior to the mobilisation of quarry plant. The main items of mobile quarry plant will be tracked, typically low ground pressure capable of traversing surfaces which have had only limited surface preparation.

4.2 Drainage of Borrow Pits

Temporary interception/peripheral bunds and cut-off drainage ditches ('clean water drains') should be constructed upslope of the borrow pits and cuts to prevent surface water runoff entering the excavation. Swales to collect runoff should be placed on the downslope of borrow pits and overburden / stockpiles and will be designed to treat potentially silty runoff before discharging back into the drainage system.

A drainage and surface water management system will be required in order to control surface water run-off from borrow pit areas. Due to the nature and size of the proposed excavations, the drainage system should comprise of a peripheral cut-off ditch together with attenuation features and soakaways. Drainage ditches should be installed using a tracked excavator and, where necessary, a hydraulic breaker.

Wastewater discharge onto vegetated surfaces from borrow pits and earthworks areas should be directed away from watercourses and drainage ditches to avoid direct discharge. Any sediment suspended within the treated water should be deposited amongst the rough surface vegetation.

4.3 Reinstatement Proposals

It is envisaged that overburden/soils will be carefully stored adjacent to the extraction areas for re-use.

The borrow pit should be suitably re-instated with topsoil and any available peat, peaty soils and turves to re-establish hydrological and ecological conditions and reduce any potential visual impacts. There is a potential for till or sands and gravels to be available for reinstatement purposes.

The reinstated peat/soil surface would be profiled to allow drainage and the re-introduction of appropriate vegetation cover would tie into existing topography. The upper part of the quarry face would remain exposed and would be allowed to become weathered. It is envisaged that this face would acquire an appearance similar to that of other natural rock exposures in the locality.

The reinstated profile will be of varying thicknesses above the base of the borrow pit and will be gently sloping from the track edge to the quarry face, generally with thicknesses representative to that of the peat and soils initially stripped from borrow pits areas.

4.4 Borrow Pit Working Programme

Borrow Pit 1 is the only Borrow Pit proposed for this development and will be used throughout the construction programme.

5 CONCLUSION

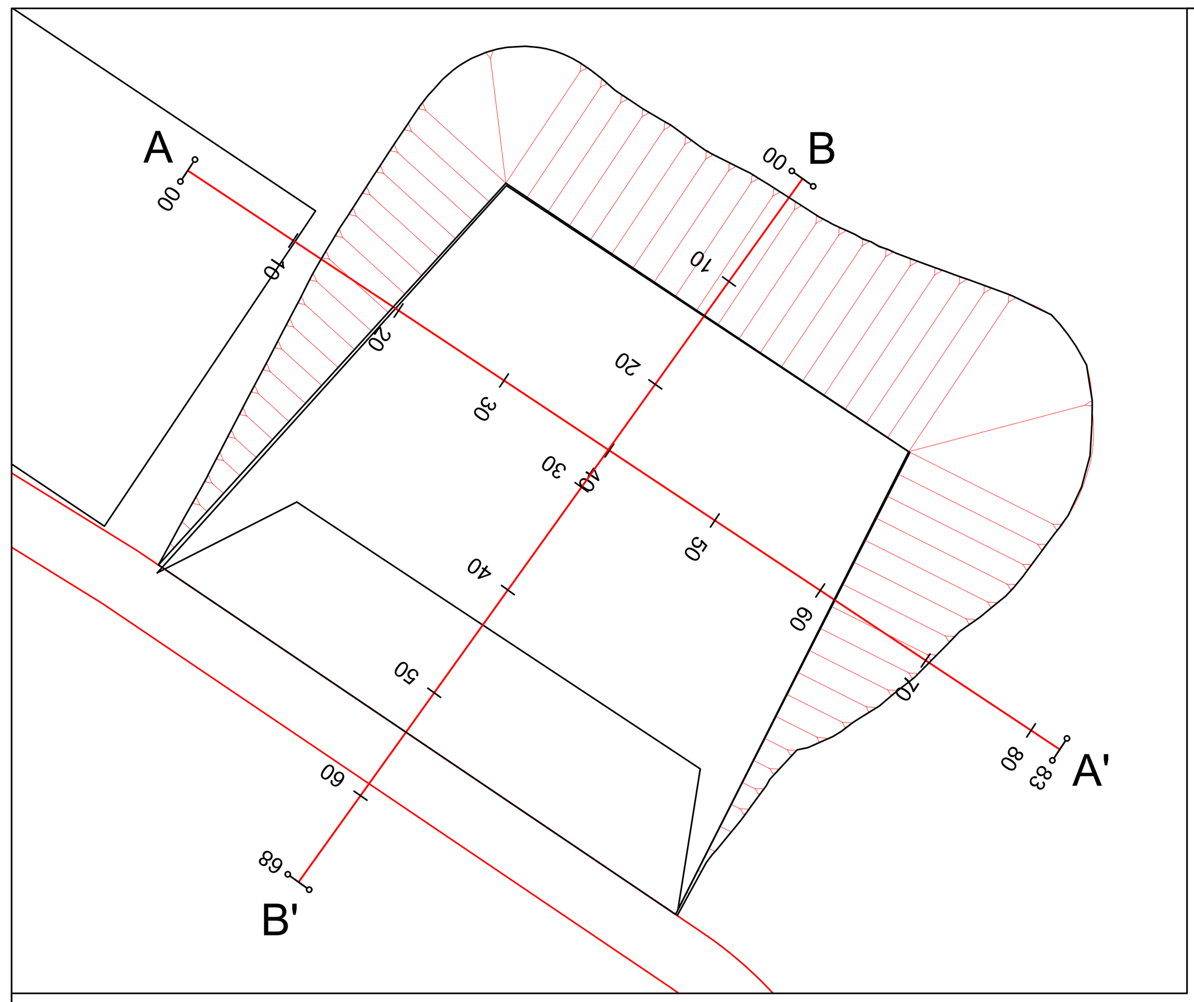
The siting of the borrow pit within the Development has been made on the basis of its location at a previously used quarry, proximity to the existing and proposed access tracks, consideration of topography, geology and identified constraints. Based on the desk-based assessment, it is anticipated that there are adequate aggregate quantities available for the development utilising the existing quarry.

Considerations for the assessment of the borrow pit following consent of the Development include:

- Ground investigations and relevant geo-environmental analysis undertaken prior to finalising borrow pit proposals;
- Three-dimensional design should be undertaken following detailed design and ground investigations to confirm the capacity of the proposed borrow pit; and
- Detailed profiles of borrow pit excavation including existing ground levels, proposed excavation levels and a conceptual restoration profile for the borrow pit should be produced once final borrow pit extents have been agreed.

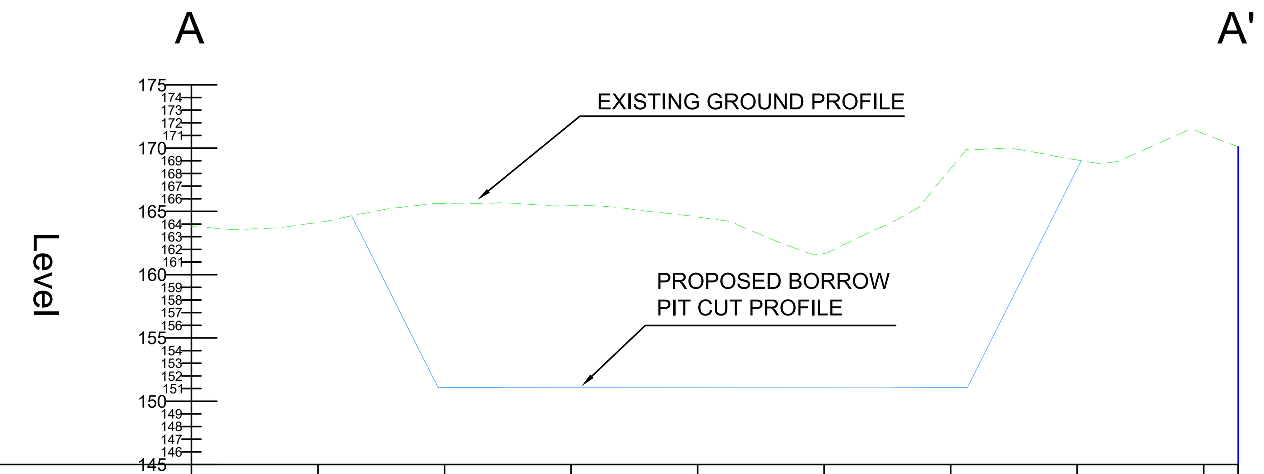
Prior to the construction of the Development, design and best practices along with any required mitigation measures would be set out in full within a Construction Environmental Management Plan and agreed with the statutory bodies.

APPENDIX A – FIGURES



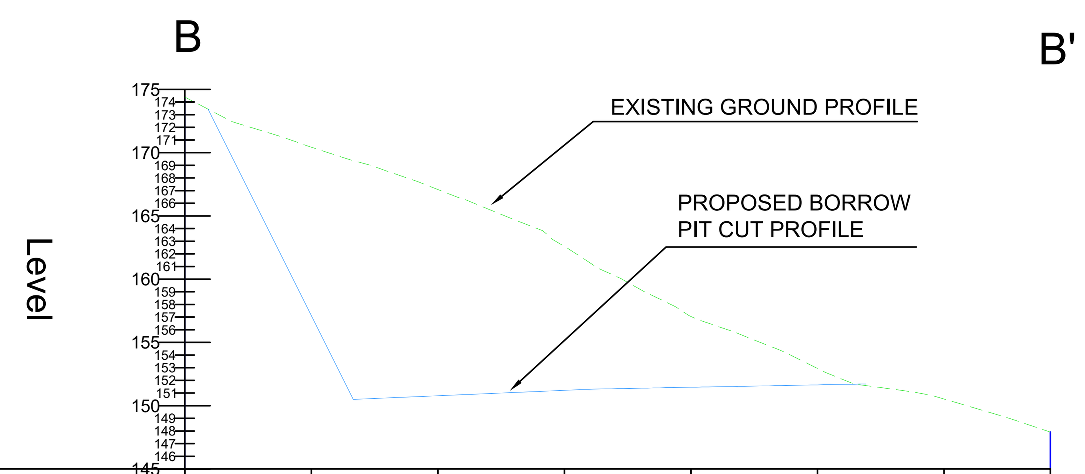
BORROW PIT - PLAN VIEW (1:500)

BP SECTION A-A'
SCALE: H 1:500,V 1:500. DATUM: 145.000

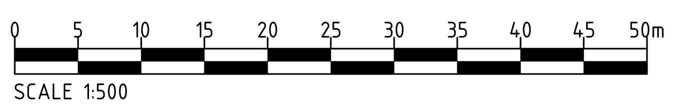


Chainage		10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000 82.723
Existing Levels	163.802	164.122	165.615	165.449	164.562	161.677	168.371	169.063	171.135 170.109
Proposed Levels			151.095	151.066	151.061	151.056	151.087	168.362	

BP SECTION B-B'
SCALE: H 1:500,V 1:500. DATUM: 145.000



Chainage	0.000	10.000	20.000	30.000	40.000	50.000	60.000	68.407
Existing Levels	174.396	170.426	167.082	162.592	157.056	152.944	150.530	147.919
Proposed Levels		157.120	150.787	151.217	151.459	151.642		



RIDGE CLEAN ENERGY

ERM

1:500 Scale @ A1

Produced: RC Reviewed: TA Approved: KR	Ref: 4378_DR_P_0002 Date: 25.07.23

INDICATIVE BORROW PIT LAYOUT
FIG 2.13

LADYFIELD RENEWABLE ENERGY PARK
EIA REPORT

Y:\CAD\4378 LADYFIELD\01-WORKING\01_01-DRAWINGS\PLANNING DRAWINGS\4378_DR_P_0004

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Environmental Impact Assessment – Technical Appendix 11.4: Online Construction Environmental Management Plan

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

The business of sustainability

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TABLE OF CONTENTS

1 INTRODUCTION

Environmental Resources Management Limited (ERM) was commissioned by Ladyfield Renewable Energy Park Ltd ('the Applicant') to prepare an Outline Construction Environmental Management Plan (oCEMP) to support an application for planning consent for the Ladyfield Renewable Energy Park ('the Development'), located approximately 4.7 km north-east of Inveraray. The Site lies wholly within the administrative boundary of Argyll and Bute Council (the Council).

The layout and technical details of the Development are provided in the associated Environmental Impact Assessment Report (EIAR) and accompanying figures indicated below:

- Site Location (Figure 1.1);
- Site Boundary Plan (Figure 1.2); and
- Indicative Temporary Construction Compound (Figure 2.6).

The oCEMP takes into account specific activities during the construction phase of the Development, including: Excavation and construction of access tracks;

- Excavation and construction of turbine foundations;
- Excavation and installation of infrastructure to be used for the transformers and cabling;
- Excavation and construction of hardstanding areas, including crane hardstandings, substation and control buildings, a BESS, and construction compounds;
- The construction and restoration of temporary construction infrastructure such as the temporary construction compound;
- Quarry extension to be used as a borrow pit;
- Watercourse crossings;
- Drainage;
- Use of plant on site;
- Storage of materials including Control of Substances Hazardous to Health (COSHH);
- Dust suppression and control; and
- Management of sediment and surface water.

Appropriate methodologies for the mitigation of environmental impacts, including any water-related impacts and pollution prevention measures are described in the following sections.

This oCEMP includes the following appendices:

- Appendix A – Outline Site Waste Management Plan (SWMP); and
- Appendix B – Pollution Incident Response Plan.

2 AIMS AND OBJECTIVES

The oCEMP is intended to demonstrate measures that could be used during the construction phase of the Development to adequately protect environmental resources. Detailed proposals for such measures will be documented prior to construction and will provide the same or greater protection for the environment as those described in this oCEMP. The measures are proportionate to the risk and, where greater risk is highlighted at specific locations prior to construction, specific measures would be agreed for those locations.

2.1 Project Environmental Policy

The Development should be delivered in accordance with good construction practice, both in its approach to the management of impacts on the environment and its support of local communities.

In doing so, the following approach has been developed and is delivered through the implementation of the oCEMP and associated plans and reports:

- The Developer, along with the Contractor, the Designers and other parties to the construction process (once appointed) will act collaboratively and cooperatively to achieve the best environmental outcomes;

- The works will progress in accordance with the requirements of the environmental reporting and methods agreed with the Council and Consultees;
- The Developer undertakes the appointment of a contractor that is competent;
- The Developer undertakes the appointment of a contractor that is experienced in delivering works in environments similar to those at the Site and in implementing mitigation works of a similar nature to those defined in this oCEMP and environmental reporting within the EIAR;
- The Contractor plans the work integrating from the outset the objectives of the Development and the environmental requirements defined in this oCEMP (modified into a Construction Environmental Management Plan (CEMP) before construction commences) and environmental reporting within the EIAR;
- The Contractor programmes the work in a manner that is safe and that the work and mitigation measures have the greatest opportunity to be effective;
- The Contractor develops contingency plans for reasonably foreseeable events. The Developer, Designer and other parties take reasonable steps to support the development of the Contractor's plans taking into account responsibilities;
- The Contractor shall take reasonable steps to notify local communities of operations during the Development that may impact on domestic or business activity and will use appropriate methods to manage the impact; and
- In all operations, management of the environment and control of impacts will be an integral part of the design, management and construction process.

2.2 OCEMP Objectives

The objective of the oCEMP is to contribute to the successful delivery of the Development, achieved through a structured approach to good construction management taking into account information and research documented in the environmental reporting, whilst incorporating flexibility to accommodate unforeseen conditions and innovation.

The oCEMP will be revised with the contractors inputs in order to develop a CEMP before construction commences. A copy of the CEMP and related files and reports will be kept in the site offices of the Contractor for the duration of the site works and will be made available for review at any time.

Upon completion of the works, the Contractor will submit a complete copy of the final set of information to the Developer for their records. This information will include electronic scans of all hard copy reports, data, field records and correspondence which are gathered over the course of the construction works, and all updates to the CEMP.

It is intended that the CEMP will be a live document that is regularly reviewed and updated to reflect conditions experienced onsite.

2.3 OCEMP Review Process

Where the Contractor has standard documents within their own Company or Corporate Environmental Management Plan which might cover a particular requirement of this CEMP, this will be provided to the Developer and the relevant corresponding documents will be made available.

A checklist will be issued providing the Contractor with a summary of the minimum information to be provided to the Developer pre, during and post-construction.

The Developer will undertake review and acceptance of the Contractor's provided information prior to commencement of construction works.

2.4 Guidance and Legislation

The methods set out in this oCEMP are based on legislation and good practice, including measures outlined by the Scottish Environment Protection Agency (SEPA) for several constructed wind farms. The following guidance is applicable:

- The Construction Industry Research and Information Association (CIRIA), 'Environmental Good Practice On Site (C741)' (2015)[1];
- Environmental Protection Act 1990[2];
- The Environmental Protection (Duty of Care) (Scotland) Regulations 2014[3];
- The Waste Management Licensing (Scotland) Regulations 2011[4];
- The Waste (Scotland) Regulations 2012[5];
- Groundwater Protection Technical Guidance[6];
- National Planning Framework 4 (NPF4) (2023)[7]
- CIRIA, 'Control of Water Pollution from Construction Sites (C532)' (2001)[8]; and
- CIRIA, 'The SuDS Manual (C753F)' (2015).

3 DESCRIPTION OF THE DEVELOPMENT

3.1 Site Description

The Site is situated approximately 4.7 km north of Inveraray centred on National Grid Reference (NGR) 210141, 715431.

The Site lies wholly within the administrative boundary of Argyll and Bute Council (the Council).

The predominant land use within the Site consists of private forestry plantation used for commercial purposes with areas of upland moorland also present in the south and east of the Site.

The elevation of the Site ranges from 470 metres (m) Above Ordnance Datum (AOD) in the east of the Site and falls to around 100 m AOD in the west of the Site.

The Site will be accessed via two access points off the A819. A new access junction is proposed at NGR 209101, 716517, to be constructed in the north of the Site, as part of the Development. Secondly, an existing access junction at NGR 208923, 713010 and existing crossing over the River Aray would be replaced with a new bridge. Both access points would be capable of accepting turbine blades and components and although it is likely that only one would be used for turbine component delivery, both are assessed as such within this oCEMP.

New tracks will be constructed to connect the existing forestry tracks to the turbine locations to enable the turbine components, construction materials and construction staff to be transported to their locations, and to enable access for subsequent maintenance visits.

3.2 Development Description

The Development comprises of the following main components:

- 13 turbines, each with a tip height of up to 180 m. Each turbine may require a small transformer located at its base. Each turbine will have a foundation with an approximate diameter of 25 m;

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[1] The Construction Industry Research and Information Association (CIRIA), (2015), Environmental Good Practice on Site Guide (C741), CIRIA: London

[2] UK Government 1990: Environmental Protection Act, 1990 [Online] Available at: Environmental Protection Act 1990 (legislation.gov.uk) (Accessed 19/05/2023)

[3] UK Government (2014) the Environmental Protection (Duty of Care) (Scotland) Regulations 2014 [Online] Available at: http://www.legislation.gov.uk/ssi/2014/4/contents/made (Accessed 19/05/2023)

[4] Scottish Government (2011) the Waste Management Licensing (Scotland) Regulations 2011 [Online] Available at: https://www.legislation.gov.uk/sdsi/2011/9780111012147/contents (Accessed 19/05/2023)

[5] Scottish Government (2012) the Waste (Scotland) Regulations 2012 [Online] Available at: https://www.legislation.gov.uk/sdsi/2012/9780111016657/contents (Accessed 19/05/2023)

[6] Environment Agency 2017: Groundwater Protection Technical Guidance [Online] Available at: Groundwater protection technical guidance - GOV.UK (www.gov.uk) (Accessed 19/05/2023).

[7] Scottish Government (2023). National Planning Framework 4 [online] Available at: National Planning Framework 4 (www.gov.scot) (Accessed 19/05/2023)

[8] CIRIA, (2001), Control of Water Pollution from Construction Sites (C532), CIRIA: London.

- Access track to serve the construction and operation of the wind farm with width approximately 5.5 m, this will consist of a combination of upgraded track and newly construction track. New tracks will be constructed of a graded stone or floated, as appropriate for the ground conditions;
- A substation and control building will be located approximately 0.66 km west of T6;
- The project will have a battery energy storage system located adjacent to the on-site substation;
- Crane hardstandings will be required adjacent to each turbine, this will consist of an area of approximately 3,450 m^2 at each turbine;
- Two temporary construction compounds will be required during the construction of the Development, forming an area of hardstanding providing space for temporary welfare, parking, lay down areas and potentially concrete batching;
- The project will include a 50m x 40m extension to the existing quarry located at NGR 209387, 714173; and

The Development will require the felling of existing forestry in necessary areas. There will be replanting on-site and compensatory planting off-site will also be required.

4 GENERAL POINTS

4.1 Working Hours

It is proposed that construction activities be limited to between 07:00 and 19:00 Monday to Saturday, with no construction work expected on Sundays or Bank Holidays. Any works out-with these hours will need to be approved in writing by the Council.

Where practicable, night-time working will not be carried out. Local residents shall be notified in advance of any night-time construction activities likely to generate significant noise levels, e.g., abnormal load movement.

In addition, road construction works are temporary in duration and location and as such more readily tolerated by residences, noise levels from typical road works machinery are unlikely to exceed the lowest daytime noise threshold[9] at more than 450 m.

It is anticipated that work will be undertaken during daylight hours, where possible, in order to prevent disturbance to nearby residents and local wildlife, such as badgers. In addition to this, a start-up and close down period for up to an hour before and after the core working hours is proposed. This does not include the operation of plant or machinery that may cause a disturbance.

If work is to be undertaken outside of daylight hours, lighting will be used for the works areas only and shall not to be allowed to spill onto nearby residential property or neighbouring wildlife habitats. Any lighting required during works will be shielded or fitted with hoods to reduce light spill. Quieter construction activities at this time would be undertaken to reduce disturbance.

Application of the above working hours to manage construction noise and vibration will ensure that impacts are minimised as far as reasonably practicable.

Exceptional circumstances in the above context is defined as reasonably unforeseeable circumstances which would result in the curtailment of construction activity, causing an increase in health and safety risk to humans (determined by the construction site manager) or a risk to wildlife (determined by the Ecological Clerk of Works (ECoW)). Examples of this would be ensuring work areas in proximity to public areas are fully secure outside of working hours, or to close up trenches to protect wildlife where practicable.

The Applicant, or the Contractors appointed by the Applicant, will notify the Council of any exceptional situations to the approved working hours 48 hours before these occur.

[9] Lowest daytime threshold of 65 dB(A) in 'ABC method' outlined in BS5228-1: Noise

4.2 Site Induction

The Principal Contractor will ensure that personnel working on and accessing the works are made aware of the content of the CEMP relevant to their work via a site induction on any personnel's first visit to the site. This will include an introduction to all health and safety measures applicable on site, as well as any Stage-specific environmental considerations. As a minimum, the following information will be provided to all inductees:

Identification of environmental risks associated with the Works specific to the work undertaken by the inductee. For example:

- Health, Safety and Environment (HSE) Policy;
- Significant environmental aspects and potential impacts of their work;
- Objectives and Targets;
- Submission of environmental improvement ideas, near misses and incidents;
- The implications of not complying with environmental consent requirements;
- Environmental site rules and requirements;
- Species and / or habitat protection requirements;
- Protocol for archaeological discoveries and watching brief;
- Pollution prevention (e.g. silt mitigation and protection of the water environment);
- Waste management practices; and
- Environmental Incident and Emergency Response Procedures (EIERP).

Stage-specific environmental constraints will be presented in the induction. This will include known sensitive areas, restricted working zones, watercourses and buffer zones, refuelling (or refuelling exclusion) areas, location of skips, etc. Where updates occur, all site personnel will be informed of the change via a Toolbox Talk (see Section 4.3 of this oCEMP).

4.3 Training and Toolbox Talks

During construction, in order to provide on-going reinforcement and awareness training, Toolbox Talks will be given on environmental issues. Toolbox Talks and training are arranged by the Principal Contractor and delivered by specialist personnel on site as required. The Principal Contractor submits a schedule for Toolbox Talks to the Projects at least one week prior to commencement of construction. The proposed schedule, to be considered as a live document, is consistent with the programme; i.e. toolbox talks for specific environmental issues are scheduled in advance of when those issues are anticipated to be encountered during the construction programme, if possible.

Additional Toolbox Talks are added as required, based on circumstances such as unforeseen risks, repeated observation of bad practices, perceived lack of awareness, pollution events, etc. Specifically, the Principal Contractor provides, as a minimum, environmental training on the following topics:

- Training on the use of spill kits (on ground and in surface waters), provided on a regular basis (to account for staff/sub-contractor changes etc.);
- Training on silt mitigation e.g. installation of silt fencing etc., silt mitigation measures to relevant construction / site staff;
- Contaminated land;
- Archaeology;
- Buried infrastructure; and
- Ecology.

A record of all training and Toolbox Talks, their content and the attendees is maintained by the Principal Contractor.

4.4 Control of Lighting

The majority of construction activities will be undertaken during daylight hours. In winter, the short daylight hours may require some temporary lighting to be deployed during construction however, this will be avoided as far as practicable, and lights will not be used outside of core working hours outlined in Section 4.1.

All construction lighting will be deployed in accordance with the following recommendations to reduce or remove impacts on human and ecological receptors:

- The use of lighting will be minimised to that required for safe site operations;
- Lighting will utilise directional fittings to minimise outward light spill and glare (e.g., via the use of light hoods/cowls which direct light below the horizontal plane, preferably at an angle greater than 20° from horizontal); and
- Lighting will be directed towards the centre of the Site rather than towards the boundaries.

4.5 Control of Noise and Vibration

Construction noise will be managed via a site-specific Noise Management Plan (NMP) provided to the Council. The embedded mitigation contained in the NMP will include the commitment to liaise directly with local residents, and the wider community via a Community Liaison Group.

The Contractor will prepare the NMP based on the final detailed construction plan. This will be submitted for approval in advance of works commencing, if required by the Council. As the Contractor is yet to be appointed, the detailed NMP cannot be finalised at this stage.

The Contractor will observe BS 5228:2009+A1:2014 (BS 5228)[10] Code of Practice for Noise and Vibration Control on Construction and Open Sites to inform noise control measures during the construction of the Development, with an awareness of noise pollution legislation.

In accordance with BS 5228 best practice; the Contractor will establish a process for handling any noise-related complaints during the construction period. These will be recorded and a log will be maintained that will include details of the response and any action taken. This will be available upon request for inspection to the relevant Council. All enquires, whether a query or a complaint will be dealt with in a timely manner. Any complaints with regards to noise will be investigated as soon as practicable, and will be logged, along with the action taken to prevent further exceedances.

The embedded mitigation contained in the NMP will include the commitment to liaise directly with local residents, and the wider community via a Community Liaison Group. The local community (residents of the Glen) will also have access to the contact details of the Site Foreman as well as an alternative Site Contact.

Any complaints received are to be recorded into the register within 24 hours. The interested party will be notified what action is being taken to address the enquiry/ complaint as required.

Rock extraction from borrow pits by means of blasting operations is anticipated, and a Blast Management Plan will be prepared by the Contractor in advance of any blasting operations.

Other excavation activities such as stone crushing and the operation of plant such as, excavators, breakers, and conveyors, will be undertaken at the existing quarry located south of the Development (NGR 209387, 714173). The quarry is located 1,070 m from the nearest receptor (NGR 208281, 714112). Based on the collective upper noise emission levels for typical crushers and excavation plant, as provided in BS5228-1, nose from excavation activities (including stone crushing) is unlikely to exceed the relative daytime criteria at 1 km distance and therefore no specific mitigation measures for noise are included for the operational phase of the development.

The good practice measures detailed below will be implemented to manage the effects of noise and vibration during construction activities, and will be required of all contractors:

[10] BS 5228:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration.

- Construction noise will be managed via a site-specific Noise Management Plan (NMP) provided to the Council. The embedded mitigation contained in the NMP will include the commitment to liaise directly with local residents, and the wider community via a Community Liaison Group.
- It is proposed that construction activities be limited to between 07:00 and 19:00 Monday to Saturday, with no construction work expected on Sundays or Bank Holidays. Any works out-with these hours will need to be approved in writing by the Council.
- Where practicable, night-time working will not be carried out. Local residents shall be notified in advance of any night-time construction activities likely to generate significant noise levels, e.g., abnormal load movement;
- The site contractors shall be required to employ the best practicable means of reducing noise emissions from plant, machinery, and construction activities, as advocated in BS 5228-1:2009;
- Where practicable, the work programme will be phased, which would help to reduce the combined effects arising from several noisy operations;
- Where necessary and practicable, noise from fixed plant and equipment will be contained within suitable acoustic enclosures or behind acoustic screens;
- All sub-contractors appointed by the main contractor will be formally and legally obliged, and required through contract, to comply with all environmental noise conditions;
- Any plant and equipment normally required for operation at night (23:00 - 07:00), e.g. generators or dewatering pumps, shall be silenced or suitably shielded to ensure that the night-time lower threshold of 45 dB, $L_{Aeq,night}$ shall not be exceeded at the nearest noise-sensitive receptors; and
- Rock extraction from borrow pits by means of blasting operations is anticipated, and a Blast Management Plan will be prepared by the Contractor in advance of any blasting operations.

With Specific regards to the south access bridge replacement works; the following measures should be implemented to reduce the effects of construction noise:

- Heavy machinery and loud plant would be fitted with silencers/attenuators where possible to reduce noise as far as reasonably practicable;
- Nearest resident will be notified in advance of expected loud construction activity and duration;
- Where possible, operation of noisy machinery / loud activity should be planned in phases and limited to notified hours of the day;
- The site contractors shall be required to employ the best practicable means of reducing vibration from plant, machinery, and construction activities, as advocated in BS 5228-2:2009; and
- Construction noise & vibration monitoring will be undertaken at the façade of the nearest NSR (Linnieghluttain) during the southern junction and bridge replacement works, the monitoring equipment should measure $L_{Aeq,1hour}$ and Peak Particle Velocity (PPV) in accordance with BS 5228-1&2. Where measured noise levels exceed the threshold value of 65 dB(A) or vibration levels exceed 10 mm/s PPV, respective construction activity should be reviewed and mitigation measures implemented in the construction activity should be improved where necessary as part of the CEMP.

4.6 Pollution Prevention

Produced historically by the Environment Agency (EA), archived Pollution Prevention Guidelines (PPGs)[11] outline previous advice statutory responsibilities and good environmental practice. Each PPG addresses a specific industrial sector or activity. Whilst the PPG documents have now been archived by the EA, they still provide a useful resource for managing on site activities.

The following are of relevance to surface water groundwater, and soil resources at the Site:

- PPG2: Above ground oil storage tanks[12];

[11] Environment Agency (2007) Pollution prevention advice and guidance [online] available at: [ARCHIVED CONTENT] Environment Agency - Pollution prevention advice and guidance (PPG) (nationalarchives.gov.uk) (Accessed 19/05/2023)

[12] Environment Agency (2011): PPG 2: Above Ground Oil Storage Tanks [online] available at: Title (nationalarchives.gov.uk) (Accessed: 19/05/2023)

- PPG3: Use and design of oil separators in surface water drainage systems[13];
- PPG4: Disposal of sewage where no mains drainage is available[14];
- PPG5: Works and maintenance in or near water[15];
- PPG6: Working at construction and demolition sites[16];
- PPG7: Safe storage: The safe operation of refuelling facilities[17]
- PPG18: Managing fire water and major spillages[18]; and
- PPG21: Pollution incident response planning[19].

A review plan for the PPGs is currently underway, replacing them with a replacement guidance series, Guidance for Pollution Prevention (GPPs) [20]. GPPs provide environmental good practice guidance for the whole UK and environmental regulatory guidance directly to Scotland. The following GPPs are of relevance:

- GPP1: Understanding your environmental responsibilities – good environmental practices[21];
- GPP2: Above ground oil storage tanks[22];
- GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer[23];
- GPP5: Works and maintenance in or near water[24];
- GPP13: Vehicle washing and cleaning[25];
- GPP21: Pollution incident response planning[26]; and
- GPP26: Safe storage – drums and intermediate bulk containers[27].

The Works will be planned and carried out in line with the PPGs and GPPs. The following other principles will be applied:

- All works will comply with Control of Water Pollution from Construction Sites – A Guide to Good Practice, CIRIA (SP156 – 2002);
- Appropriate spill and leak containment systems will be incorporated into the construction procedures to ensure no uncontrolled releases of contaminants occur;

[13] Environment Agency (2006): PPG 3: Use and design of oil separators in surface water drainage systems [online] available at: Layout 1 (nationalarchives.gov.uk) (Accessed: 03.10.23)

[14] Environment Agency (2006): PPG 4: Disposal of sewage where no mains drainage is available [online] available at: New EnvAgency PPG4 (nationalarchives.gov.uk) (Accessed 03.10.23)

[15] Environment Agency (2007): PPG 5: Works and maintenance in or near water [online] available at: pmho1107bnkg-e-e.pdf (nationalarchives.gov.uk) (Accessed 03.10.23)

[16] Environment Agency (2010): PPG 6: Working at construction and demolition sites [online] available at: pmho0412bwfe-e-e.pdf (nationalarchives.gov.uk) (Accessed 03.10.23)

[17] Environment Agency (2011): PPG 7: Safe storage: The safe operation of refuelling facilities [online] available at: Title (nationalarchives.gov.uk) (Accessed 03.10.23)

[18] Environment Agency: PPG 18: Managing fire, water and major spillages [online] available at: EnvAgency PPG18_6pp (nationalarchives.gov.uk) (Accessed 03.10.23)

[19] Environment Agency (2011): PPG 21: Pollution Incident response planning [online] available at: [ARCHIVED CONTENT] (nationalarchives.gov.uk) (Accessed 03.10.23)

[20] NetRegs (2021): Guidance for Pollution Prevention (GPP) [Online]. Available at: Guidance for Pollution Prevention (GPP) documents | NetRegs | Environmental guidance for your business in Northern Ireland & Scotland (Accessed 03.10.23)

[21] NetRegs (2020) *GPP1: Understanding your environmental responsibilities – good environmental practices* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-1-understanding-your-environmental-responsibilities-good-environmental-practices/ (Accessed 03.10.23)

[22] SEPA et al (2018): GPP 2: Above ground oil storage tanks [online] available at: guidance-for-pollution-prevention-2-2022-update.pdf (netregs.org.uk) (Accessed 03.10.23)

[23] SEPA et al (2021): GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul water [online] available at: guidance-for-pollution-prevention-4-2022-update.pdf (netregs.org.uk) (Accessed 03.10.23)

[24] SEPA et al (2018): GPP 5: works and maintenance in or near water [online] available at: GPP 5: Works and maintenance in or near water | NetRegs | Environmental guidance for your business in Northern Ireland & Scotland (Accessed 03.10.23)

[25] SEPA et al (2021): GPP 13: vehicle washing and cleaning [online] available at: guidance-for-pollution-prevention-13-2022-update-v2.pdf (netregs.org.uk) (Accessed 03.10.23)

[26] SEPA et al (2021): GPP 21: Pollution incident response planning [online[available at: gpp-21-final.pdf (netregs.org.uk) (Accessed 03.10.23)

[27] SEPA et al (2021): GPP 26: safe storage – drums and intermediate bulk containers [online] available at: guidance-for-pollution-prevention-26-2022-updated.pdf (netregs.org.uk) Accessed (03.10.23)

- Storage of fuels, oils and chemicals will be in appropriately bunded static tanks within the site of the relative works. This storage will be in compliance with the respective Control of Substances Hazardous to Health (COSHH)[28] assessments; and
- Refuelling will take place within dedicated refuelling areas within the site. Where applicable, fuel systems will have automatic shut-off pistol grip nozzles.

Oil and fuel storage containers will meet the following requirements:

- Bunded to at least 110% of the volume stored;
- Associated pipework to be stored within the bund;
- Located at least 10 m from any existing surface water drainage systems;
- Mobile bowsers will be locked when not in use;
- Mobile bowsers will be double-bunded;
- Using appropriate measures e.g. drip trays when refuelling at all locations and providing spill kits with these at all working areas; and
- If required, construction plant will only be washed in designated areas.

4.6.1 Water Quality Monitoring

A surface water monitoring programme will be established prior to the construction phase of the Development. An indicative monitoring programme is set out below.

Visual inspections of any drainage or nearby surface watercourses will be regularly carried out by the ECoW, especially during major excavation works. This will allow rapid identification of changes to water quantity or water quality that could indicate construction related impacts are occurring. Potential impacts will then be investigated and remedial action taken to prevent further impacts, if necessary.

To supplement the visual inspections, it is anticipated that there would be a number of surface water monitoring points for extractive sampling and analysis. Details will be agreed with the SEPA prior to construction.

The following sampling frequency is proposed in order to establish baseline hydro-chemical conditions of surface water constituents:

- Once every month for 12 months prior to the construction phase.

The following sampling frequencies are proposed in order to monitor surface water conditions against baseline conditions:

- Once a month in-situ monitoring and sampling throughout the duration of the construction phase; and
- Once a month in-situ monitoring and sampling for 3 months post construction.

Establishing baseline conditions for surface waters will enable any trends in levels of critical parameters to be assessed and deviations from the norm identified and rectified through water management measures.

4.6.2 Pollution Incident Procedure

Measures have been taken in the design to prevent pollution incidents, such as the use of a sump at each transformer bund within the substation. The purpose of the sump is to collect any oily water and divert it through a separate drainage system where the oil will be separated from the water before the water is discharged into the Site water drainage, soakaway or to surface water. In the event of an incident resulting in pollution, e.g. spillage of fuel or other chemicals, the following additional responses will be made:

[28] Health and Safety Executive: Control Of Substances Hazardous to Health (COSHH) [online] Available at: Control of Substances Hazardous to Health (COSHH) - COSHH (hse.gov.uk) (Accessed 03.10.23)

- All incidents will be immediately reported to the Site Manager and Health and Safety (H&S) Manager and logged;
- Appropriate spill kits will be available at all times and employed during any such instances in order to try and limit and contain the affected area; and
- Compliance with the Emergency Response Procedures, detailed further in Section 4.7.

The SEPA's guidance on pollution prevention encourages the reporting of all spillages, particularly under the following circumstances:

- Incidents that the operator cannot deal with, or does not know how to deal with;
- Spills that reach surface water drains or flow into the ground;
- Spills that run over hard surfaces and leave the site or run into surface waters; and
- Fires where the fire service has been called out.

If any of these criteria are met, the pollution incident will be reported to the SEPA as soon as possible.

The excavation of turbine foundations, access tracks and other infrastructure elements has the potential to have a direct impact upon geological features.

A range of mitigation measures exist to reduce the impacts on underlying geology and aquifer. This includes measures for avoiding the likelihood of spills and leakages, such as:

- The implementation of properly designed shoring systems to avoid unstable excavations;
- The removal of superficial deposits should be minimised wherever possible;
- Limiting of refuelling activities to designated, impermeably surfaced areas and use drip traps where possible;
- Checking and maintain equipment regularly to ensure that leakages do not occur; and
- Ensuring site inductions are completed for all staff including the Principal Contractor and sub-contractors; include the above procedures and the locations of spill kits.

4.7 Emergency Response Procedures

Emergency Response Procedures will be contained within the Construction Phase Plan (CPP) written by the Principal Contractor. This includes evacuation procedures, emergency access and egress, muster points, location of first aid facilities and a list of emergency contact telephone numbers for key personnel and emergency services. Emergency arrangements will be documented on all site notice boards, and would include details of:

- A map with route to nearest medical facilities (Mid Argyll Community Hospital and Integrated Care Centre, Lochgilphead);
- Emergency contact number (Police, Fire and Rescue and Ambulance);
- On-site team contacts;
- Incident Notification;
- First Aid Arrangements;
- Fire Emergency Arrangements;
- Environmental Incidents; and
- Security Arrangements.

All personnel will be made aware of and required to follow Site Emergency Protocols. This will form part of their induction process.

Should an incident involving injury or damage to vehicles or plant take place, the Site should be left undisturbed as far as is reasonably practicable (in accordance with personal health and safety). Where it is necessary to move equipment, materials or people to prevent or reduce environmental impact, photographs will be taken, wherever reasonably practicable (in accordance with personal health and safety), to allow easy reconstruction of the incident layout for any required investigative purposes. Both the Principal Contractor and Employer will be immediately notified of any incidents and contact will be made with the relevant emergency services, if required. Section 4.6.2 of this document details pollution prevention measures that will be followed in the event of an environmental incident.

Consultation with the Scottish Fire & Rescue Service (SFRS) will be sought by the Applicant to develop an adequate emergency response in the event of a fire. The Applicant will provide the fire services with all of the necessary information and will provide updates during operation as required.

4.8 Site Inspections

Environmental site inspections will be undertaken by the Contractor's Onsite Environmental and Consents Manager supported by the wider site team. In addition, throughout construction at a frequency to be agreed as appropriate to the construction activity underway at the time, inspections and audits will be carried out by the Employer's Environmental Manager. Health and Safety inspections will be undertaken by the Employer's H&S Manager.

The results of these inspections will be fed back to both the Principal Contractor and the Employer. Evidence of good practices are highlighted and where issues are identified, remedial actions will be put in place.

4.9 Fire Prevention and Control

The office and welfare facilities associated with the Site will have in place appropriate plans and management controls to prevent fires in line with the Joint Code of Practice on the Protection from Fire on Construction Sites (9th ed.)[29]. A response plan, in the event of a fire breaking out, will be explained to personnel during site inductions. The Plan will be prepared by the Principal Contractor and will be specific to the Works being undertaken.

4.10 Ecological Clerk of Works (ECoW)

There is a requirement for an ECoW to be appointed for certain periods of times in areas of sensitivity from commencement of construction to final commissioning of the Development, or end of the construction period, whichever is the latter. The scope of the work of the ECoW shall include, but not be limited to:

- Monitoring compliance with the ecological mitigation works – including measures for the protection of water vole, nesting birds, bats, badger, invertebrates and common amphibians, plus mitigation measures for reptiles following the detailed presence/absence surveys;
- Providing advice on adequate protection of nature conservation interests on-site;
- Providing contractor tool-box briefings about legally protected species and their habitats;
- Ensuring any required protected species licences are in place and providing advice and monitoring compliance with the licence conditions;
- Ensuring visual checks on surrounding watercourses are carried out regularly to identify possible construction impacts;
- Monitoring the construction and impacts of new watercrossings; and
- To ensure sediment and chemical pollution prevention measures are employed correctly and replaced when required.

4.11 Housekeeping

A good housekeeping policy will be applied at all times. As far as reasonably practicable, the following principles will be applied:

- All working areas will be kept in a clean and tidy condition;
- Construction sites and working areas will be secured to prevent unauthorised access;
- Open fires and the burning of rubbish will be prohibited at all times;

[29] Construction Industry Publications and Fire Protection Association (1992): "Fire Prevention on Construction Sites – The joint code of practice on the Protection from Fire of Construction Sites and Buildings Undergoing Renovation – 9th Edition"

- All necessary measures will be taken to minimise the risk of fire and the Principal Contractor will comply with the requirements of the local fire authority;
- Adequate welfare facilities will be provided for site and construction staff;
- Site waste will be stored securely to prevent wind blow;
- Rubbish will be removed at frequent intervals;
- The local community (residents of the Glen) will have access to the contact details of the Site Foreman as well as an alternative Site Contact; and
- All reasonable steps will be taken to ensure mud, water and other loose material does not encroach onto the public highway, and if it does, steps will be taken to as soon as practicable address the concern.

4.12 Public Liaison, General Enquiries and Complaints

The Principal Contractor has in place a plan covering community liaison, enquiries and complaints which will be contained within the CPP. Measures that will be adopted by the Principal Contractor as part of the construction of the Works include:

- The Communications Manager will establish a system for dealing with enquiries or complaints from the public, local authorities or statutory consultees;
- Displaying an information board containing the appropriate contact names, telephone numbers and addresses for the Site contacts, as well as the helpline number at appropriate locations on the boundaries of the Site will be in place to inform the local community;
- Prior to commencing main construction activities, occupiers of premises in the vicinity of the Works will be notified by the Contractor of the nature of the works, access restrictions, and provided with contact details to which any enquiries should be directed;
- Any complaints that may arise will be logged, reported and addressed. The system will include measures to keep all relevant parties informed about the progress of complaints;
- Complaints will be investigated and where required, mitigation implemented; and
- A complaint close-out report will be provided, as appropriate. Discussions will be undertaken to agree a timescale for this.

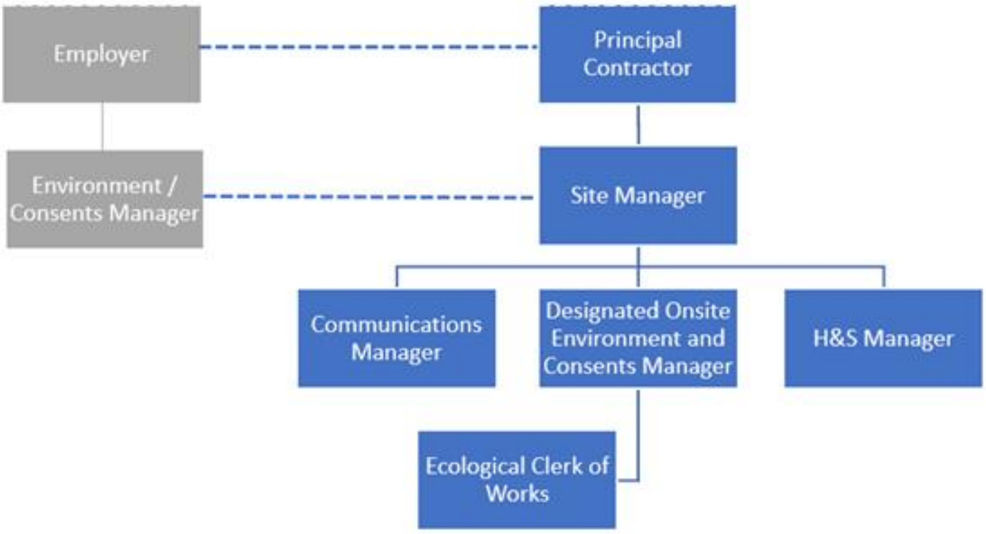
During construction, any external enquiries or complaints relating to an environmental and consents matter shall be reported to the Principal Contractor's Communications Manager, as well as the Environmental/Consents Manager, Ecological Clerk of Works (ECoW) and the H&S Manager.

The Communications Manager will then work with the on-site team to investigate, address and respond to the complaint accordingly. Environmental complaints will be recorded on the Principal Contractor's HSE system in accordance with HSE management procedures.

Records of complaints are regularly monitored by the Principal Contractor and Employer to check that an appropriate and timely response has been made, and to identify emergent trends which may require further investigation. Roles and responsibilities are defined further in Section 4.13 of this document.

4.13 Environmental Roles and Responsibilities

Environmental roles and responsibilities vary between different Stages of Projects. Information regarding roles specific to the Works can be found below.



Employer: The Employer fulfils the role of the commercial client, and as such has oversight of all construction work packages. The Employer ensures that project requirements are properly implemented, controlled and effectively documented. It is the Employer's responsibility to ensure that suitable processes and resources are in place to ensure the Principal Contractor complies with the health, safety and environmental obligations.

Principal Contractor: The Principal Contractor will lead responsibility for practical construction of the Development, including the appointment of a competent Site Manager, Health and Safety (H&S) Manager, and sub-contractors, agreeing and setting construction environmental targets with the Employer, and ensuring all activities are in compliance with the requirements of documents and management plans such as a Code of Construction Practice (CoCP) and detailed Construction Environmental Management Plan and other associated reports and appendices. This contractor will be deemed to be the Principal Contractor for the purposes of the Construction (Design and Management) Regulations 2015 (CDM Regulations)[30].

Site Manager: The Site Manager will have the overall day to day responsibility for the delivery of the Works and will oversee all operational aspects of the construction programmes.

H&S Manager: The Health and Safety (H&S) Manager role is to oversee and enforce the implementation and adherence to all relevant health & safety provisions within the site. This role will have overall responsibility for maintaining and updating H&S provisions, and be on site to advise, guide, support and promote awareness of the onsite requirements to all personnel. The H&S role will be filled by an appropriately qualified and experienced staff member of the Principal Contractor.

Environment and Consents Manager: The Employer will appoint an appropriately competent person or persons (the Environment and Consents Manager) to undertake relevant environmental tasks and supervision as detailed in this document, prior to, during and upon completion of the Works. Together with the Principal Contractor and their Designated Onsite Environment and Consents Manager and the Ecological Clerk of Works (ECoW), the Environment and Consents Manager will monitor and report CoCP and oCEMP implementation through liaison with the H&S Manager, Site Manager, and other parties as appropriate.

Designated Onsite Environment and Consents Manager: The Principal Contractor will appoint an appropriately competent person or persons (the Designated Onsite Environment and Consents Manager) to undertake relevant environmental tasks and supervision as detailed in this document,

[30] UK Government, 2015: Construction (Design & Management) Regulations 2015 [Online} Available at: The Construction (Design and Management) Regulations 2015 (legislation.gov.uk) (Accessed 03.10.23)

prior to, during and upon completion of the Works. Together with the Employer's Environment and Consents Manager, the Principal Contractor and their Ecological Clerk of Works (ECoW), the Designated Onsite Environment and Consents Manager will monitor and report CoCP and oCEMP implementation through liaison with the H&S Manager, Site Manager, and other parties as appropriate.

Ecological Clerk of Works: A suitably qualified and experienced ECoW will be appointed and will be responsible for providing advice about ecological issues and helping to ensure that the measures specified in the CEMP and Habitat Management Plan (HMP) are complied with.

Communications Manager. A Communications Manager will be appointed and will establish a system for dealing with enquiries or complaints from the public, local authorities or statutory consultees. Any complaints that may arise will be logged, reported and addressed and complaint close-out reports will be produced and submitted.

5 MANAGEMENT OF SEDIMENT AND SURFACE WATER

This section addresses the management of sediment and surface water run-off generated during the construction phase of the Development, through good practice construction techniques.

Drainage from the Site will include elements of Sustainable Drainage Systems (SuDS) design, where appropriate. SuDS replicate natural drainage patterns and have a number of benefits:

- SuDS will attenuate run-off, thus reducing peak flow and any flooding issues that might arise downstream;
- SuDS will treat run-off, which can reduce sediment and pollutant volumes in run-off before discharging back into natural drainage network; and
- In addition, any installed drainage management system, where necessary, will be implemented to avoid any surface water run-off to public roads.

The following best practice guidance should be used:

- CIRIA C648 – Control of water pollution from linear construction projects[31];
- CIRIA C352 – Control of water pollution from construction sites [32];
- CIRIA SuDS Manual (C753)[33];
- CIRIA Guidance on the construction of SuDS (C768)[34]; and
- SEPA WAT-RM-08 Regulatory Method: SuDS[35];
- SEPA WAT-SG-75 Sector-specific Guidance – Construction Sites[36]; and
- Water Assessment and Drainage Guide (WADAG)[37];

Pollution Prevention Guidelines (PPGs) and the replacement series Guidance for Pollution Prevention (GPPs) give advice on statutory responsibilities and good environmental practice. Each PPG and GPP addresses a specific industrial sector or activity. SEPA is in the process of replacing the PPGs with GPPs. The following guidance are of relevance principally to surface water, however, as surface water has the potential to affect groundwater, they are also of relevance to the management of groundwater:

[31] CIRIA (2006) *C648: Control of water pollution from linear construction projects: Technical Guidance* [online] available at: https://www.ciria.org/ProductExcerpts/C648.aspx (Accessed: 03.10.23)

[32] CIRIA (2001) *C532: Control of water pollution from construction sites: Guidance for consultants and contractors* [online] available at: https://www.ciria.org/ProductExcerpts/C532.aspx (Accessed: 03.10.23)

[33] CIRIA (2015) *C753: The SuDS Manual* [online] Available at: http://www.scotsnet.org.uk/documents/NRDG/CIRIA-report-C753-the-SuDS-manual-v6.pdf (Accessed 03.10.23)

[34] CIRIA (2017) *C768: Guidance on the construction of SuDS*

[35] SEPA (2019) *WAT-RM-08: Regulatory Method Sustainable Drainage Systems (SUDS or SUD Systems) v6.4* [online] available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 03.10.23)

[36] SEPA (2018) *WAT-SG-75 Supporting Guidance Sector Specific Guidance: Construction Sites v2* [online] Available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 03.10.23)

[37] SUDSWP (2016) *Water Assessment and Drainage Assessment Guide* [online] available at: https://www.sepa.org.uk/regulations/water/pollution-control/pollution-control-guidance/ (Accessed: 03.10.23)

- GPP1 (2020): Understanding your environmental responsibilities – good environmental practices[38];
- GPP2 (2018): Above ground oil storage tanks[39];
- GPP4: Treatment and disposal of wastewater where there is no connection to the public fowl sewer[40];
- GPP5: Works and maintenance in or near water[41];
- PPG6 (2012): Working at construction and demolition sites[42];
- GPP8 (2017): Safe storage and disposal of used oils[43];
- PPG18 (2000): Managing fire water and major spillages[44];
- GPP21 (2017): Pollution incident response planning[45]; and
- GPP22 (2018): Dealing with spills[46].

5.1 Authorisation

SUDS are a legal requirement for all developments draining to the water environment (other than a single dwelling or discharges to coastal water). All developments must comply with all conditions of the CAR Regulations General Binding Rules (GBR) including the requirement for SUDS.

Developments require authorisation for surface water run-off discharges under CAR regulations by a SEPA licence (Construction SUDS licence) for construction sites which:

- Exceed 4 hectares (ha) of area;
- Contain a road or track length in excess of 5 km; and / or
- Include any area with a slope gradient of more than 25° over 1 ha area or 500 m length.

If the development is below the threshold criteria, a licence is not required, and the development can be authorised under GBR10 and no direct consultation with SEPA is required.

SEPA WAT-RM-08 Regulatory Method: Regulatory Method Sustainable Drainage Systems (SUDS or SUD Systems) provides further details on the licence requirements.

5.2 Pre-Earthworks drainage

Pre-earthworks drainage relates to the required drainage measures to be installed prior to earthwork activities such as access track and other infrastructure construction.

Best practice pre-earthworks drainage measures include:

- Cut-off/ diversion ditches;

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38 NetRegs (2020) *GPP1: Understanding your environmental responsibilities – good environmental practices* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-1-understanding-your-environmental-responsibilities-good-environmental-practices/ (Accessed 03.10.23)

39 NetRegs (2018) *GPP2: Above ground oil storage* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-2-above-ground-oil-storage/ (Accessed 03.10.23)

40 NetRegs (2017) *GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-4-treatment-and-disposal-of-wastewater-where-there-is-no-connection-to-the-public-foul-sewer/ (Accessed 03.10.23)

41 NetRegs (2017) *GPP5: Works and maintenance in or near water* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-5-works-and-maintenance-in-or-near-water/ (Accessed: 03.10.23)

42 NetRegs (2012) *PPG6: Working at construction and demolition sites* [online] available at: https://www.netregs.org.uk/media/1672/ppg-6.pdf (Accessed 03.10.23)

43 NetRegs (2017) *GPP8: Safe storage and disposal of used oils* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-8-safe-storage-and-disposal-of-used-oils/ (Accessed 03.10.23)

44 NetRegs (N.d.) *PPG18: Managing fire water and major spillages* [online] available at: https://www.netregs.org.uk/media/1674/ppg-18.pdf (Accessed 03.10.23)

45 NetRegs (2021) *GPP21: Pollution incident response planning* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-21-pollution-incident-response-planning/ (Accessed 03.10.23)

46 NetRegs (2018) *GPP22: Dealing with spills* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-22-dealing-with-spills/ (Accessed 03.10.23)

- Temporary interception bunds;
- Swales; and
- Retention ponds.

Pre-earthwork drainage should be installed immediately prior to earthworks and construction works commencing. Final details of the pre-earthworks drainage system design will be provided by the contractor in accordance with the requirements at the specific location within the site.

The appointed contractor is to ensure appropriate drainage infrastructure is put in place. This could include for temporary interception bunds and cut-off drainage ditches ('clean water drains') being constructed on the 'high-side' boundary of the earthwork operations to prevent surface water run-off entering excavations. Run-off collected in the drainage ditches will be diverted along a channel which follows the natural gradient of the ground, avoiding steep gradients.

The profile of the ditch can vary from a 'v' shape to a 'u' shape but should have a constant uniform depth. The profile of cut-off ditches is generally a 1 in 4 slope but will depend on the soil type and stability at the Site.

If appropriate, the use of 'u'-shaped vegetated ditches is preferential, these are also known as swales. The dimensions and gradient of swales will be kept to a minimum to prevent rapid flow of water. Swales to collect runoff will be placed on the downslope of earthworks and stockpiles and will be designed to treat potentially silty runoff before discharging back into the drainage system. This may include constructing check dams within the channel and employing silt management measures. The use of retention ponds allows for additional storage capacity during heavier rainfall events.

All pre-earthworks drainage channels should be re-instated unless required for long-term drainage on the site. No exposed soils should remain, and turves should be emplaced to prevent erosion.

Where exposed soil is to be left for a long period before reinstatement or re-seeding, other measure to prevent erosion may be required:

- Geotextiles (biodegradable and non-biodegradable);
- Mulching/ binders/ hydro-seeding;
- Turf cut from other areas on site; and
- Surface roughening.

5.3 Earthworks drainage

Drainage for permanent or semi-permanent earthworks is required to control surface water run-off and discharge to appropriate outlets.

Best practice earthworks drainage measures include:

- Drainage ditches;
- Sumps; and
- Culverts.

5.3.1 Purpose / Aim

To manage surface water run-off from earthworks and manage and allow for continuity of the natural drainage of surface water and groundwater from higher elevations to lower.

5.3.2 Pre-Installation

Prior to temporary access track and earthwork construction, site operatives will identify flush areas, depressions or zones which may concentrate water flow so that site drainage design will maintain hydrological connectivity. Detailed site drainage design will be produced in advance of construction.

5.3.3 Installation

All earthworks will have a gravity drainage system and all water will drain to an adequately sized sump. If dewatering of excavations is necessary, wastewater will be treated using the aggregate sub-base, further details are provided in Appendix A: Outline Site Waste Management Plan.

Trackside drainage ditches are to be constructed parallel to the access tracks and follow the same gradient as the access tracks. To allow for continuity of surface and ground water flow from the high-side of the track to low-side, culverts are required to be built crossing the track at appropriate intervals, as shown in Plate 5.1 to peak river flow plus a climate change allowance of 59% in the Argyll catchment in accordance with SEPA climate change allowances for flood risk guidance[47]. Further details of culvert design are provided in Section 5.9.4.

Plate 5.1: Example of a trackside drainage ditch and cross-drainage culvert

Permanent check dams can also be installed to slow the flow of water in ditches with steeper gradients and straightened channels to prevent erosion of channels. Water within channels should be allowed to flow and should not be stagnant, and tracks should be free from standing water through inclusion of camber or cross-fall. Track surface cross-drains can be installed on tracks with long gradients and limited camber and should be kept free of sediment.

Sustainable drainage systems such as swales with vegetated channels are preferential and will be designed to intercept, filtrate and convey run-off. Permanent swales and drainage ditches adjacent to access tracks will have outlets at specified intervals to reduce the volume of water collected in a single channel and, therefore, reduce the potential for erosion.

Settlement lagoons should be installed at drainage ditch outlets, prior to discharge to watercourse. They should be constructed to allow for adequate attenuation of water and settlement of sediments to peak river flow plus a climate change allowance of 59% in the Argyll River Basin Region in accordance with SEPA climate change allowances for flood risk guidance. Silt mats may be used at the outfalls of settlement lagoons and retention ponds to further aid the settlement of sediment from earthworks drainage. Further details on sediment management are provided in section 5.7.

[47] SEPA (2022) *Climate change allowances for flood risk assessment in land use planning v2* (LUPS-CC1) [online] available at: climate-change-guidance.pdf (sepa.org.uk) (Accessed 03.10.23).

The use of retention ponds should allow for additional storage capacity during heavier rainfall and storm events.

5.3.4 Management of Drainage from Surplus and Loose Materials

Careful consideration will be given to the location of topsoil and subsoil storage areas for all areas of the Development during construction, in accordance with the Peat Management Plan. Storage areas will be either in a flat dry area away from watercourses, or be protected by the addition of cut off drains above the storage areas to minimise the ingress of water.

The use of soil stockpiles will be minimised by earthworks planning. However, where stockpiles are used, silt fences and silt mats will be employed to minimise sediment levels in run-off.

All stockpiled material will be stored at least 50 m from watercourses in order to reduce the potential for sediment to be transferred into the wider surface water system and will be regularly inspected to ensure that erosion of the material is not taking place. Stockpiles must be regularly monitored for holes, and they should also be fenced to ensure that they do not attract badger activity.

An example of a stockpile / overburden and the installation of drainage ditch to divert run-off from the stockpile material is shown in Plate 5.2.

Plate 5.2: Example stockpile and drainage ditch (under construction)

5.4 Discharge of water

Discharge of water from the Site will follow the methods outlined within Chapter 10: Hydrology of the EIAR. This section considers the discharge of surface water drainage to the water environment and does not consider foul drainage from welfare facilities.

5.5 Provision For Storm Events

According to published mapping by SEPA[48] the Site does have several small, isolated spots where there is surface water flood risk but they are not located in the vicinity of any Site Infrastructure. The sum of areas of surface water flood risk are <1% of the total Site area and are widely distributed across the Site. Published flood data from SEPA[49] states that the Site does not lie within a designated flood risk zone from coastal or river flooding.

[48] SEPA (2022) *SEPA Flood Maps* [online] available at: SEPA Flood Maps (arcgis.com) (Accessed 03.10.23)

[49] SEPA (2023) *Flood Hazard and Flood Risk Information* [online] available at: Flood Maps | SEPA - Flood Maps | SEPA (Accessed 03.10.23)

In extreme storm events, there would be elevated levels of run-off from the hardstanding elements of the Development relative to greenfield flow rates, which has the potential to contribute to down-stream, off-site flood risk. The areas of new hardstanding, in terms of the percentage of the relevant catchments that may be affected are as follows:

- Glen Aray: 0.19 %.

In the baseline scenario, the water table is not at the ground surface, and hence some infiltration would be expected. Measures are proposed in this oCEMP that would limit runoff rates in Section 5.7.

Temporary storage volume for storm runoff from the turbine foundations and crane hardstanding areas would be provided via settlement lagoons, further details of which are provided in Section 5.7.4.

During flood events the welfare facility will be utilised as a point of refuge should excavation of the Site not be feasible.

The Development will have a remote shut down system to allow electrical infrastructure to be isolated during times of flooding with staff having to attend the Site.

5.6 Foul Drainage

This is described in Appendix A: Outline Site Waste Management Plan.

5.7 Sediment pollution prevention

Mitigation measures should minimise mobilisation and release of sediments to the water environment. Water polluted by sediments are not allowed to leave the site untreated and the final discharge from the site must have acceptable levels of sediment (in line with baseline levels).

The contractor will work under a wet weather working policy during construction. Works that could mobilise sediments and impact the water environment would be stopped during heavy precipitation events.

5.7.1 Silt Traps and Silt Matting

Silt traps may be utilised to trap and filter sediment-laden run-off from excavation works at the Site, including foundations for the sub-station, temporary construction compounds and temporary access tracks.

Silt traps and matting are to be installed at the following locations:

- Within drainage ditches but will be sited to avoid slopes with a gradient greater than 1 in 20;
- At the inlet (sump) or outlet side of culverts; and
- At the outfall of settlement lagoons to filter sediment during times of heavy rainfall as shown in Plate 5.3.

Plate 5.3: Example silt matting (combined with silt fencing)

The silt traps and silt matting will be monitored by the ECoW and should be cleared regularly and replaced when necessary.

5.7.2 Silt Fencing

Silt fences are a semi-permeable geotextile fabric arranged in the form of a fence (attached to timber posts) as shown in Plate 5.4.

Silt fences are to be used as perimeter controls on the site at the downslope end of earthworks or disturbed soils. They should be used in conjunction with other sediment and water treatment solutions where required.

To comply with best practice, they should be installed as follows:

- Installed perpendicular to the gradient of the slope;
- Construct a trench on the up-gradient side;
- Install stakes on the down-gradient side; and
- Position with a curve to the end of the fence in the up-gradient direction to help capture surface run-off as shown in Plate 5.4.

Silt fences should not be installed in the following:

- Within drainage ditches or channels; and / or
- Running parallel to the direction of slope.

Plate 5.4: Typical Silt Fencing

Silt fencing will be monitored by the ECoW and should be cleared regularly of sediment and silt build-up, and after heavy rainfall and storm events. Silt fencing will should be replaced, when necessary, as monitored by the ECoW.

5.7.3 Check Dams

Check dams will be utilised to facilitate the settlement of suspended solids by slowing the flow of water within the drainage ditches. Appropriately sized stone pitching will be used and installed at regular intervals within ditches, as shown in Plate 5.5.

Plate 5.5: Check dam example

5.7.4 Settlement Lagoons

Settlement lagoons allow for contaminated water to be retained to allow for the settlement of silt and sediments to an acceptable level prior to discharge to the water environment. They will be implemented where appropriate and take the form of large trenches dug into the ground and are often bunded, as shown in Plate 5.6.

To avoid harm to wildlife, strong, badger-proof, fencing must be used around any lagoons to prevent animals from entering and drowning.

Plate 5.6: Settlement Lagoon Series

Settlement lagoons should be installed so as to retain water long enough for silt to settle out. The length of time required will depend on the type of silt with finer silts and clays taking longer to settle.

Further measures may include the use of flocculent to further facilitate the settlement of suspended solids. The appropriateness of flocculent use must be discussed with the SEPA prior to its introduction into settlement lagoons. Flocculants can be pollutants if the incorrect dosage is used. Further guidance on the required dimension of settlement lagoons is provided in GPP5: Works and maintenance in or near water[50].

To comply with best practice, they should be installed as follows:

- Install energy dissipation methods (e.g. rip-rap) at the inlet to minimise flow;
- Install inlet pipe work vertically to dissipate energy of flow in;
- Install a lined inlet chamber and outlet weir with materials such as geotextiles;
- Install a long outlet weir; and
- Install two or three lagoons in a series to increase silt retention and storage as shown in Plate 5.6.

[50] SEPA (2018) *GPP5: works and maintenance in or near water* [online] available at: https://www.netregs.org.uk/environmental-topics/guidance-for-pollution-prevention-gpp-documents/gpp-5-works-and-maintenance-in-or-near-water/ (Accessed 03.10.23)

Settlement lagoons should be inspected regularly by the ECoW to ascertain the functionality of the system. Settlement lagoon outflow discharge may be pumped, when required, for maintenance purposes. A 'Siltbuster' is a method of pumping excess silt-laden water and treated prior to discharge. Any pumping activities will be supervised and authorised by the Contractor's Project Manager.

5.8 Chemical pollution prevention

5.8.1 Storage of Chemicals and Oil

Potentially contaminating chemicals stored on site will be kept within a secure bunded area to prevent any accidental spills from affecting hydrological resources. The bunded area will be within the construction compound and will be underlain by an impermeable ground membrane layer to reduce the potential pathways for contaminants to enter watercourses and groundwater.

Oil storage areas will be covered in order to prevent rainwater collecting within the bunded area.

The chemicals storage area would be kept secure to prevent theft or vandalism. A safe system for accessing the storage area would be implemented by the Construction Contractor.

The following measures should be employed under best practice guidance for storage of chemicals and oils:

- Storage tanks (above or below ground) should have sufficient strength and structural integrity to hold without leak or burst and bunded in accordance with guidance;
- Storage containers should have a minimum design life of 20 years; and
- All storage containers are closed and locked when not in use.

Once construction has been completed chemical storage areas are to be removed from Site as part of site demobilisation.

Any remaining in-situ storage facilities required for the operational phase shall be appropriately maintained and monitored for degradation and release of oils or chemicals.

5.8.2 Spillage of Chemicals and Oil

The construction compound will have a bunded area and this area will be underlain by an impermeable ground membrane layer. The bund will have a capacity of 110% of the stored liquid containers (including fresh concrete). This will reduce the potential for accidental spillages to contaminate surface water or groundwater.

Best practice guidance on the prevention of spillages of chemical outlines the following measures:

- Areas where transfer and handling of chemicals is to occur should have impermeable surface;
- Drainage systems onsite should be designed to enable the containment of spillages and appropriate disposal and treatment;
- Emergency procedures are implemented for a spillage incident and leak detection measures (if appropriate);
- Regular maintenance and inspection of chemical storage facilities to be conducted (may be carried out by onsite ECoW); and
- Provision and training in the use of spill kits, as outlined below.

Appropriately sized spill kit(s) will be provided, maintained and located at strategic points across the Site, as shown in Plate 5.7. It is also recommended that all vehicles on-site have spill kits in the event of a spillage from a vehicle. This will contain materials, such as absorbent granules and pads, absorbent booms and collection bags. These are designed to halt the spread of spillages and will be deployed, as necessary, should a spillage occur elsewhere within the construction compound.

Plate 5.7: Example Spill Kit Provision on Site

5.8.3 Concrete, Cement and Grout

Concrete, cement and grouts which are to be stored or transported on site will be subject to the same requirements as outlined in Section 5.8.1.

To comply with best practice, concrete, cement and grout mixing and washing areas should:

- Be sited in an impermeable hardstanding or geotextile within a designated area;
- Be sited at least 10 m from any watercourse or surface water drain, rock outcrop or sinkhole;
- Install settlement and re-circulation systems for water re-use in the batching process to minimise water use, treatment requirements and risk of pollution;
- Designated and contained washing areas for batching plant and vehicles; and
- Collect contaminated wash waters which cannot be reused and discharge to foul sewer or tanker off-site. Contaminated water should never be released to the water environment.

To prevent pollution, it is important that all concrete pours are planned and that specific procedures are adopted where there may be a risk of surface water or groundwater contamination, in accordance with CIRIA C532[51]. These procedures will include:

- Ensuring that all excavations are sufficiently dewatered before concrete pours begin and that dewatering continues while the concrete cures. However, construction good practice will be followed to ensure that fresh concrete is isolated from the dewatering system; and
- Ensuring that covers are available for freshly placed concrete to avoid the surface of the concrete washing away during heavy precipitation.

5.9 Activities Within the Water Environment

Construction phase works within the water environment include the construction of temporary and permanent watercourse crossings.

[51] CIRIA (2001) *Control of water pollution from construction sites. Guidance for consultants and contractors (C532)*

5.9.1 Authorisation

Engineering activities within the water environment, including construction of watercourse crossings, culverting, diversions and dewatering requires authorisation under the Controlled Activities Regulations (CAR).

5.9.2 Watercourse Diversions

Temporary watercourse diversions may be required for construction works to be conducted on the banks of a watercourse, within wetlands or a watercourse channel. The requirement for this should be avoided and designed out where possible.

Where required, watercourse diversions are to be installed in line with best practice guidance. The following Scottish guidance should be followed:

- SEPA WAT-SG-29: Temporary Construction Methods[52].

Isolation of a watercourse to allow works may be in the following good practice methods:

- Partial isolation (cofferdam);
- Partial isolation (caisson);
- Full isolation (temporary diversion);
- Full isolation (gravity/flume pipe); or
- Full isolation (over-pumping/siphon).

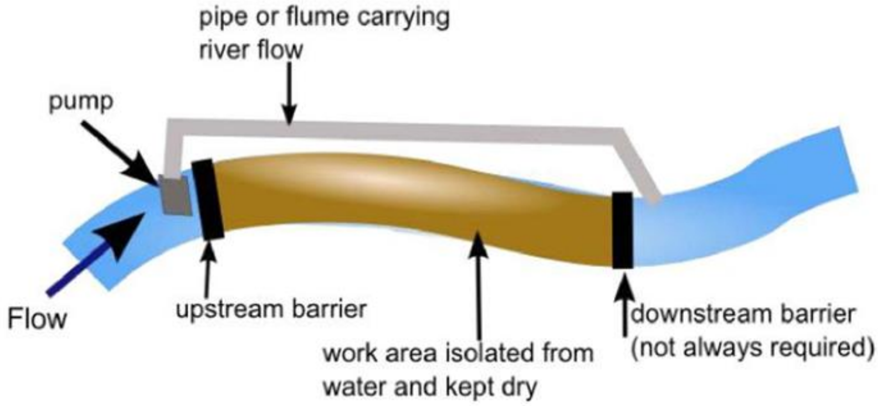
Over pumping/siphon allows for a whole section of the channel to be isolated, and water is diverted downstream using a pump or siphon in order to retain hydrological continuity. This temporary diversion may be utilised prior to establishing a long-term watercourse diversion for permanent infrastructure within watercourses.

The section of the watercourse requiring diversion will be isolated using barriers that span the full width of the existing watercourse. This keeps a stretch of the watercourse dry and the water is transferred downstream of the works area by mechanical assistance (pumping), until a long-term diversion is operational.

The pump and associated pipework need not be located in the isolated area, as shown in Plate 5.8.

[52] SEPA (2009) WAT-SG-29: *Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods First Edition* [online] available at: https://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/ (Accessed: 03.10.23)

Plate 5.8: Typical over-pumping arrangement



SEPA (2009) WAT-SG-29: *Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods First Edition*

It may be necessary to pump water from upstream of the barrier to downstream of the works area, i.e., maintain 'normal' flow in the watercourse either side of the isolated reach. Depending on the gradient of the watercourse, it may also be necessary to install a full width barrier downstream of the work area to prevent ingress of water, as shown in Plate 5.9.

Plate 5.9: Watercourse Diversion (Full isolation – over pumping)

SEPA (2009) WAT-SG-29: *Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods First Edition*

Pumps will be kept at least 10 m from the edge of the channel and on drip trays or within bunds that have a capacity 110 % of that of the fuel tank.

5.9.3 Watercourse Crossings

The crossing of watercourses has been avoided in the design where possible. Existing culverts and watercourse crossings may be upgraded and anticipated to be replaced with suitable pre-cast culvert designs.

Where required to be installed, watercourse crossings should be designed in order to minimise impacts of developments on the natural integrity and continuity of watercourses. The following best practice guidance should be used:

- Forest and Water Guidelines[53];
- SEPA WAT-SG-25 River Crossing – Good Practice Guide[54];
- SEPA WAT-PS-06-02: Culverting watercourses[55]; and
- CIRIA C786F: Culvert, screen and outfall manual[56].

5.9.3.1 Pre-installation

Identification of ecological requirements and limiting factors (e.g. breeding birds and fish spawning) should be conducted prior to installation of a watercourse crossing. The ECoW should be consulted before watercourse crossing construction can commence.

The hydraulic capacity of the crossing is to be assessed and constructed peak river flow plus a climate change allowance of 59% in Argyll.

Watercourse crossings should not be installed in 'active' areas of a watercourse e.g. meandering bends and depositional areas.

Consideration should be given to the type of watercourse crossing acknowledging that hard engineering structures, such as concrete culverts, can make it more difficult to restore a site or remove temporary structures e.g. access tracks. Bottomless arched culverts will be used for the small-scale crossings. Further details on the type of culvert to use is provided in Section 5.9.4.

The requirement for access tracks was minimised, where possible, during the design stage. The design plan will also establish a 50 m watercourse buffer for infrastructure and access tracks, where possible, aside from watercourse crossings. Where access tracks do fall within the 50 m watercourse buffer, additional measures such as additional silt traps and silt matting, discussed in Section 5.7.1, additional silt fencing, discussed in Section 5.7.2, and additional cut-off drainage ditches will be implemented. The appointed contractor is to ensure appropriate drainage infrastructure is put in place prior to construction.

5.9.3.2 Installation

The use of in-situ fresh concrete in the construction of watercourse crossings will be avoided where possible by the use of pre-cast elements. Watercourse crossings will be installed perpendicular to the direction of flow.

In total, 20 new watercourse crossings are required for the Development and 10 existing watercourses may require upgrading, as shown in Figure 10.4 within Chapter 10: Hydrology of the EIAR submission. It is anticipated that ready-made bottomless arched concrete or plastic culverts watercourse crossings are to be installed on site. However, in accordance with best practice guidance, each watercourse crossing shall be designed on a case-by-case basis to be appropriate for the width of watercourse being crossed, and the prevailing ecological and hydrological situation

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[53] Forestry Commission (2011) *Forest and Water Guidelines, 5th Edition,* Forestry Commission [online] available at: Scottish Forestry - Protecting and managing water in forests (Accessed: 03.10.23).

[54] SEPA (2010) *WAT-SG-25 Engineering in the water environment: good practice guide. River Crossings.* [online] available at: https://www.sepa.org.uk/media/151036/wat-sg-25.pdf (Accessed: 03.10.23).

[55] SEPA (2015) *WAT-PS-06-02: Culverting of Water courses - Position Statement and Supporting Guidance* [online] available at: https://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/ (Accessed: 03.10.23).

[56] CIRIA (2010) (2019) *Culvert, screen and outfall manual (C786F)* [online] available at: https://www.ciria.org/ItemDetail?iProductCode=C786F&Category=FREEPUBS (Accessed: 03.10.23)

(i.e. the sensitivity of the watercourse). A number of factors, both environmental and engineering will influence the selection of structure type and the design of the crossing.

All watercourse crossings should be installed in line with SEPA WAT-SG-25 River Crossing good practice guide. General good practice in watercourse crossing design and construction will ensure that site conditions are taken into account and the objectives of The Water Environment (Controlled Activities) (Scotland) Regulations 2011[57] (CAR) are achieved. These include:

- The use of appropriate structures to carry access tracks across watercourses taking into account the scale of the watercourse, ecological value, sensitivity to construction activities, topography and construction methodology;
- There is a preference to avoid construction in watercourses altogether through the use of arch culverts appropriately designed not to impede the flow of water and allow safe passage for wildlife, such as fish, water voles, otters etc;
- When installing culverts, care will be taken to ensure that the construction does not pose a permanent obstruction to migrating species of fish, or riparian mammals (i.e. the crossings will make provision for fish and wildlife migration);
- Culverts should be sized so that they do not interfere with the bed of the stream post construction, (i.e. the crossings will leave the watercourse in as natural condition as possible or permit re-establishment of substrate post construction);
- Single culverts will be used in preference to a series of smaller culverts that may be more likely to become blocked with flotsam and create erosion (i.e. the crossings will not constrict the channel);
- To minimise impacts on the breeding of any fish found, no instream works will occur between October and the end of May on any watercourse containing suitable fish spawning substrates within the vicinity of any watercourse crossing locations without further survey and assessment by the ECoW in advance of works;
- Ease and speed of construction are important to minimise disruption to the watercourse and surrounding habitat;
- Culverts and headwalls should be designed to last the operational life of the Development;
- Designs should be low maintenance and where possible self-cleansing; and
- Structures should be visually in keeping with the surroundings.

5.9.3.3 Maintenance

Erosion to the bed and banks at a watercourse crossing as a result of scouring during high rainfall and storm events. Erosion can expose span structure foundations and/ or cause a drop forming at the outlet of the watercourse crossing.

If this occurs, the inclusion of erosion protection measures may be required, such as baffles. The crossing should be reinstated and reinforced to allow for scour during higher flows. The crossing should be reinstated to allow for fish passage and continuity of the watercourse bed. If this is not possible, inclusion of a fish pass may be required.

If maintenance works are required within the watercourse bed, then isolation of the watercourse is required, as detailed in Section 5.9.2, and authorisation from SEPA may be required.

Culverts are prone to blockage by debris and may require routine clearing.

5.9.4 Culverts

Culverts are used to create artificial channels and allow for the continuity of water drainage and balance upstream and downstream of infrastructure associated with the Development e.g., access tracks.

[57] Scottish Government (2022) *The Water Environment (Controlled Activities) (Scotland) Regulations 2011* [online] available at: https://www.legislation.gov.uk/ssi/2011/209/contents/made (Accessed 03.10.23)

Closed culverts are sufficient for cross-drainage under an onsite access track, as outlined in Section 5.3.

Bottomless arch culverts should be used for all culverts over watercourses.

Culverts will be installed and designed in line with best practice guidance, including CIRIA C786F[58], and incorporate the following criteria:

- Culverts will be well bedded to avoid settlement and protected by an adequate cover of road material;
- The substrate and side/ head walls will be reinforced in order to prevent erosion;
- The culverts will be designed such that it does not cause a barrier to movement of fish or other aquatic fauna;
- Culvert floors will have the same gradient (not exceeding a slope of 3 %) and level, and carry similar bed material and flow, as the original stream;
- There shall be no hydraulic drop at the culvert inlet or outlet;
- The width of the culvert will be greater than the active channel width of the watercourse;
- The culvert must not exacerbate or create flooding;
- Culverts will be used to conduct water under the wind farm tracks;
- Any fences or screens fitted on the inlet or outlet of the culvert will be designed to allow at least 230 mm of space between the bars of the screen of fence, up to the high-water level;
- A natural stone headwall will be provided upstream and downstream of culverts to protect the road embankment. Further protection will be provided to the banks using soft engineering techniques as much as possible; and
- Where there is risk of bed erosion upstream or downstream of culverts, natural stone rip-rap will be provided.

5.9.5 Dewatering

Dewatering may be required for excavations or construction of foundations. The following best practice guidance should be followed during dewatering activities:

- SEPA WAT-SG-29: Temporary Construction Methods[59];
- SEPA Good Practice Guide WAT-SG-28: Intakes and Outfalls[60]; and
- SEPA Regulatory Method WAT-RM-11: Licensing Groundwater Abstractions including Dewatering[61].

Discharge of water as a result of dewatering must not cause further erosion and energy dissipation measures should be put in place as outlined in SEPA WAT-SG-28 guidance.

Dewatering must consider the impact on other groundwater abstractions and groundwater dependent terrestrial ecosystems (GWDTE). Further information on the protection of GWDTE are provided in Section 5.10.

Settlement lagoons may also be constructed with a composting layer also allow for the treatment of any ochre water before being discharged into the hydrological system. A schematic diagram is displayed below:

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[58] CIRIA (2019) *Culvert, screen and outfall manual (C786F)* [online] available at: https://www.ciria.org/ItemDetail?iProductCode=C786F&Category=FREEPUBS (Accessed: 03.10.23)

[59] SEPA (2009) *WAT-SG-29: Engineering in the Water Environment Good Practice Guide: Temporary Construction Methods* [online] available at: https://www.sepa.org.uk/media/150997/wat_sg_29.pdf (Accessed: 03.10.23)

[60] SEPA (2019) *WAT-SG-28: Engineering in the Water Environment Good Practice Guide: Intakes and outfalls Second Edition* [online] available at: https://www.sepa.org.uk/media/150984/wat_sg_28.pdf (Accessed: 03.10.23)

[61] SEPA (2017) *WAT-RM-11: Regulatory Method: Licensing Groundwater Abstractions including Dewatering* [online] available at: https://www.sepa.org.uk/media/151997/wat-rm-11.pdf (Accessed: 03.10.23)

Plate 5.10: Settlement Lagoon

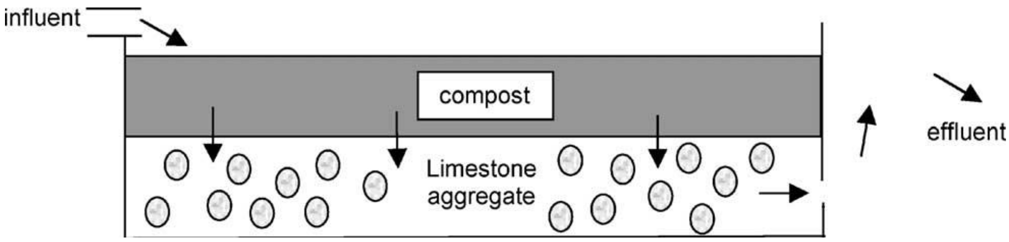

Diagram taken from Johnson & Hallberg 2005[62].

5.9.6 Surface water abstraction

If concrete batching on-site is determined to be necessary using water extracted from the nearby hydrological network, a surface water abstraction license must be obtained from SEPA with the abstraction parameters detailed in the following SEPA CAR guidance:

- SEPA Water Environment (Controlled Activities) (Scotland) Regulations[63].

Abstractions can be applied for under Form D 'Abstraction and Impoundment Activities' of the SEPA CAR guidance and should detail:

- Volume of water abstractions
  - Between 10m^3/day and 50m^3/day – 'registration abstraction activities'
  - Between 50 m^3/day and 2000 m^3/day – 'simple license abstraction activities'
  - Greater than 2000 m^3/day – 'complex license abstraction activities'
- Number of water abstractions

5.10 Measures to Protect Groundwater Dependent Terrestrial Ecosystems (GWDTE)

During the NVC survey, several communities were determined to have a Moderate groundwater dependency according to UKTAG guidance. Communities of U2b/M6c and M6c were found throughout the Site and a conservative approach was taken to assess all potential GWDTE communities. These communities have been found within the proposed infrastructure footprint which will result in direct loss of GWDTE communities. Additionally some communities are subject to indirect impacts. In a worst case scenario, this would affect the integrity of GWDTEs although they will still be functional.

Foundations and linear infrastructure such as roads, tracks and trenches can disrupt groundwater flow. If carried out in close proximity to GWDTE, construction activities can have adverse impacts on these receptors.

Measures to protect GWDTE are based on mitigation and good practice, similar to those outlined already in this document, as well as avoidance of GWDTE habitats during design. The following guidance document(s) are used to inform protection of GWDTE habitats:

- SEPA LUPS-GU-31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems[64].

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[62] Johnson & Hallberg 2005. "*Acid mine drainage remediation options: a review*" [online] available at: https://www.sciencedirect.com/science/article/abs/pii/S0048969704006199 (Accessed 03.10.23).

[63] SEPA (2011*) Water Environment (Controlled Activities) (Scotland) Regulations 2011* [online] available at: https://www.sepa.org.uk/media/34540/car_licence_applicant_guide.pdf (Accessed: 03.10.23).

[64] SEPA (2017) *Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (LUPS-GU-31)* [online] available at: lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions.pdf (sepa.org.uk) (Accessed: 03.10.23)

The following measures will ensure that water quality and the flow supply of groundwater and near-surface water are maintained during the construction and operational phase of the Development.

Key measures include:

- Silt traps may be deployed to trap and filter sediment-laden run-off throughout the construction phase of the Development;
- Settlement lagoons may be constructed and actively managed to control water levels and ensure that any runoff is contained, especially during times of rainfall. The location and management of the settlement lagoons is essential and will not be sited within vulnerable wetland areas where they may cause drying out and direct loss of habitat;
- Flush areas, depressions or zones which may concentrate water flow, will be identified in advance of construction and a suitable drainage design shall be developed to address each location, to ensure hydraulic connectivity;
- Site drainage design will avoid any severance of saturated areas to ensure hydrological connectivity is maintained. Site drainage design will be produced in advance of construction;
- The length of time excavations are kept open and the duration of any dewatering will be minimised;
- All excavations will be sufficiently dewatered before concrete pours begin and that dewatering continues while the concrete cures. However, construction good practice will be followed to ensure that fresh concrete is isolated from the dewatering system; and
- Water from dewatering activities is generally treated by settlement lagoons and will be discharged onto vegetated surfaces, ensuring no net loss of water from the hydrological system. If ponding of water is observed during the discharge onto vegetated surfaces, additional measures may be employed.

The restoration and improvement in quality of existing peat habitat is discussed further as part of the outline Habitat Management Plan in Technical Appendix 8.4 of the EIAR.

6 MANAGEMENT OF SOIL AND LAND

6.1 Degradation of Soils

There is the potential for soils to be compacted and soil structure to deteriorate especially in areas where heavy materials or equipment is stored.

To minimise the risk of damage to soil structure, the following rules must be observed during all soil handling tasks:

- No trafficking of vehicles/plant or materials storage to occur outside demarcated working areas;
- No trafficking of vehicles/plant on reinstated soil (topsoil or subsoil);
- Only direct movement of soil from donor to receptor areas (no triple handling and/or ad hoc storage);
- Soil handling is to be determined based upon soil moisture content. Where practicable soil handling when soil moisture content is above the lower plastic limit (the moisture content at which soil begins to behave as a plastic material and the soil is deemed too wet to handle without causing damage to the soil structure), should be avoided;
- Where soils are wet or damp, to minimise compaction, soils should be handled using excavators rather than dozers;
- No mixing of topsoil with subsoil, or of soil with other materials;
- Soil is only to be stored in designated soil storage areas;
- All soil storage areas (stockpiles) must be planned appropriately and must have clear signage accordingly by the appropriate contractors to ensure no cross contamination occurs and ease of identification for reinstatement;
- Topsoil stockpiles should not exceed 4 m in height and subsoil stockpiles should not exceed 5 m in height. However, if the soil to be stockpiled is dry, formation of higher stockpiles may

be permissible, if required, as the soil is likely to remain dry in the core of the stockpile for the entire storage period. However, the appropriateness of higher stockpiles will need to be established on a location by location basis;
- Upon the placement of soils into stockpiles has been completed, rainfall and soil moisture conditions are of lesser importance, providing they do not lead to erosion resulting in a loss of the soil resource and potentially a change in soil composition if fine material is lost leaving a greater proportion of stones. Stockpile erosion can also result in significant environmental impacts, such as discharges of sediment laden for pathways that could be susceptible to local receptors (roads, drainage systems and surrounding land);
- Locations and footprints of each stockpile will be accurately recorded on a plan of appropriate scale by the Contractor(s). Marker posts will need to be provided in locations which have been surveyed and recorded (this should also occur if further soil surveys are required);
- Plant and machinery only work when ground or soil surface conditions enable their maximum operating efficiency (i.e. when machinery is not at risk of being bogged down or skidding causing compaction or smearing);
- All plant and machinery must always be maintained in good working condition to ensure that the soil is stripped correctly, for example to ensure that the depth of the strip can be accurately controlled, and to minimise the risk of contamination through spillages;
- The size of the earthmoving plant to be used should be tailored to the size of the area to be stripped and the space available within the working area. The use of a long reach excavator, which will minimise the need for movement across the soil surface and the use of tracked vehicles, will further reduce soil compaction;
- Given the wide spacing of exploratory locations in some area, if any critical buried concrete infrastructure is planned to be constructed as part of the project, it would be prudent to undertake targeted sampling and analysis of soil and groundwater in the location of critical infrastructure to confirm the risk associated to buried concrete attack. The process should be documented; and
- If any soil or aggregate materials are imported as part of the construction, the materials should be subject to sampling and analysis to ensure it is suitable for its intended use from an environmental risk and waste management perspective. This process should be fully documented.

6.2 Land Quality (Contamination)

No known areas of soil contamination were identified within the site during the site walkovers and desk studies. It is therefore considered that the presence of contaminated land either as designated within Part 2A of the Environmental Protection Act 1990, or which may otherwise impact the Development is very unlikely.

6.2.1 Unexpected Contamination

In the event that previously unidentified contamination is found at any time during the Works, the Principal Contractor will report it in writing immediately to the Local Planning Authority.

An investigation and risk assessment must be undertaken, and where remediation is necessary a remediation scheme must be prepared which is subject to the approval in writing of the Local Planning Authority.

Following completion of measures identified in the approved remediation scheme a verification report must be prepared, which will be subject to the approval in writing of the Local Planning Authority. Following completion of the enabling works, a report must be submitted confirming that unexpected contamination was not encountered during the development.

7 OTHER POLLUTION PREVENTION MEASURES

7.1 Vehicle Maintenance

7.1.1 Potential Hydrocarbon Contamination

During construction, machinery will be regularly maintained to reduce the likelihood of fuel or oil leaks / spillages to occur. All maintenance will be conducted on suitable absorbent spill pads to minimise the potential for groundwater and surface water pollution. All machinery will be bunded and equipped with drip pans to contain fuel spillage or equipment leakages.

Appointed refuelling personnel will be trained in the correct methods of refuelling on-site to ensure that pollution incidents are prevented. Should a spill occur, a quick response plan will be implemented to minimise the impact of spills (see Appendix B: Pollution Incident Response Plan).

Fuel delivery vehicles servicing the Site will only be allowed as far as the construction compounds. Equipment within the construction compound will be bunded to mitigate any spillage during refuelling and operations will only be permitted where they comply with the Contractor's method statement/ requirements.

Fuel pipes on plant, outlets at fuel tanks, etc., will be regularly checked and maintained to ensure that no drips or leaks to ground occur. The following precautions will also be installed on fuel delivery pipes:

- Any flexible pipe, tap or valve must be fitted with a lock where it leaves the container and be locked when not in use;
- Flexible delivery pipes must be fitted with manually operated pumps or a valve at the delivery end that closes automatically when not in use;
- The pump or valve must have a lock and be locked when not in use;
- Warning notices including "No smoking" and "Close valves when not in use" shall also be displayed; and
- Spill kits will be available within each plant/ vehicle on site and also located close to identified pollution sources or sensitive receptors (fuel storage areas, water course crossings, etc.).

Irrespective of the buffer distances to watercourses and location of refuelling points, interceptor drip trays or similar (open metal drip trays are not acceptable) will be available in accordance with standard good practice across the construction industry. Interceptor drip trays will be positioned under any stationary mobile plant to prevent oil contamination of the ground surface or water. Plant and site vehicles are to be well maintained and any vehicles leaking fluids must be repaired or removed from the Site immediately. Any servicing operations shall take place over drip trays.

7.1.2 Non-Road Mobile Machinery

Recommended mitigation measures in relation to Non-Road Mobile Machinery (NRMM) are detailed below:

- All NRMM should use fuel equivalent to ultra-low sulphur diesel (fuel meeting the specification within EN590:2013[65]);
- All NRMM should comply with the previous EU Directive Staged Emission Standards (97/68/EC, 2002/88/EC, 2004/26/EC) or new emission standards as they are introduced in the UK. Acceptable standards will be updated to the most current standard as appropriate;
- All NRMM should be fitted with Diesel Particulate Filters conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting);
- The on-going conformity of plant retrofitted with Diesel Particulate Filters, to a defined performance standard, should be ensured through a programme of on-site checks;

[65] British Standards (2013) BS EN 590:2013+A1:2017 Automotive fuels. Diesel. Requirements and test methods

- Implementation of energy conservation measures including instructions to throttle down or switch off idle construction equipment; switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded;
- Ensure equipment is properly maintained to ensure efficient energy consumption; and
- NRMM and plant should be well maintained. If any emissions of dark smoke occur, then the relevant machinery will stop immediately and any problem will be rectified.

7.2 Chemical Storage

Potentially contaminating chemicals stored on-site will be kept within the construction compound and will each be bunded to prevent any accidental spills from affecting hydrological resources by removing a potential pathway for contaminants to enter watercourses and groundwater.

Oil storage areas will be covered in order to prevent rainwater collecting within bunded areas.

The chemicals storage area would be kept secure to prevent theft or vandalism. A safe system for accessing the storage area would be implemented by the Contractor.

7.3 Management of Drainage from Surplus Materials

Careful consideration will be given to the location of topsoil and subsoil storage areas for all areas of the Site during construction. Storage areas will be either in a flat dry area away from existing land drains, or be protected by the addition of cut off drains above the storage areas to minimise the ingress of water.

Mineral soils will not be allowed to dry out and silt fences and mats will be employed to minimise sediment levels in run-off.

All stockpiled material will be stored at least 50 m from drainage ditches in order to reduce the potential for sediment to be transferred into the wider surface water system and will be regularly inspected to ensure that erosion of the material is not taking place.

7.4 Dust Suppression and Control

Water will be needed for dust suppression on the haul roads during periods of dry weather and the compound vehicle wash will be clean water. Clean water may be obtained from re-circulated clean or treated drainage waters.

Where required, water may be extracted from local watercourses or groundwater. In these instances, the Contractor will liaise with the EIAR beforehand to agree abstraction locations, rates and licencing requirements.

Good practice measures will be adopted during construction to control the generation and dispersion of dust such that significant impacts on neighbouring habitats will not occur. The hierarchy for mitigation will be prevention, suppression then containment.

The following mitigation measures will be implemented to control the movement of dust within the Site:

- Excavation and earthworks areas will be stripped as required in order to minimise exposed areas;
- During excavation works, drop heights from buckets will be minimised to control the fall of materials reducing dust escape;
- Completed earthworks and other exposed areas will be covered with topsoil and re-vegetated as soon as it is practical in order to stabilise surfaces;
- During stockpiling of loose materials, stockpiles shall exist for the shortest possible time;
- Material stockpiles will be low mounds without steep sides or sharp changes in shape;
- Material stockpiles will be located away from the site boundary, sensitive receptors, watercourses and surface drains;

- Material stockpiles will be sited to account for the predominant wind direction and the location of sensitive receptors;
- Water bowsers will be available on site and utilised for dust suppression during roadworks/ vehicle movements when and where required;
- Daily visual inspections will be undertaken to assess need for use of water bowsers, with increased frequency when activities with high potential to generate dust are carried out during prolonged dry or windy conditions;
- Shielding of dust-generating activities;
- Use of enclosed chutes, conveyors and covered skips;
- Covering vehicles carrying dry spoil and other wastes to prevent escape of materials;
- Cutting, grinding and sawing equipment will only be used in conjunction with suitable dust suppression techniques; and
- A wheel washing system will be sited close to the site entrance to avoid getting dust on the public road.

7.5 Installation of Underground Cabling

Underground electrical cabling will be required to import and export electricity on-site.

The installation of underground cabling could lead to sedimentation of near-surface water should the cabling be buried in trenches. Chemical pollutants and sedimentation could, therefore, have the potential to adversely affect subsurface water quality, surface water quality, and groundwater.

The position of the cable route will be marked out and the line stripped of turfs and soils and set aside for reinstatement. Ecologically sensitive areas will be avoided by construction plant and vehicles. Where practical, the cable run installation will be undertaken adjacent to and within the access track, to minimise intrusion into the surrounding areas, although it may be required to divert to the shortest possible routes locally. The siting and laying of the cables will be supervised by the ECoW(s) where possible.

Sand will be imported to the Site and will be placed around the cables as protection. Suitable duct marker tape shall be installed in the trench prior to backfilling.

The following mitigation measures will aim to minimise soil compaction:

- The position of trenches will be marked out and the line stripped of turfs and soils and set aside for reinstatement; and
- Vehicles using the track/undertaking the cable laying must be the lightest vehicle required for that job and must use either wider tires, dual tires, or tracks.

8 TRAFFIC MANAGEMENT

8.1 Overview

During construction there may be a need to alter or manage the current state of traffic operations on the Site and the surrounding areas.

8.2 Traffic

Measures to be adopted as part of the Works:

- As far as reasonably possible, deliveries should be scheduled outside of school opening and closing times;
- Drivers of all delivery vehicles to be made aware during induction of the presence of schools and other amenities within these settlements;
- Drivers to be reminded of the presence of 20mph temporary speed restrictions on the main roads outside of these schools and that a strict adherence to these speed limits is expected of all wind farm personnel;
- Delivery times will be scheduled to ensure that deliveries do not arrive in a convoy;

- Timing of the deliveries will be outlined within the CTMP to ensure construction vehicles avoid potentially congested networks at peak hours;
- Communications with local communities should be undertaken for planned activities such as turbine deliveries and concrete delivery days (if onsite batching is not possible).
- Drivers of all delivery vehicles will be made aware of the approved route to the Site and any restrictions. Drivers of HGVs and other vehicles will be made aware that only the approved route is to be used and that access from non-approved routes is prohibited;
- Prior to the commencement of construction, the Principal Contractor will install temporary construction phase signage on the approved route to Site to warn people of construction activities and associated construction vehicles. Pedestrian and road user safety will be enhanced via the installation of signage and the maintenance of sight lines;
- The Principal Contractor will develop a logistics plan highlighting the access point for the Proposed Development, loading bay, pedestrian / vehicular segregation, welfare, storage, security and material handling that would be enforced following full Development Area establishment;
- To ensure that deliveries do not arrive in a convoy, the construction material 'lay down' areas will allow for a staggered delivery schedule throughout the day, avoiding peak and unsociable hours (i.e., before 06:00 and after 22:00);
- Under no circumstances will HGVs be allowed to lay-up in surrounding roads. All personnel in the team will be in contact with each other and with Site management, who in turn will have mobile and telephone contact with the subcontractors; and
- Roads will be maintained in a clean and safe condition. A wheel washing facility would be installed on-site during the construction period in order to reduce mud and debris being deposited onto the local road network.

9 MATERIALS MANAGEMENT

9.1 General Good Practice Measures

Import, export (not anticipated) and reuse of material generated on-site will be undertaken in line with the requirements of the CL:AIRE Definition of Waste: Development Industry Code of Practice (version 2)[66].

No soils are expected to be generated that cannot be re-used on the site. Any soils that cannot be re-used will be taken off site and disposed of in line with current waste disposal guidance. Further details will be included in the detailed CEMP produced by the appointed contractor. Refer to Appendix A for the Outline Site Waste Management Plan.

Soils will be stored in accordance with the Peat Management Plan, which is to be produced by the contractor and will accord with the outline Peat Management Plan provided as Technical Appendix 11.2 of the EIAR.

9.2 Other Waste Materials

Waste such as timber, metal, general waste, etc., will be segregated on-site, and disposed of off-site in a licenced waste facility.

10 CONCLUSIONS AND RECOMMENDATIONS

The purpose of this oCEMP is to outline how the Development will avoid, minimise and/or mitigate any impacts on the environment and surrounding area. It further details appropriate soil and water management measures to control surface water run-off, drainage infrastructure and soil quality during the construction of the Development.

[66] Contaminated Land: Applications in Real Environments (2011): The Definition of Waste: Development Industry Code of Practice (Version 2)

The measures proposed in this oCEMP will ensure that any impacts on the surface and groundwater environment are minimised.

If required, this oCEMP will be adapted to meet the additional requirements of the Contractor and ECoW, to ensure that all measures implemented are effective and site-specific.

The oCEMP is considered to be a 'live' document, such that modifications can be made following additional information and advice from consultees.

APPENDIX A - OUTLINE SITE WASTE MANAGEMENT PLAN

Introduction

The aim of this Outline Site Waste Management Plan (SWMP) is to protect the environment through implementation of effective management plans which relate to the management of waste throughout the life cycle of the Development.

Prior to construction of the Development, the Contractor will update this Outline SWMP to ensure it is a suitably detailed document. The Contractor will take ownership of the Detailed SWMP and will adhere to the principles presented within it.

The Detailed SWMP is a key tool which is used to plan, implement, monitor and review waste minimisation and management during the construction and operation of the Development.

This Outline SWMP provides guidelines and details of the minimum requirements which the Contractor shall include in their detailed SWMP. The Detailed SWMP will be put in place by the appointed Contractor prior to commencement of the construction phase of the Development and will be implemented in conjunction with the Construction Environmental Management Plan (CEMP) to ensure environmental impacts on-site are reduced.

It is anticipated that all excavated materials will be utilised on-site as part of the permanent works and site restoration process resulting in no waste arising from these elements of the Development.

Any import, export (not anticipated) and reuse of material generated onsite will be undertaken in line with the requirements of the CL:AIRE Definition of Waste: Development Industry Code of Practice (version 2)[67]. As such, this Outline SWMP considers only the management of the waste arising from other imported construction materials.

The Waste Hierarchy

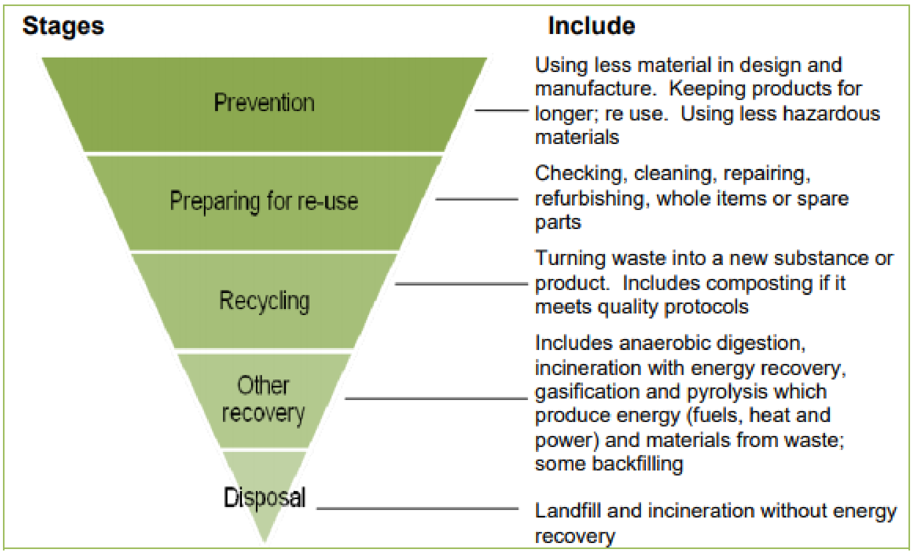
The 'Waste Hierarchy' provides an outline approach of how waste management should be assessed within the Outline SWMP, see Plate A.1. The Environmental Protection (duty of care) (Scotland) Regulations [68] place a duty on all persons who produce, keep or manage waste to apply the 'Waste Hierarchy' in order to minimise waste production at every stage of the Development.

The 'Waste Hierarchy' promotes selection of the Best Practicable Environmental Option (BPEO) and preferred option for management of waste.

[67] Contaminated Land: Applications in Real Environments (2011): The Definition of Waste: Development Industry Code of Practice (Version 2)

[68] Uk Government 2014: Environmental Protection (duty of care) (Scotland) Regulations 2014 [online] Available at: The Environmental Protection (Duty of Care) (Scotland) Regulations 2014 (legislation.gov.uk) (Accessed 03.10.23)

Plate A.1: Waste Hierarchy[69]



The core waste management principles of reduce, reuse, recycle, recover and disposal as defined in the 'Waste Hierarchy', are embedded within this Outline SWMP.

Waste Prevention

Minimisation of waste generation is achieved through careful design and creating a 'waste aware' culture on-site. All reasonable actions will be taken by the Contractor to avoid the production of and/or minimise the volume of waste produced as a result of the Development. This can be through reducing consumption, using resources efficiently, and designing for longevity.

Waste Separation for Reuse and Recycle

Where possible, the separation of waste will be carried out at the source in order to maximise opportunities for reuse and recycling. Segregation of waste will require training, monitoring and enforcement.

Waste Storage, Disposal and Transportation

All areas used for temporary storage of waste on-site will comply with Defra and EA guidelines and will be clearly signed. Waste storage facilities will be provided at source using the best environmental options available. Any hazardous or special waste will be stored in separate, secure containers and clearly identified as such.

Disposal activities will also be carried out in accordance with the EA, Pollution Prevention Guidelines (PPGs[70]) and Guidance for Pollution Prevention (GPPs[71]) in order to ensure compliance with current waste legislation.

As the Site is within Scotland, the activities will be carried out in accordance with both PPGs and GPPs to demonstrate environmental good practice.

Waste transportation will take place at regular intervals to avoid the accrual of waste. Where possible, delivery vehicles will aim to remove waste materials on return trips.

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[69] Defra (2011) Guidance on applying the Waste Hierarchy [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69403/pb13530-waste-hierarchy-guidance.pdf (Accessed 03.10.23)

[70] Environment Agency (2014): Pollution prevention guidance (PPG) [Withdrawn] Available at: https://webarchive.nationalarchives.gov.uk/20140328090931/http://www.environment-agency.gov.uk/business/topics/pollution/39083.aspx (Achieved material accessed 03.10.23)

[71] NetRegs (2021): Guidance for Pollution Prevention (GPP) [Online]. Available at: Guidance for Pollution Prevention (GPP) documents | NetRegs | Environmental guidance for your business in Northern Ireland & Scotland (Accessed 03.10.23)

Only registered waste carriers will be authorised to transport waste and a Waste Transfer Note (WTN) will be completed for each load of waste, which must contain a record of their waste carrier registration number. Copies of each WTN will be filed as an appendix to the SWMP and held for at least two years. The appropriate European Waste Catalogue (EWC) code will be established using updated Technical Guidance (WM3)[72] and will be noted on the WTN, in addition to how it is contained. All sites receiving waste must have an appropriate permit, licence or registration exemption, the details of which should also be recoded.

If required, the EA will be advised in advance of any hazardous waste movements and Waste Consignment Notes (WCNs) will be purchased in advance for this type of waste transportation. These consignment notes will be held for at least three years.

Policy Context and Legislation

As of 2013, the production and implementation of a SWMP is no longer a legal requirement, however it is regarded as best practice[73]. Policy and legislation dictate the management of waste in Scotland and the following items should be considered when developing the Site Waste Management Plan:

- The Environmental Protection Act 1990[74];
- The Environmental Protection (Duty of Care) (Scotland) Regulations 2014[75];
- The Waste Management Licensing (Scotland) Regulations 2011[76];
- The Waste (Scotland) Regulations 2012[77]; and
- The Waste Framework Directive[78].

Should any surplus waste remain which cannot be reused or recycled, then the Landfill (Scotland) Regulations 2003[79] and the Landfill Directive 1999[80] will apply.

Guidance

Several guidance documents were also used to develop the SWMP and include:

- Environment Agency, 2015, Manage Water on Land: Guidance for Land Managers[81];
- British Standards Institution, 2015, BS 5930:2015, Code of practice for ground investigations[82];
- Construction Industry Research and Information Association (CIRIA), 2015, Environmental Good Practice on Site (C741), 4th edition[83];

[72] DAERA, SEPA: Guidance on the classification and assessment of waste (1st edition, v1.2 NI) Technical Guidance WM3 [online] available at: Waste Classification - Guidance on the classification and assessment of waste (Edition 1.1) Technical Guidance WM3 (daera-ni.gov.uk) (accessed 03.10.23)

[73] IEMA (2008) Practitioner Series No. 11, Waste Management: A Guide for Business in the UK. Institute of Environmental Management and Assessment.

[74] UK Government (1990) Environmental Protection Action 1990 [Online] Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents (Accessed 03.10.23)

[75] UK Government (2014) the Environmental Protection (Duty of Care) (Scotland) Regulations 2014 [Online] Available at: http://www.legislation.gov.uk/ssi/2014/4/contents/made (Accessed 03.10.23)

[76] Scottish Government (2011) the Waste Management Licensing (Scotland) Regulations 2011 [Online] Available at: https://www.legislation.gov.uk/sdsi/2011/9780111012147/contents (Accessed 03.10.23)

[77] Scottish Government (2012) the Waste (Scotland) Regulations 2012 [Online] Available at: https://www.legislation.gov.uk/sdsi/2012/9780111016657/contents (Accessed 03.10.23)

[78] European Parliament (2008) Directive 2008/98/EC on waste (Waste Framework Directive) [Online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0098&from=EN (Accessed 03.10.23)

[79] Scottish Government (2003) the Landfill (Scotland) Regulations 2003 [Online] Available at: http://www.legislation.gov.uk/ssi/2003/235/contents/made (Accessed 03.10.23)

[80] European Council (1999) Directive 1999/31/EC [Online] Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31999L0031&from=EN (Accessed 03.10.23)

[81] Environment Agency (2015) Manage Water on Land: Guidance for Land Managers [Online] Available at: https://www.gov.uk/guidance/manage-water-on-land-guidance-for-land-managers (Accessed 03.10.23)

[82] British Standards Institution (2015) Code of practice for ground investigations - BS 5930:2015+A1:2020

[83] Construction Industry Research and Information Association (2015): Environmental Good Practice on Site (C741), 4th edition

- Pollution Prevention and Control (Scotland) Regulations 2012 (PPC 2012)[84]
- Controlled Activity Regulations (CAR) 2021[85]
- Institute of Environmental Management and Assessment (IEMA), 2008, Practitioner Vol. 11 Waste Management: a guide for businesses in the UK[86]; and
- Wrap[87].

The above guidance on waste management will be used to ensure the following objectives are met through the Outline SWMP:

- Legal obligations of the Development;
- Waste production is minimised;
- Waste is recognised as a resource;
- Project build costs are minimised;
- A framework for continuous improvement and best practice is implemented and maintained; and
- Adverse environmental impacts associated with the production and management of waste materials are minimised.

Anticipated Waste Streams

The list below provides an indication of the expected waste streams, however this list is not exhaustive and additional streams may be added as the works progress:

- Waste from welfare and domestic facilities;
- Waste chemicals, fuels and oils;
- Packaging;
- Waste metals; and
- Waste water.

Waste from Welfare and Domestic Facilities

During the construction phase, 'Porta-loo' type facilities, or equivalent, will be used and emptied by a waste contractor, therefore minimising potential impacts on drainage ditches and watercourses.

It is anticipated that presence on site during the operational phase will be infrequent. Visits will mainly be restricted to maintenance personnel and will only be for short periods of time. A cesspit will be used for foul waste during the operational phase, which will be emptied by a licenced waste contractor.

Other Domestic Refuse

Collection facilities for refuse will be provided to segregate waste. These facilities will be clearly marked, positioned in appropriate locations and protected from the weather and animals.

Waste Chemicals, Fuels and Oils

All fuel and oil will be stored within a designated area and contained by a small bund constructed from material sourced on site and lined with an impermeable membrane in order to prevent any contamination of the surrounding soils, vegetation and water table, in accordance with Defra and Environmental Agency Oil Storage Regulations for Businesses[88]. Any contaminated run-off within the bund will be disposed of at an appropriate waste management facility.

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[84] SEPA (2013) Pollution Prevention and Control [online] Available at: Pollution prevention and control | Scottish Environment Protection Agency (SEPA) (Accessed 03.10.23)

[85] SEPA (2021) Controlled Activity Regulations [online] Available at: https://www.sepa.org.uk/regulations/water/ (Accessed 03.10.23)

[86] IEMA (2008) Practitioner Series No. 11, Waste Management: A Guide for Business in the UK. Institute of Environmental Management and Assessment.

[87] Waste and Resources Action Programme (WRAP) [Online] Available at: https://wrap.org.uk/ (Accessed 03.10.23)

[88] Defra and Environmental Agency (2020) Oil Storage Regulations for Businesses [Online] Available at: https://www.gov.uk/guidance/storing-oil-at-a-home-or-business (Accessed 03.10.23)

Any used (contaminated) spill kits, absorbent granules, sheets or fibres must be disposed of in accordance with the COSHH Regulations[89] and amended workplace limits for exposure to COSHH materials[90] and in accordance with the spill management plan.

Packaging

Construction waste generated is expected to be restricted to general construction waste (e.g., off cuts of timber, timber pallets, cardboard, wire, cleaning cloths, paper, etc.) which will be sorted and either recycled or disposed of off-site to an appropriately licenced landfill by the Contractor.

Packaging will be separated at the source of generation on-site, where practical. This approach uses the Waste Hierarchy by encouraging reuse and recycling of materials, such as plastic, wood and paper.

Waste Metals

It is likely that this will be produced from excess steel (e.g., cuttings from underground cabling). Any waste metals would be recycled as appropriate.

[89] Health and Safety Executive (2002) Control of Substances Hazardous to Health 2002 (COSHH)

[90] Health and Safety Executive (2020) EH40/2005 Workplace exposure limits. Containing the list of workplace exposure limits for use with the Control of Substances Hazardous to Health Regulations 2002 (as amended)

APPENDIX B – POLLUTION INCIDENT RESPONSE PLAN

Introduction

An Incident Response Plan will be implemented throughout the construction and operation of the Development.

Prior to the commencement of construction, the lead construction contractor shall set up an emergency response plan/procedure in liaison with Scottish Environment Protection Agency (SEPA) in order to ensure that this plan is adequate for the nature and lifetime of the project and the environment in which works are being undertaken.

The Incident Response Plan will include emergency contacts who will coordinate response activities in the event of a pollution incident.

This Incident Response Plan will include an outline procedure similar to that set out below:

1. Make the situation safe: Do not compromise the health and safety of site personnel in controlling a pollution incident. Ensure that appropriate Personal Protective Equipment (PPE) is available to use where necessary.

2. Stop the source of the pollution incident: Identify the cause of the emergency or incident and act immediately to prevent further pollution.

3. Contain the pollution incident: Once the source of the pollution has been stopped, act to prevent the pollution that has already taken place from spreading. Ensure that appropriate materials are available in appropriate quantities to use where necessary. For example, absorbent materials and booms to soak up the pollution are required to deal with spillages of liquid contaminants. For example, an excavator may be used to dig containment facilities or bunds where containing large volumes of pollutants.

4. Notify the pollution incident: Any emergency or incident will be reported as soon as possible after the above initial control measures have been implemented detailing the nature, cause and location to ensure that appropriate action is taken. Where appropriate, the site team should refer the incident to a specialist clean up Contractor. Where pollution is serious, or containment has failed, it may be necessary to contact the Local Authority, the Environment Agency and/or Natural England as relevant to the incident.

5. Monitor the pollution incident: Once the pollutants are contained, the site of the pollution should be monitored on an ongoing basis until the pollutants and contaminated materials are successfully removed and if necessary, further action taken to contain the pollutants. Where it is possible that pollution has spread, the surrounding water bodies and watercourses should be inspected and monitored on an ongoing basis to identify the extents of the pollution. In the event of pollution due to sedimentation of watercourses, those watercourses should be checked during periods of high rainfall or during construction activities with the potential for significant run-off.

6. Clean up the pollution incident: Once the pollution incident has been stopped, contained and the full extents defined, a strategy for cleaning up should be developed. All waste generated by clean-up activities should be disposed of in accordance with current legislative requirements and the site waste management plan and copies of all transfer notes retained.

7. Learn from the pollution incident: Ensure that any lessons from the incident are communicated to all relevant staff and appropriate action taken elsewhere on site if necessary. Update all relevant Method Statements and Toolbox Talks, and ensure new information is communicated to site staff.

Environmental Incident Protocol

In the event of an environmental incident occurring, the following protocol (or similar) will be adopted:

The appropriate notification protocols shall be implemented immediately following a planning or environmental spillage or incident, followed by immediate notification of the Site Manager. Should a serious environmental incident occur, the EA should also be notified;

The Site Manager will investigate the incident, with inputs from specialist advice as to appropriate measures to remedy or mitigate any potential pollution arising from the incident;

Assuming the issue arose from the failure of a control system, the issue shall be rectified at the earliest opportunity;

The response action shall be recorded on the Environmental Complaints/ Spills/ Incidents Report by the Site Manager, Lead Contractor or ECoW;

A log of all environmental spills/ incidents and follow-up actions should be kept and made available for inspection; and

All complaints received from the public or other interested parties as a result of the installation works must be recorded on the Environmental Complaints/ Spills/ Incident Form.

Reporting of Environmental Incidents

All accidents, incidents and near misses (including spills, dust, noise pollution etc) will be reported to the Site Manager immediately, these will be recorded and investigated by the Site Manager and ECoW as appropriate.

Details which will be recorded on the report will include:

- A description of the incident;
- Contributory causes;
- Adverse effects;
- Measures implemented to mitigate adverse effects; and
- Effectiveness of measures implemented to prevent pollution incidents.

Emergency Contact Details

A notice displaying emergency contact details will be displayed in a prominent location within the site accommodation / office, including emergency spill response team details.

Internal Emergency Pollution Response Team

The details of at least two lead members of staff with responsibility for emergency pollution response will be included in this section, as well as the details of the Ecological Clerk of Works during construction:

- Primary emergency contact;
- Secondary emergency contact; and
- Ecological Clerk of Works.

External Organisations

This section will be populated with contact telephone numbers for organisations to be contacted following a pollution incident (contact details are specifically excluded to ensure that the final version of the oCEMP includes the most up to date details).

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Environmental Impact Assessment – Technical Appendix 12.1: Baseline Noise Survey Records

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

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Noise Survey Record Sheet

Project No.	4378	**Project Name:**	Ladyfield Wind Farm
Location (x of y)	1	**Installed By:**	MT/PB
Lat/Long	56.27082, -5.03446	**Location Name**	Maam House
Start Date	28/01/2022	**Start Time**	0930

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	510114
Calibrator:	Rion NC-74	35105087
Source of Equipment:		ERM
Meter Timestamp (Start/End, GMT/BST):		Start GMT

Description of Location:	Garden to side of house
Distance from façade::	>3.5m
Noise sources observed:	River and stream noise, birdsong, forestry work down the valley
Additional notes:	None

Installation (Visit 1)

Date:	28/01/2022	**Time:**	0930
Filename:	101	**Calibration level:**	94.0
Range setting:	20-130	**Meas. period:**	10min
Freq weighting:	A	**Rain Gauge?**	Yes
Notes:	None		

Visit 2

Date:	21/02/2022	**Time:**	1800
Visited by:	PB	**Calibration level:**	94.0
Level pre-calibration	94.1	**Batts replaced?**	Yes
Equipment Removed?			No
Notes:	Rain gauge blocked with leaves. Light rain, overcast, no wind. Stream, animals and birds audible. Calibrator 34104515.		

Visit 3

Date:	14/03/2022	**Time:**	1710
Visited by:	PB	**Calibration level:**	94.0
Level pre-calibration	94.0	**Batts replaced?**	No
Equipment Removed?			Yes
Notes:	Rain gauge blocked with leaves. Light rain, overcast, no wind. Stream, animals and birds audible. Calibrator 34104515.		

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Noise Survey Record Sheet

Project No.	4378	**Project Name:**	Ladyfield wind farm
Location (x of y)	2	**Installed By:**	MT/PB
Lat/Long	56.2852, -5.10163	**Location Name**	Drimfern
Start Date	28/01/2022	**Start Time**	1050

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	709258
Calibrator:	Rion NC-74	35105087
Source of Equipment:		ERM
Meter Timestamp (Start/End, GMT/BST):		Start GMT

Description of Location:	On gravel drive to side of property. Shielded as much as possible from river noise, no room to place kit to rear of the house.
Distance from façade::	>3.5m, soft ground slight rise next to kit, not likely to be reflective.
Noise sources observed:	River noise, birdsong, distant road noise occasionally
Additional notes:	Cool damp slight drizzle overcast

Installation (Visit 1)

Date:	28/01/2022	**Time:**	1050
Filename:	201	**Calibration level:**	94.0
Range setting:	20-130	**Meas. period:**	10min
Freq weighting:	A	**Rain Gauge?**	Yes
Notes:	Cool damp slight drizzle overcast		

Visit 2

Date:	21/02/2022	**Time:**	1400
Visited by:	PB	**Calibration level:**	94.0
Level pre-calibration	93.9	**Batts replaced?**	Yes
Equipment Removed?			No
Notes:	Moderate rain, overcast, light winds. Stream and birds audible. Calibrator 34104515		

Visit 3

Date:	14/03/2022	**Time:**	1530
Visited by:	PB	**Calibration level:**	94.0
Level pre-calibration	93.8	**Batts replaced?**	No
Equipment Removed?			Yes
Notes:	Moderate rain, overcast, light winds. Stream and birds audible. Calibrator 34104515		

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Noise Survey Record Sheet - Photos

Project No.	4378	Location (x of y)	2

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Noise Survey Record Sheet

Project No.	4378	**Project Name:**	Ladyfield Wind Farm
Location (x of y)	3	**Installed By:**	MT/PB
Lat/Long	56.29468, -5.08662	**Location Name**	Ladyfield farm
Start Date	28/10/2022	**Start Time**	1140

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	510130
Calibrator:	Rion NC-74	35105087
Source of Equipment:		ERM
Meter Timestamp (Start/End, GMT/BST):		Start GMT

Description of Location:	To rear of wooden cabin, sheltered from river and road noise, and prevailing wind. Some watercourse noise audible to east.
Distance from façade::	>3.5m
Noise sources observed:	Distant river be watercourse noise. No noticeable wind.
Additional notes:	None

Installation (Visit 1)

Date:	28/10/2022	**Time:**	1140
Filename:	301	**Calibration level:**	94.0
Range setting:	20-130	**Meas. period:**	10min
Freq weighting:	A	**Rain Gauge?**	Yes
Notes:	None		

Visit 2

Date:	21/02/2022	**Time:**	1540
Visited by:	PB	**Calibration level:**	94.0
Level pre-calibration	94.3	**Batts replaced?**	Yes
Equipment Removed?			No
Notes:	Heavy rain, mist, light winds. Rain noise predominant, stream and traffic audible . Calibrator 34104515. Residents report that equipment blew over a few times and they uprighted it		

Visit 3

Date:	14/03/2022	**Time:**	1610
Visited by:	PB	**Calibration level:**	93.8
Level pre-calibration	93.8	**Batts replaced?**	No
Equipment Removed?			Yes
Notes:	Heavy rain, mist, light winds. Rain noise predominant, stream and traffic audible . Calibrator 34104515. Residents report that equipment blew over a few times and they uprighted it		

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Noise Survey Record Sheet - Photos

Project No.	4378	Location (x of y)	3

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Noise Survey Record Sheet

Project No.	4378	**Project Name:**	Ladyfield Wind Farm
Location (x of y)	4	**Installed By:**	MT/PB
Lat/Long	56.26534, -5.08872	**Location Name**	Three bridges
Start Date	28/01/2022	**Start Time**	1240

Equipment Details	**Make/Model**	**Serial No.**
Sound Level Meter:	Rion NL-52	1276547
Calibrator:	Rion NC-74	35105087
Source of Equipment:		ERM
Meter Timestamp (Start/End, GMT/BST):		Start GMT

Description of Location:	Garden behind house, sheltered from river
Distance from façade::	>10m
Noise sources observed:	River and watercourse noise, birdsong and occasional passing cars
Additional notes:	NL-31 & NL-52 installed

Installation (Visit 1)

Date:	28/01/2022	**Time:**	1240
Filename:	401	**Calibration level:**	94.0
Range setting:	20-130	**Meas. period:**	10min
Freq weighting:	A	**Rain Gauge?**	Yes
Notes:	NL-31 & NL-52 installed		

Visit 2

Date:	21/02/2022	**Time:**	1710
Visited by:	PB	**Calibration level:**	94.0
Level pre-calibration	94.0	**Batts replaced?**	Yes
Equipment Removed?			No
Notes:	NL-52 pre-cal 93.3 dB. Clear, dry, light winds. Noise of streams, road and birds audible		

Visit 3

Date:	14/03/2022	**Time:**	1400
Visited by:	PB	**Calibration level:**	94.0
Level pre-calibration	94.4	**Batts replaced?**	No
Equipment Removed?			Yes
Notes:	Light rain, overcast, low wind. Stream, birds, traffic audible. Calibrator 34104515. NL-31 00503852 pre-cal 93.9		

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Noise Survey Record Sheet - Photos

Project No.	4378	**Location (x of y)**	4

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Environmental Impact Assessment – Technical Appendix 12.2: Details of Construction Plant

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

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TECHNICAL APPENDIX 12.2 – CONSTRUCTION TRAFFIC NOISE CALCULATIONS

The following sections present the construction noise calculation details as described in Section 12.5.1 of the EIA Report.

Table A12.2.0.1: Baseline Traffic Noise Level Calculations

Location	Annual Average Daily Traffic (ADT)	Low Flows	% HGV	Average Speed	Basic Noise Level	ΔpV	Basic Noise Level (inc HGV) L+ΔpV	distance from road edge, d (m)	Receiver height, H (m)	Slant distance, d'(m)	Distance correction, dB	Façade Correction, dB	Low flow Correction	Noise Level, corrected for 4m distance, facades and low flows, dB
A85 near Taynuilt, DfT Point ID: 80339	4,272	-	7.8	80	65.4	2.3	67.7	4.0	1.5	7.6	2.5	2.5	-	67.7
A85 near Clifton, DfT Point ID: 10845	1,586	CORRECTION	7.9	80	61.1	2.3	63.4	4.0	1.5	7.6	2.5	2.5	-1.6	61.8
A85 near Arrivain, DfT Point ID: 30775	1,826	CORRECTION	9.9	80	61.7	2.6	64.3	4.0	1.5	7.6	2.5	2.5	-1.1	63.2
A83 near Auchnabreac, DfT Point ID: 10765	2,627	CORRECTION	10.4	80	63.3	2.7	66.0	4.0	1.5	7.6	2.5	2.5	-0.3	65.7
A819 N	1,231	CORRECTION	17.3	80	60.0	3.7	63.7	4.0	1.5	7.6	2.5	2.5	-2.6	61.2
A819 S	1,322	CORRECTION	15.1	80	60.3	3.4	63.7	4.0	1.5	7.6	2.5	2.5	-2.3	61.5

Table A12.2.2: Baseline Plus Construction Traffic Noise Level Calculations – Concrete days

Location	Annual Average Daily Traffic	Low Flows	% HGV	Average Speed	Basic Noise Level	ΔpV	Basic Noise Level (inc HGV) L+ΔpV	distance from road edge, d (m)	Receiver height, H (m)	Slant distance, d'(m)	Distance correction, dB	Façade Correction, dB	Low flow Correction	Noise Level, corrected for 4m distance, facades and low flows, dB
A85 near Taynuilt, DfT Point ID: 80339	4667	-	12.9	80	65.8	3.1	68.9	4.0	1.5	7.6	2.5	2.5	-	68.9
A85 near Clifton, DfT Point ID: 10845	1981	CORRECTION	19.8	80	62.1	4.0	66.1	4.0	1.5	7.6	2.5	2.5	-0.9	65.2
A85 near Arrivain, DfT Point ID: 30775	2222	CORRECTION	20.2	80	62.6	4.1	66.6	4.0	1.5	7.6	2.5	2.5	-0.6	66.0
A83 near Auchnabreac, DfT Point ID: 10765	3022	CORRECTION	17.9	80	63.9	3.8	67.7	4.0	1.5	7.6	2.5	2.5	-0.1	67.6
A819 N	1626	CORRECTION	29.5	80	61.2	5.1	66.3	4.0	1.5	7.6	2.5	2.5	-1.5	64.8
A819 S	1717	CORRECTION	27.2	80	61.4	4.9	66.3	4.0	1.5	7.6	2.5	2.5	-1.3	65.0

Table A12.2.3: Change in Noise Level and Magnitude of Impact – Concrete Days

Location	Increase in all Vehicles	Increase in HGV only	Increase, dB	Magnitude of Impact
A85 near Taynuilt, DfT Point ID: 80339	395	267	**1.2**	**Minor**
A85 near Clifton, DfT Point ID: 10845	395	267	**3.4**	**Moderate**
A85 near Arrivain, DfT Point ID: 30775	395	267	**2.8**	**Minor**
A83 near Auchnabreac, DfT Point ID: 10765	395	267	**1.9**	**Minor**
A819 N	395	267	**3.6**	**Moderate**
A819 S	395	267	**3.5**	**Moderate**

Table A12.2.4: Baseline Plus Construction Traffic Noise Level Calculations – non-Concrete days

Location	Annual Average Daily Traffic	Low Flows	% HGV	Average Speed	Basic Noise Level	ΔpV	Basic Noise Level (inc HGV) L+ΔpV	distance from road edge, d (m)	Receiver height, H (m)	Slant distance, d'(m)	Distance correction, dB	Façade Correction, dB	Low flow Correction	Noise Level, corrected for 4m distance, facades and low flows, dB
A85 near Taynuilt, DfT Point ID: 80339	4417	-	7.9	97	65.6	3.7	69.3	4.0	1.5	7.6	2.5	2.5	-	69.3
A85 near Clifton, DfT Point ID: 10845	1731	CORRECTION	8.2	97	61.5	3.8	65.3	4.0	1.5	7.6	2.5	2.5	-1.3	64.0
A85 near Arrivain, DfT Point ID: 30775	1971	CORRECTION	10.0	97	62.0	4.1	66.1	4.0	1.5	7.6	2.5	2.5	-0.9	65.2
A83 near Auchnabreac, DfT Point ID: 10765	2772	CORRECTION	10.5	97	63.5	4.1	67.6	4.0	1.5	7.6	2.5	2.5	-0.2	67.4
A819 N	1376	CORRECTION	16.7	97	60.5	4.9	65.4	4.0	1.5	7.6	2.5	2.5	-2.1	63.3
A819 S	1467	CORRECTION	14.8	97	60.8	4.7	65.5	4.0	1.5	7.6	2.5	2.5	-1.9	63.6

Table A12.2.5: Change in Noise Level and Magnitude of Impact -non-Concrete Days

Location	Increase in all Vehicles	Increase in HGV only	Increase, dB	Magnitude of Impact
A85 near Taynuilt, DfT Point ID: 80339	145	17	**0.2**	**Negligible**
A85 near Clifton, DfT Point ID: 10845	145	17	**0.7**	**Negligible**
A85 near Arrivain, DfT Point ID: 30775	145	17	**0.6**	**Negligible**
A83 near Auchnabreac, DfT Point ID: 10765	145	17	**0.3**	**Negligible**
A819 N	145	17	**0.8**	**Negligible**
A819 S	145	17	**0.8**	**Negligible**

Environmental Impact Assessment – Technical Appendix 13.1: Abnormal Indivisible Load Route Survey

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

ERM

The business of sustainability

Pell Frischmann

Ladyfield Renewable Energy Park

Abnormal Indivisible Load Route Survey

August 2023

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RIDGE CLEAN ENERGY

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Appendices

1 Introduction

1.1 Purpose of the Report

Pell Frischmann (PF) has been commissioned by Ridge Clean Energy Ltd. (RCE) to undertake a survey of the Abnormal Indivisible Load (AIL) delivery route for wind turbine loads associated with the construction and development of Ladyfield Renewable Energy Park, located to the north of Inverary, Argyll and Bute.

The Route Survey Report (RSR) has been prepared to help inform RCE on the likely issues associated with the development of the site with regards to off-site transport and access for AIL traffic. This report is based upon a site visit and identifies the key issues associated with AIL deliveries and notes that remedial works, either in the form of physical works or as traffic management interventions will be required to accommodate the predicted loads.

The detailed assessment and subsequent designs of any remedial works are beyond the agreed scope of works between PF and RCE at this point in time.

It is the responsibility of the wind turbine supplier to ensure that the entirety of the proposed access route is suitable and meets with their satisfaction. The turbine supplier will be responsible for ensuring that the finalised proposals meet with the appropriate levels of health and safety consideration for all road users and in accordance with the relevant legislation at the time of delivery.

2 Site Background

2.1 Site Location

The development site is located to the north of Inveraray, Argyll and Bute. Figure 2-1 illustrates the general site location.

Figure 2-1: Site Location Plan

2.2 Candidate Turbine

RCE have indicated that they wish to consider the worst case components from the Vestas V136 turbine at a tip height of 150m or 180m. The details of the components are detailed in Table 2-1 and Table 2-2 below.

Table 2-1: Vestas V136 Turbine Size Summary (Tip Height 150m)

Component	Length (m)	Width (m)	Height / Min Diameter (m)	Weight (t)
Blade	66.770	4.040	3.625	15.648
Base Tower	19.640	(4.205) 4	4.000	75.000
Mid Tower	29.960	4.000	3.650	64.000
Top Tower	30.000	3.650	3.350	45.500

Table 2-2: Vestas V136 Turbine Size Summary (Tip Height 180m)

Component	Length (m)	Width (m)	Height / Min Diameter (m)	Weight (t)
Blade	66.770	4.040	3.625	15.648
Base Tower	15.760	(4.450) 4.000	4.044	84.000
Mid Tower 1	17.920	4.044	4.040	83.000
Mid Tower 2	19.880	4.040	4.028	75.500
Mid Tower 3	26.040	4.028	3.916	56.000
Top Tower	30.000	3.916	3.268	44.000

The swept path assessment has utilised the blade and a combination of the worst case tower dimensions from both tower options to represent the worst-case kinematic envelope.

2.3 Proposed Delivery Equipment

To provide a robust assessment scenario based upon the known issues along the access route, it has been assumed that all blades would be carried on a Superwing Carrier trailer to reduce the need for mitigation in constrained sections of the route.

The base and mid towers would be carried on a 4+7 clamp trailer. The hub, nacelle housing, and top towers would be carried on a six-axle step frame trailer. The worst case loads for these sections will be considered in a further study.

Figure 2-2: Superwing Carrier Trailer

Figure 2-3: Tower Trailer

A scissor lift adaptor will be required at certain locations to elevate the blade tip to allow loads to oversail various obstructions without the need for intrusive ground works. This would involve an adaptor being fitted to the trailer and the H frame of the blade being hinged. The adaptor allows the blade (at the point of support) to be lifted up to 10m. An example of this is provided in Figure 2-4

The report notes where on the route this would need to be deployed.

Figure 2-4: Scissor Lift Adaptor

3 Access Route Review

3.1 Port of Entry

The nearest feasible and economical Port of Entry (PoE) for the site is Corpach Harbour. The port has been previously used by turbines imports in the past including tower and nacelle deliveries for Stronelairg Wind Farm.

Access from the closer port of Campbeltown has been considered and discounted due to the constraints at Inverary Parish Church and the arch at the Inverary Inn.

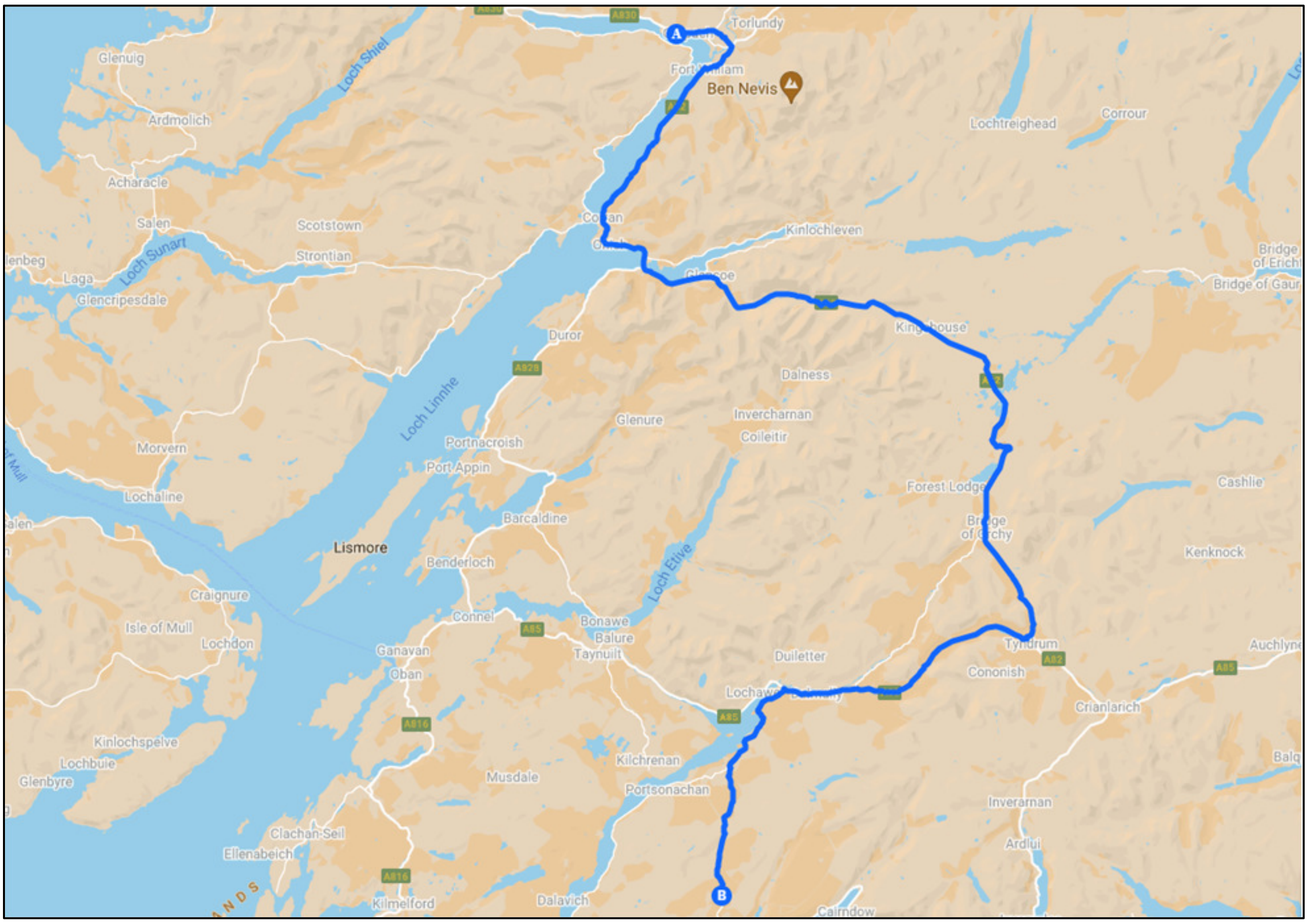
3.2 Proposed Access Routes

A site visit to review the constraints was undertaken using an HD video review of the route. Points of Interest (POI) were recorded using a GPS tracker along the route. The proposed access route to the site access junction from Corpach is as follows:

- Loads would exit Corpach Harbour and proceed east on the A830;
- Loads would exit the A830 to join the A82 southbound;
- At Tyndrum, loads would exit the A82 to join the A85 westbound; and
- To the west of Dalmally, loads would exit the A85 to join the A819 southbound. Loads would then proceed to one of two site access junction options, where they would turn left.

The proposed access route is illustrated in Figure 3-1.

Figure 3-1: Proposed Access Route



3.3 Route Constraints

The constraints noted on the route are detailed in Table 3-1. These cover all constraints from the port access gate through to the proposed site access junction. No consideration of the transport issues within the development site have been undertaken.

Plans illustrating the location of the constraints are provided in Appendix A.

Table 3-1: Constraint Summary

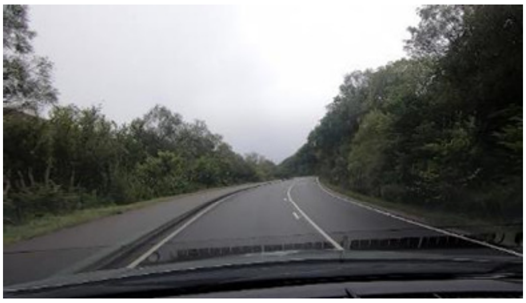
POI	Key Constraint	Details
1	**Corpach Harbour** 	Loads will exit Corpach Harbour and turn right onto the A830 eastbound. A swept path assessment has been undertaken and indicates that loads will over-run and over-sail the northern verge of the A830 and an access road where load bearing surfaces should be laid, and existing utilities should be protected. The area should be cleared of obstructions and parking should be suspended during deliveries. The fence should be removed, and all trees and vegetation should be cleared. **Third party land** is required. One lighting column and one lit road sign should be removed from the northern verge. Load suspension should be raised to allow for over-sail of the railings. Swept path assessment SK01 is included in Appendix B.
2	**Banavie Swing Bridge** 	Loads will proceed on the A830. Loads will cross the bridge at caution and will advise the swing bridge control room that loads will be passing prior to them leaving Corpach.
3	**Blar Mhor Roundabout** 	Loads will take the second exit at the roundabout to continue on the A830 via a **contraflow** manoeuvre. A swept path assessment has been undertaken and indicates that loads will over-sail the right-hand verge on entry to the roundabout where one lighting column should be removed. Loads will over-sail the central island where one set of lit chevron signs should be removed. Swept path assessment SK02 is included in Appendix B.

POI	Key Constraint	Details
4	**A830 / A82 Roundabout** 	Loads will take the second exit at the roundabout to join the A82 southbound via a **contraflow** manoeuvre. A swept path assessment has been undertaken and indicates that loads will over-sail the northern verge on approach to the junction but that no works are required. Loads will oversail the entry splitter island where the bollards and one road sign should be removed. Loads will then over-sail the central island where two chevron signs should be removed. Loads then will overrun and oversail the inside of the junction where a load bearing surface should be laid and two lighting columns, four road sign, one traffic signal, one call post and the guardrail should be removed. It is recommended that a land search is completed to confirm the extent of adopted boundary available. Loads will over-run the exit arm splitter island where a load bearing surface should be laid. Bollards and one road sign should be removed. They will also over-run and over-sail the eastern verge on the exit arm where a load bearing surface should be laid. A guardrail and one traffic signal should be removed. Swept path assessment SK03 is included in Appendix B.
5	**A82 / North Road Roundabout** 	Loads will take the second exit at the roundabout to continue on the A82. A swept path assessment has been undertaken and indicates that loads will oversail the south eastern verge on approach and the exit arm splitter island where one bollard and one road sign should be removed. Loads will overrun and oversail the south eastern edge of the roundabout island where a load bearing surface should be laid and two sets of lit chevron signs should be removed. Swept path assessment SK04 is included in Appendix B.

POI	Key Constraint	Details
6	**Belford Road Roundabout** 	Loads will take the third exit at the roundabout to continue on the A82 via a **contraflow** manoeuvre. A swept path assessment has been undertaken and indicates that loads will over-sail the eastern bridge parapet into **third party land.** Trees, vegetation, four road signs and two lighting columns should be removed. The temporary splitter island on the approach should be removed along with the bollard. Loads should be raised using suspension settings to allow oversail of the bridge parapet on the inside of the right bend where trees should be trimmed and one road sign and one lighting column should be removed. **Third party land** required. Loads will overrun and oversail the exit arm splitter island and southern footway where load bearing surfaces should be laid and one road sign and two bollards should be removed. Swept path assessment SK05 is included in Appendix B.
7	**Belford Road / A82 Roundabout** 	It is proposed that loads will approach the roundabout on the opposite side of the carriageway. A swept path assessment has been undertaken and indicates that loads will cross the central reserve in advance of the roundabout where a load bearing surface should be laid. The blade tip will oversail the northeastern footway. Loads will oversail the verge on the inside of the roundabout along with the southern edge of the roundabout and the exit arm central reserve where one lit chevron sign, two road signs and one bollard should be removed. One lighting column and a section of guardrail should be removed from the southern verge. The guardrail should be removed from the southeastern verge of the exit arm. Swept path assessment SK06 is included in Appendix B.
8	**West End Roundabout** 	Loads will take the third exit at the roundabout to continue on the A82 via a **contraflow** manoeuvre. A swept path assessment has been undertaken and indicates that loads will cross the central reservation on the entry arm where a load bearing surface should be laid, and existing utilities protected. Two road signs should be removed. Loads will over-sail the northwestern verge on entry, where one traffic signal head and the guardrail should be removed. They will then oversail the central roundabout island where two lit chevron signs should be removed. Loads will over-sail northwestern verge and splitter island of the exit arm where one bollard will be over-sailed. Swept path assessment SK07 is included in Appendix B.

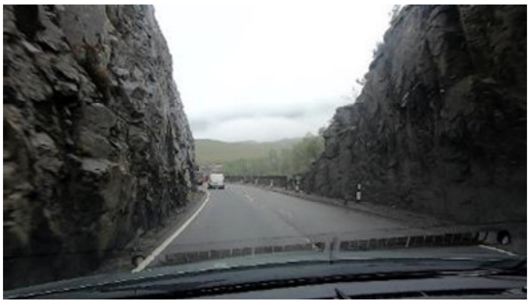
POI	Key Constraint	Details
9	**A82 Druimarbin** 	Loads will continue on the A82. The road surface was noted to be in a poor state of repair at this location. It is recommended that discussions are held with the roads authority to ensure repairs are completed prior to deliveries.
10	**A82 Southwest of Drimarben** 	Loads will continue south on the A82. *The available OS mapping does not accurately identify the road edge. An indicative road edge has been provided for illustration only and should be confirmed during the test run.* A swept path assessment has been undertaken and indicates that loads will over-sail both verges through the bends. The blade will oversail a series of bollards on the outside of the right bend, where one road sign should be removed. Swept path assessment SK08 is included in Appendix B.
11	**A82 South of River Kiachnish** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail both verges through the bend. The blade will over-sail a series of bollards on the outside of the bend where one set of chevron signs should be removed. Vegetation and trees should be trimmed on both sides of the carriageway. Swept path assessment SK09 is included in Appendix B.
12	**A82 North of Corrychurrachan** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail the inside verge through the bend, however no physical works are required. Swept path assessment SK10 is included in Appendix B.

POI	Key Constraint	Details
13	**A82 Corrychurrachan** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail the inside of the left bend where vegetation should be trimmed. Loads will oversail the western verge through the left bend where vegetation should be cleared and the bollards over-sailed. They will then oversail the western verge through the right bend where one road sign should be removed. Loads will finally oversail the eastern verge through the right bend where bollards should be over-sailed. Swept path assessment SK11 is included in Appendix B.
14	**A82 Northeast of Corran** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail both verges through the bend. The blade will over-sail a series of bollards on the outside of the bend. Loads will over-sail the safety barrier on the inside of the bend, where vegetation should be trimmed and one road sign removed. Swept path assessment SK12 is included in Appendix B.
15	**A82 Bends, Corran** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail the inside of the left bend where vegetation should be trimmed. There is limited clearance to the rock face. Loads will oversail the western verge through the left bend where one set of chevron signs should be removed. The bollards should be over-sailed. They will then oversail the western verge through the right bend where the bollards should be over-sailed. Swept path assessment SK13 is included in Appendix B.
16	**A82 Right Bend, Corran** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail both verges through the bends, though no works are required. Swept path assessment SK14 is included in Appendix B.

POI	Key Constraint	Details
17	**A82 Double Bend, Keppanach** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail both verges of the bend where vegetation should be trimmed on the inside verge. Swept path assessment SK15 is included in Appendix B.
18	**A82 Right Bend, Keppanach** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail both verges of the bend. Vegetation should be trimmed on the inside verge. Swept path assessment SK16 is included in Appendix B.
19	**A82 Northwest of Onich** 	Loads will continue on the A82. Loads will oversail both verges of the carriageway, but no works are required.
20	**A82 Left Bend, Onich** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail both verges of the carriageway where bollards should be over-sailed on the western verge and vegetation trimmed. Swept path assessment SK17 is included in Appendix B.
21	**A82 Bends, Onich** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail both verge of the carriageway through the bends, though no works are required. Swept path assessment SK18 is included in Appendix B.

POI	Key Constraint	Details
22	**A82 Double Bend, Onich** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail both verges of the carriageway through the bends, though no works are required. Swept path assessment SK19 is included in Appendix B.
23	**A82 Northwest of Ballachulish** 	Loads will continue on the A82. Loads will oversail the inside verge through the bend, but no works are required.
24	**A82 Right Bend North of Ballachulish** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-run and over-sail the northeastern verge where a load bearing surface should be laid. Parking should be suspended during movements. Loads will oversail the inside of the bend, however no physical works are required. Swept path assessment SK20 is included in Appendix B.
25	**Ballachulish Roundabout** 	Loads will take the second exit at the roundabout to continue on the A82 via a **contraflow** manoeuvre. A swept path assessment has been undertaken and indicates that loads will over-run and over-sail the southern verge of the entry arm where a load bearing surface should be laid. One lit road sign should be removed. Loads will over-run and over-sail the entry splitter island where a load bearing surface should be laid. One road sign and one bollard should be removed. They will over-run and over-sail the southern verge of the central island where a load bearing surface should be laid. Loads will then over-run and over-sail the southern verge on the exit arm where a load bearing surface should be laid. Swept path assessment SK21 is included in Appendix B.

POI	Key Constraint	Details
26	**North East of Loch Achtriochtan** 	Loads will continue on the A82. The road surface was noted to be in a poor state of repair at this location. It is recommended that discussions are held with the roads authority to ensure repairs are completed prior to deliveries.
27	**A82 North of Three Sisters of Glencoe** 	Loads will continue on the A82. A swept path assessment has been undertaken on a topographical base plan for this section. Loads will oversail the southern verge of the road. **Third party land rights** are required. Swept path assessment SK22 is included in Appendix B.
28	**A82 East of Three Sisters of Glencoe Car Park** 	Loads will continue on the A82. A swept path assessment has been undertaken on a topographical base plan for this section. Loads will oversail the western verge of the road. **Third party land rights** are required. Swept path assessment SK23 is included in Appendix B.
29	**A82 East of Aonach Eagach Car Park** 	Loads will continue on the A82. The scissor lifting trailer should be raised through this section. Any overhead utilities should be relocated. A swept path assessment has been undertaken on a topographical base plan for this section. Loads will oversail the northern verge of the road where vegetation should be trimmed and one road sign removed. **Third party land rights** are required. Loads should be set to highest suspension to over-sail safety barrier on the inside of the bend. Vegetation should be trimmed in this area. Swept path assessment SK24 is included in Appendix B.

POI	Key Constraint	Details
30	**A82 West of Ralston Cairn** 	Loads will continue on the A82. The scissor lifting trailer should be raised through this section. Any overhead utilities should be relocated. A swept path assessment has been undertaken on a topographical base plan for this section. Loads will over-sail the northern verge where the existing street furniture can remain in place. Loads will oversail the inside of the left bend. Loads should be set to higher suspension settings to oversail the safety barrier. Swept path assessment SK25 is included in Appendix B.
31	**A82 Glencoe Waterfall** 	Loads will continue on the A82. The scissor lifting trailer should be raised through this extremely constrained section. A swept path assessment has been undertaken on a topographical base plan for this section. Loads will oversail both verges of the carriageway, however no physical works are required. The road surface was noted to be in a poor state of repair at this location. It is recommended that discussions are held with the roads authority to ensure repairs are completed prior to deliveries. Swept path assessment SK26 is included in Appendix B.
32	**A82 Northwest of Glencoe Waterfall** 	Loads will continue on the A82. The scissor lifting trailer should be raised through this section. A swept path assessment has been undertaken on a topographical base plan for this section. Loads will oversail the northern verge and street furniture. On the southern verge, the rock face will need limited works to enable loads to oversail. **Third party land rights** will be required. Following this section, the blade tip should be lowered. Swept path assessment SK27 is included in Appendix B.

POI	Key Constraint	Details
33	**A82 West of Glencoe Valley Viewpoint** 	Loads will continue on the A82. The road surface was noted to be in a poor state of repair at this location. It is recommended that discussions are held with the roads authority to ensure repairs are completed prior to deliveries.
34	**A82 Loch Tulla Viewpoint** 	Loads will continue on the A82. A swept path assessment has been undertaken and indicates that loads will over-sail the inside of the bend where one pole should be removed. Loads will oversail the western verge on approach to the bend where one pole and one set of chevron signs should be removed and bollards over-sailed. Swept path assessment SK28 is included in Appendix B.
35	**A82 Left Bend, Northwest of Achallader** 	Loads will continue on the A82. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* Loads will over-sail both verges of the carriageway where loads will oversail the safety barrier and bollards one the southern verge. Swept path assessment SK29 is included in Appendix B.
36	**A82 Northwest of Achallader** 	Loads will continue on the A82. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail both verges through the bend. Three sets of chevron signs and two poles should be removed from the outside of the bend. The blade will over-sail all bollards. Loads will oversail the inside of the bend where two poles should be removed. Swept path assessment SK30 is included in Appendix B.

POI	Key Constraint	Details
37	**A82 South of Auch** 	Loads will continue on the A82. Ongoing road works were noted at this location during the site visit. Confirmation that all works have finished should be sought before movements commence.
38, 39	**A82 / A85 Junction**  	Loads will turn right at the junction to exit the A82 and join the A85 westbound. A swept path assessment has been undertaken and indicates that loads will over-sail both verges of the bend on the A82 prior to the junction. On the outside verge two sets of chevron signs, one sign and one lighting column should be removed. The blade will over-sail the safety barrier. On the inside of the bend loads will over-sail the safety barrier and one road sign and one snow gate should be removed. A land search should be completed to confirm the extent of adopted boundary available. On joining the A85, loads will over-run and over-sail the eastern verge of the A82 where a load bearing surface should be laid and three road signs, section of barrier and trees should be removed. The blade will over-sail the safety barrier. **Third party land** is required. Loads will then over-run and over-sail the inside of the turn where three road signs and all bollards should be removed. A load bearing surface should be laid. Trees and vegetation should be cleared. **Third party land** required. Swept path assessment SK31 is included in Appendix B.

POI	Key Constraint	Details
40	**A85 Clifton** 	Loads will continue on the A85. A swept path assessment has been undertaken and indicates that loads will over-sail both verges through the section. Loads will over-sail the inside of the first bend where three poles should be removed. They will then over-sail the southern verge of the first bend where three sets of chevron signs, one road sign and two poles should be removed. The blade will oversail the bollards. Loads will over-sail the inside of the second bend where several poles should be removed. They will then oversail the inside of the third bend where one road sign and several poles should be removed. Loads will oversail the outside of the third bend where three sets of chevron signs, one road sign and several poles should be removed. The blade will over-sail a series of bollards. The vertical profile of the road at this location is pronounced and should be reviewed during the test run stage to ascertain if tar wedges will be required to extend the vertical curvature of the road and prevent grounding. Swept path assessment SK32 is included in Appendix B.
41	**A85 Arrivain** 	Loads will continue on the A85. The vertical profile of the road at this location is pronounced and should be reviewed during the test run stage to ascertain if tar wedges will be required to extend the vertical curvature of the road and prevent grounding.
42	**A85 Southwest of Arrivain** 	Loads will continue on the A85. Loads will oversail both verges of the carriageway, but no works are required. The vertical profile of the road at this location is pronounced and should be reviewed during the test run stage to ascertain if tar wedges will be required to extend the vertical curvature of the road and prevent grounding.

POI	Key Constraint	Details
43	**A85 Bends Southwest of Arrivain** 	Loads will continue on the A85. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail the safety barrier on the eastern verge, where two poles should be removed. The blade will over-sail all bollards. Loads will oversail the western verge where one pole should be removed. Swept path assessment SK33 is included in Appendix B.
44	**A85 Bends Southwest of Arrivain** 	Loads will continue on the A85. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail the inside of the bend where one pole should be removed. The blade will over-sail the safety barrier. Loads will over-sail the northwestern verge where one chevron sign should be removed and bollards over-sailed. Swept path assessment SK34 is included in Appendix B.
45	**A85 Bends Southwest of Arrivain** 	Loads will continue on the A85. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail both verges of the bend. On the outside of the bend two sets of chevron signs and two poles should be removed. The blade will over-sail the safety barrier and bollards. One pole should be removed from the inside of the bend. A land search should be completed to confirm the extent of adopted boundary available. Swept path assessment SK35 is included in Appendix B.

POI	Key Constraint	Details
46	**A85 Northeast of Glen Lochy Car Park** 	Loads will continue on the A85. The vertical profile of the road at this location is pronounced and should be reviewed during the test run stage to ascertain if tar wedges will be required to extend the vertical curvature of the road and prevent grounding. Loads should be set on a higher suspension setting to reduce the need for physical works at this location.
47	**A85 Southwest of Glen Lochy Car Park** 	Loads will continue on the A85. The vertical profile of the road at this location is pronounced. Loads should be set on a higher suspension setting to reduce the need for physical works at this location.
48	**A85 Southwest of Glen Lochy Car Park** 	Loads will continue on the A85. The vertical profile of the road at this location is pronounced. Loads should be set on a higher suspension setting to reduce the need for physical works at this location.
49	**A85 Strone Hill Car Park** 	Loads will continue on the A85. The clearances to overhead power lines at this location should be reviewed with the utility provider prior to loads moving to ensure that there is sufficient head height and flashover protection for all temperature ranges.
50	**A85 West of Inverlochy** 	Loads will continue on the A85. The clearances to overhead power lines at this location should be reviewed with the utility provider prior to loads moving to ensure that there is sufficient head height and flashover protection for all temperature ranges.

POI	Key Constraint	Details
51	**A85 Right Bend, Dalmally** 	Loads will continue on the A85. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail the outside of the right bend, though no works are required. Loads will oversail the northern verge of the left bend where the bollards should be over-sailed. They will then oversail the southern verge of the left bend where one road sign should be removed. Swept path assessment SK36 is included in Appendix B.
52	**A85 Dalmally Golf Club** 	Loads will continue on the A85. Loads will oversail both verges of the carriageway, however no physical works are required.
53	**A85 / A819 Junction** 	Loads will turn left at the junction to leave the A85 and join the A819 southbound. *OS base mapping does not fully identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail the north eastern verge of the A85 where the trees, vegetation and one road sign should be removed. Loads will over-run and over-sail the inside of the turn where a load bearing surface should be laid and several bollards should be removed. Trees and vegetation should be cleared. Reprofiling works and detailed design are required. **Third party land** is required. Loads will then oversail the western verge of the A819 where one road sign should be removed. Swept path assessment SK37 is included in Appendix B.

POI	Key Constraint	Details
54	**A819 East of Kilchurn Castle** 	Loads will continue on the A819. The vertical profile of the road at this location is pronounced. Loads should be set on a higher suspension setting to reduce the need for physical works at this location.
55	**A819 South of Kilchurn Castle** 	Loads will continue on the A819. The vertical profile of the road at this location is pronounced. Loads should be set on a higher suspension setting to reduce the need for physical works at this location. The tree canopy should be trimmed to ensure that there is a 5m clear head height. Trimming works can be subject to ecological time constraints and early engagement with the relevant authority is recommended.
56	**A819 Northwest of Ardteatle** 	Loads will continue on the A819. Loads will oversail the inside verge through the bend, however no physical works are required.
57	**A819 West of Ardteatle** 	Loads will continue on the A819. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail both verges through the bend. On the outside of the bend one set of chevron signs should be removed, and vegetation trimmed. The bollards will be over-sailed. Vegetation should be trimmed on the inside verge. Swept path assessment SK38 is included in Appendix B.
58	**A819 Achlian** 	Loads will continue on the A819. A swept path assessment has been undertaken and indicates that loads will over-sail both verges of the bend. The bollards on the outside verge will be over-sailed and one utility pole should be removed from the inside verge. Swept path assessment SK39 is included in Appendix B.

POI	Key Constraint	Details
59	**A819 Northeast of Inistrynich** 	Loads will continue on the A819. Loads will oversail the western verge where the bollards will be over-sailed. Loads will oversail the eastern verge where there is limited clearance to the rock face. Vegetation should be cleared. Swept path assessment SK40 is included in Appendix B.
60	**A819 East of Inistrynich** 	Loads will continue on the A819. Loads will oversail both verges of the carriageway, however no works are required.
61	**A819 East of Inistrynich** 	Loads will continue on the A819. A swept path assessment has been undertaken and indicates that loads will over-sail both verges of the bend. The safety barrier should be over-sailed on the western verge and one utility pole removed. The bollards should be over-sailed on the eastern verge where parking should be suspended and one set of chevron signs removed. The suspension should be raised to allow oversail of the bridge parapet on both sides of the carriageway where **third party land** is required. Vegetation and trees should be trimmed on both verges. Swept path assessment SK41 is included in Appendix B.
62	**A819 South of Inistrynich** 	Loads will continue on the A819. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail both verges through this location where one utility pole should be removed from the northwestern verge and vegetation should be trimmed. Swept path assessment SK42 is included in Appendix B.

POI	Key Constraint	Details
63	**A819 Bends Southwest of Cladich Farm** 	Loads will continue on the A819. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail the outside of the bend where one road sign should be removed and vegetation trimmed. Loads will oversail the inside of the bend, however no physical works are required. Swept path assessment SK43 is included in Appendix B.
64	**A819 Left Bend, Cladich** 	Loads will continue on the A819. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail the northwestern verge where the blade tip will over-sail the bollards. They will then over-sail the western verge where one set of chevron signs should be removed and bollards over-sailed. Loads will over-run and over-sail the inside of the bend where a load bearing surface should be laid and the ditch culverted. Two road signs should be removed. Swept path assessment SK44 is included in Appendix B.
65	**A819 Right Bend, Cladich** 	Loads will continue on the A819. *OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.* A swept path assessment has been undertaken and indicates that loads will over-sail the outside of the bend where one set of chevron signs should be removed. Trees and vegetation should be trimmed. The blade will over-sail all bollards. Loads will also oversail the inside of the bend where vegetation should be trimmed. Swept path assessment SK45 is included in Appendix B.

<table>
<tr><th>POI</th><th>Key Constraint</th><th>Details</th></tr>
<tr><td>66</td><td>A819 South of Cladich
</td><td>Loads will continue on the A819.

OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.

A swept path assessment has been undertaken and indicates that loads will over-sail both verges through this location. Loads will over-sail the outside of the right bend where one road sign should be removed. Trees and vegetation should be trimmed. The blade will over-sail all bollards.

Loads will over-sail the western verge through the right bend where trees and vegetation should be trimmed. They will then over-sail the western verge through the left bend where two sets of chevron signs should be removed. Bollards should be over-sailed.

Swept path assessment SK46 is included in Appendix B.</td></tr>
<tr><td>67</td><td>A819 North of Ladyfield
</td><td>Loads will continue on the A819.

OS base mapping does not identify the road edge at this location. An indicative road edge has been provided for illustration only. Mitigation should be confirmed through a test run.

A swept path assessment has been undertaken and indicates that loads will over-sail both verges through this location. Loads will over-sail the western verge through the right bend where the bollards will be over-sailed.

Loads will over-sail the eastern verge through the right bend where trees and vegetation should be trimmed. Bollards and safety barrier should be over-sailed in this section.

Loads will over-sail the eastern verge through the left bend where trees and vegetation should be trimmed. The bollards and safety barrier should be over-sailed.

Loads will finally over-sail the western verge where one road sign should be removed. Trees and vegetation should be trimmed.

Swept path assessment SK47 is included in Appendix B.</td></tr>
</table>

POI	Key Constraint	Details
68	**A819 North Site Access Junction Option** 	Loads will turn left into the site access junction should this northern option be used. A swept path assessment has been undertaken and indicates that loads will oversail the western verge however no physical mitigation works are required. A load bearing surface is required on the inside of the junction where existing vegetation should be removed. Loads will the cross via a new bridge and will enter the development site. Swept path assessment SK48 is included in Appendix B.
69	**A819 Southern Site Access Junction Option** 	An alternative access junction for AIL loads is located at this point. Loads would turn left into the site access junction. A swept path assessment has been undertaken and indicates that loads will require **third party land.** Detailed design of the access junction will be required to ensure that it meets turbine manufacturer and local road authority standards. Up to the private bridge crossing, trees and vegetation will need to be removed and load bearing surface provided. Swept path assessment SK49 is included in Appendix B.

3.4 Swept Path Assessment Results and Summary

The detailed swept path drawings for the locations assessed are provided in Appendix B for review. The drawings in Appendix B illustrate tracking undertaken for the worst case loads at each location.

The colours illustrated on the swept paths are:

- Grey / Black – OS / Topographical Base Mapping;
- Green – Vehicle body outline (body swept path);
- Red – Tracked pathway of the wheels (wheel swept path); and
- Purple – The over-sail tracked path of the load where it encroaches outwith the trailer (load swept path).

Where mitigation works are required, the extents of over-run and over-sail areas are illustrated on the swept path drawings.

Please note that where assessments have been undertaken using Ordnance Survey (OS) base mapping, there can be errors in this data source.

Where provided by the client, topographical data has been utilised. Please note that PF cannot accept liability for errors on the data source, be that OS base mapping or client supplied data.

3.5 Land Ownership

The limits of road adoption can vary depending upon the location of the site and the history of the road agencies involved. The adopted area is generally defined as land contained within a defined boundary where the road agency holds the maintenance rights for the land. In urban areas, this usually defined as the area from the edge of the footway across the road to the opposing footway back edge.

In rural areas the area of adoption can be open to greater interpretation as defined boundaries may not be readily visible. The has previously stated that their general rule is that the area of adoption is between established fence / hedges lines or a maximum 2m from the road edge (3m in The Highland Council area). This can vary between areas and location.

3.6 Summary Issues

It is strongly suggested that following a review of the RSR, the Developer should undertake the following prior to the delivery of the first abnormal loads, to ensure load and road user safety:

- That any necessary topographical surveys are undertaken and the swept path results completed;
- A review of axle loading on structures along the entire access route with the various road agencies is undertaken immediately prior to the loads being transported in case of last minute changes to structures;
- A review of clear heights with utility providers and the transport agencies along the route to ensure that there is sufficient space to allow for loads plus sufficient flashover protection (to electrical installations);
- That any verge vegetation and tree canopies which may foul loads is trimmed prior to loads moving;
- That a review of potential roadworks and or closures is undertaken once the delivery schedule is established in draft form;
- That a condition survey is undertaken to ascertain the extents of road defects prior to loads commencing to protect the developer from spurious damage claims.

4 Summary

4.1 Summary of Access Review

PF has been commissioned by RCE to prepare a Route Survey Report to examine the issues associated with the transport of AIL turbine components to the development site.

This report identifies the key points and issues associated with the proposed route and outlines the issues that will need to be considered for successful delivery of components.

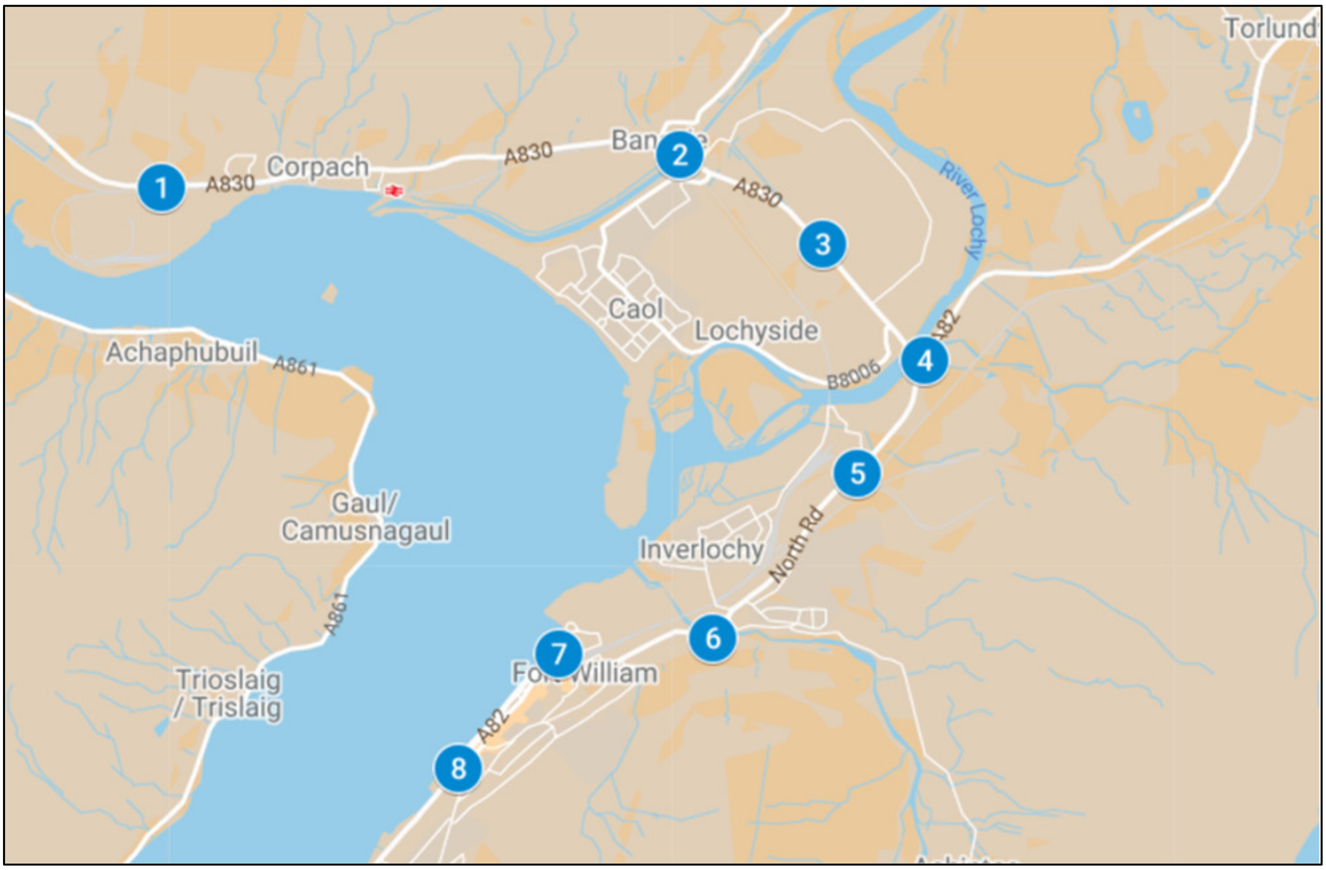
The report is presented for consideration to RCE. Various road modifications, structural reviews and interventions are required to successfully access the site. If these are undertaken, access to the consented wind farm site is considered feasible for the V136 turbine.

4.2 Further Actions

The following actions are recommended to pursue the transport and access issues further:

- Prepare detailed mitigation design proposals to help inform the land option / consultee discussions;
- Obtain the necessary land options;
- Undertake discussion with the affected utility providers and roads agencies;
- Obtain the necessary statutory licences to enable the mitigation measures; and
- Develop a detailed operational Transport Management Plan to assist in transporting the proposed loads.

Appendix A Points of Interest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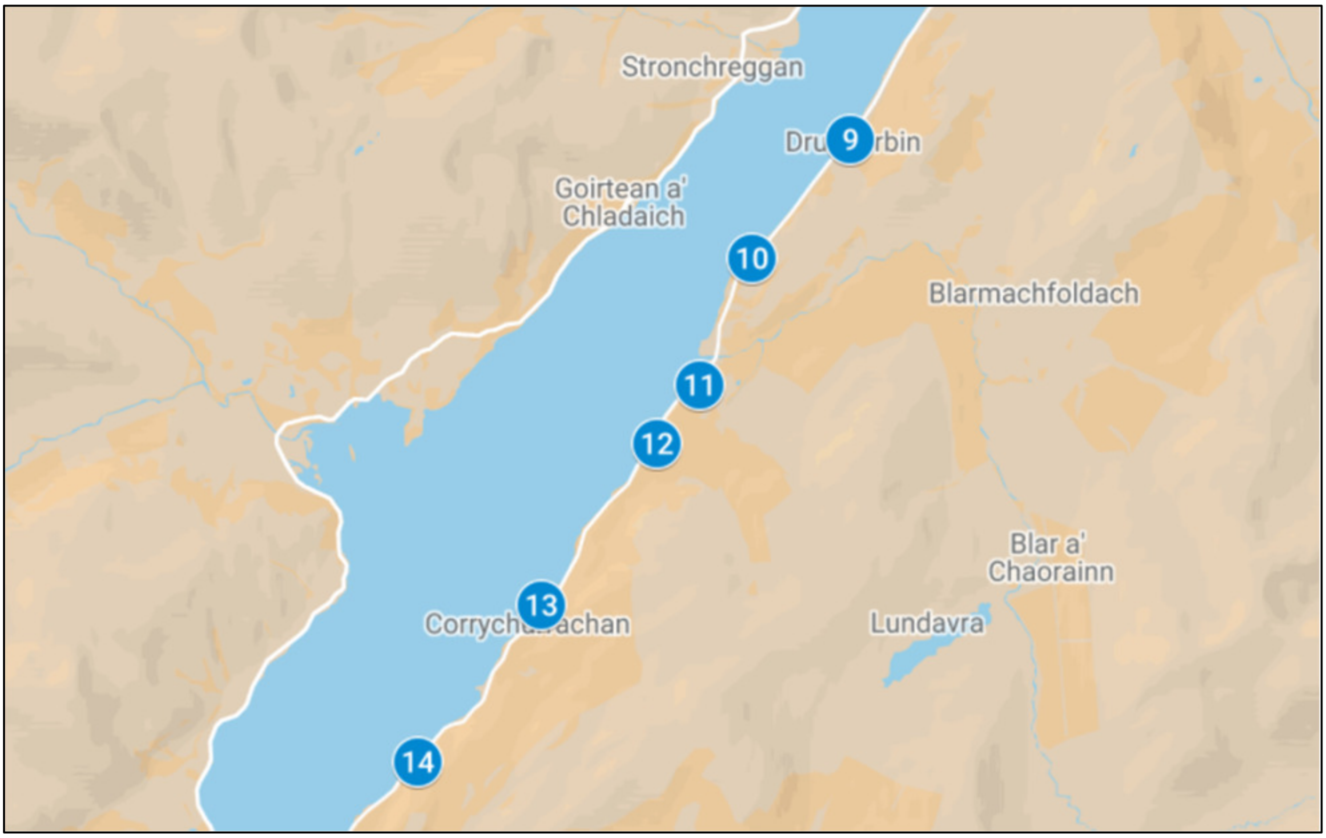
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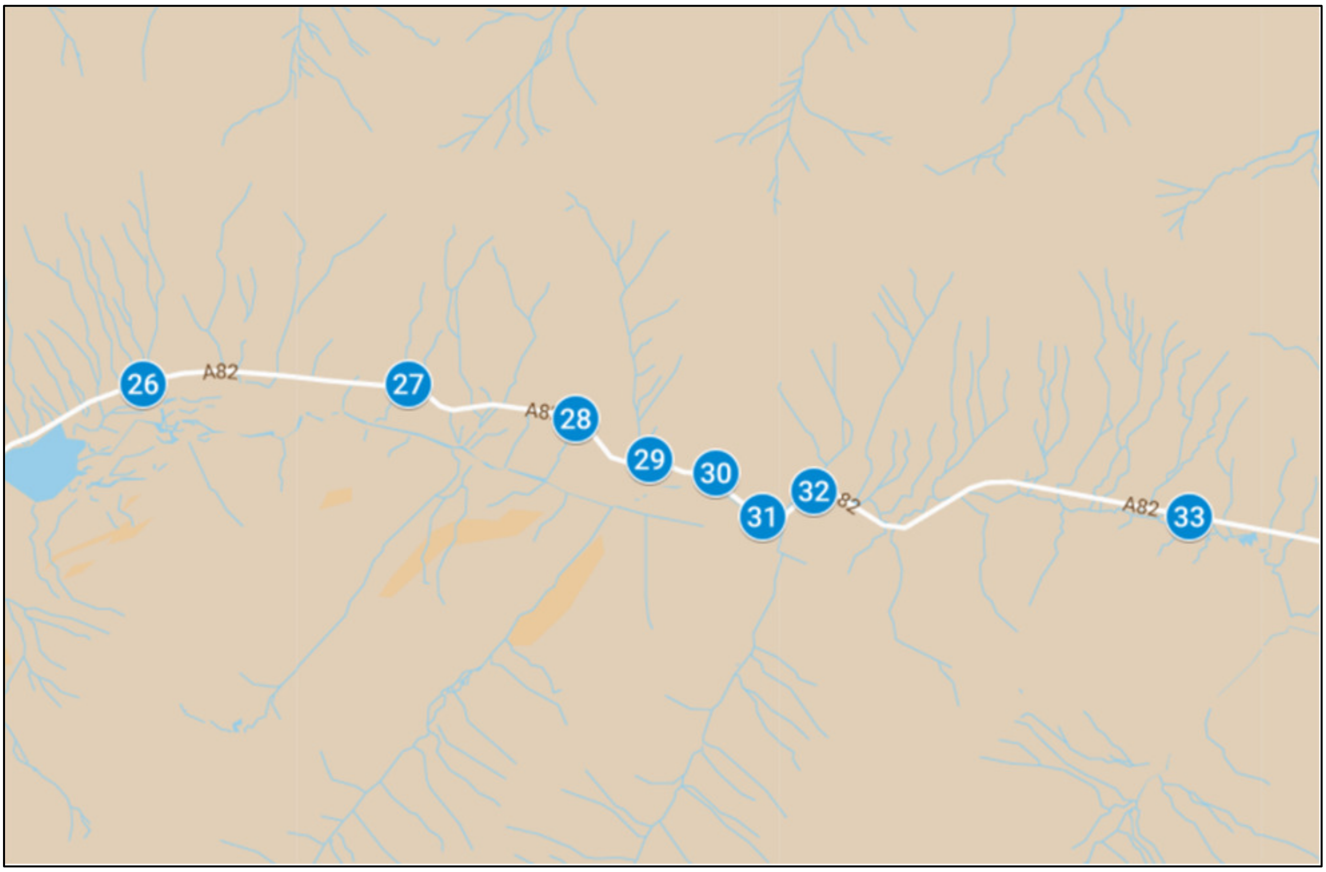
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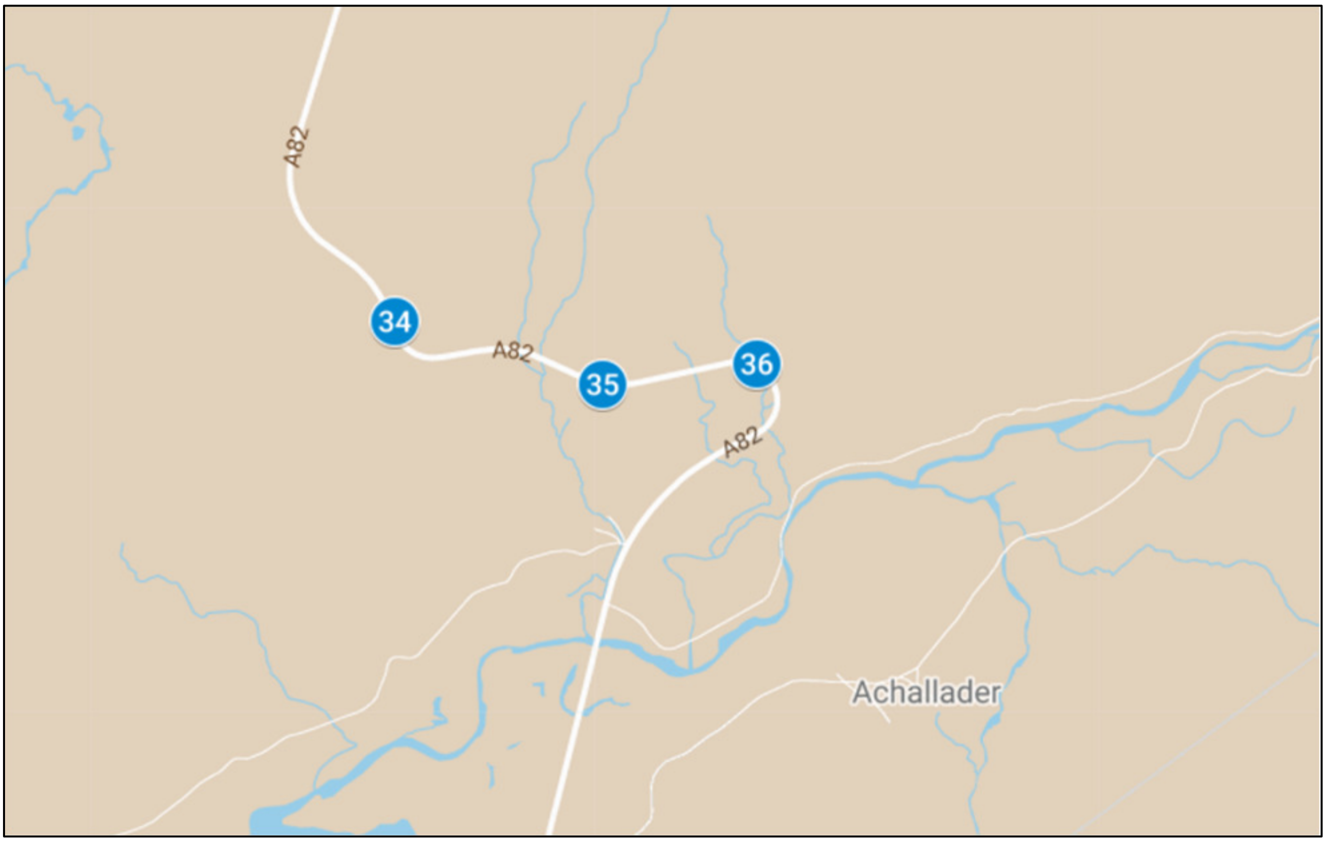
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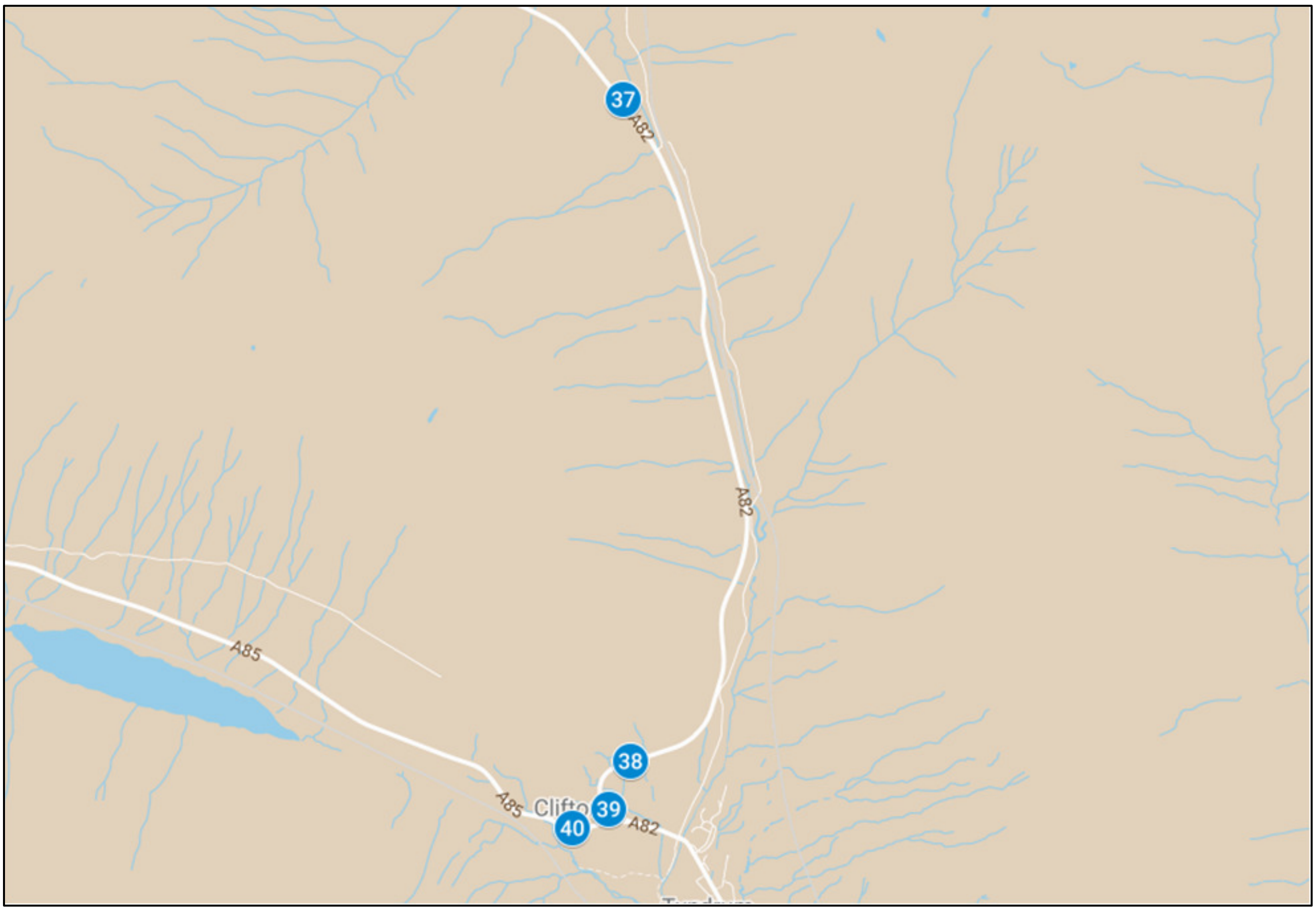
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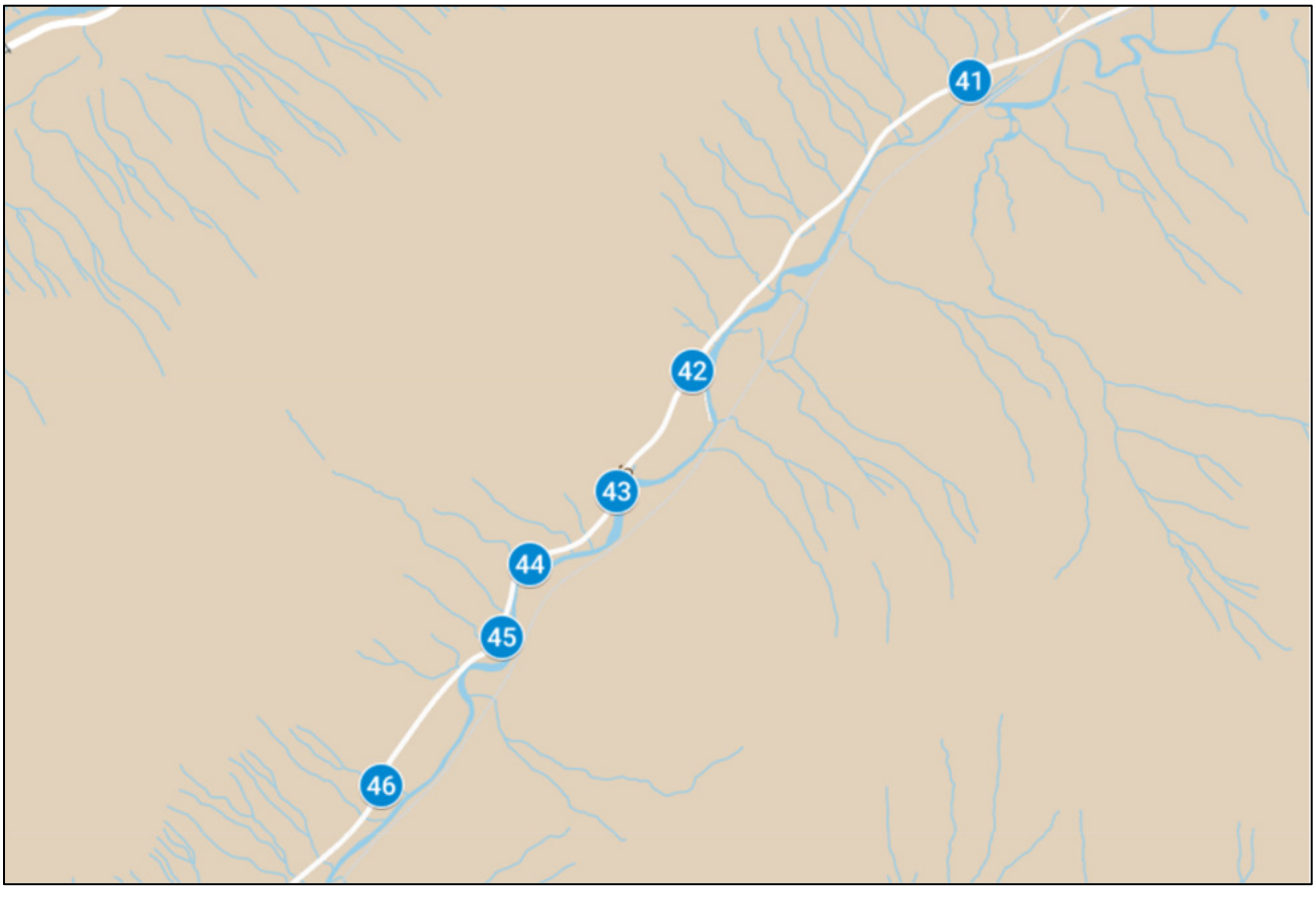
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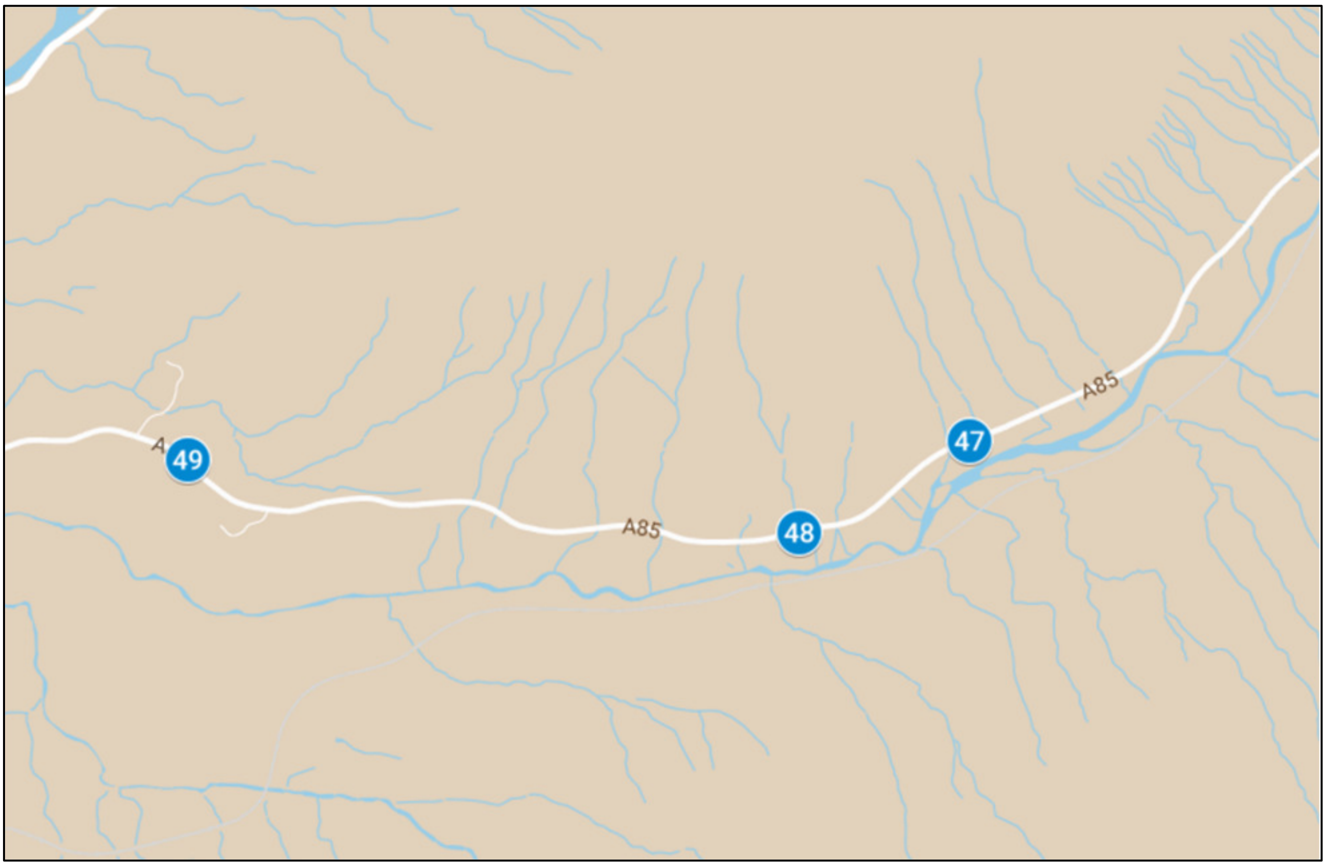
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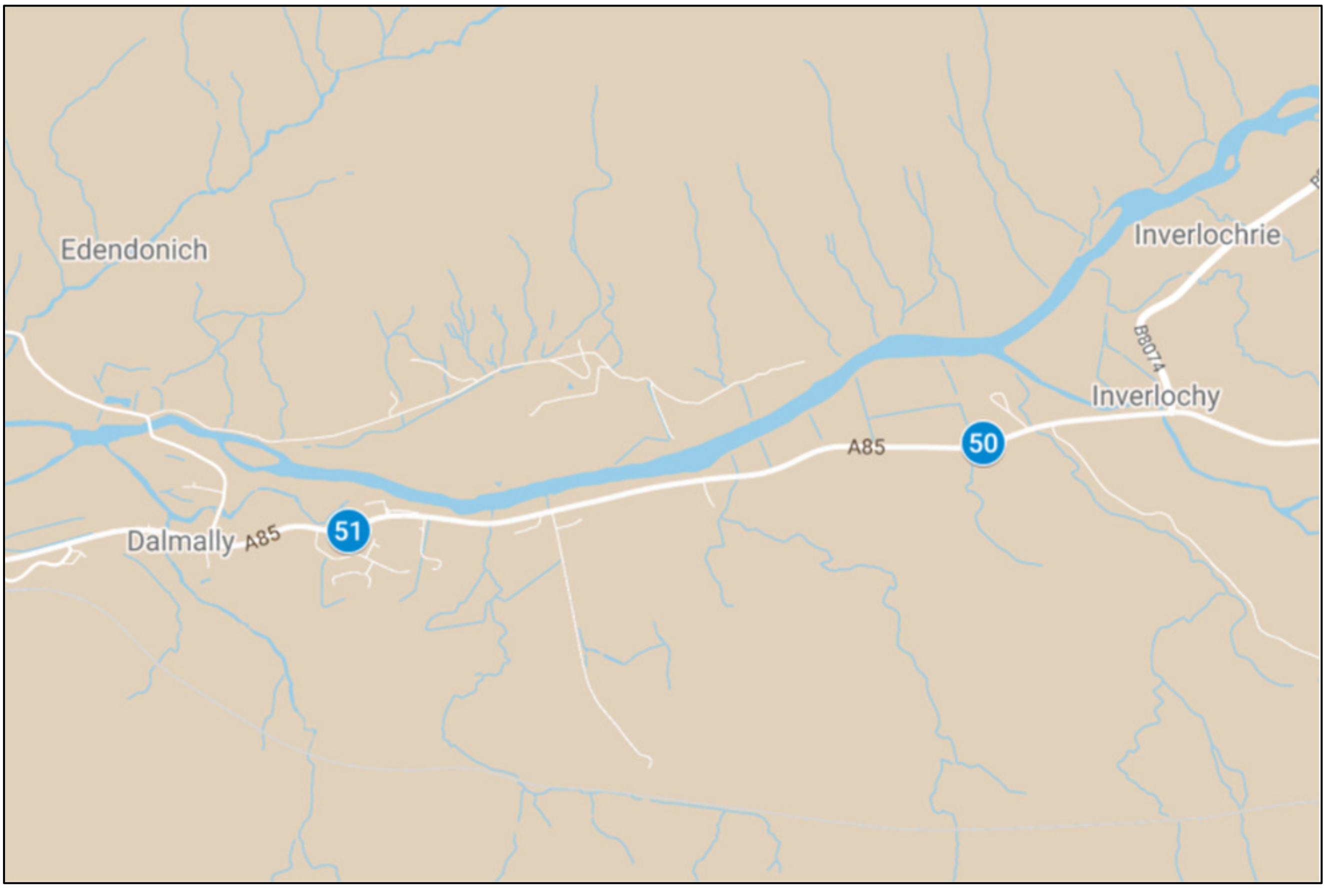
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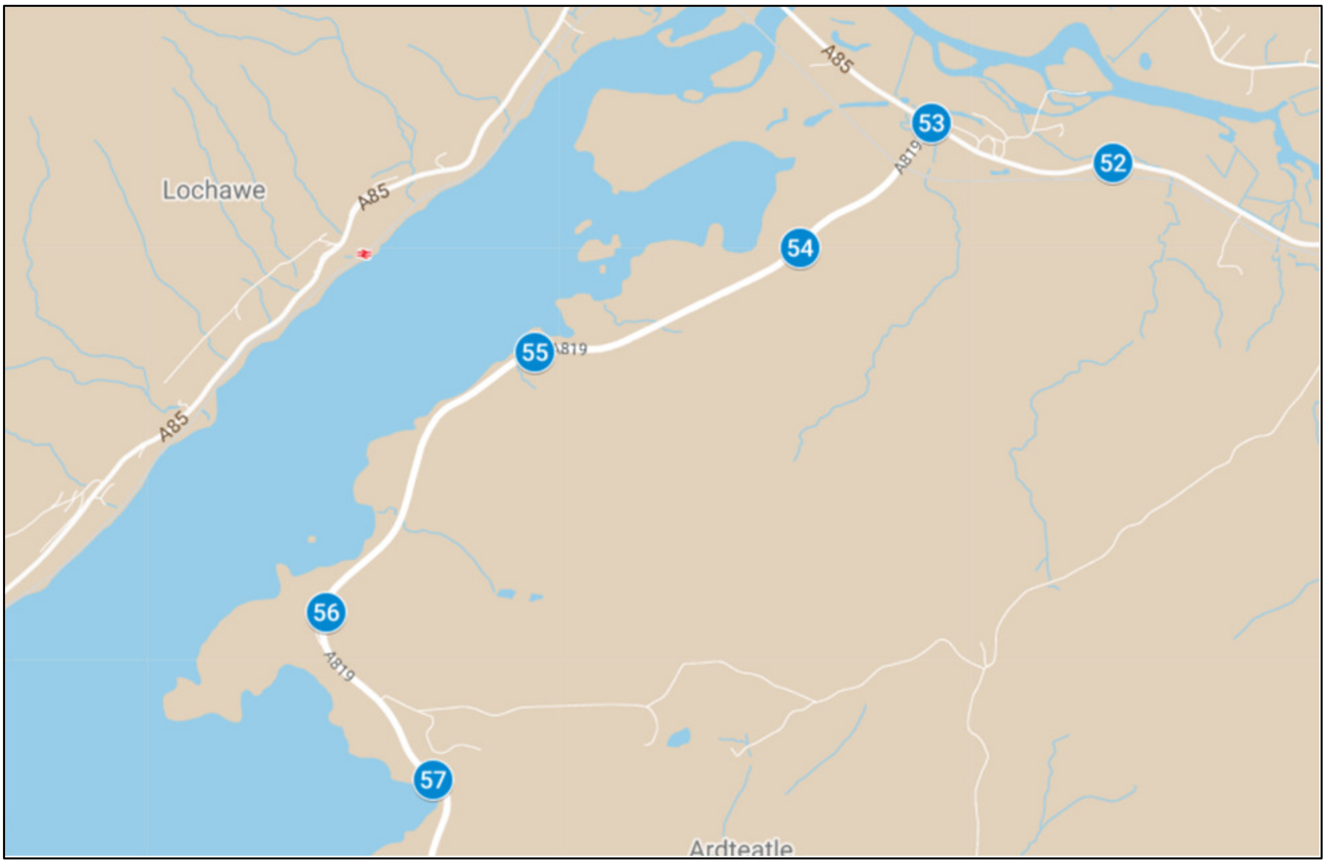
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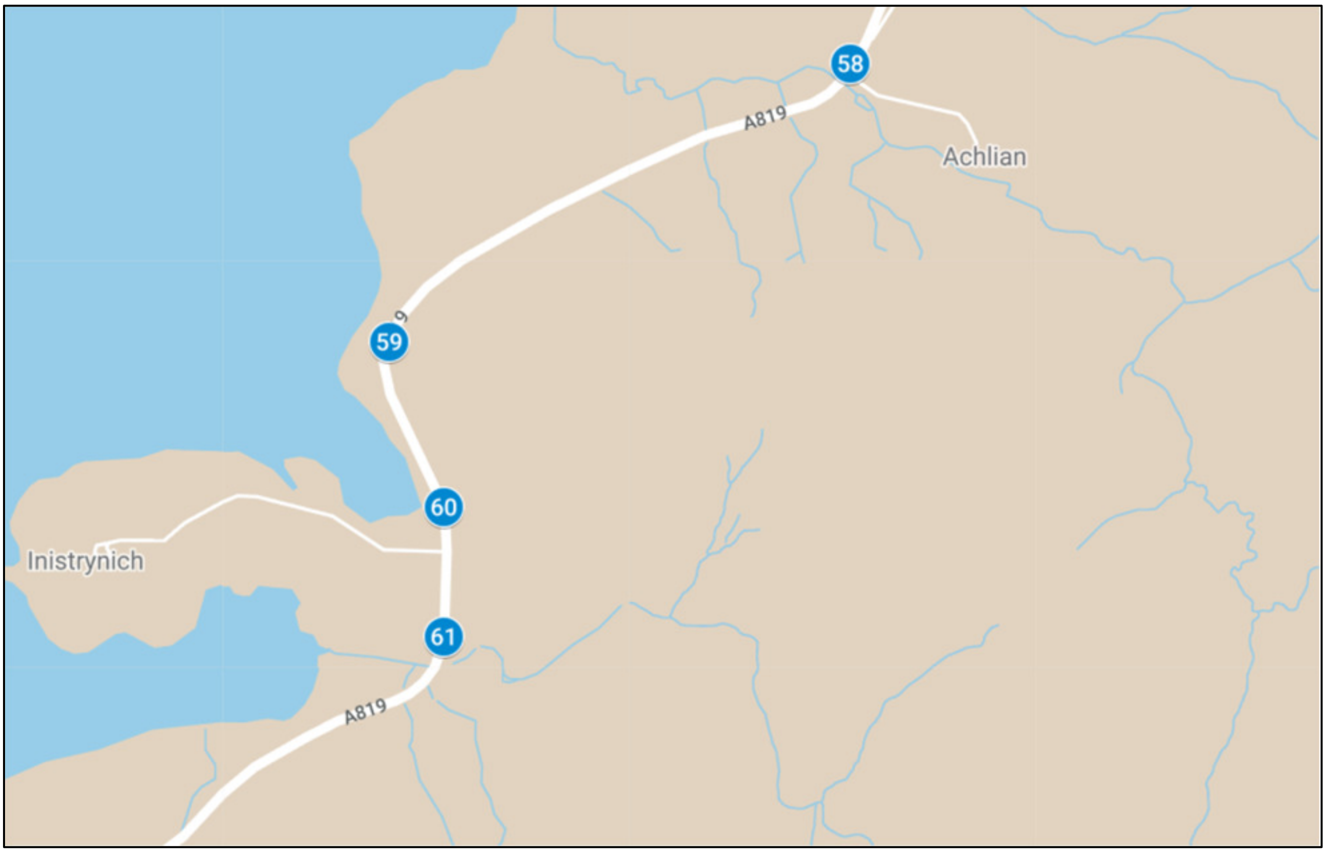
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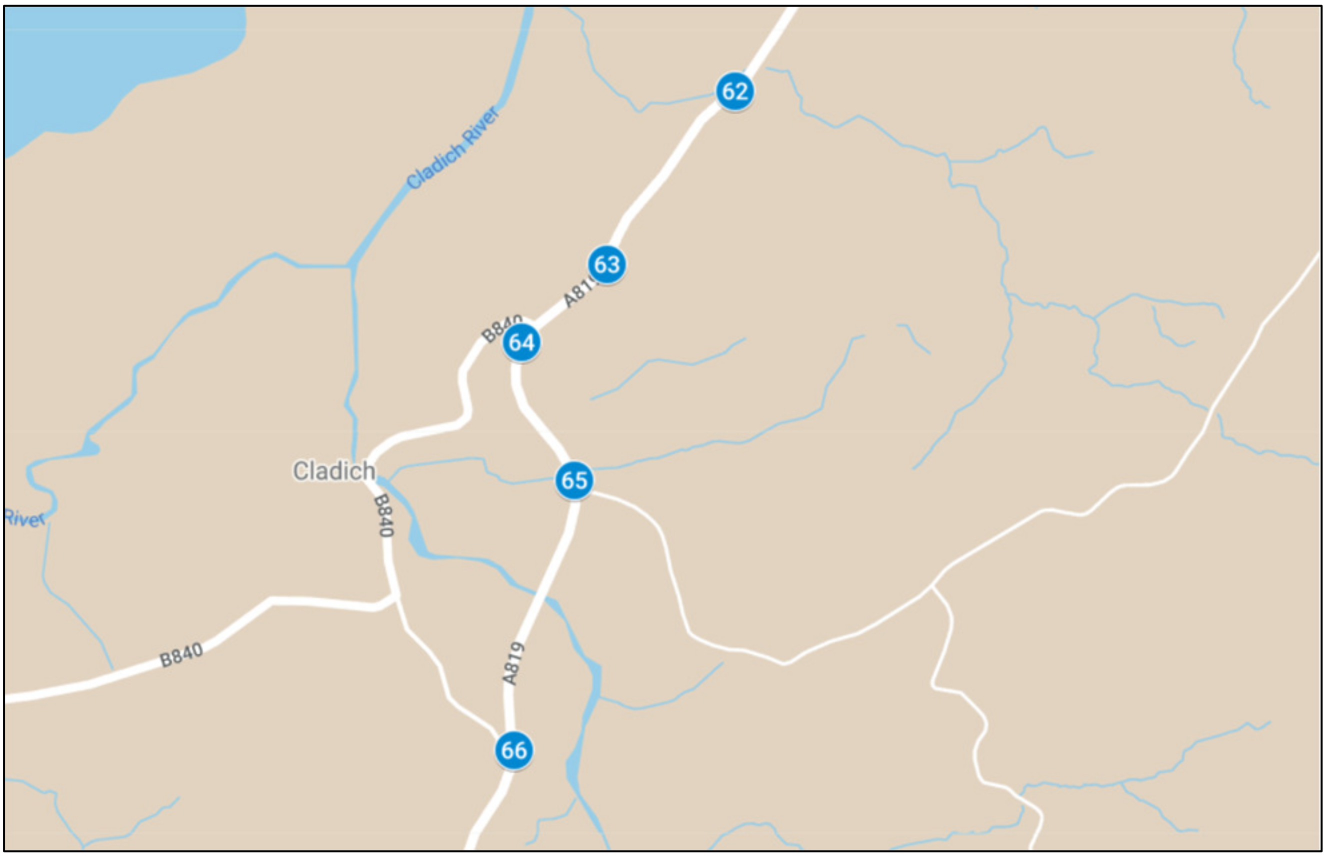
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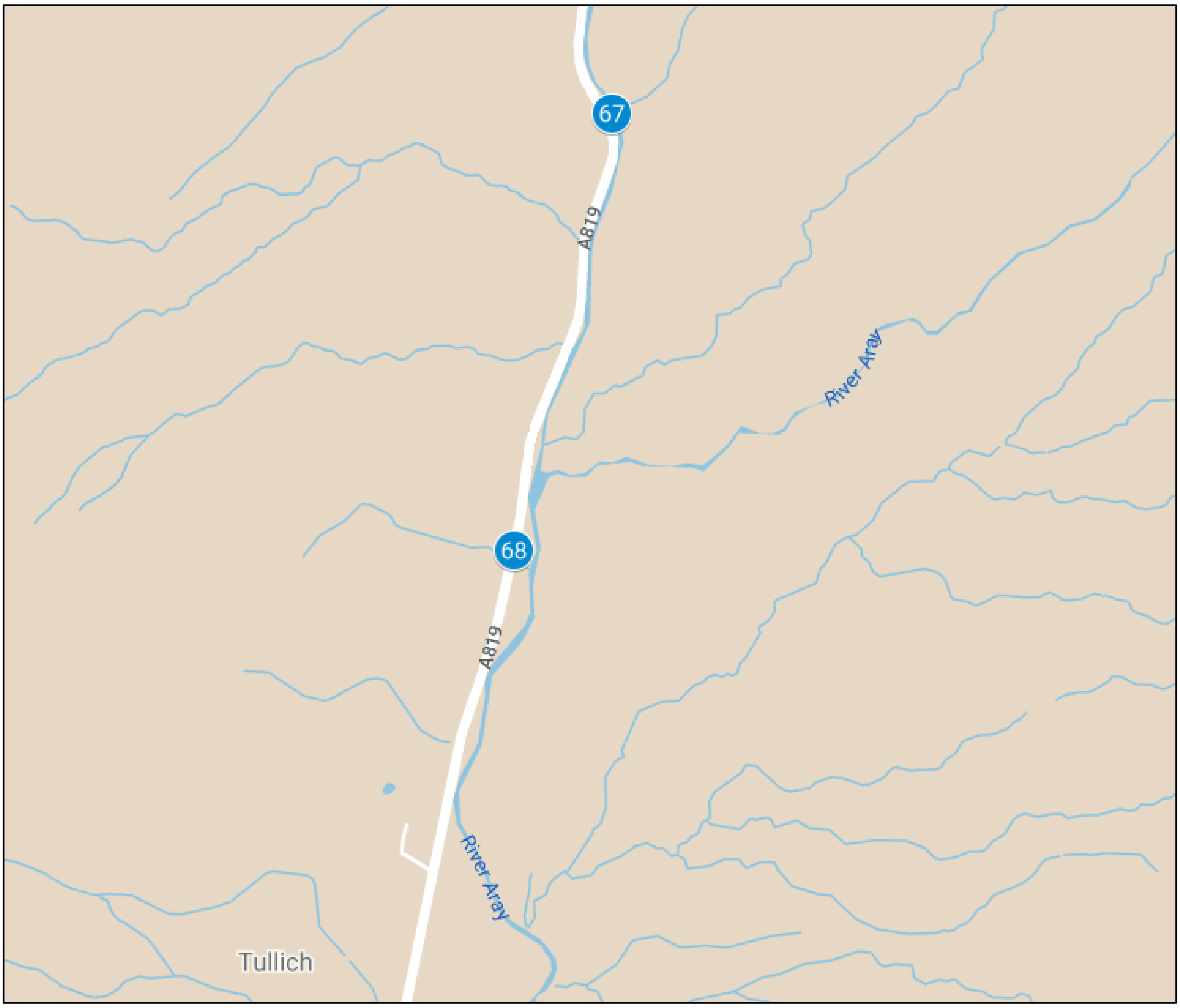
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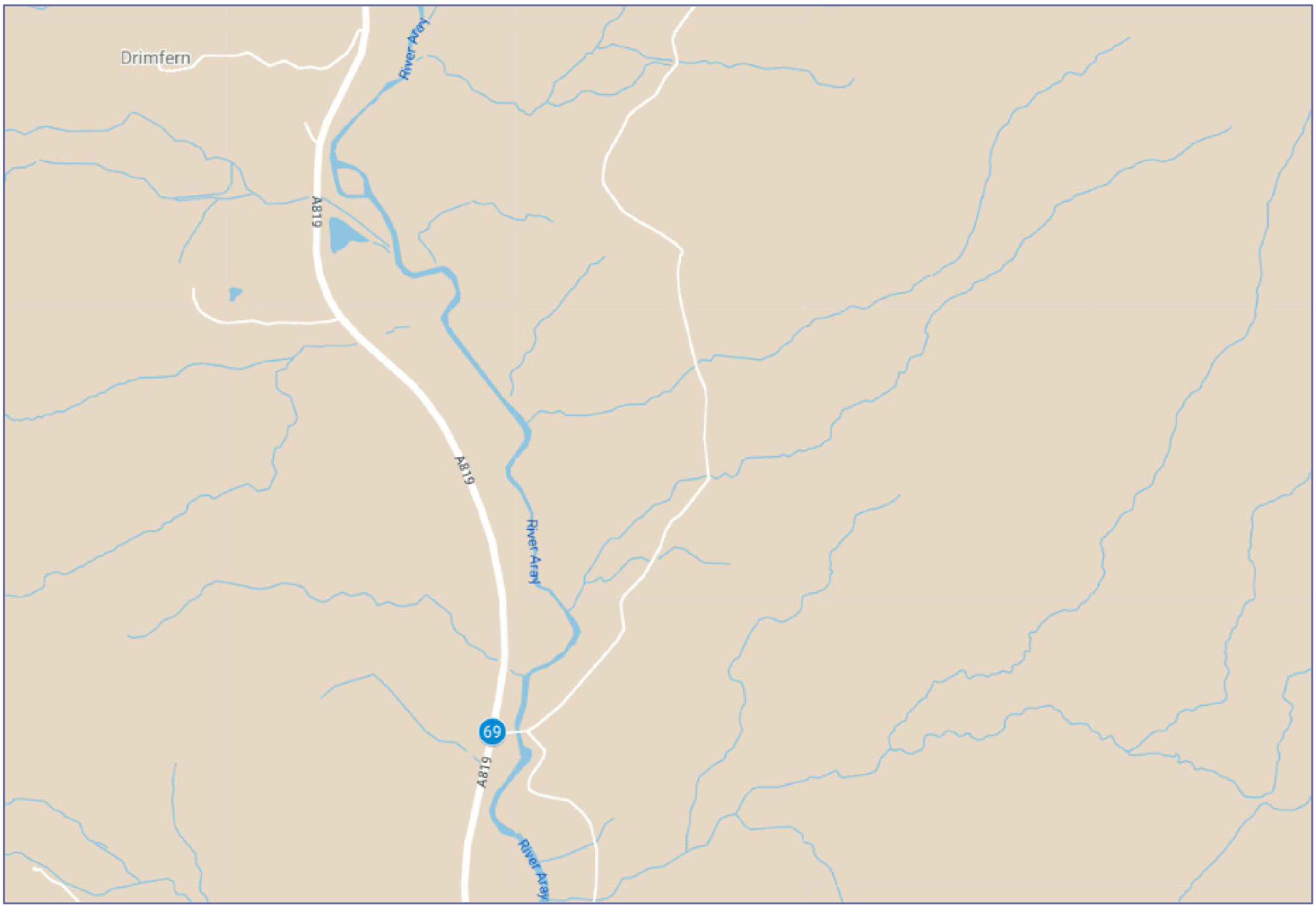
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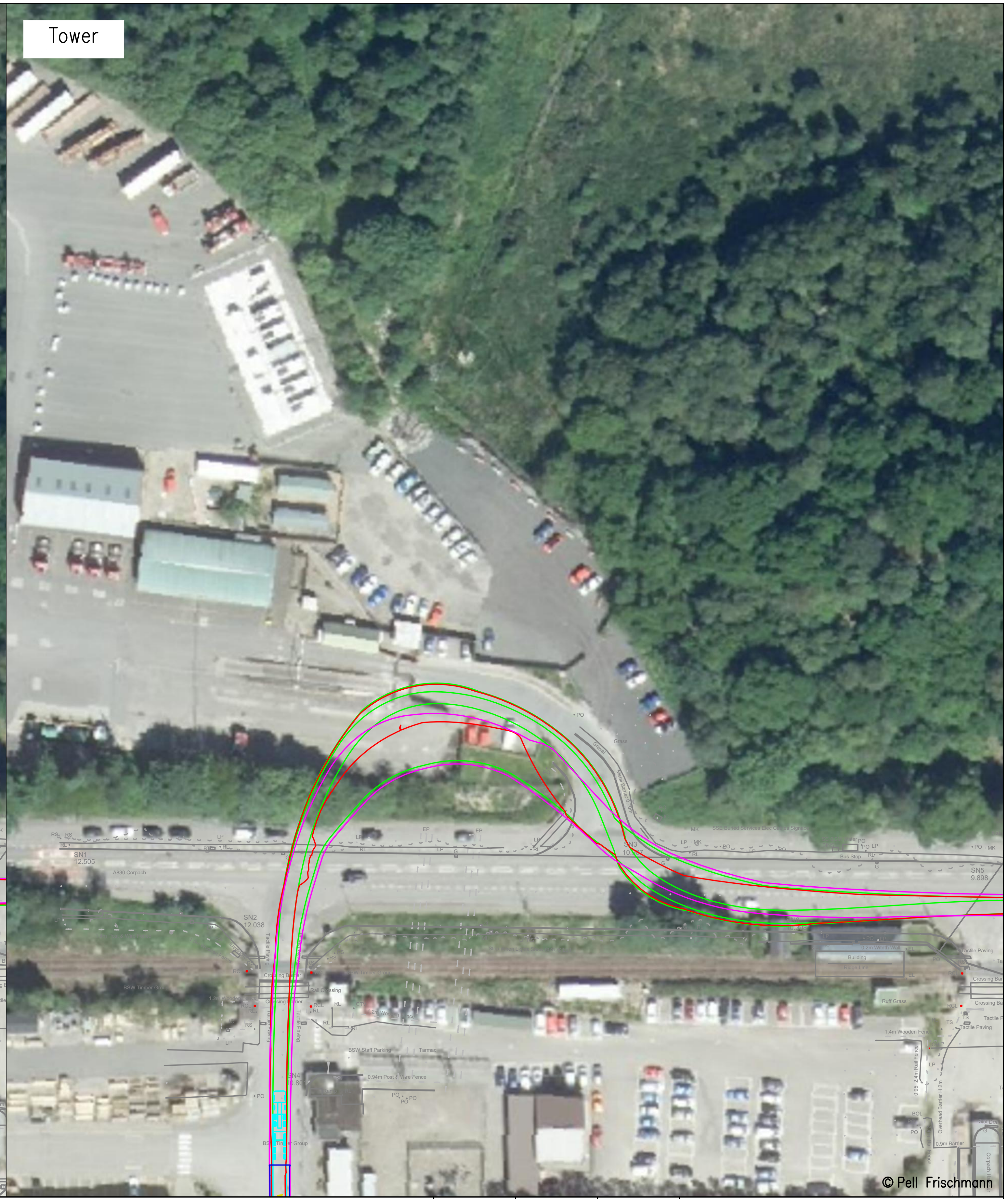
Appendix B Swept Path Assessments



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Project	Ladyfield Renewable Energy Park
Client	Ridge Clean Energy Ltd.
Drawing Title	V136 Blade and Tower
SPA Location	Corpach Harbour

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
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Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	1	

Scale: 1:1000 @ A3

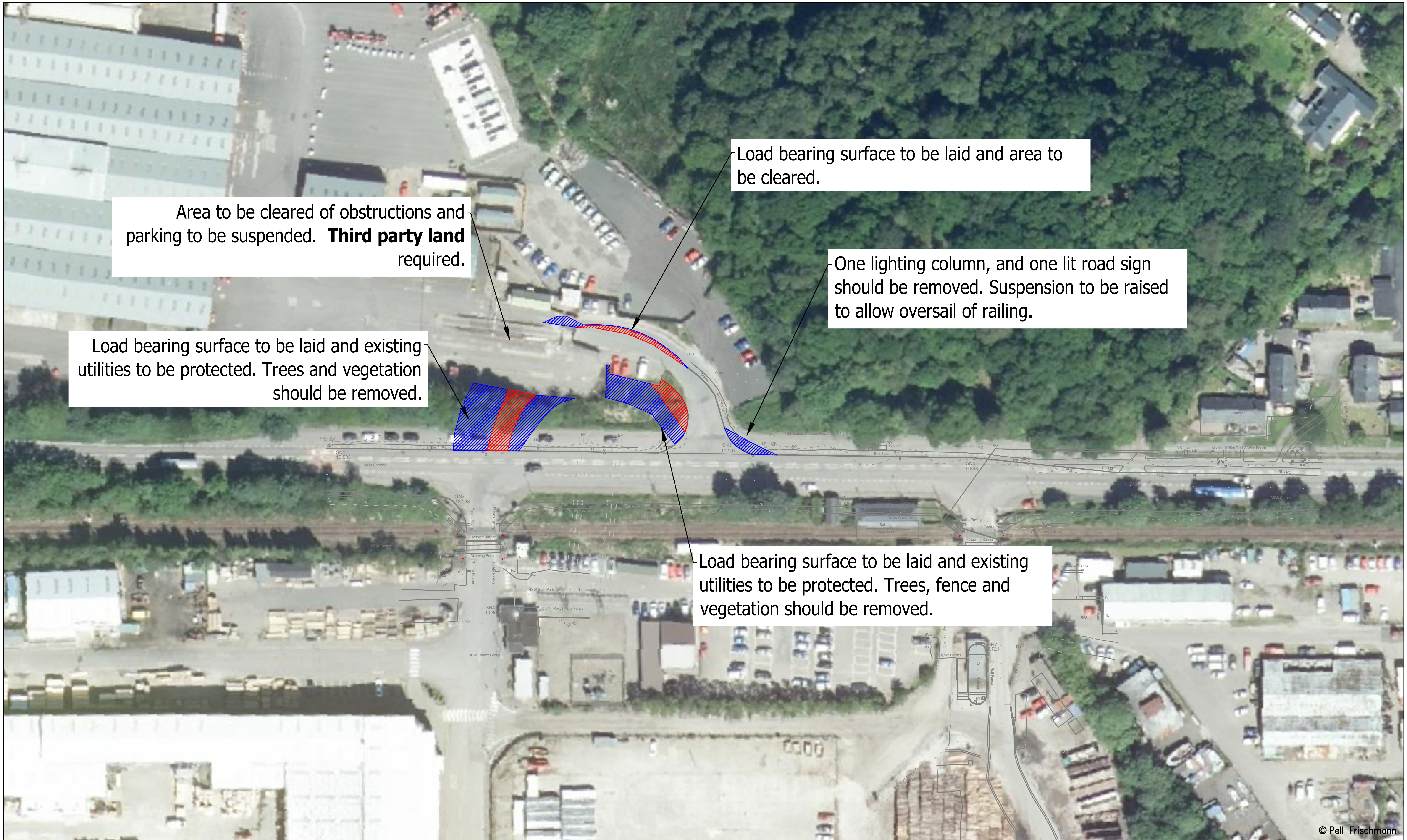
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK01

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Project: Ladyfield Renewable Energy Park

Client: Ridge Clean Energy Ltd.

Drawing Title: V136 Blade and Tower

SPA Location: Corpach Harbour

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail

	Name	Date
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Designed	TL	09/08/2023
Checked	GB	09/08/2023
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Drawing Status: Draft

Drawing No. SK01A

Notes:
1. All mitigation is subject to confirmation through a test run.
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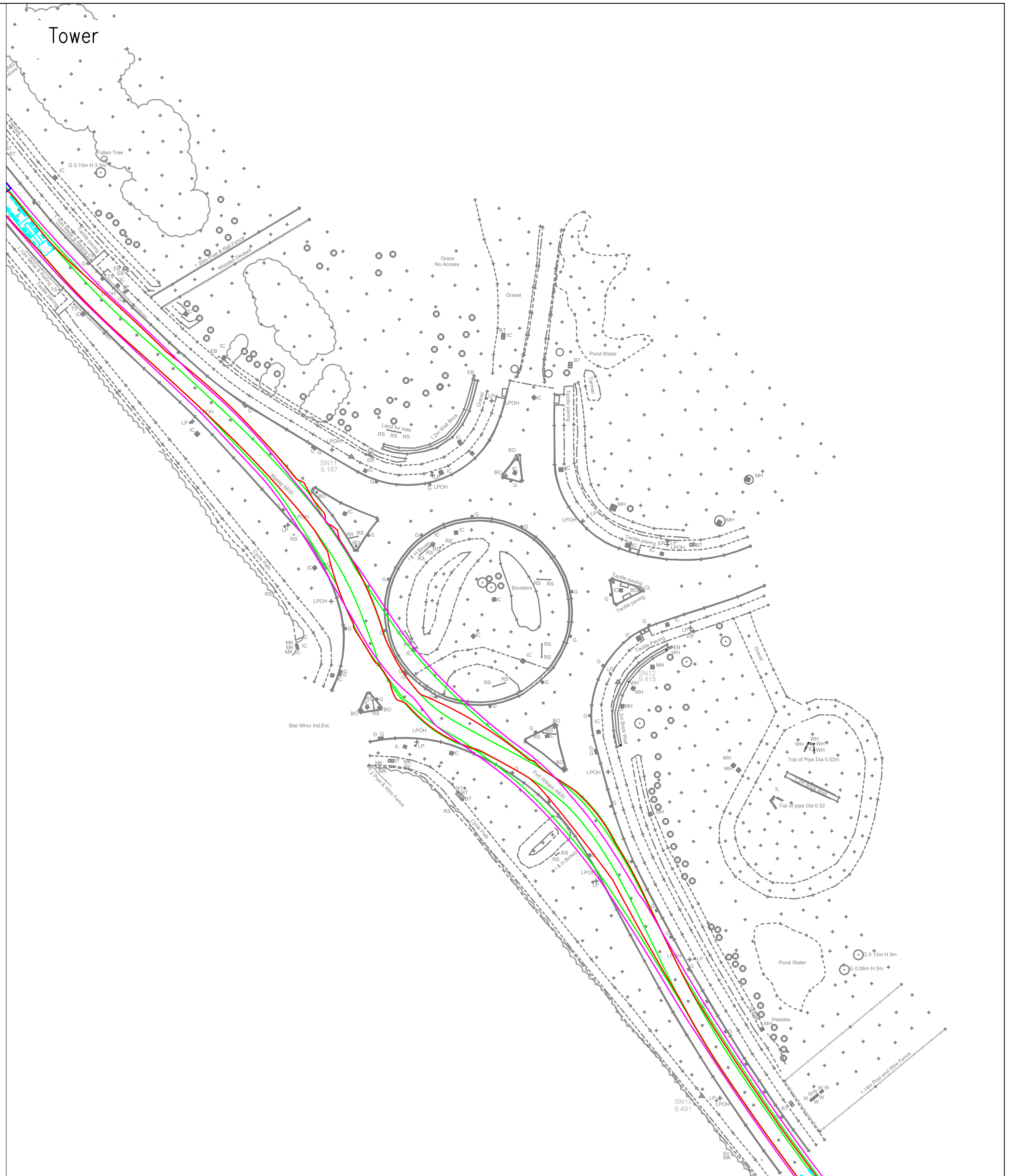
Revision: XXX

Blade

Tower



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: Blar Mhor Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
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Drawing Status: Draft

Drawing No. SK02

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1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

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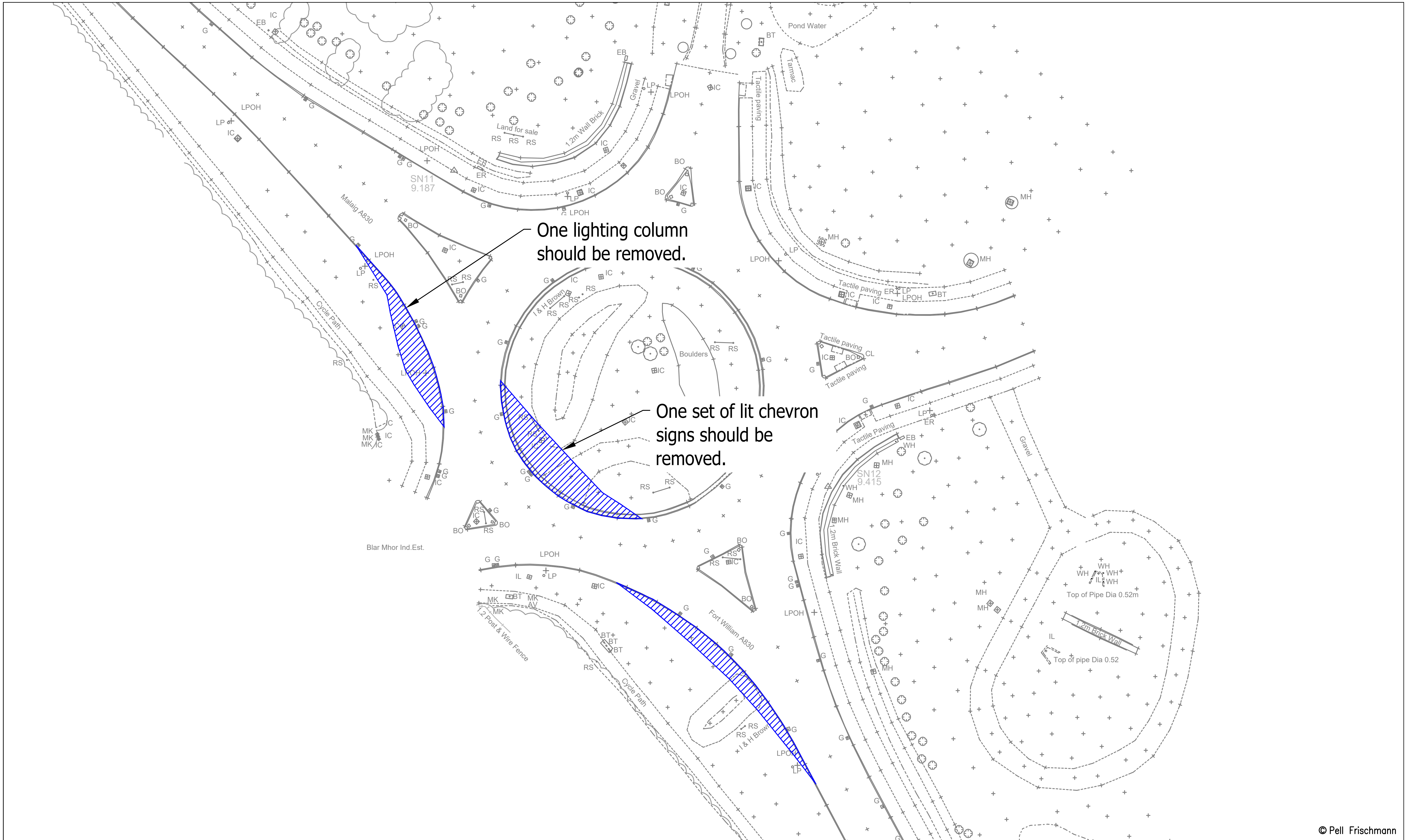

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: Blar Mhor Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		3

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File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK02A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

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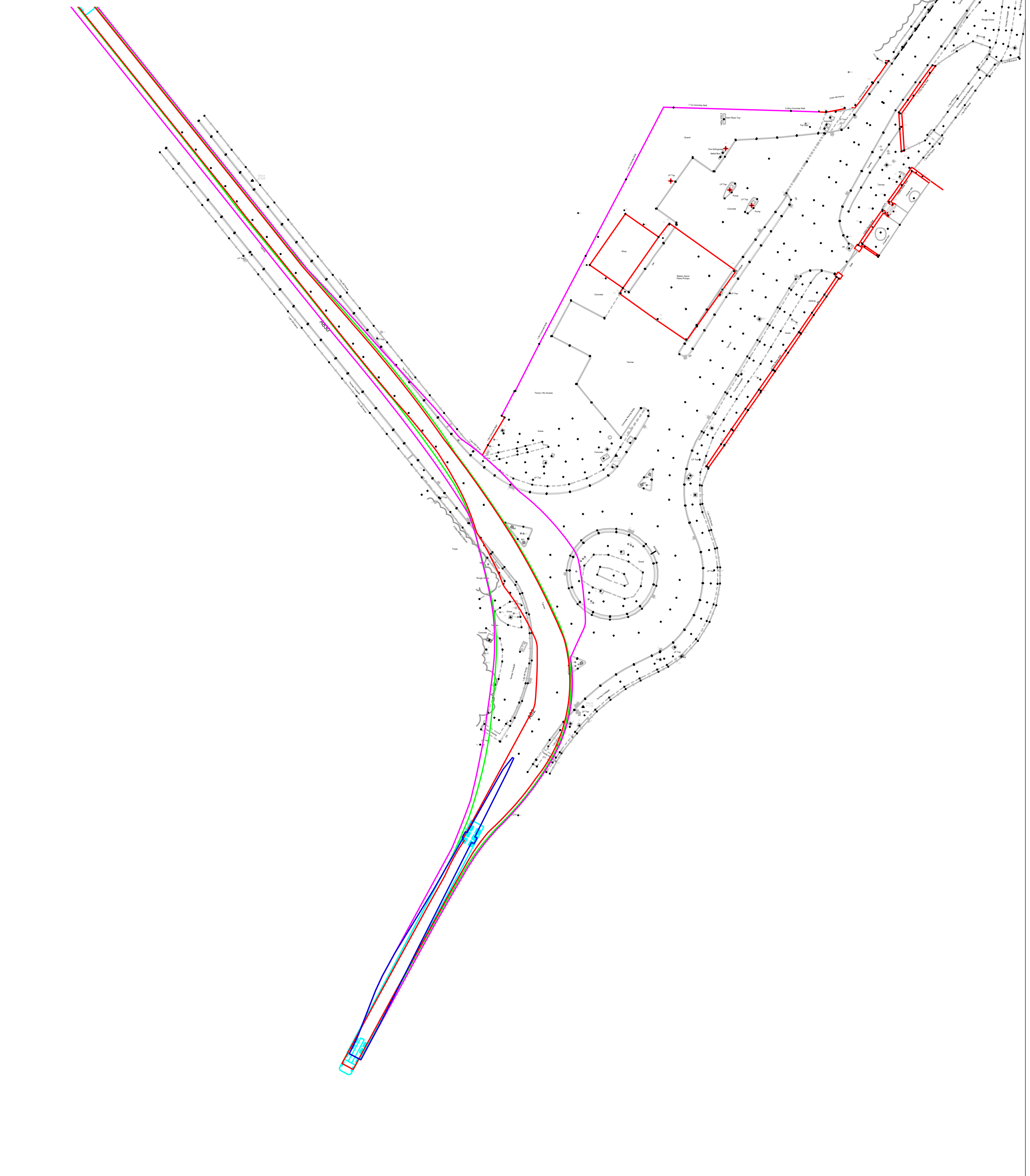

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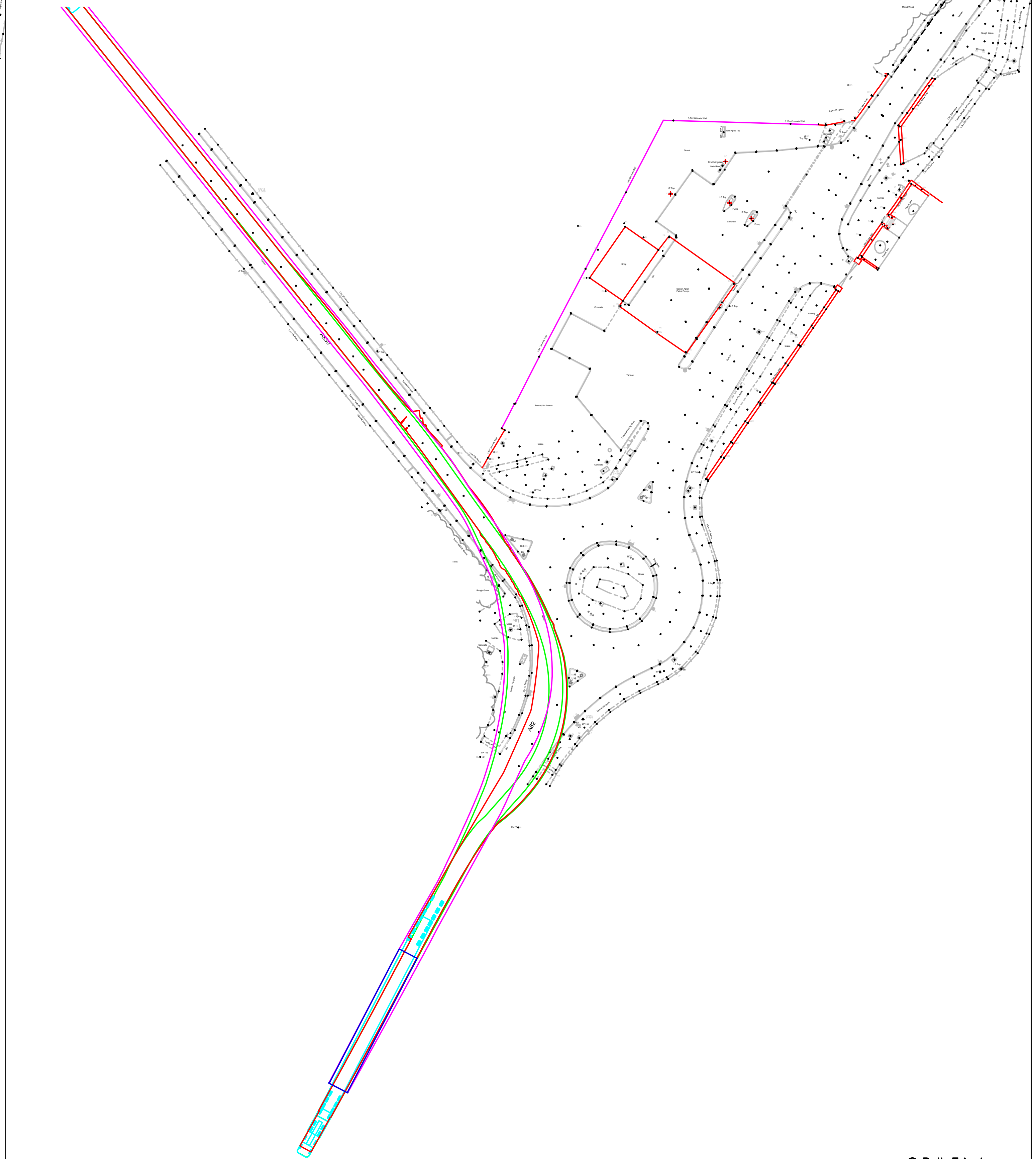

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over−run | Over−sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A830 / A82 Roundabout

	Name	Date
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Designed	TL	09/08/2023
Checked	GB	09/08/2023
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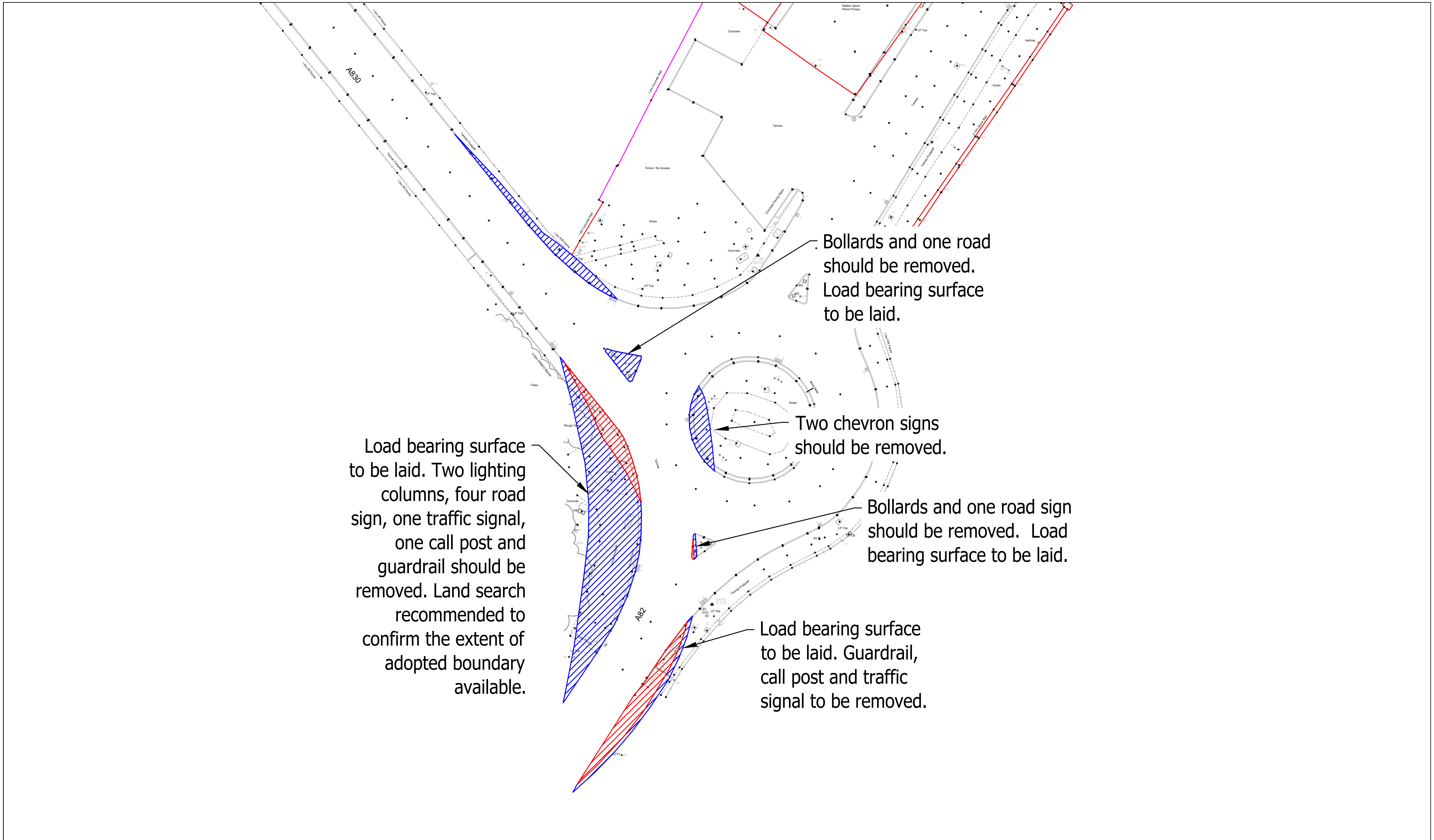
Drawing Status: Draft

Drawing No. SK03

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A830 / A82 Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		4

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

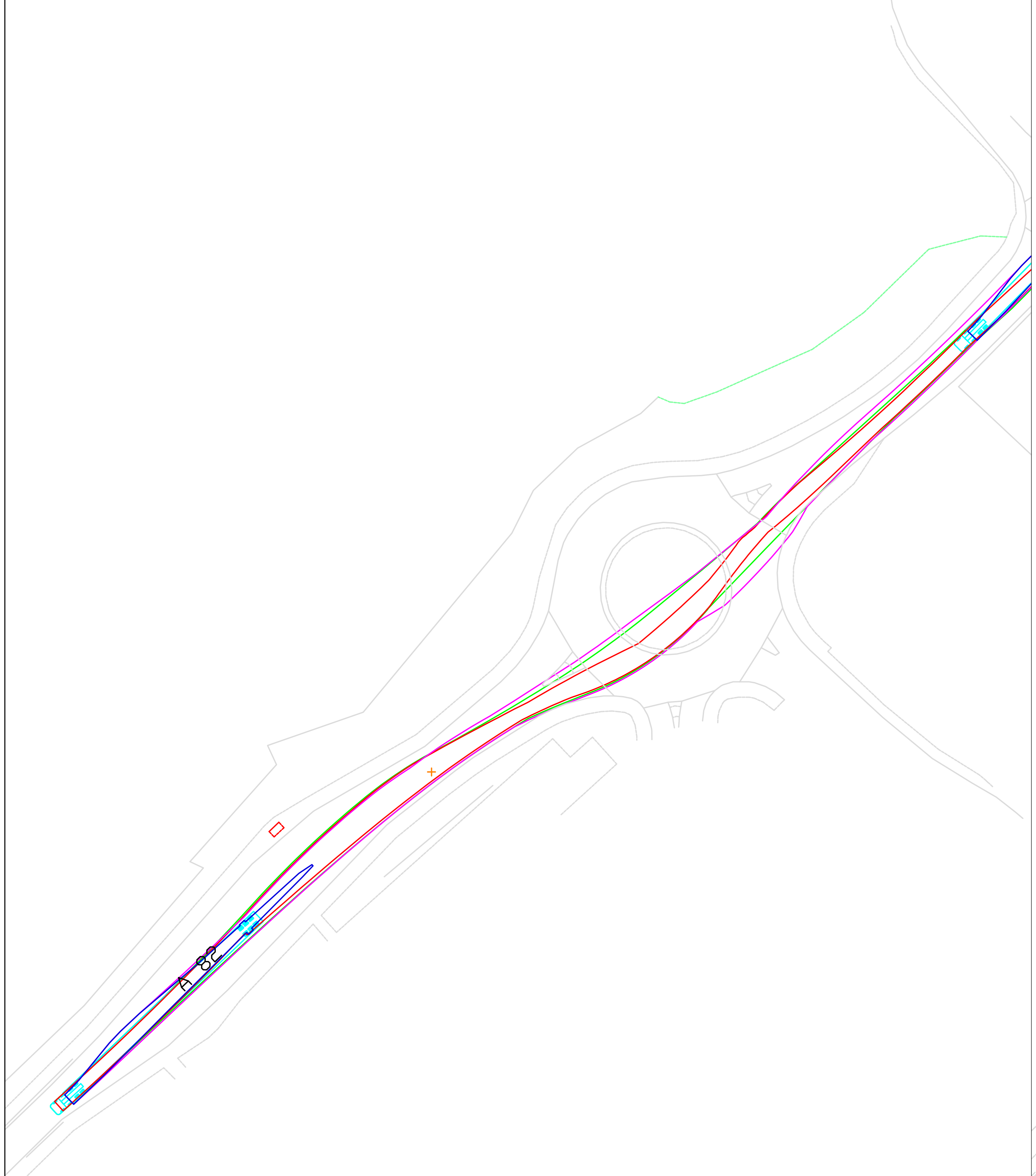
Drawing Status: Draft

Drawing No. SK03A

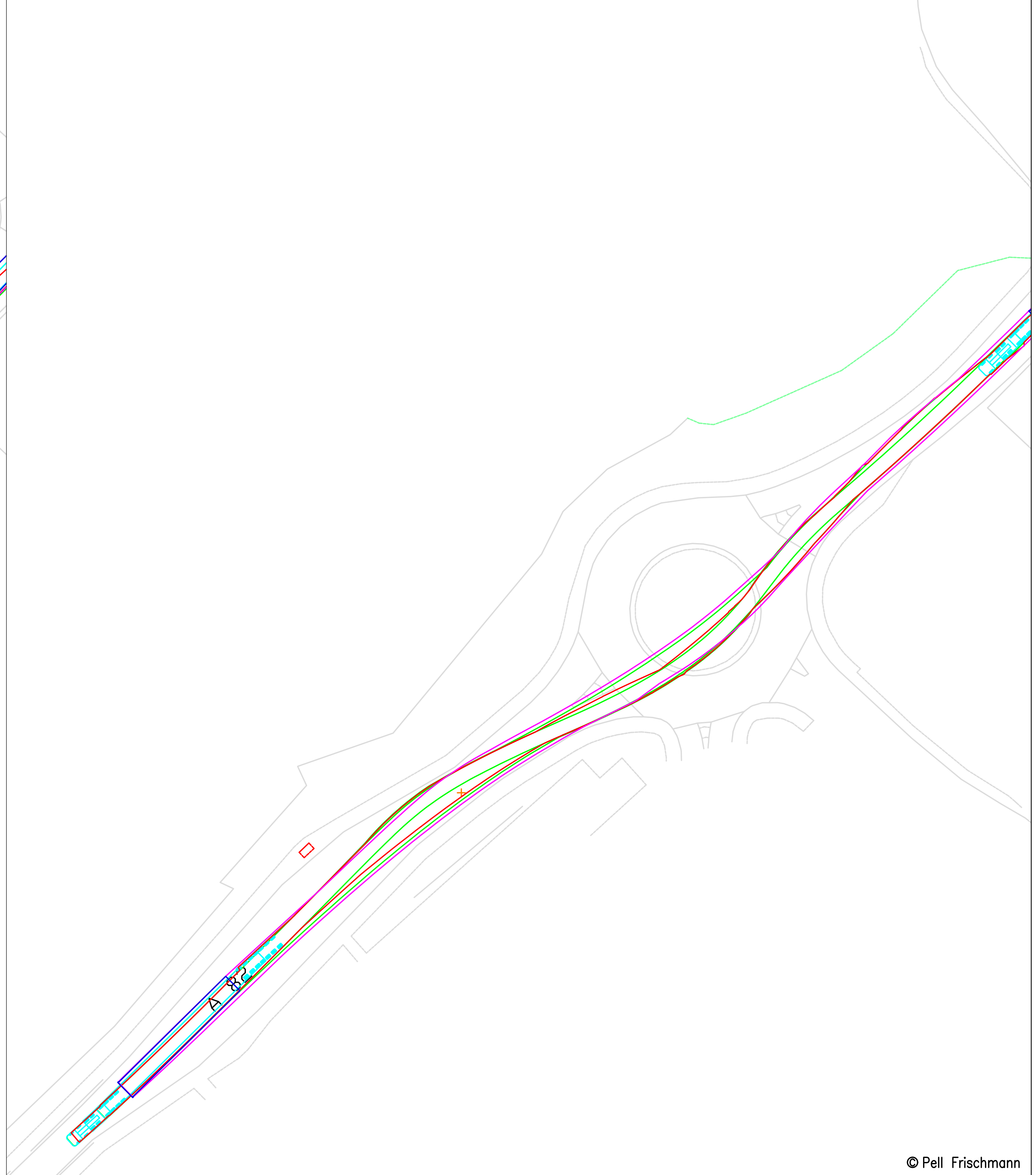
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower



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www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 / North Road Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		5

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK04

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

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Client	Ridge Clean Energy Ltd.
Project	Ladyfield Renewable Energy Park
Drawing Title	V136 Blade and Tower
SPA Location	A82 / North Road Roundabout

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	5	

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK04A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

Tower

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: Belford Road Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		6

Scale: 1:1000 @ A3

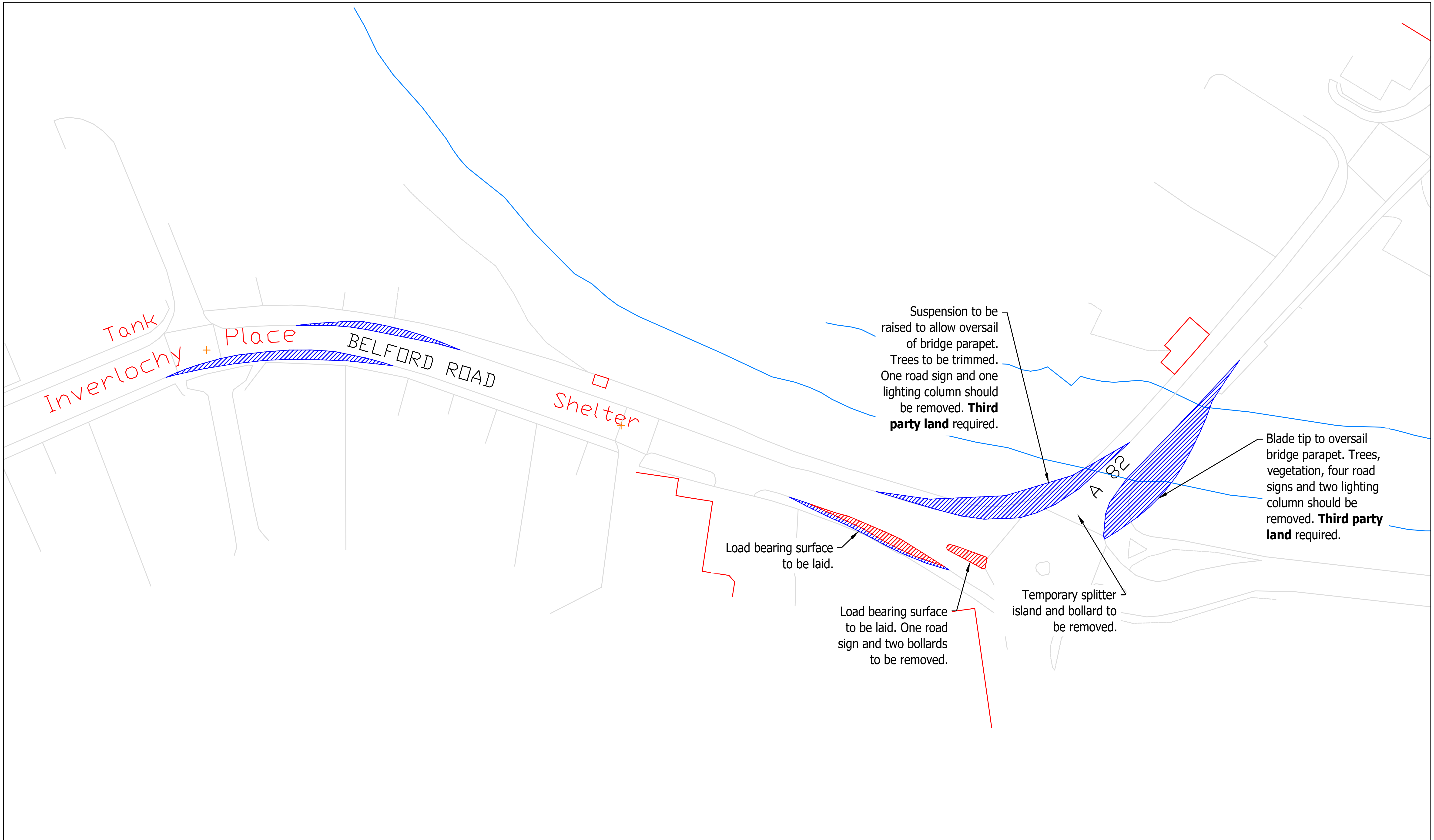
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK05

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: Belford Road Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		6

Scale: 1:750 @ A3

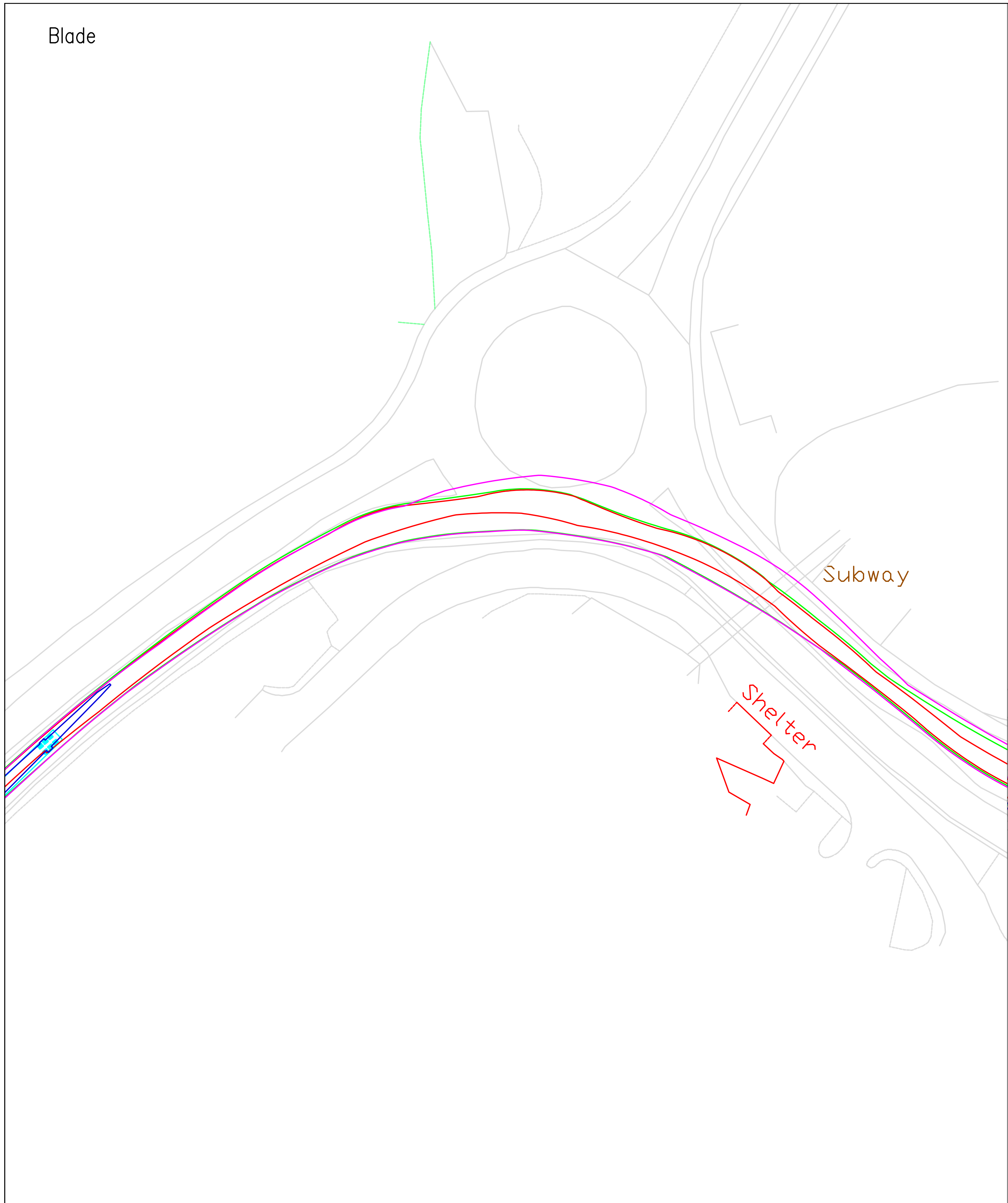
File No. 230725 Ladyfield V136 SPA.dwg

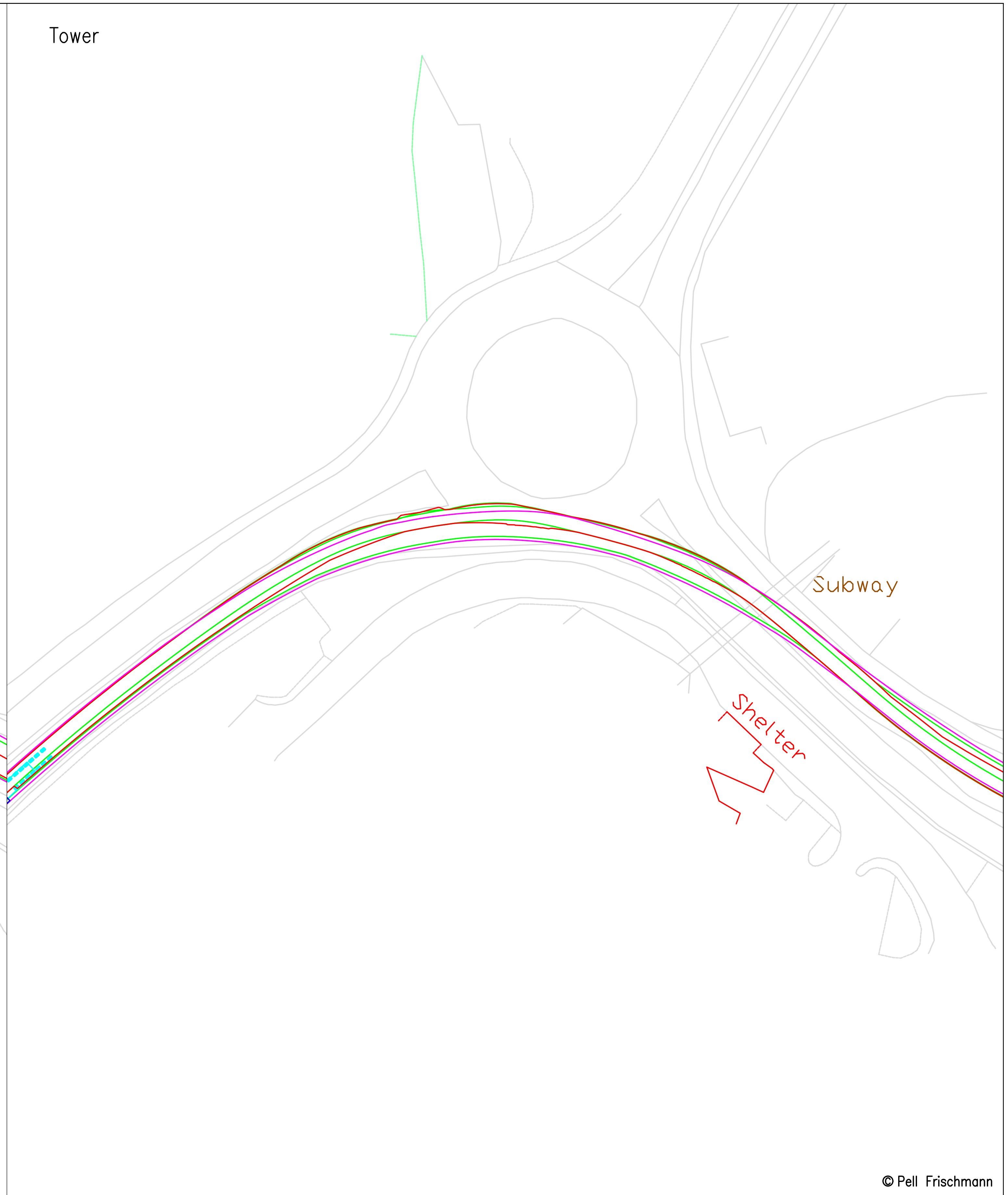
Drawing Status: Draft

Drawing No. SK05A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: Belford Road / A82 Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		7

Scale: 1:1000 @ A3

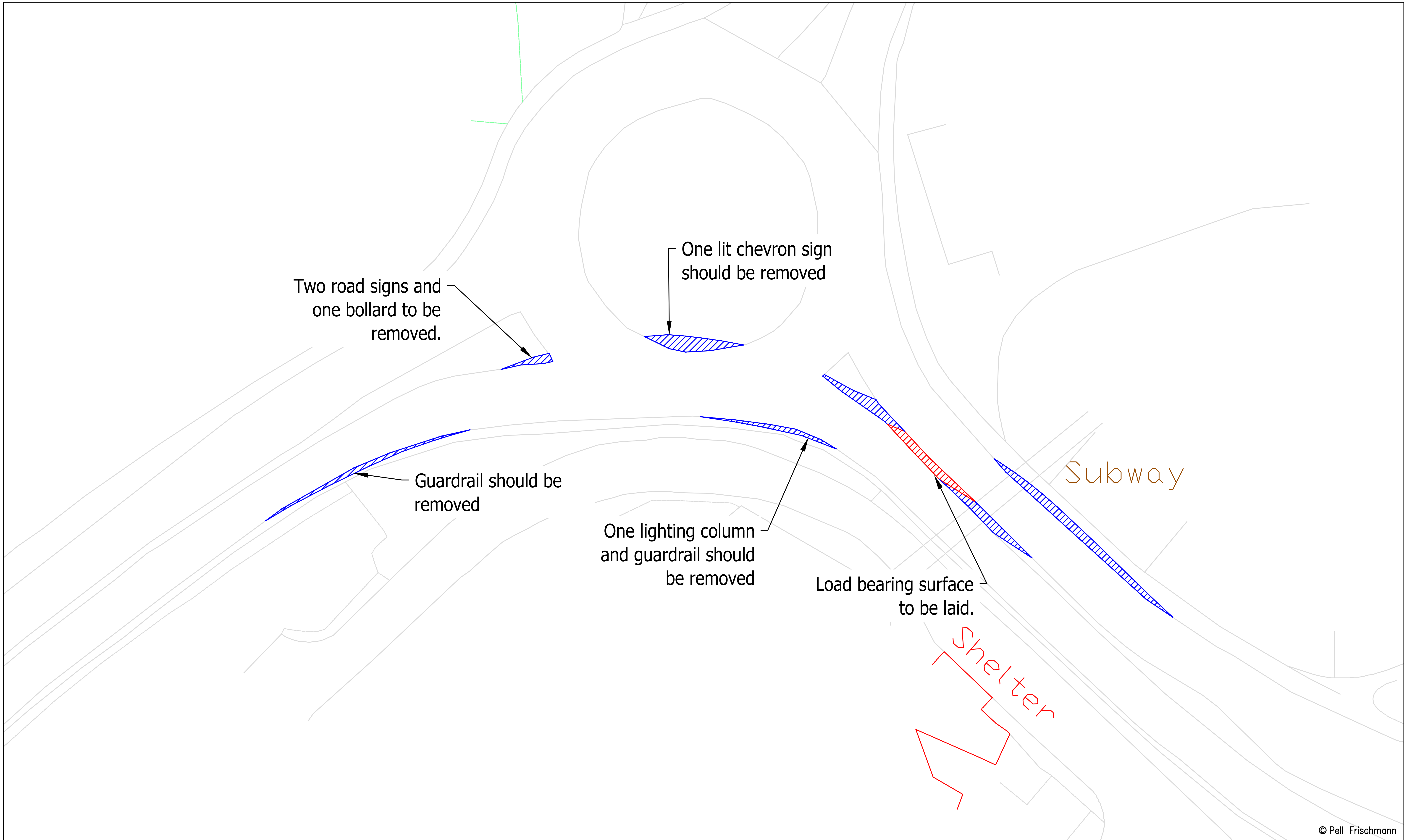
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK06

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: Belford Road / A82 Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		7

Scale: 1:500 @ A3

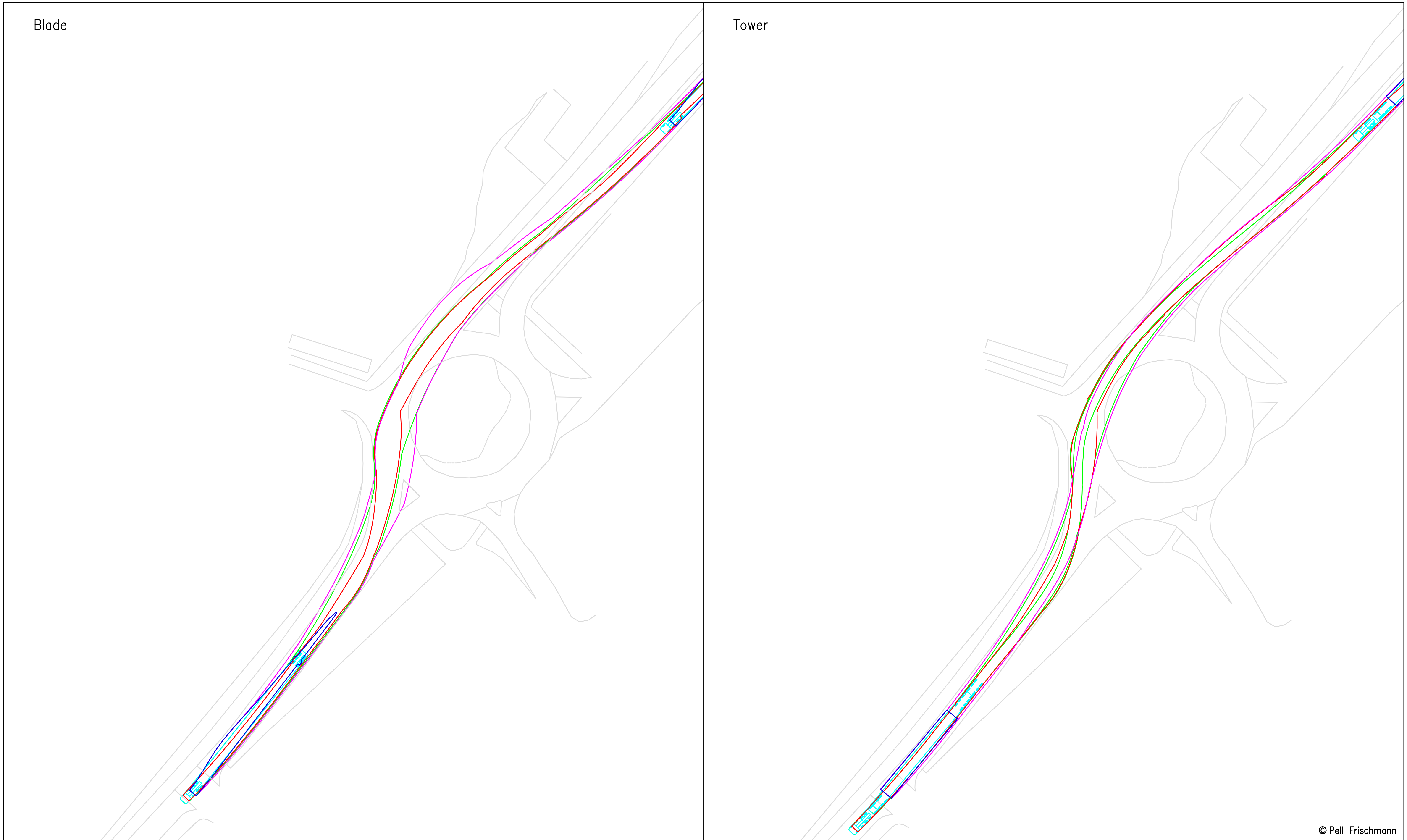
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK06A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: W End Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		8

Scale: 1:1000 @ A3

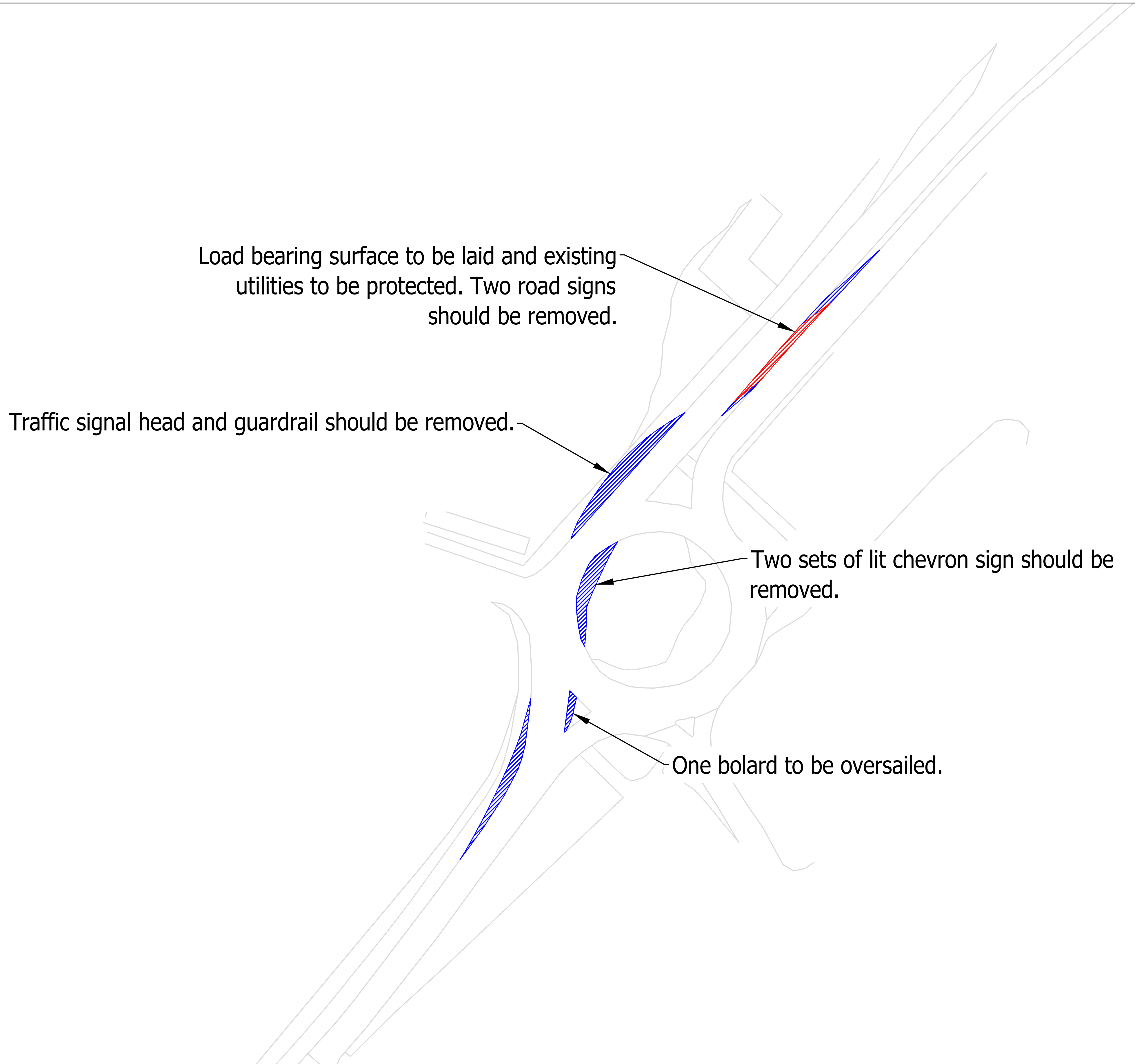
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK07

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Project: Ladyfield Renewable Energy Park

Client: Ridge Clean Energy Ltd.

Drawing Title: V136 Blade and Tower

SPA Location: W End Roundabout

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	8	

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK07A

Notes:
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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Southwest of Drimarben

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		10

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK08

Notes:
1. All mitigation is subject to confirmation through a test run.
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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Southwest of Drimarben

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		10

Scale: 1:1000 @ A3

File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK08A

Notes:
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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Southwest of Drimarben

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		10

Scale: 1:1000 @ A3

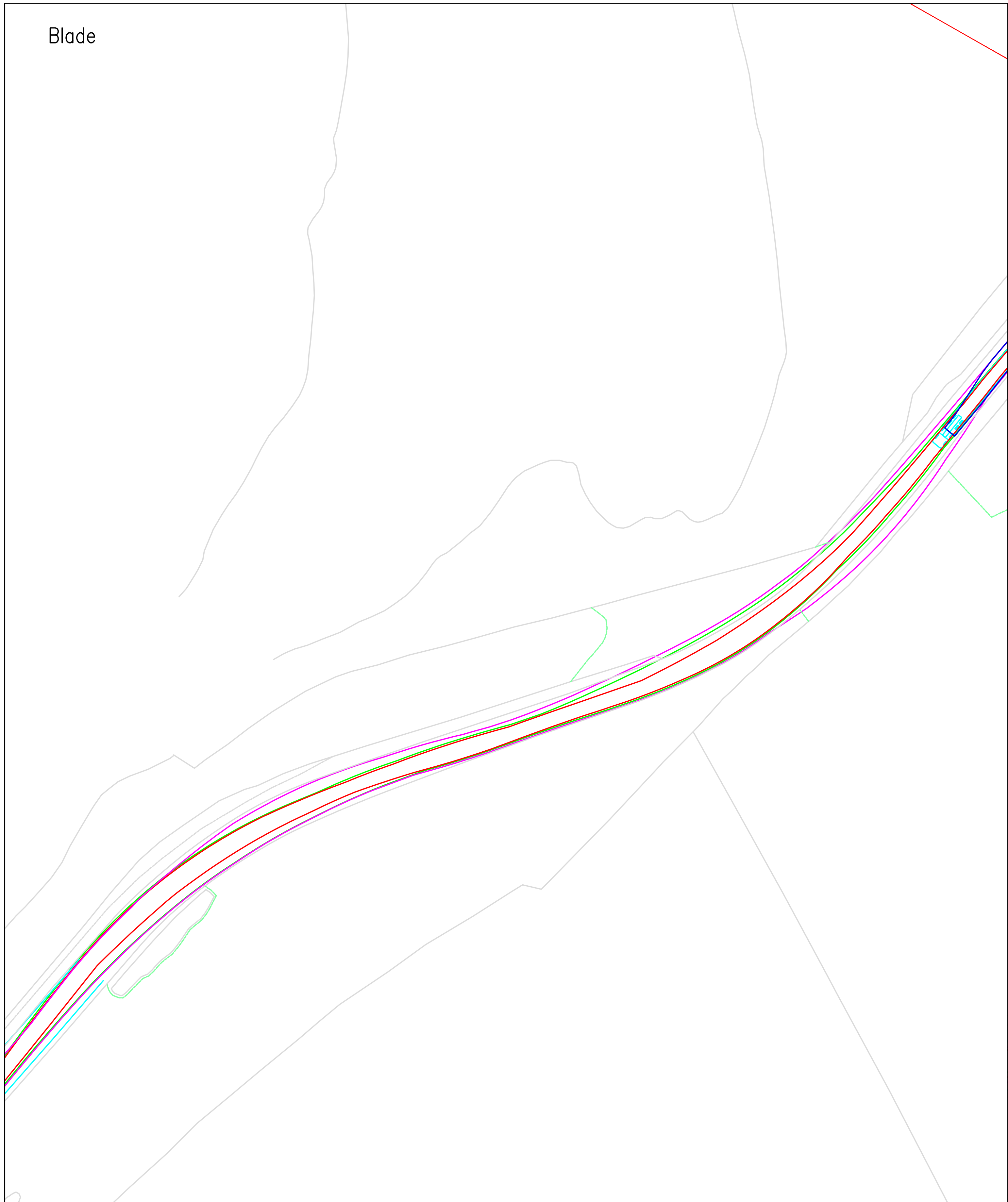
File No.: 230725 Ladyfield V136 SPA.dwg

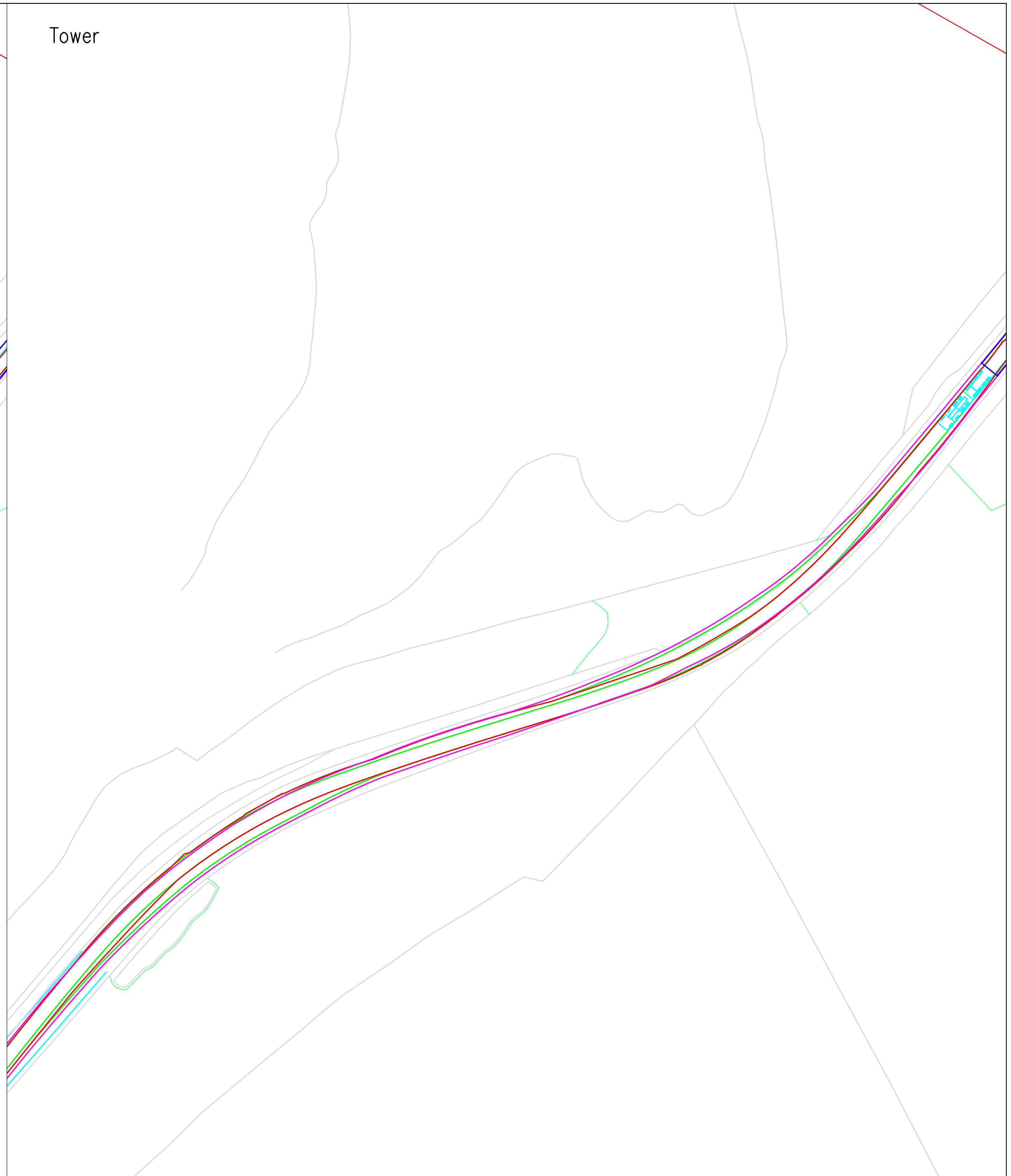
Drawing Status: Draft

Drawing No.: SK08B

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 South of River Kiachnish

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		11

Scale: 1:1000 @ A3

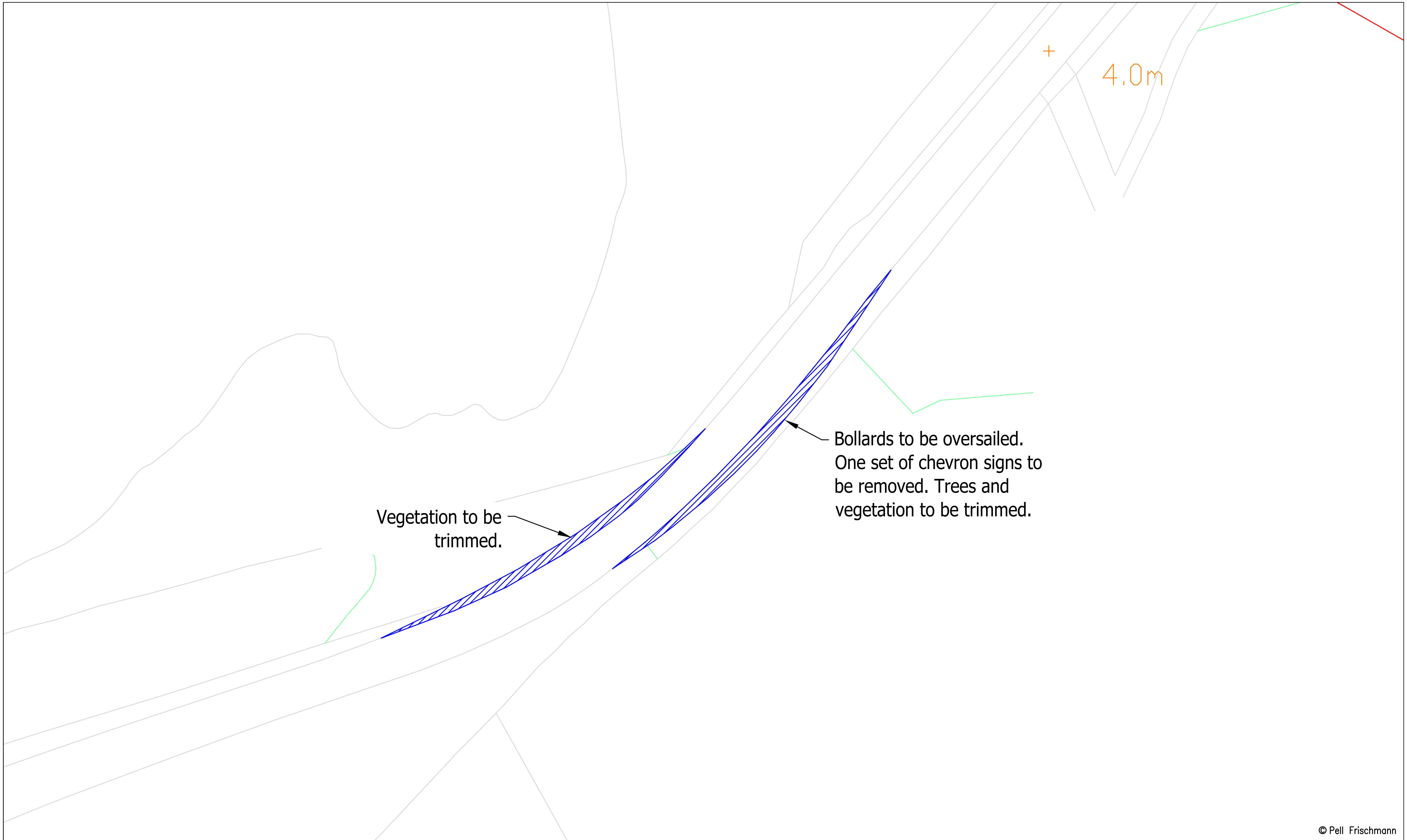
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK09

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 South of River Kiachnish

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		11

Scale: 1:500 @ A3

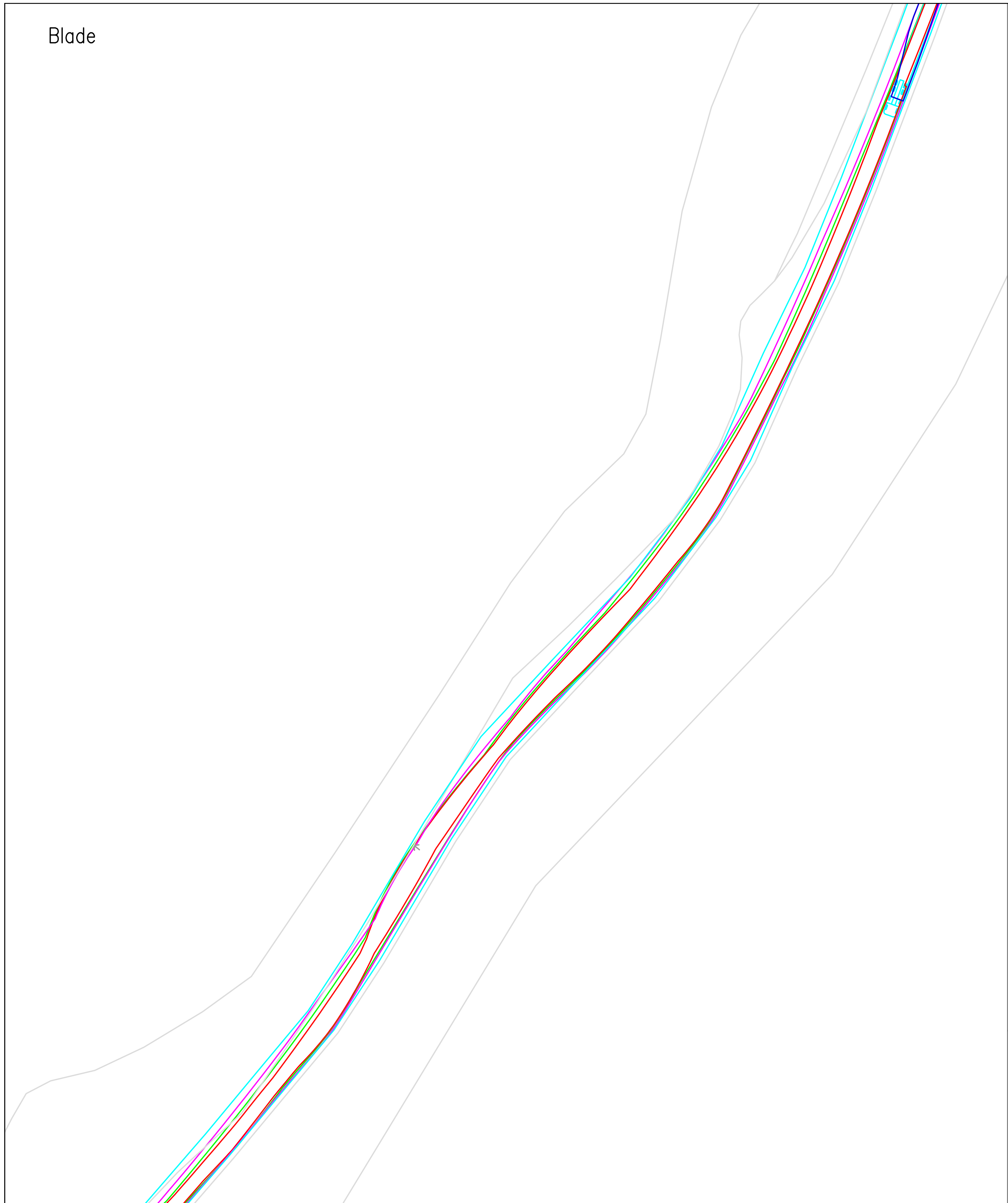
File No.: 230725 Ladyfield V136 SPA.dwg

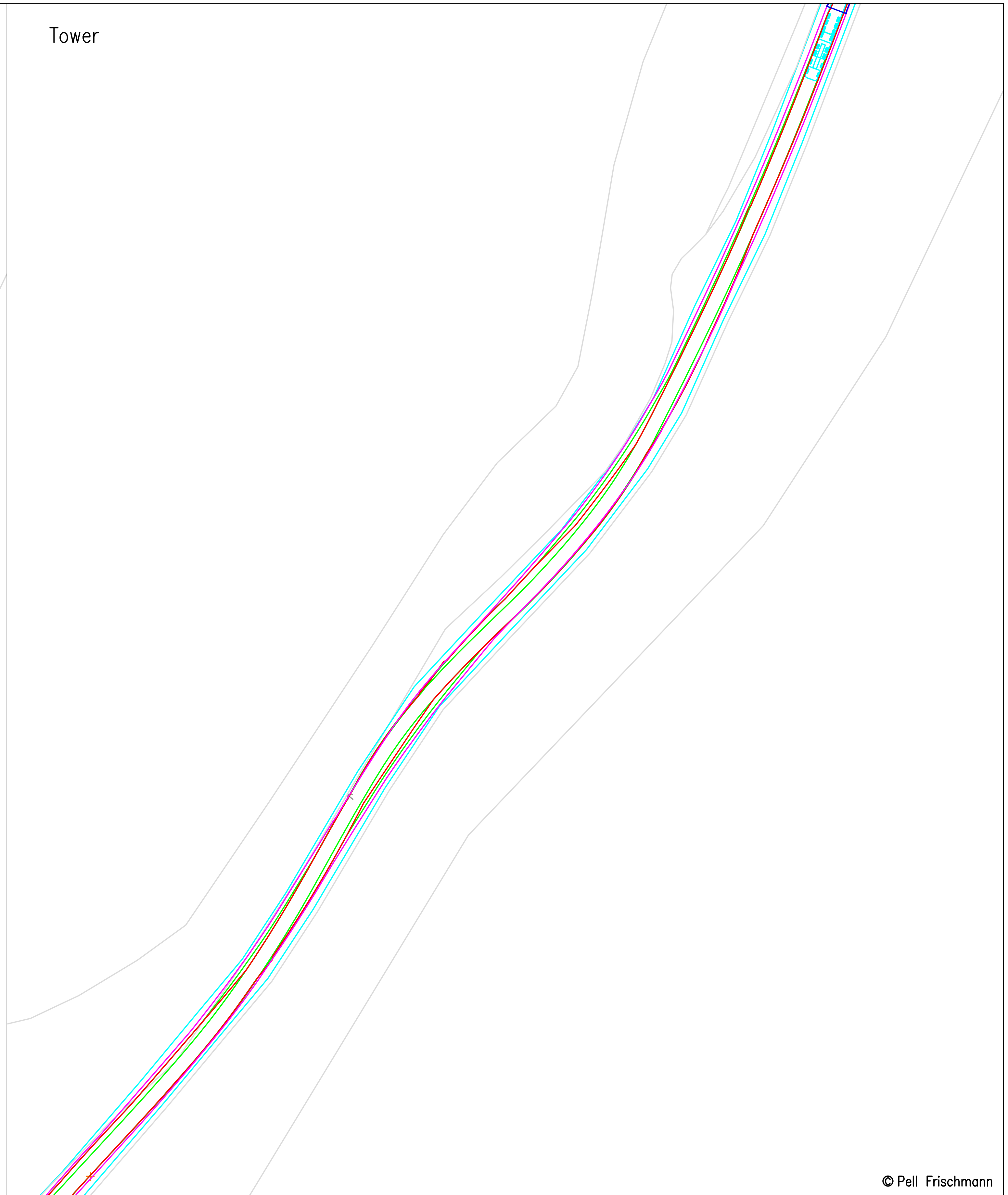
Drawing Status: Draft

Drawing No.: SK09A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 North of Corrychurrachan

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		12

Scale: 1:1000 @ A3

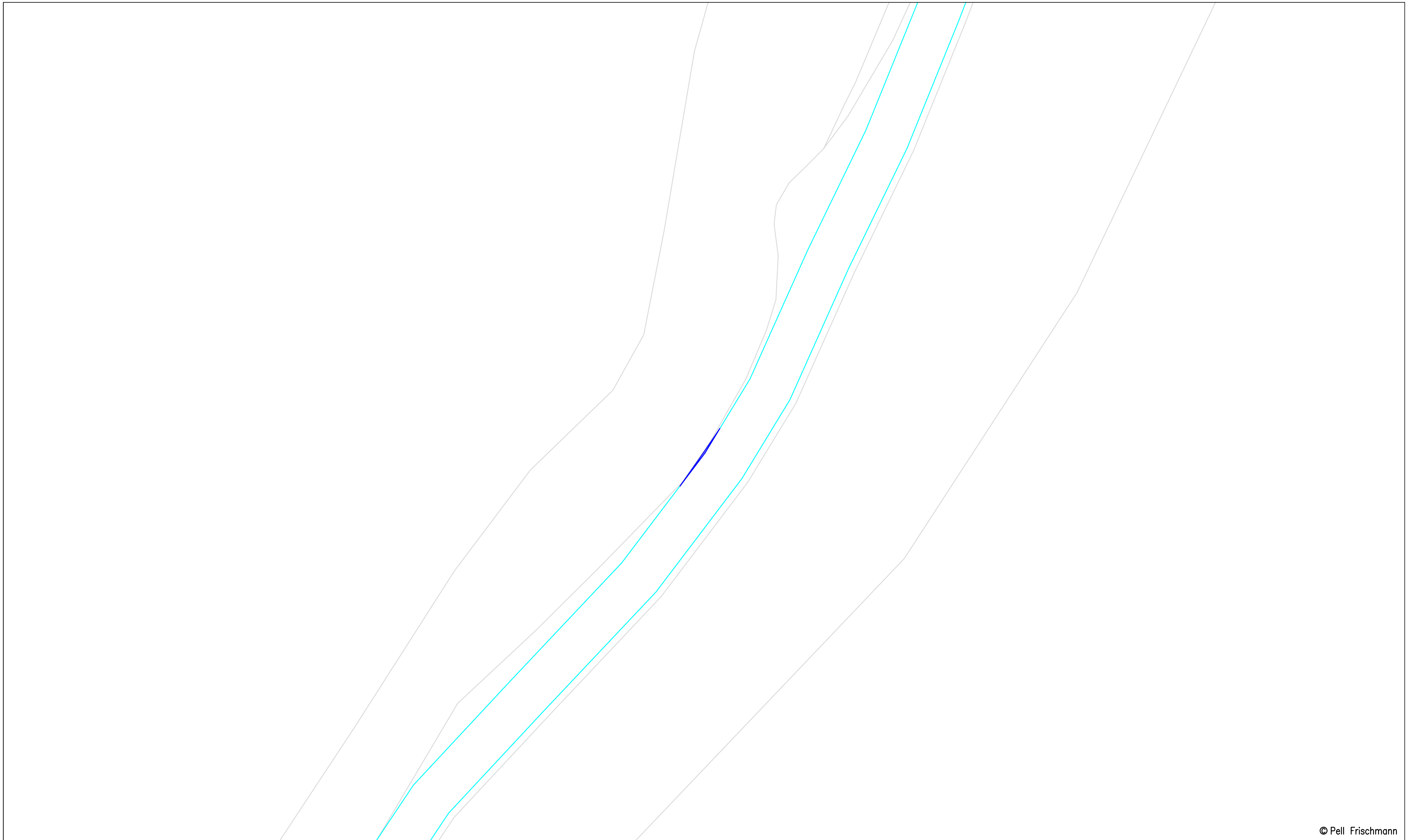
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK10

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 North of Corrychurrachan

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		12

Scale: 1:500 @ A3

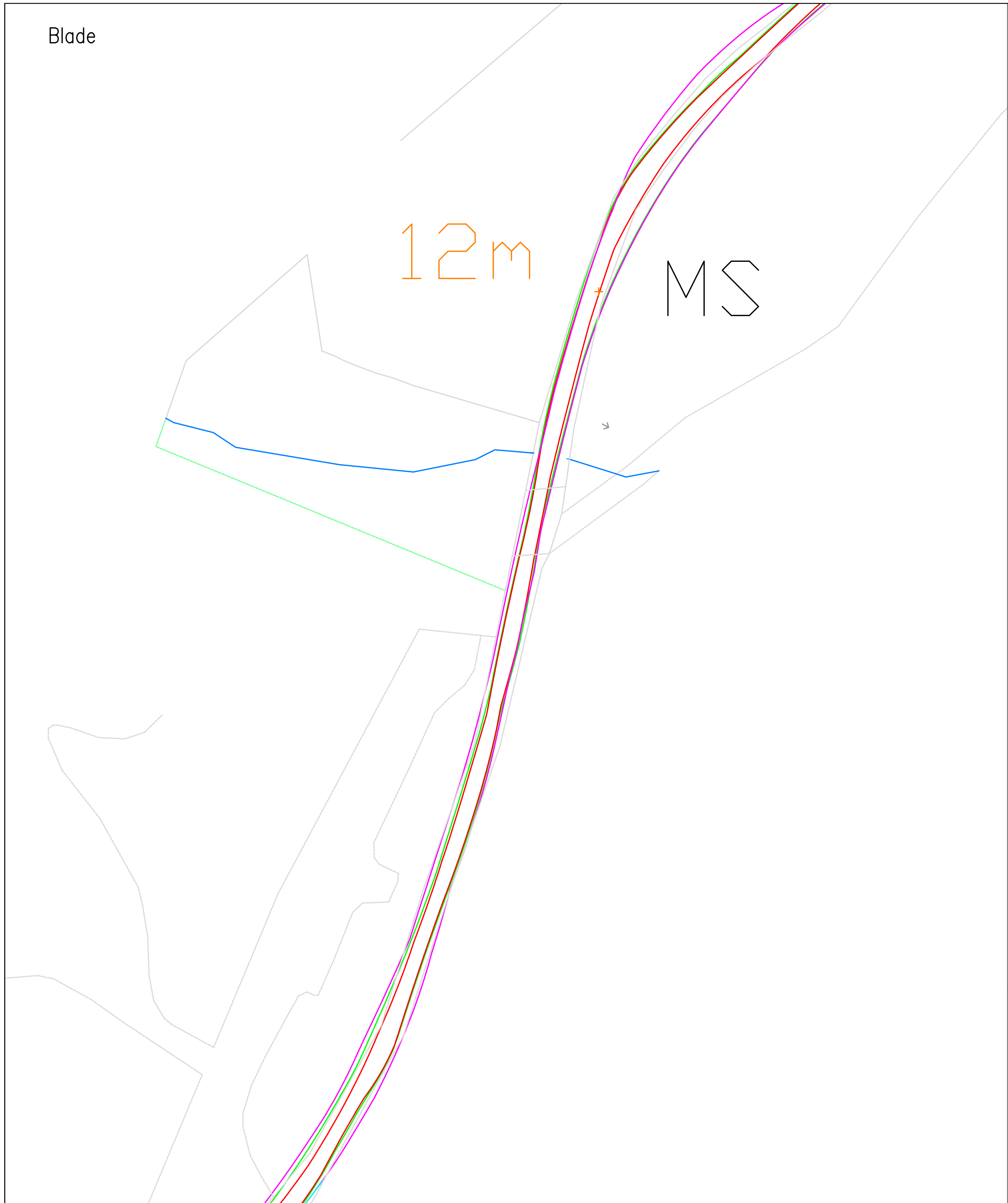
File No. 230725 Ladyfield V136 SPA.dwg

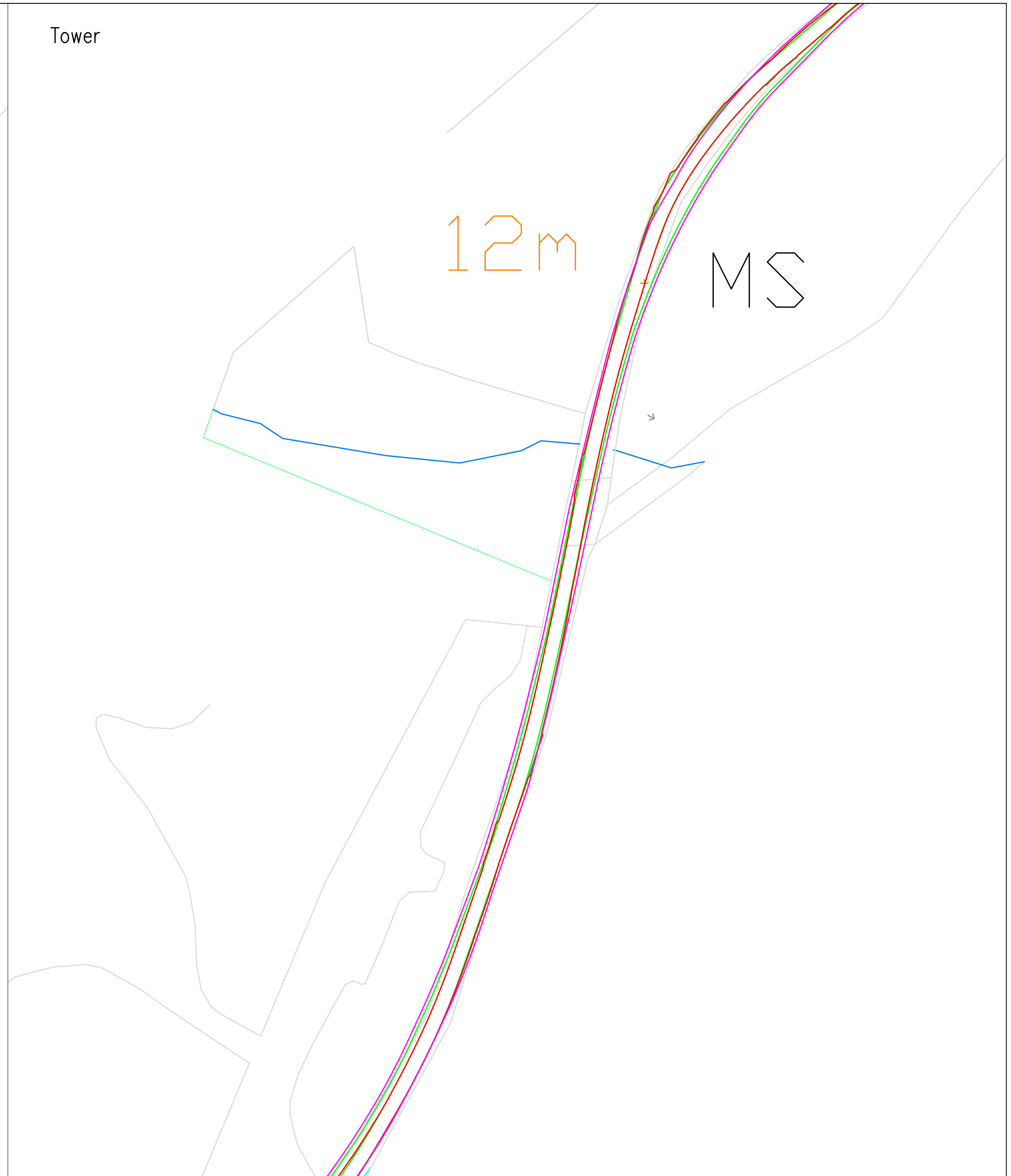
Drawing Status: Draft

Drawing No. SK10A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Corrychurrachan

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	13	

Scale: 1:1000 @ A3

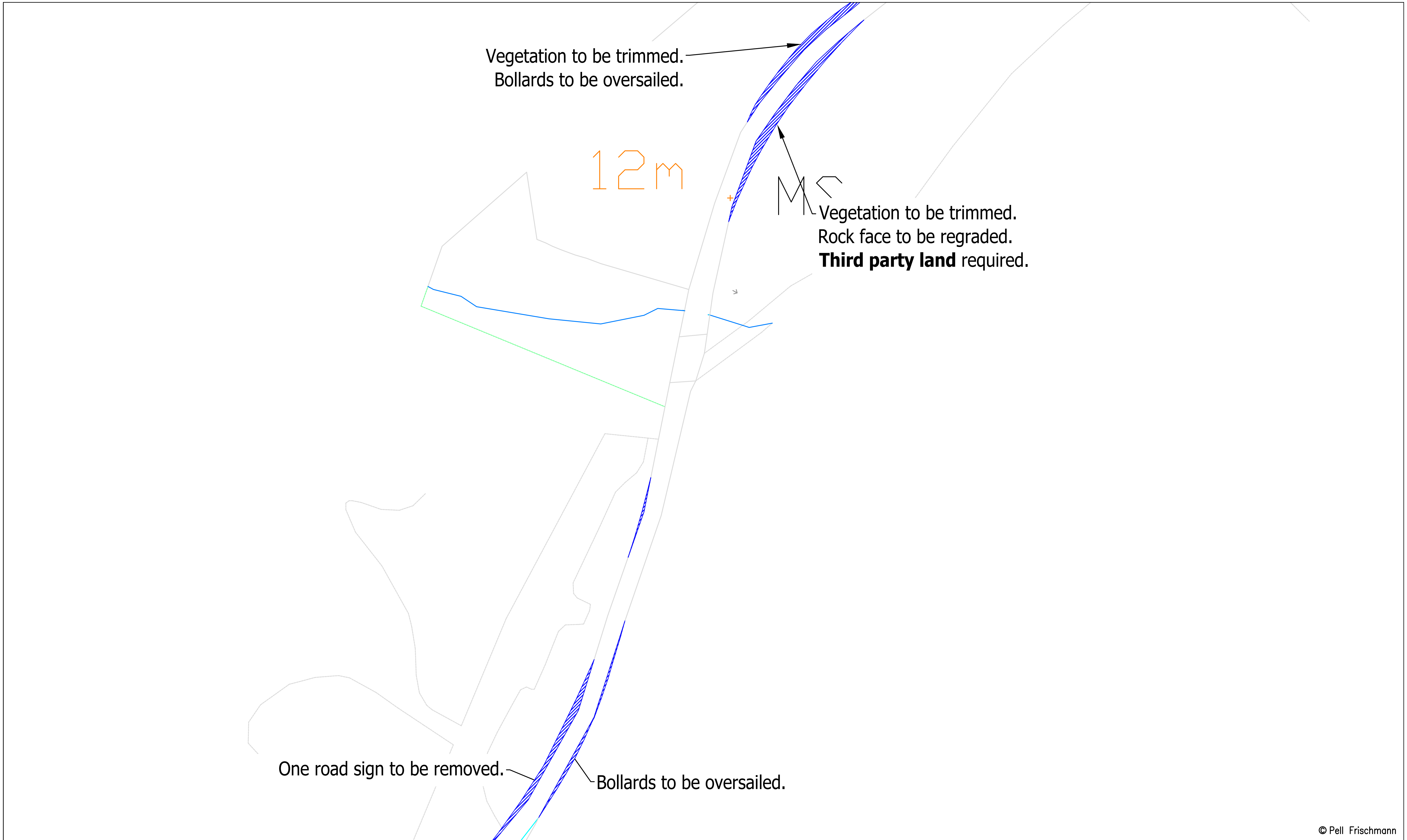
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK11

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Project	Ladyfield Renewable Energy Park		
Client	Ridge Clean Energy Ltd.	Drawing Title	V136 Blade and Tower
Key	Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail	SPA Location	A82 Corrychurrachan

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		13

Scale: 1:1000 @ A3

File No.: 230725 Ladyfield V136 SPA.dwg

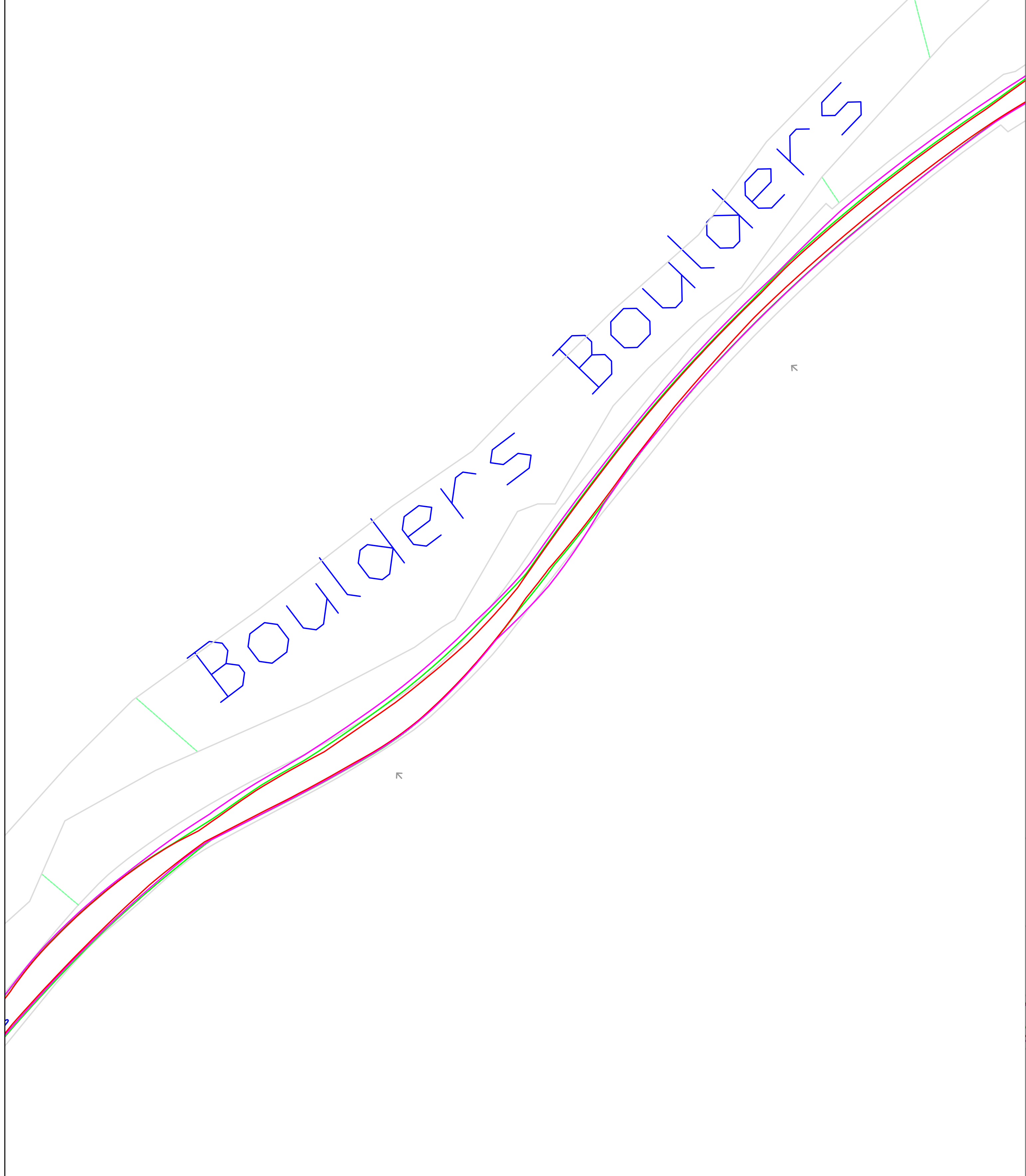
Drawing Status: Draft

Drawing No.: SK11A

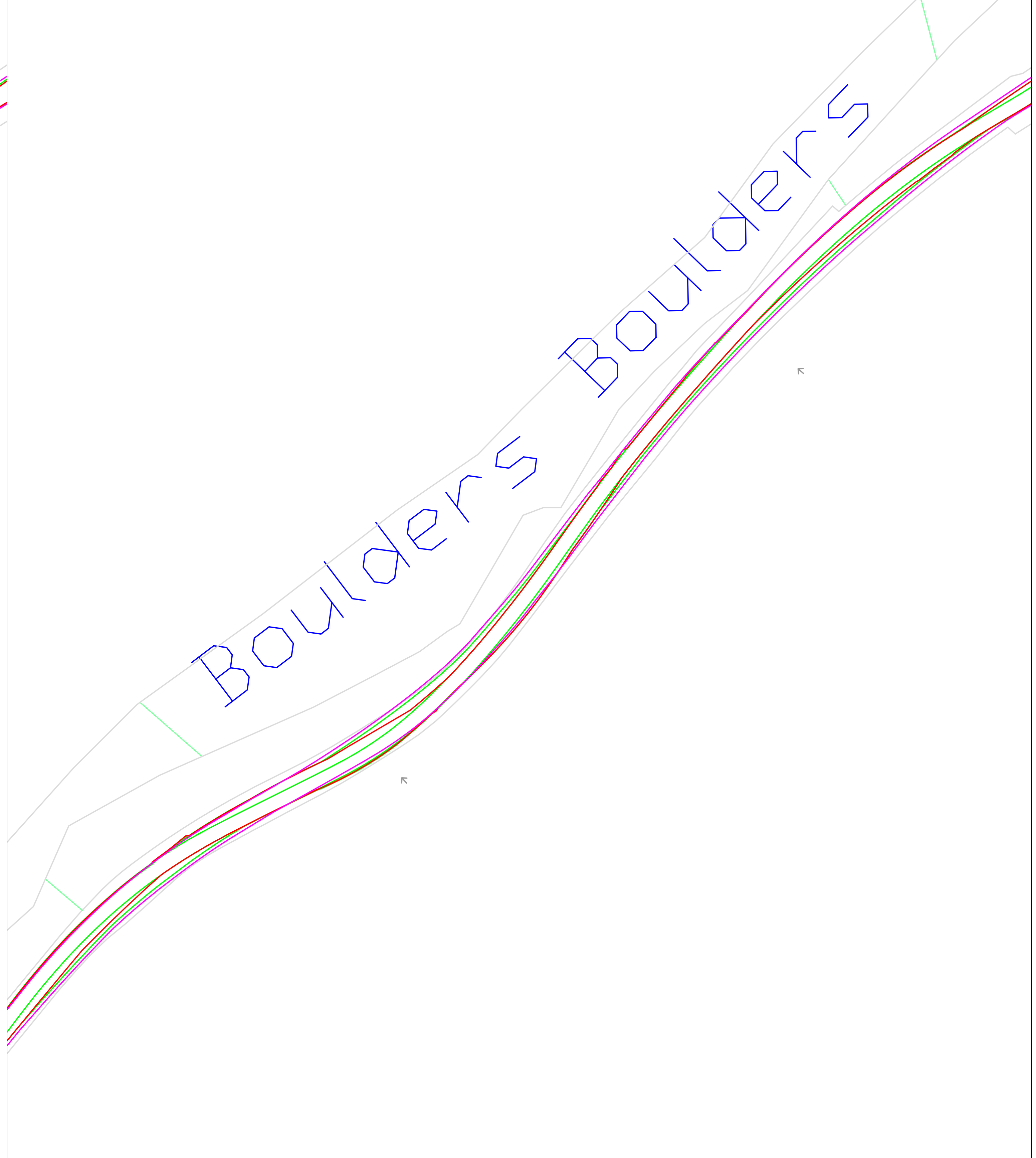
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Northeast of Corran

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		14

Scale: 1:1000 @ A3

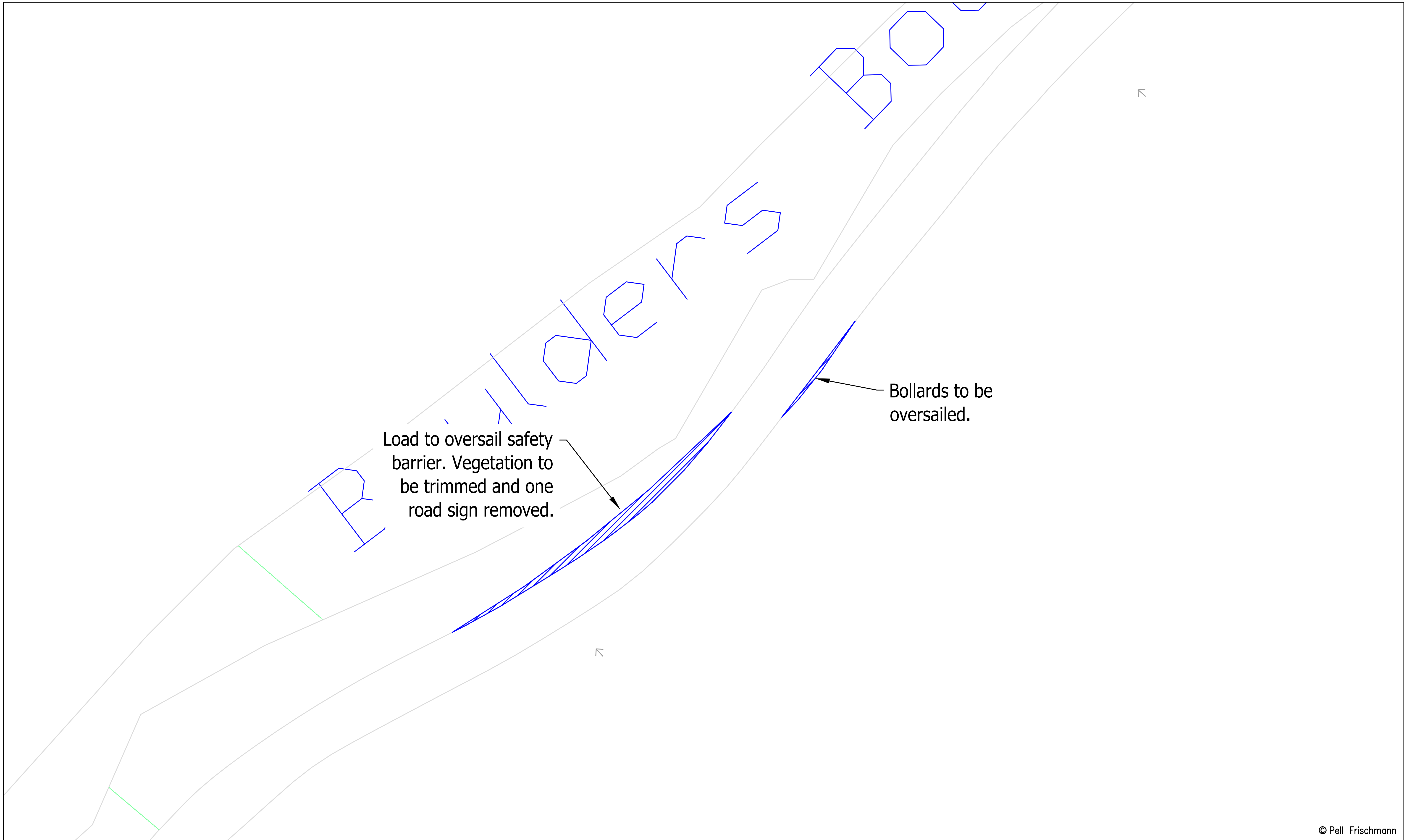
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK12

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Northeast of Corran

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		14

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

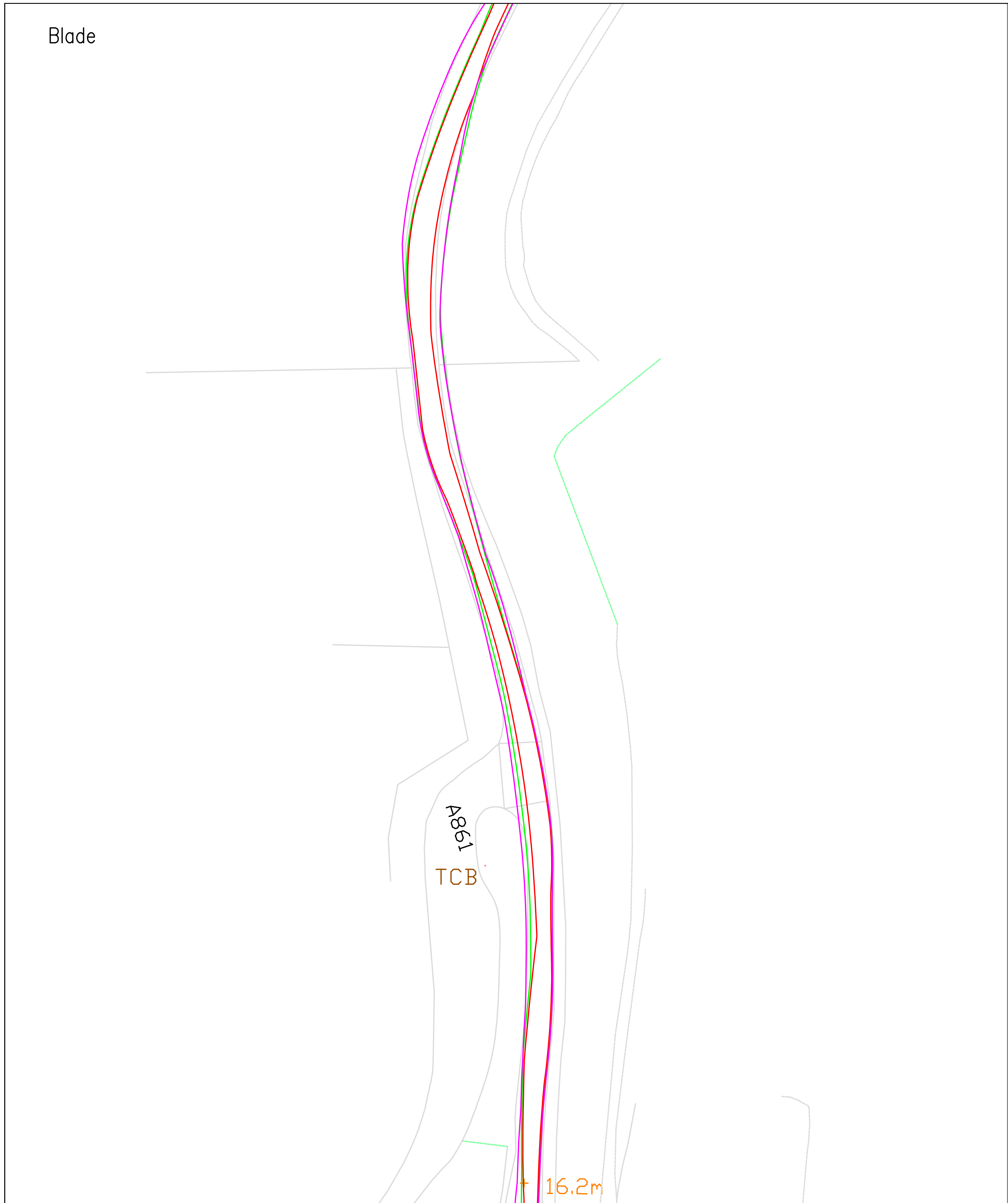
Drawing Status: Draft

Drawing No. SK12A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Bends, Corran

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	15	

Scale: Custom @ A3

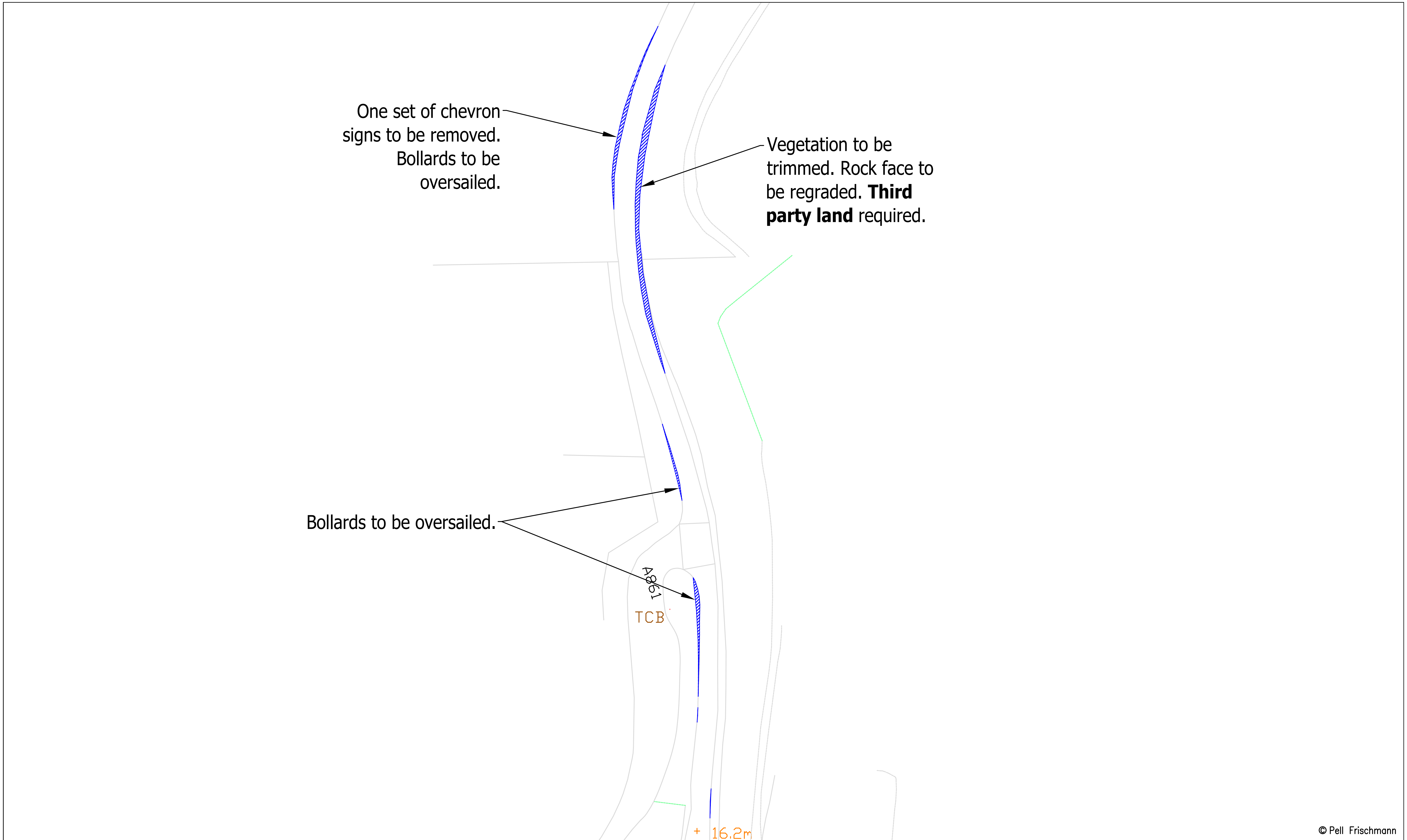
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK13

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Bends, Corran

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		15

Scale: 1:1000 @ A3

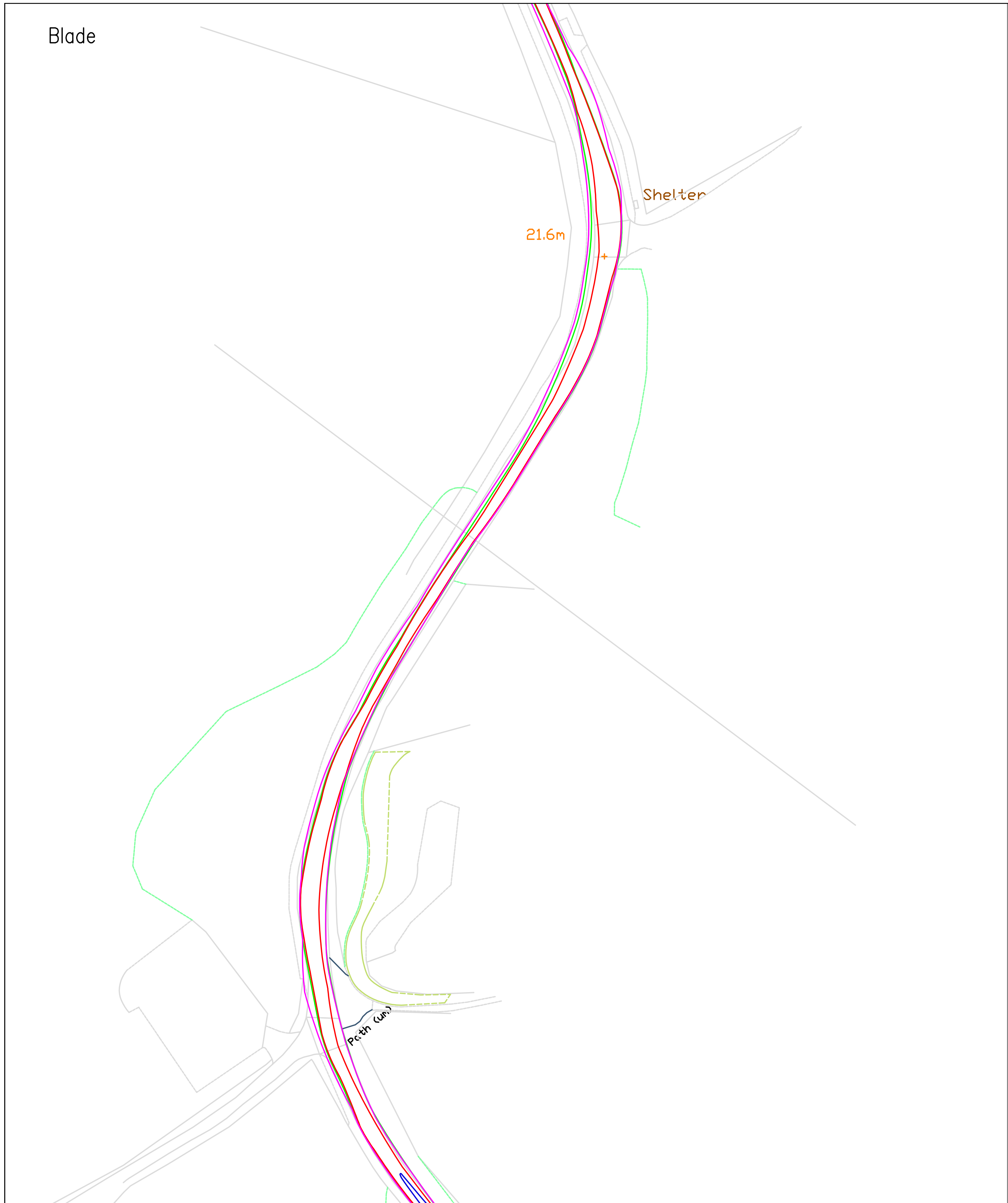
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK13A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Bends, Corran

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		16

Scale: 1:1500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK14

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Bends, Corran

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		16

Scale: 1:1500 @ A3

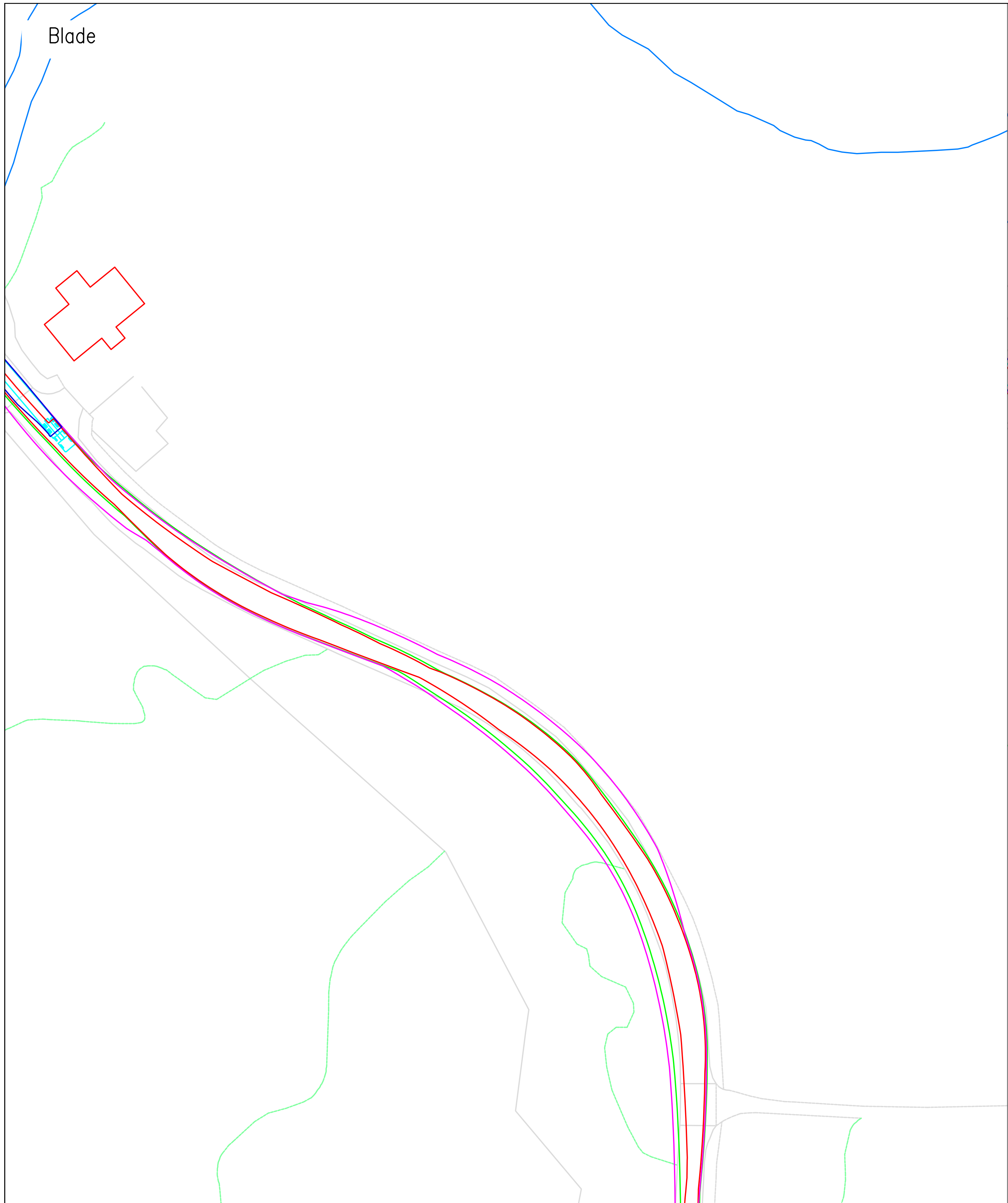
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK14A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Double Bend, Keppanach

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	17	

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK15

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Double Bend, Keppanach

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		17

Scale: 1:1000 @ A3

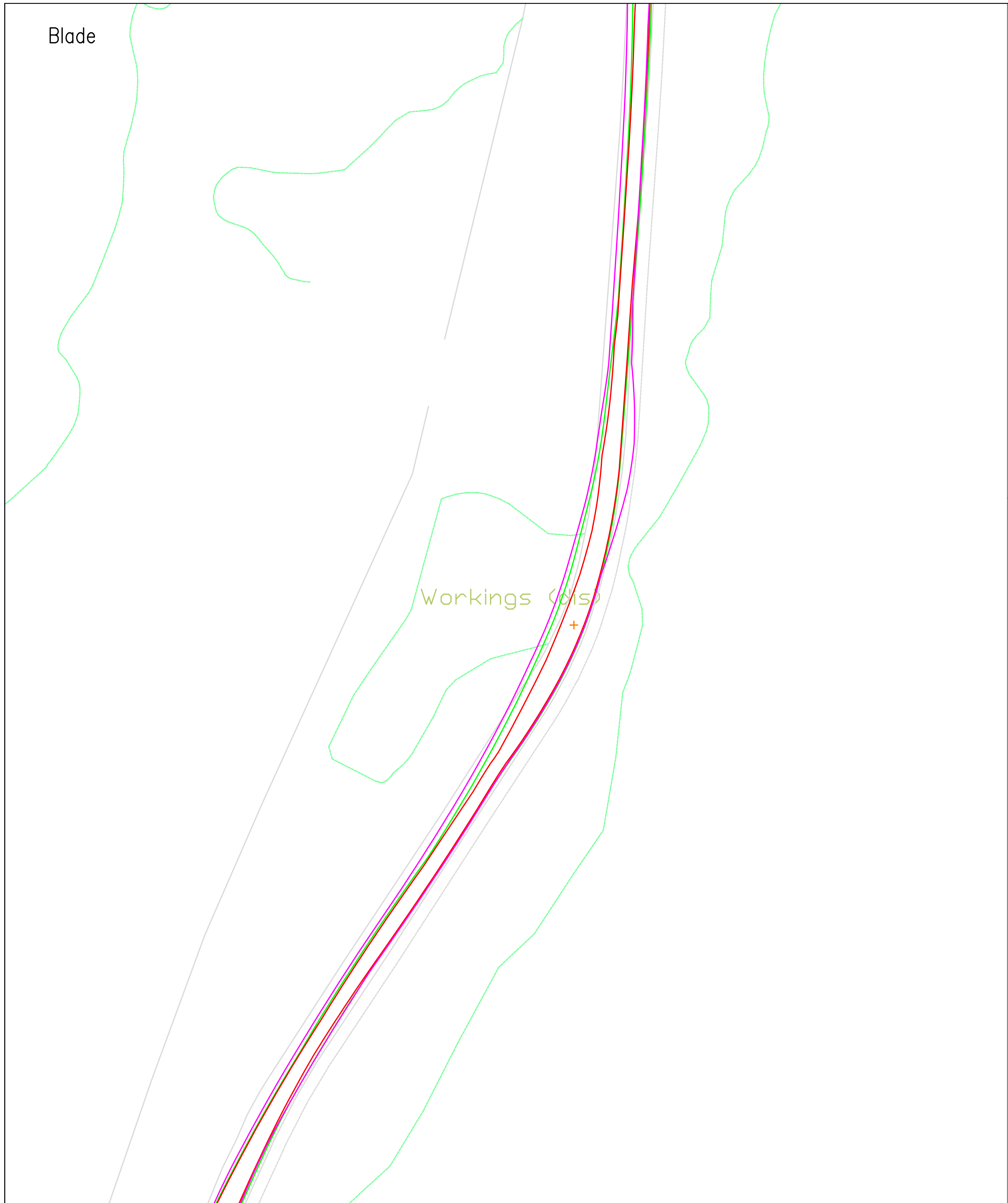
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK15A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Right Bend, Keppanach

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		18

Scale: 1:1000 @ A3

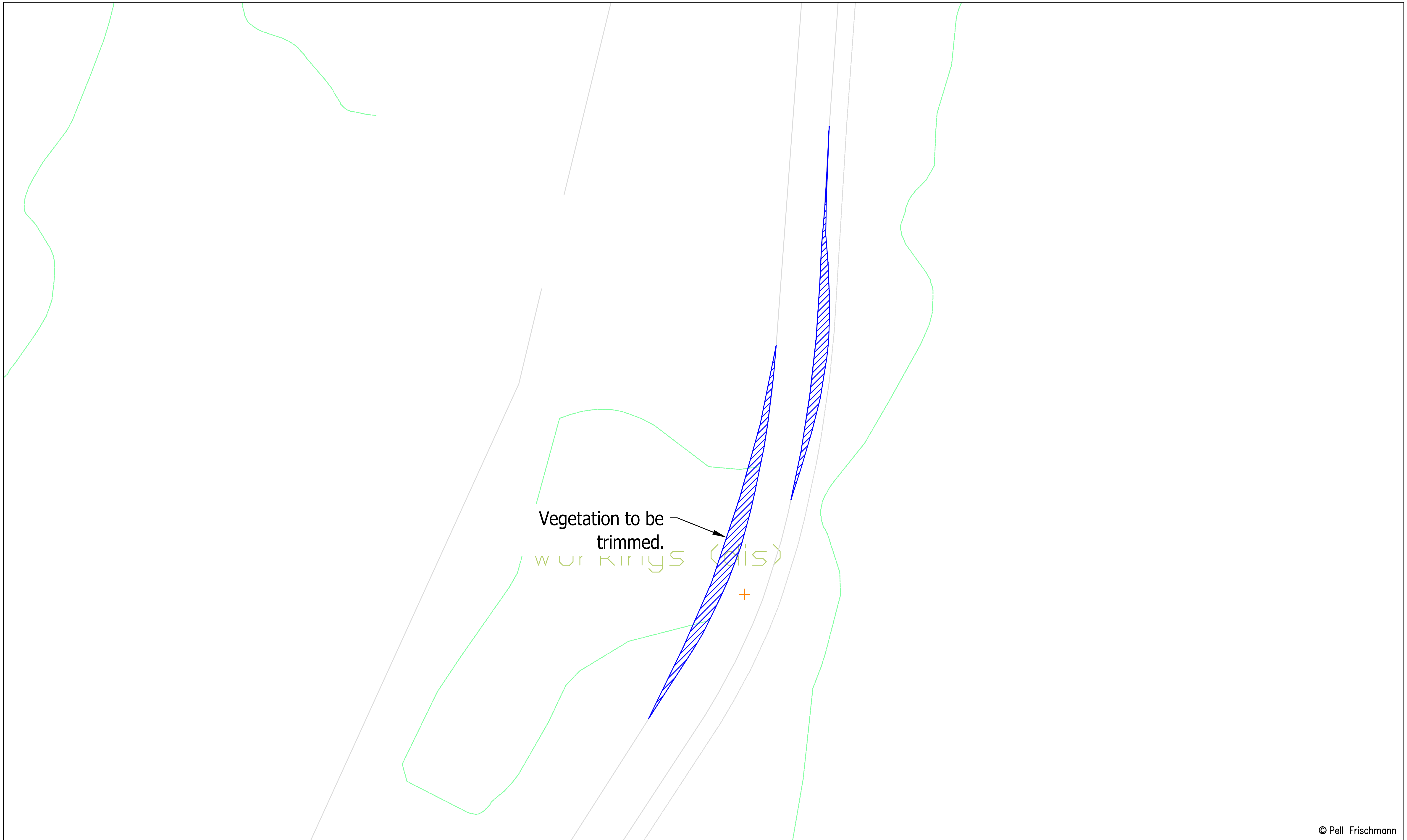
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK16

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Right Bend, Keppanach

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		18

Scale: 1:500 @ A3

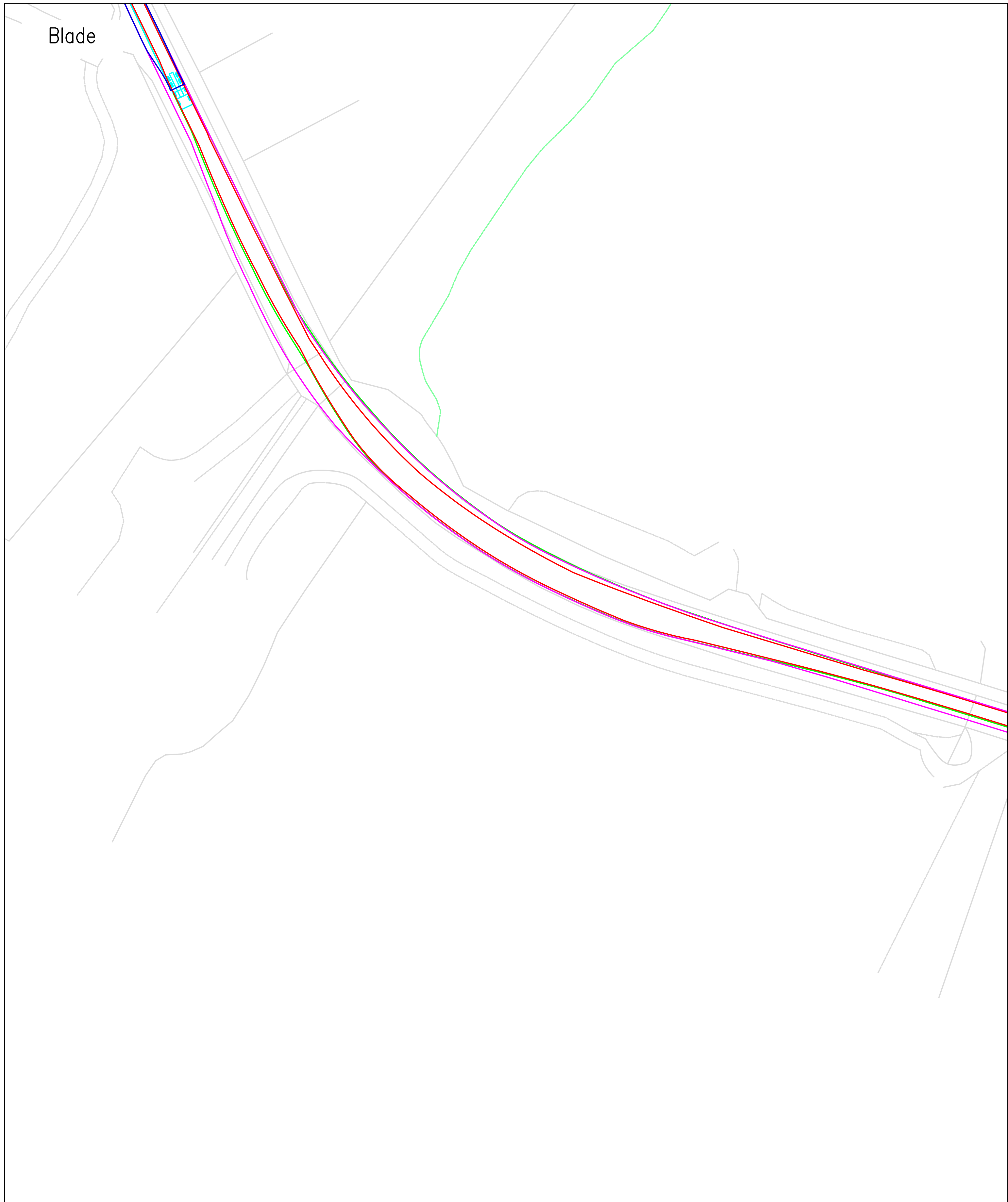
File No. 230725 Ladyfield V136 SPA.dwg

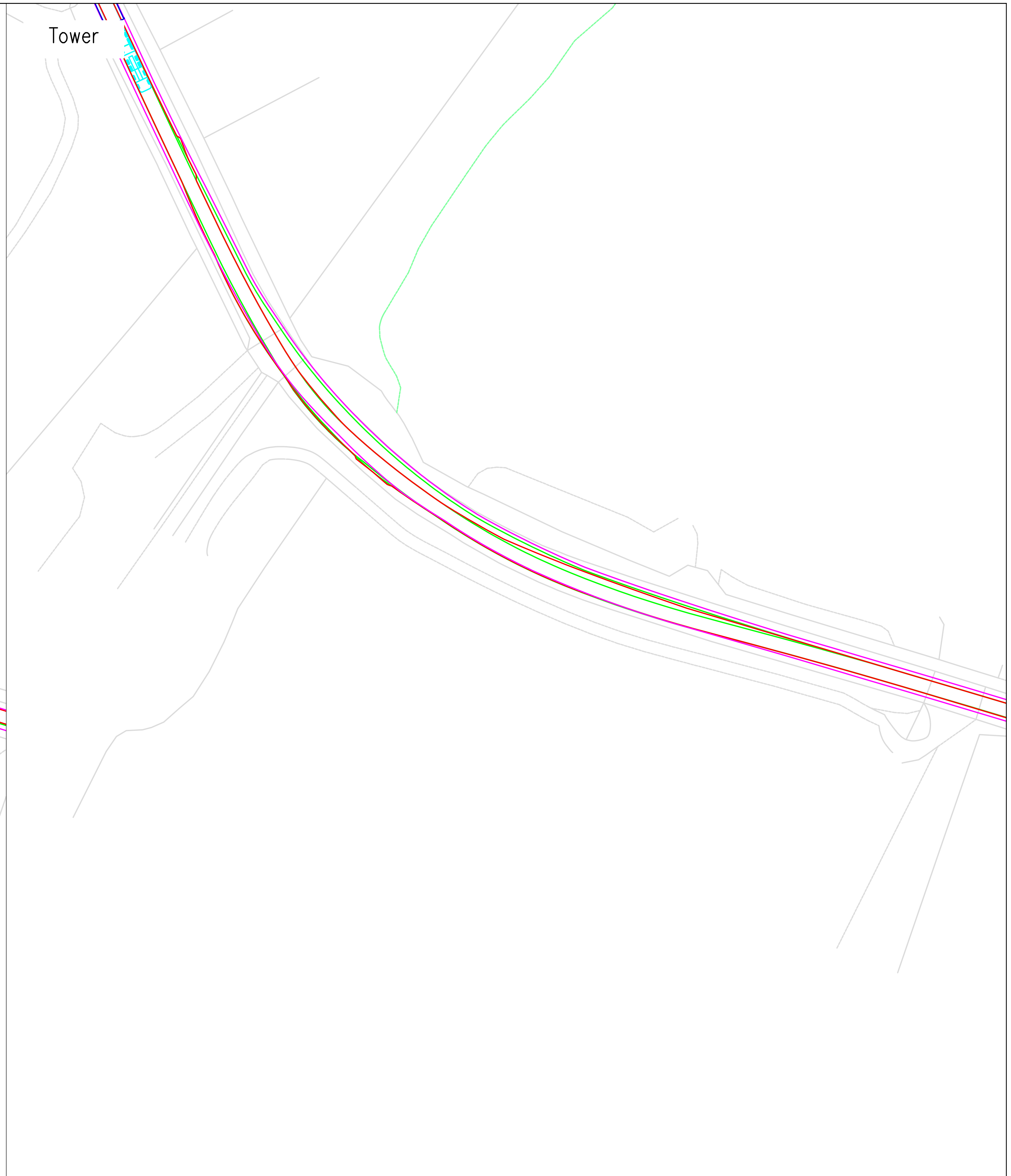
Drawing Status: Draft

Drawing No. SK16A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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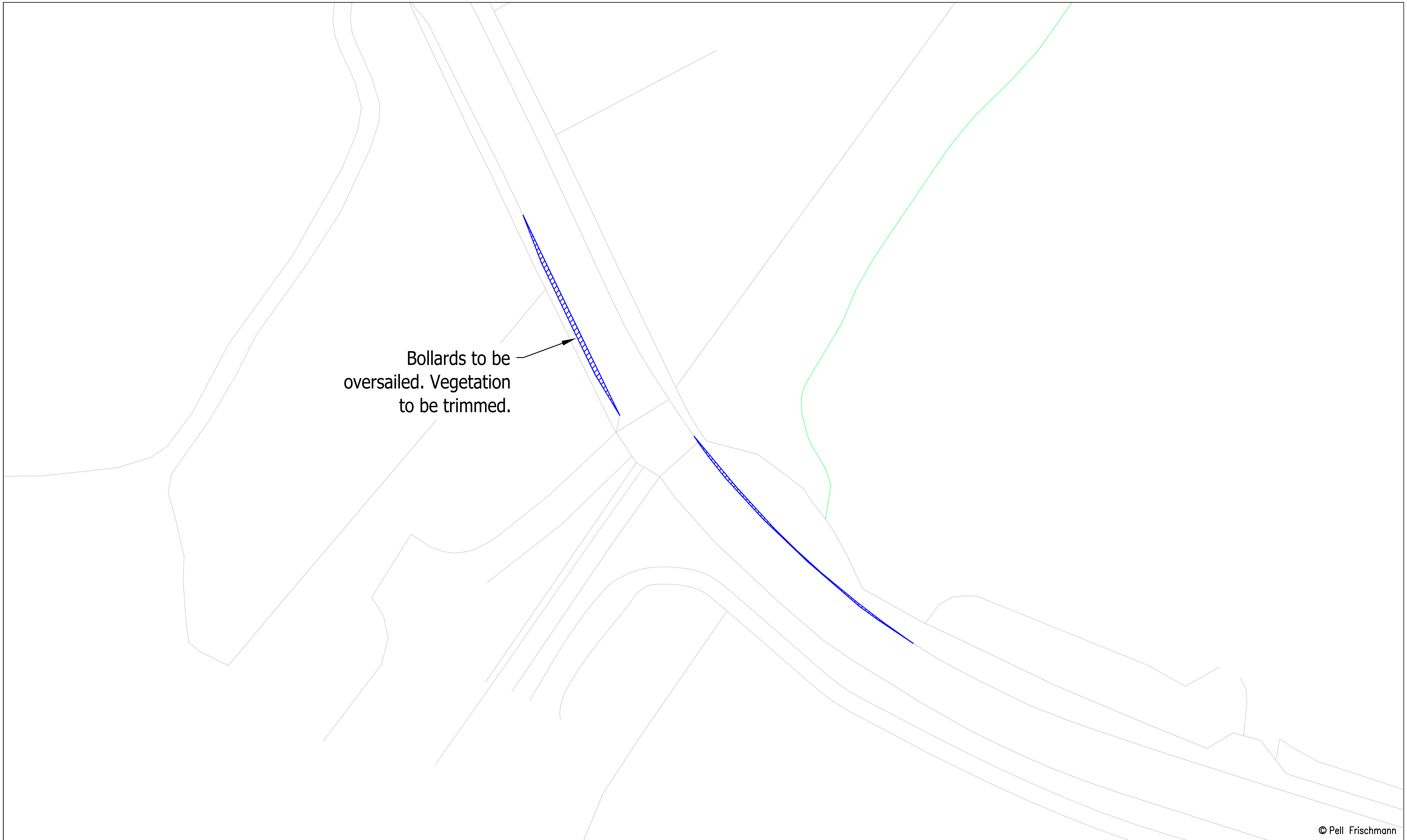
Project	Ladyfield Renewable Energy Park
Client	Ridge Clean Energy Ltd.
Drawing Title	V136 Blade and Tower
SPA Location	A82 Left Bend, Onich

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		20

Scale: 1:1000 @ A3
File No. 230725 Ladyfield V136 SPA.dwg
Drawing Status: Draft
Drawing No. SK17
Revision: XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Left Bend, Onich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		20

Scale: Custom @ A3

File No.: 230725 Ladyfield V136 SPA.dwg

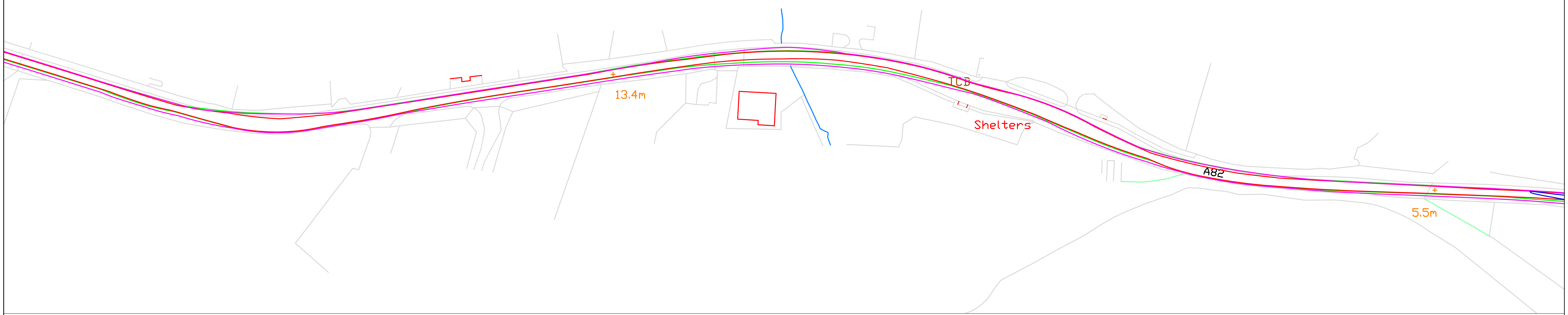
Drawing Status: Draft

Drawing No.: SK17A

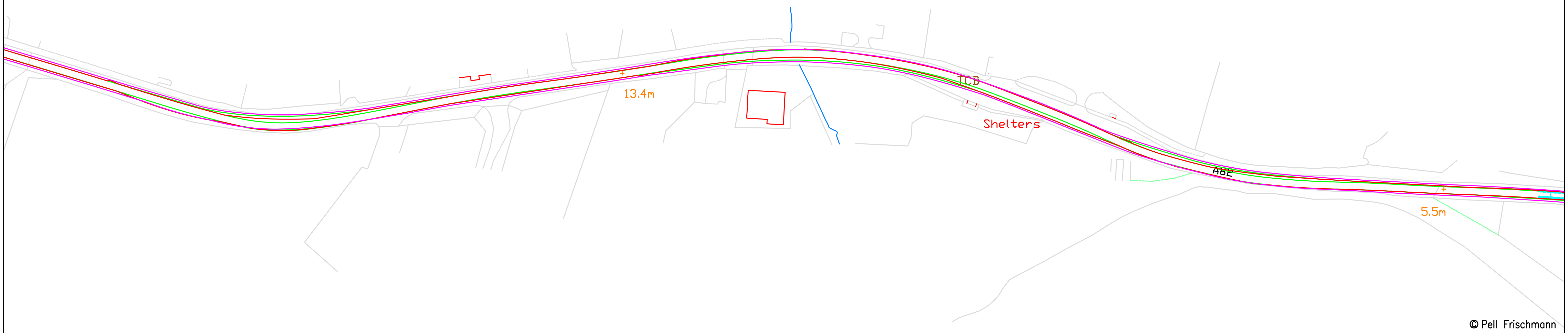
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower



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Project: Ladyfield Renewable Energy Park

Client: Ridge Clean Energy Ltd.

Drawing Title: V136 Blade and Tower

SPA Location: A82 Bends, Onich

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		20

Scale: 1:1500 @ A3

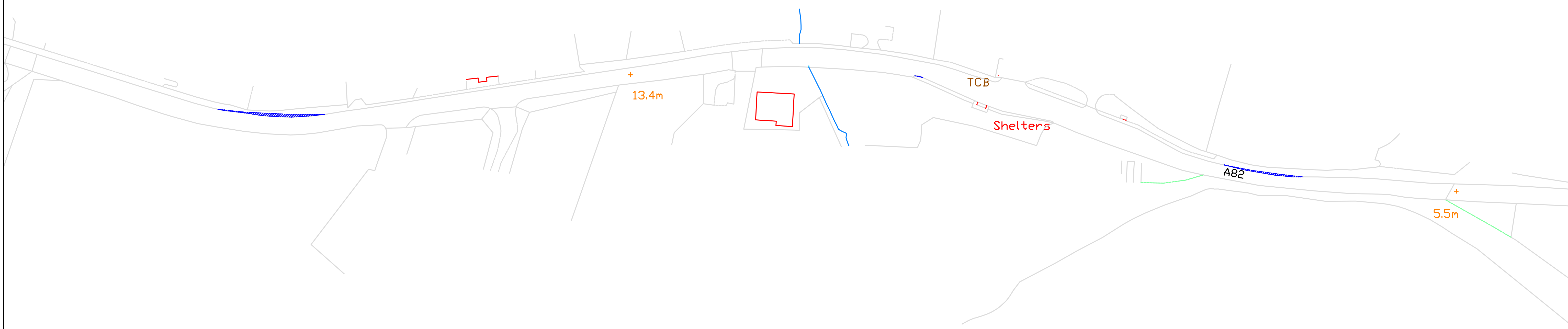
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK18

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Project	Ladyfield Renewable Energy Park
Client	Ridge Clean Energy Ltd.
Drawing Title	V136 Blade and Tower
SPA Location	A82 Bends, Onich

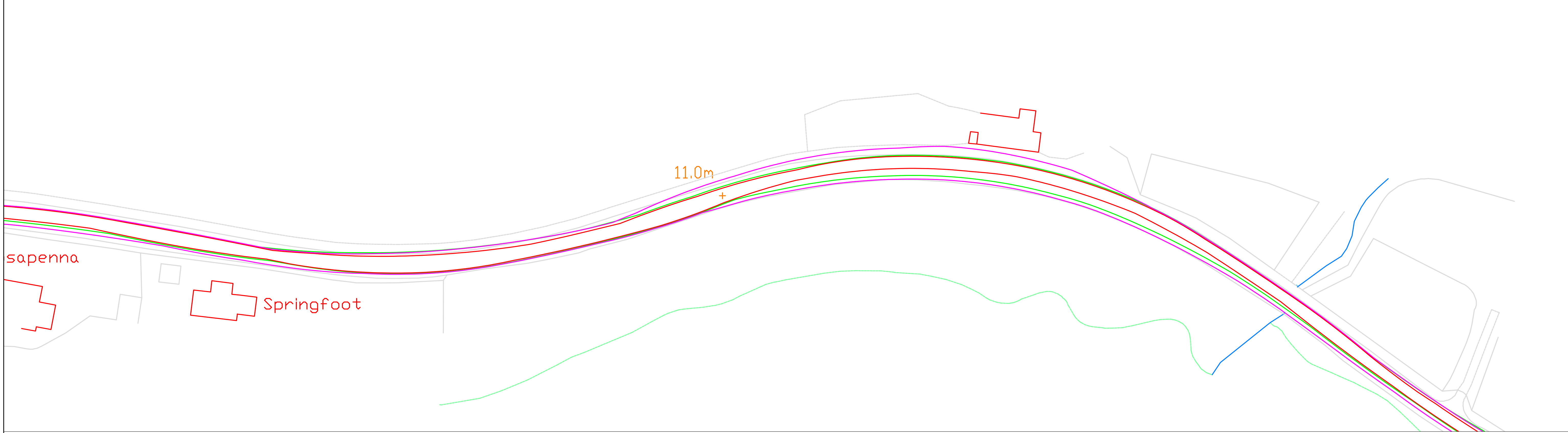
Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over−run, Over−sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	21	

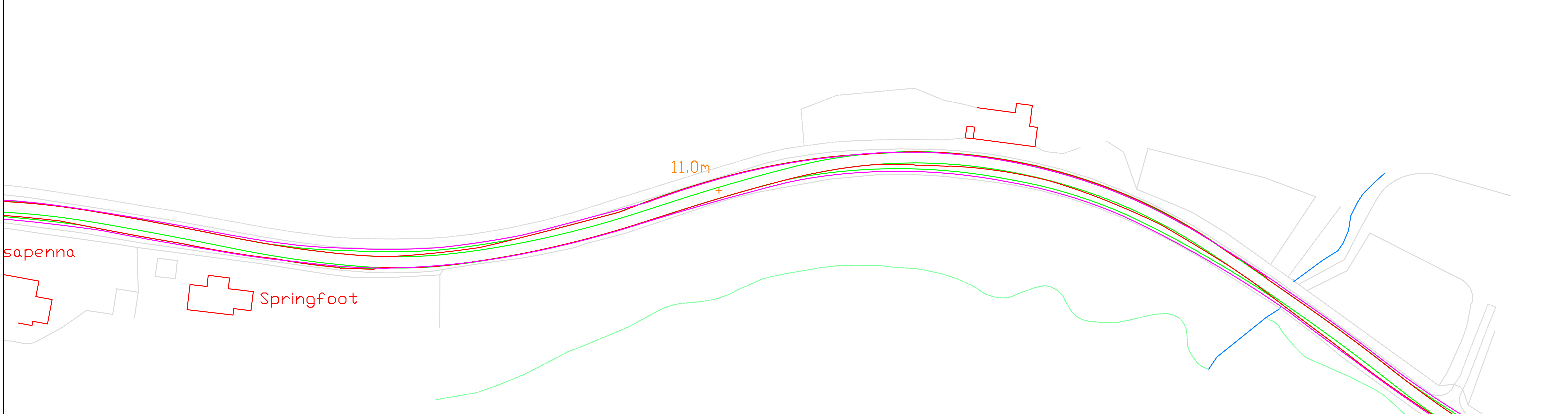
Scale: 1:1500 @ A3
File No. 230725 Ladyfield V136 SPA.dwg
Drawing Status: Draft
Drawing No. SK18A
Revision: XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Blade



Tower



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Double Bend, Onich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		22

Scale: 1:1000 @ A3

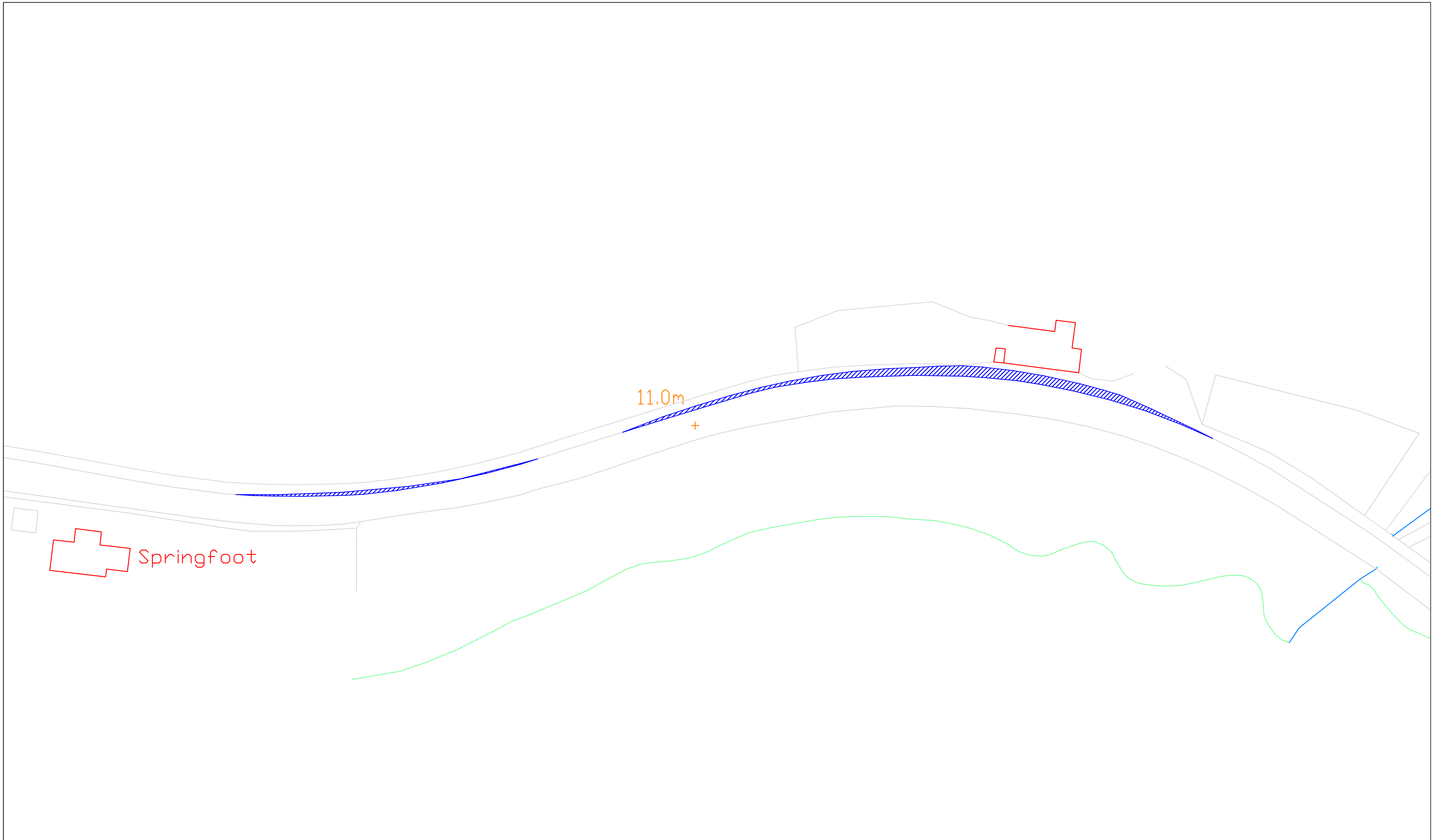
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK19

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Double Bend, Onich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		22

Scale: 1:750 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

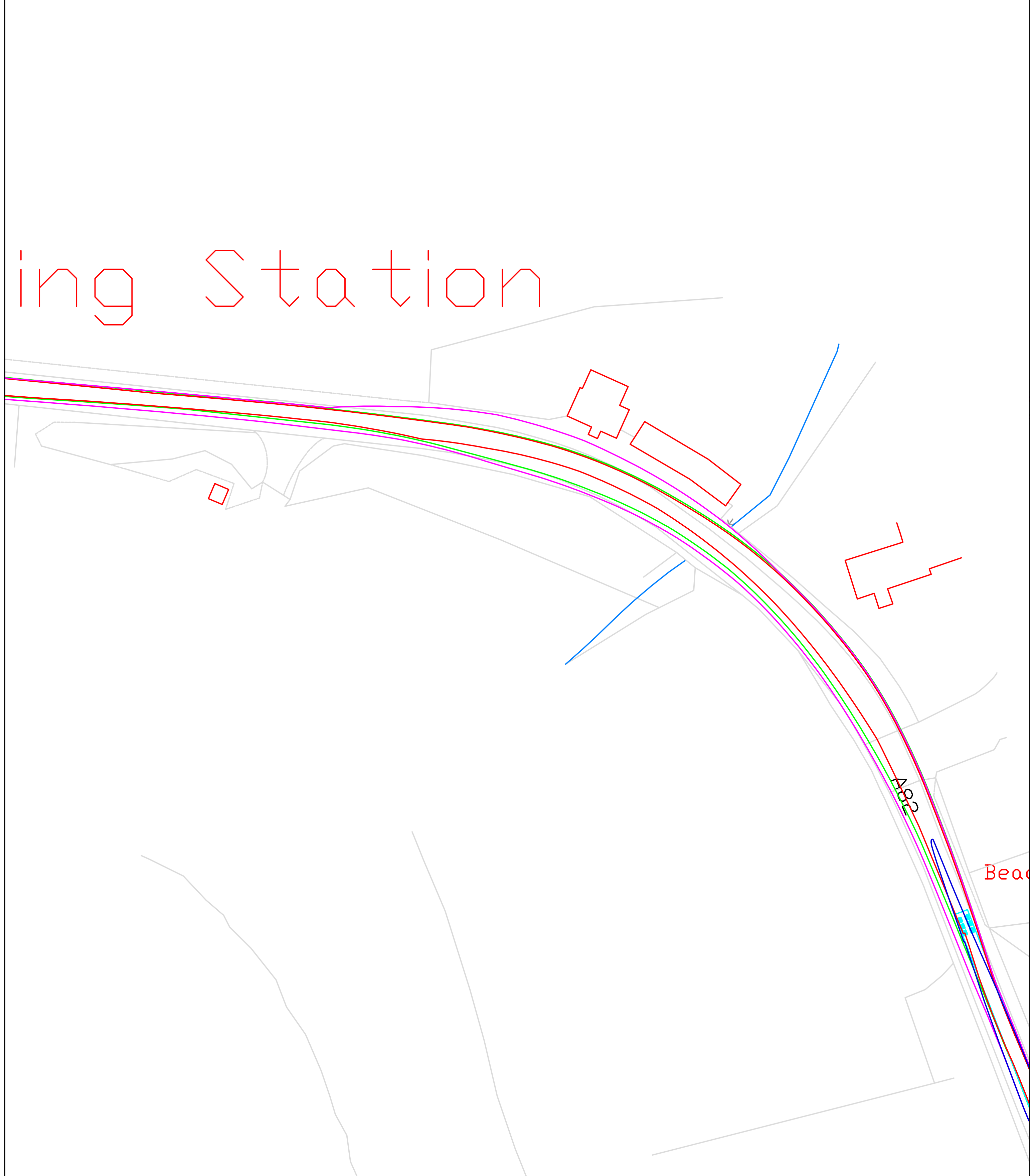
Drawing Status: Draft

Drawing No. SK19A

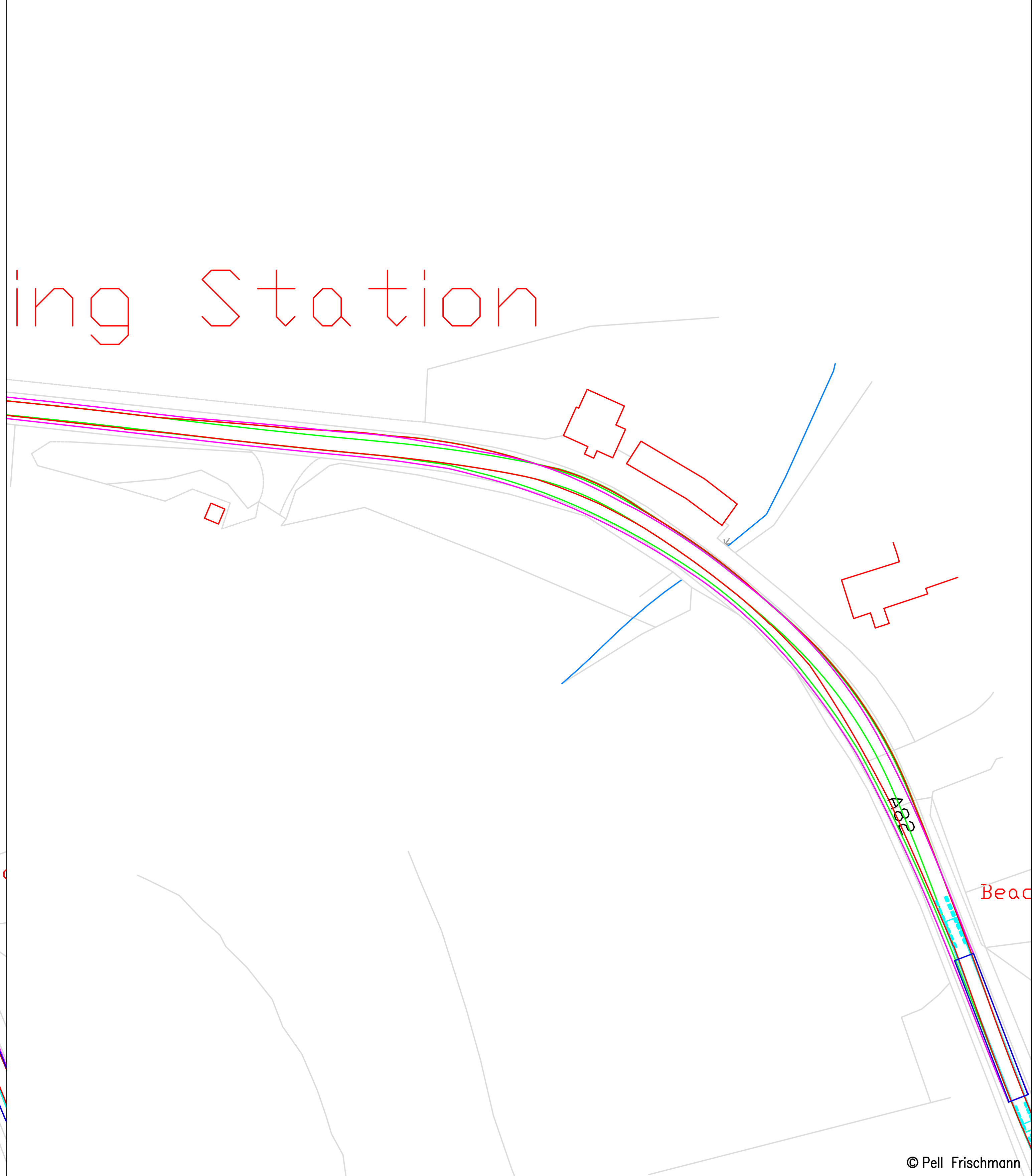
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Right Bend North of Ballachulish

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		24

Scale: 1:1000 @ A3

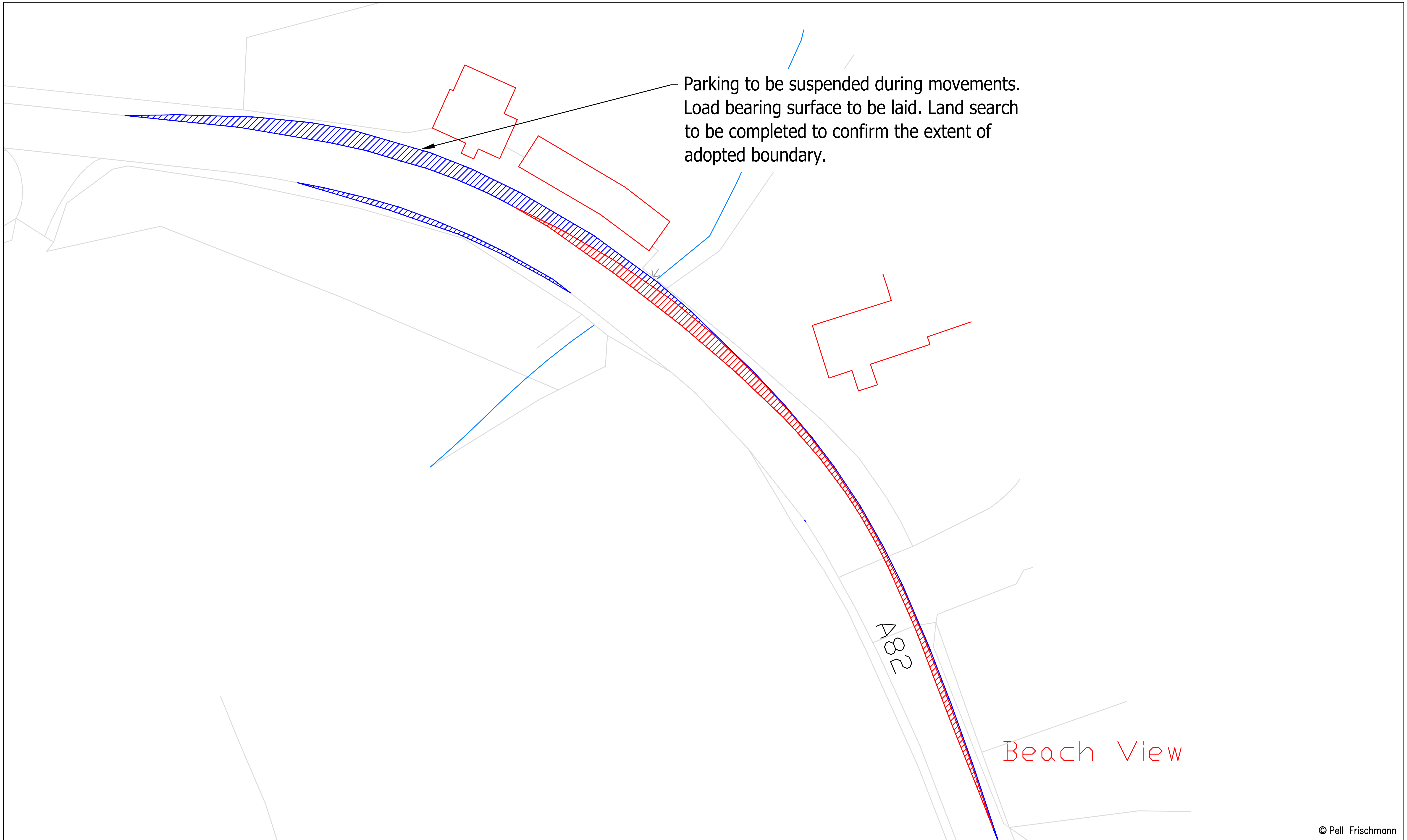
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK20

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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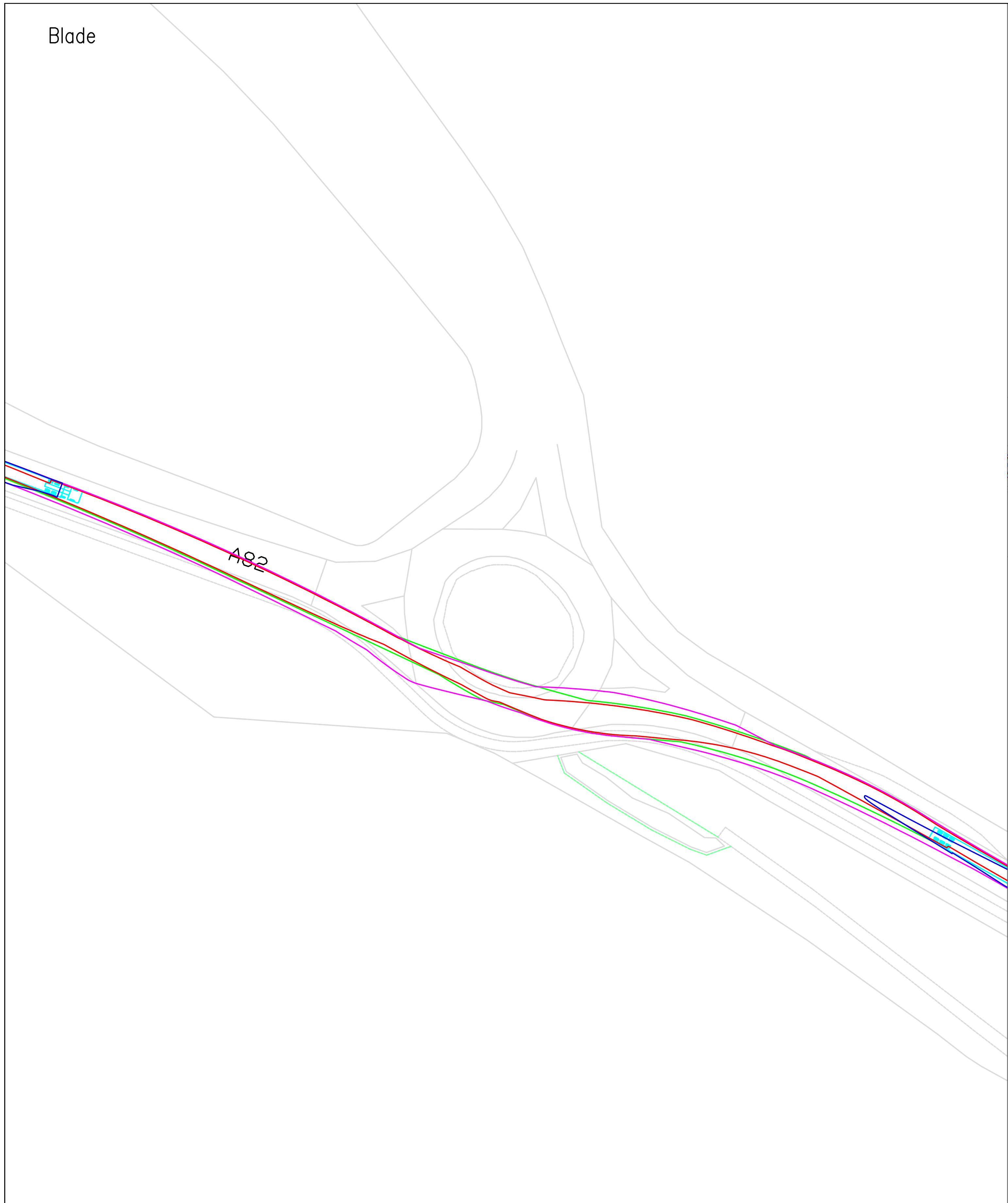
Project	Ladyfield Renewable Energy Park
Client	Ridge Clean Energy Ltd.
Drawing Title	V136 Blade and Tower
SPA Location	A82 Right Bend North of Ballachulish

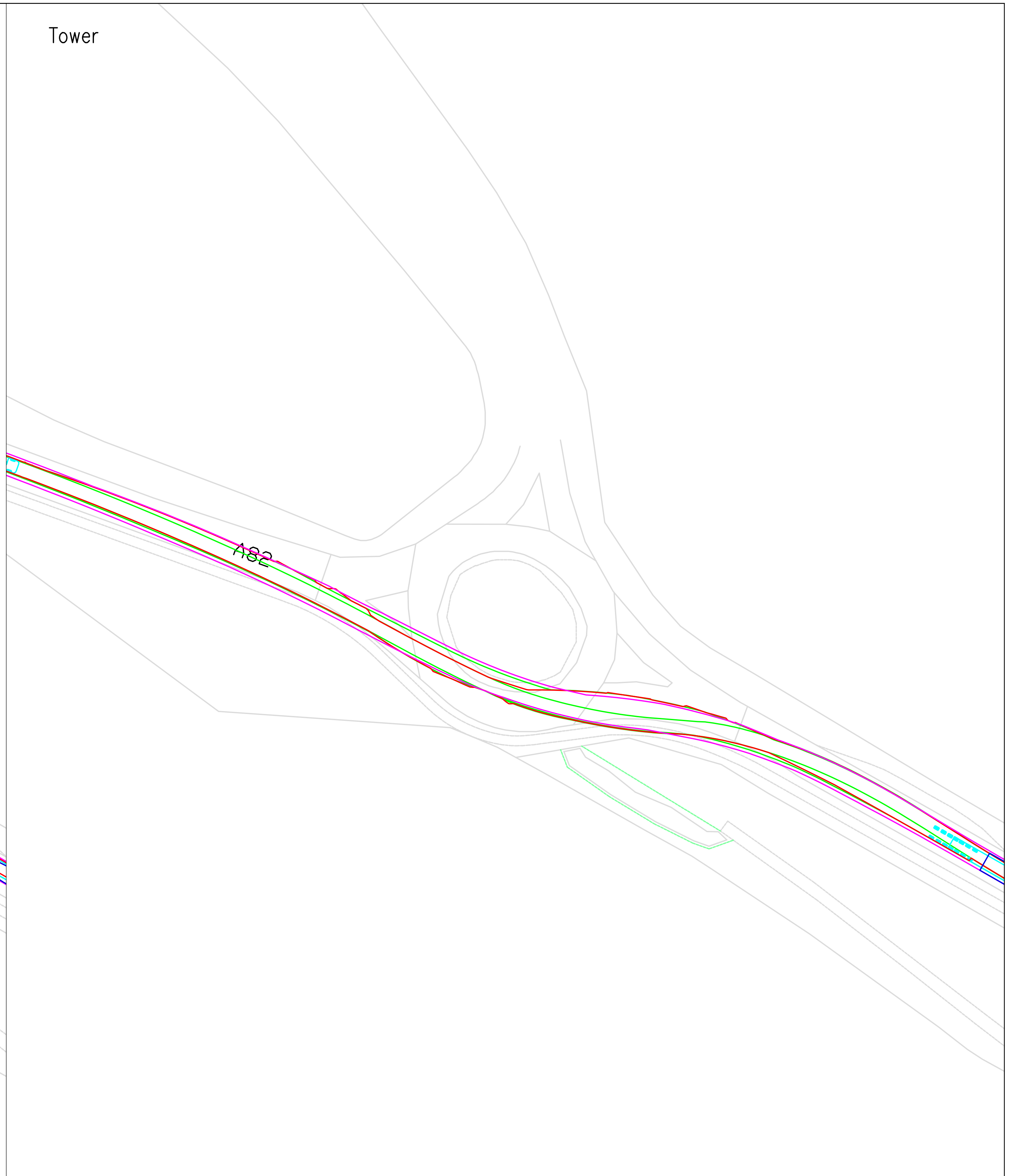
Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		24

Scale	1:500 @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK20A
Revision	XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: Ballachulish Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		25

Drawing No. SK21

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Revision: XXX

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: Ballachulish Roundabout

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	25	

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

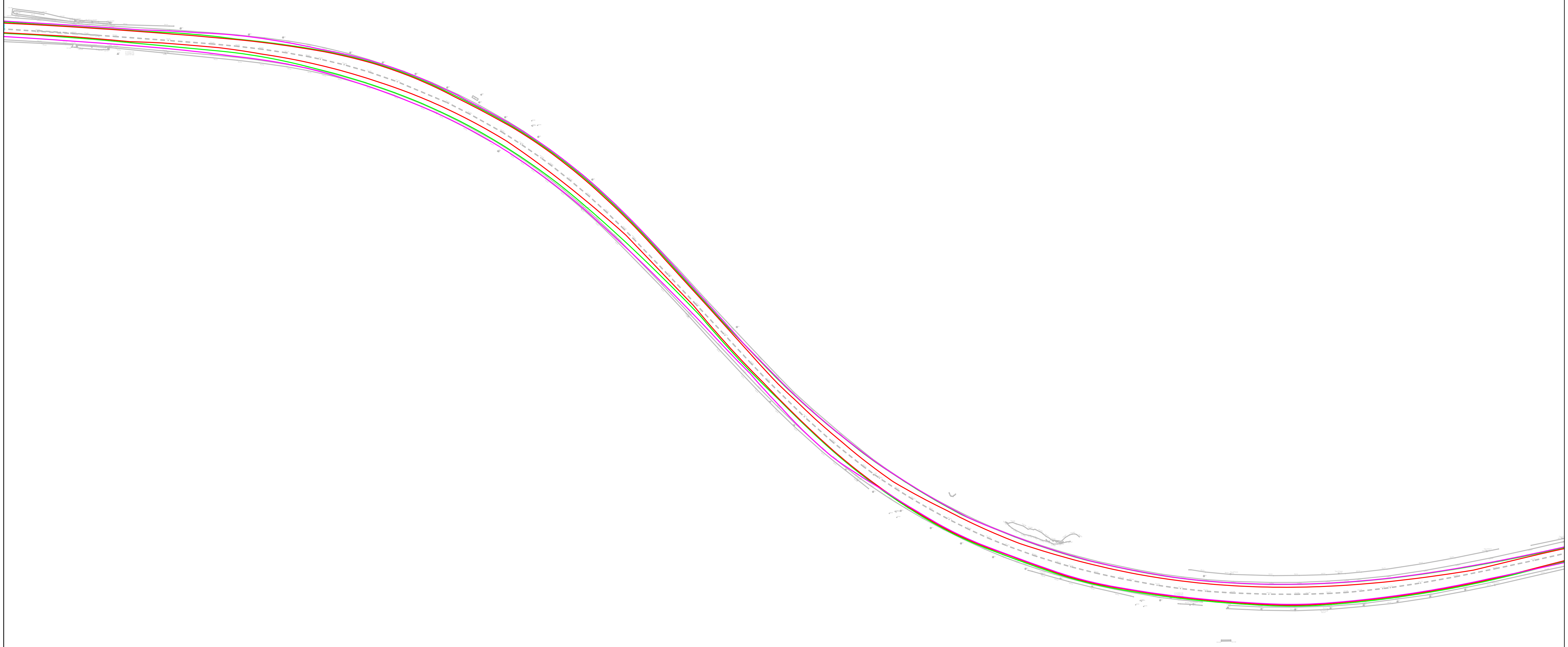
Drawing Status: Draft

Drawing No. SK21A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



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Project	Ladyfield Renewable Energy Park	
Client	Ridge Clean Energy Ltd.	
Drawing Title	V136 Blade and Tower	
SPA Location	A82 North of Three Sisters of Glencoe	

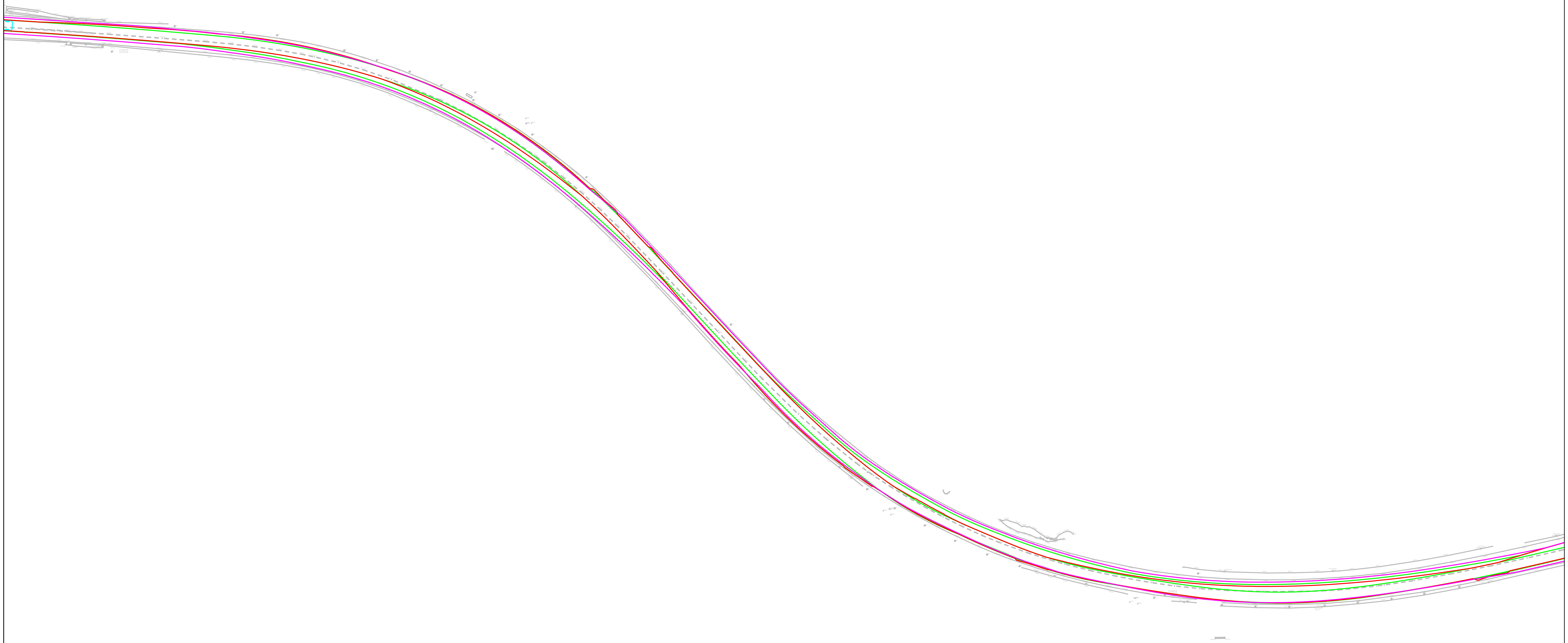
Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	27	

Scale	1:1000 @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK22
Revision	XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Tower



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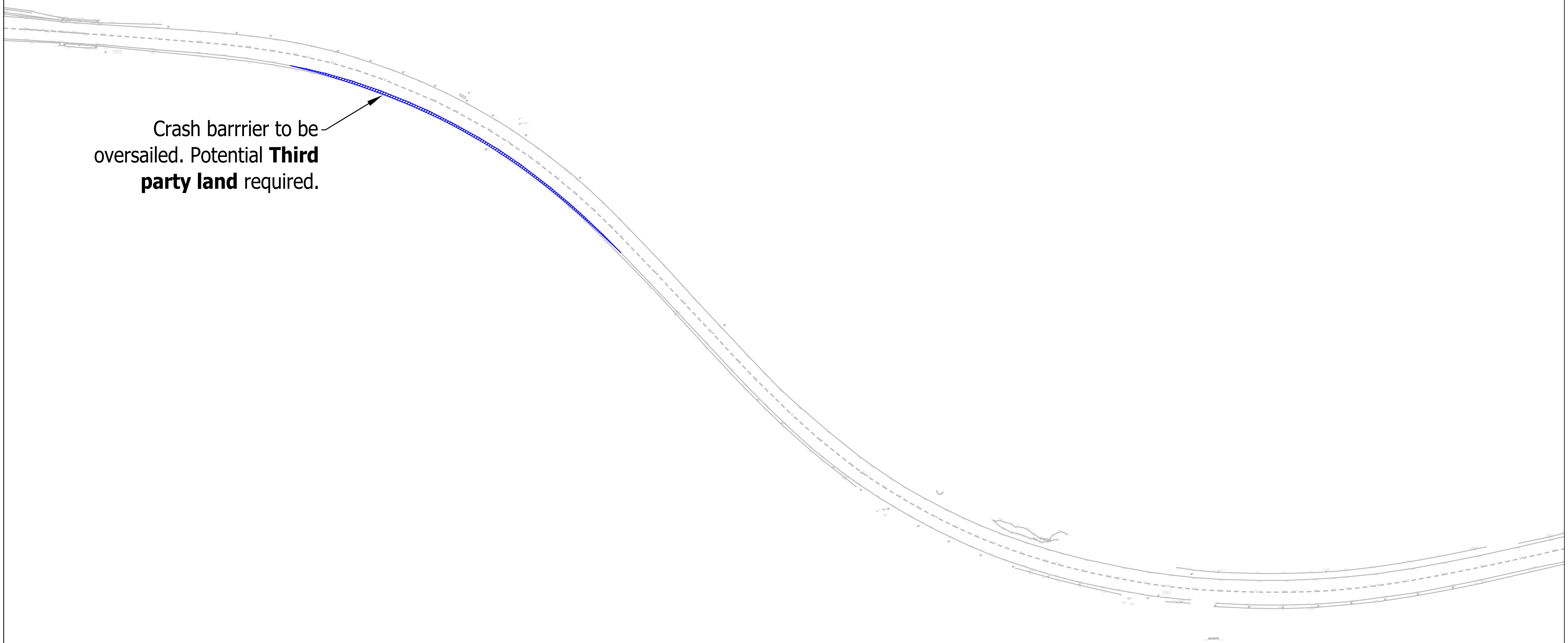
Client: Ridge Clean Energy Ltd.	Drawing Title: V136 Blade and Tower	Point of Interest: 27	Drawing Status: Draft	
Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail	SPA Location: A82 North of Three Sisters of Glencoe	Drawing No. SK22A	Notes: 1. All mitigation is subject to confirmation through a test run. 2. This is not a construction drawing and is intended for illustration purposes only.	Revision: XXX



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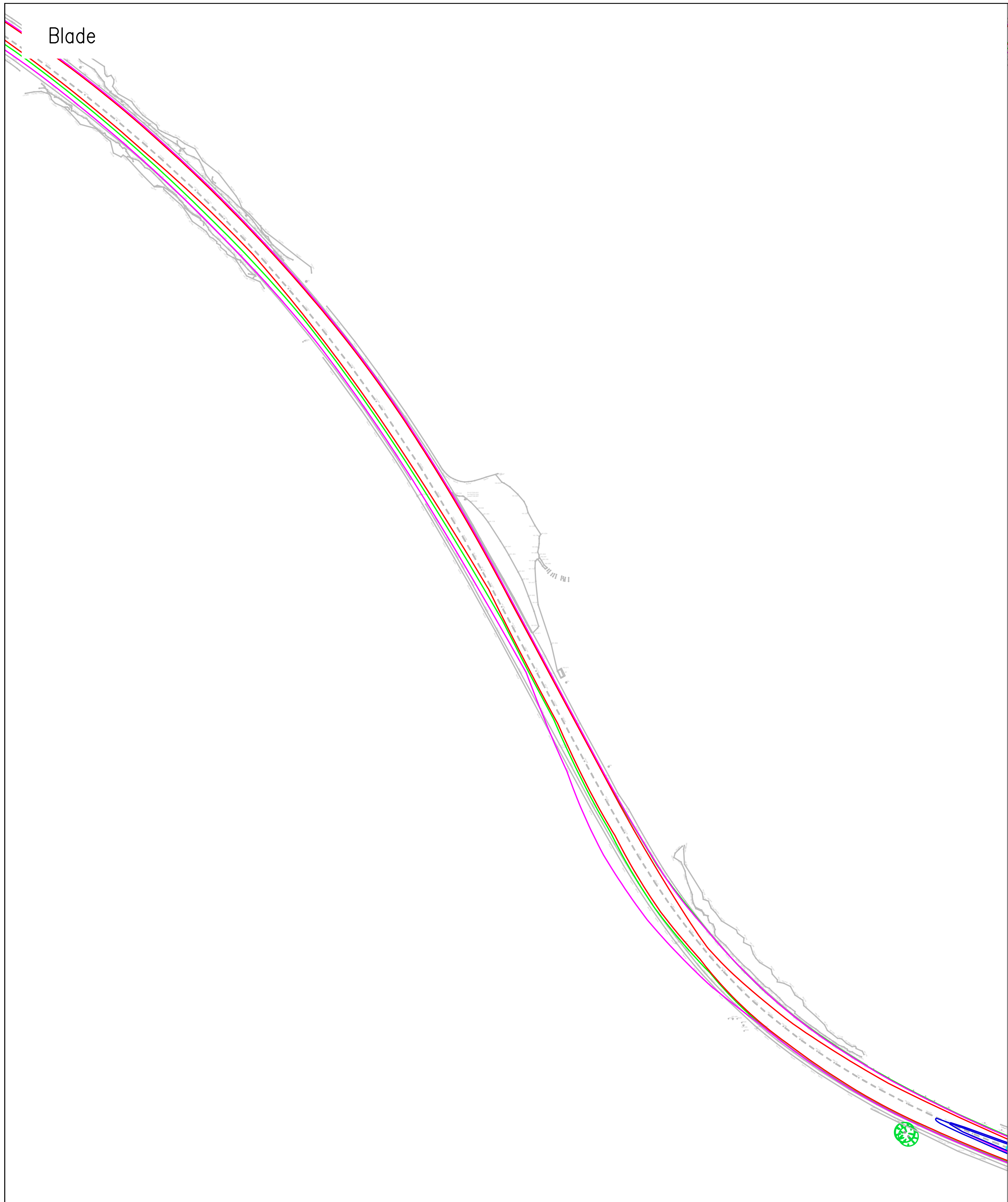
Project	Ladyfield Renewable Energy Park
Client	Ridge Clean Energy Ltd.
Drawing Title	V136 Blade and Tower
SPA Location	A82 North of Three Sisters of Glencoe

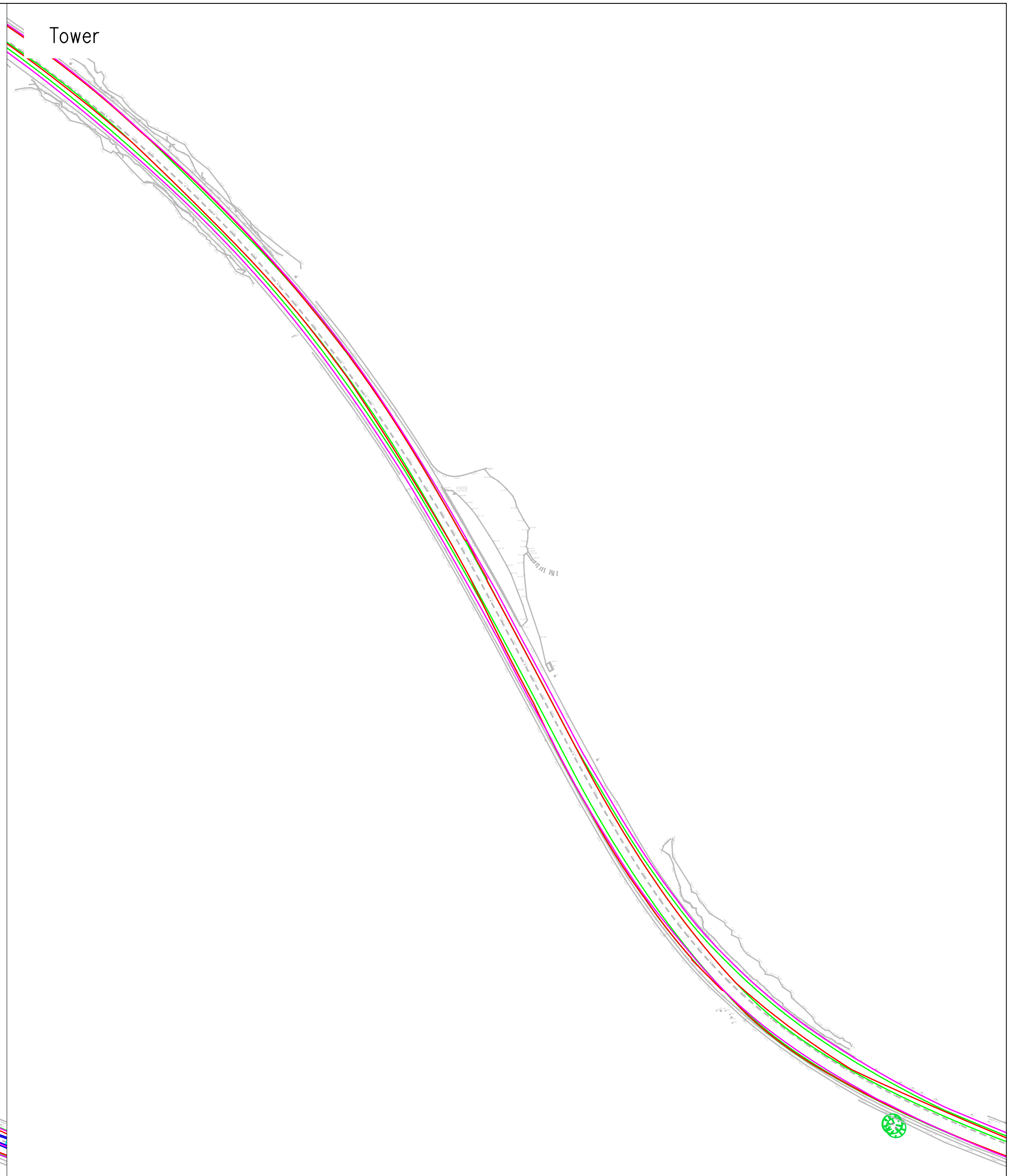
Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		27

Scale	1:1000 @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK22B
Revision	XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.





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Client	Ridge Clean Energy Ltd.
Project	Ladyfield Renewable Energy Park
Drawing Title	V136 Blade and Tower
SPA Location	A82 East of Three Sisters of Glencoe Car Park

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		28

Scale	1:1000 @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK23
Revision	XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 East of Three Sisters of Glencoe Car Park

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		28

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

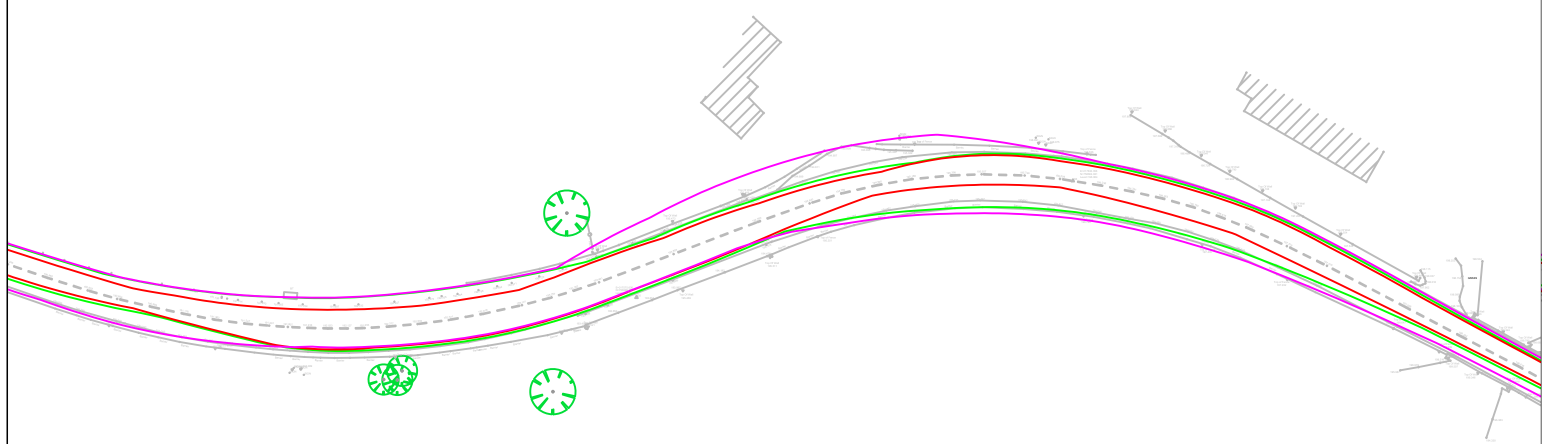
Drawing Status: Draft

Drawing No. SK23A

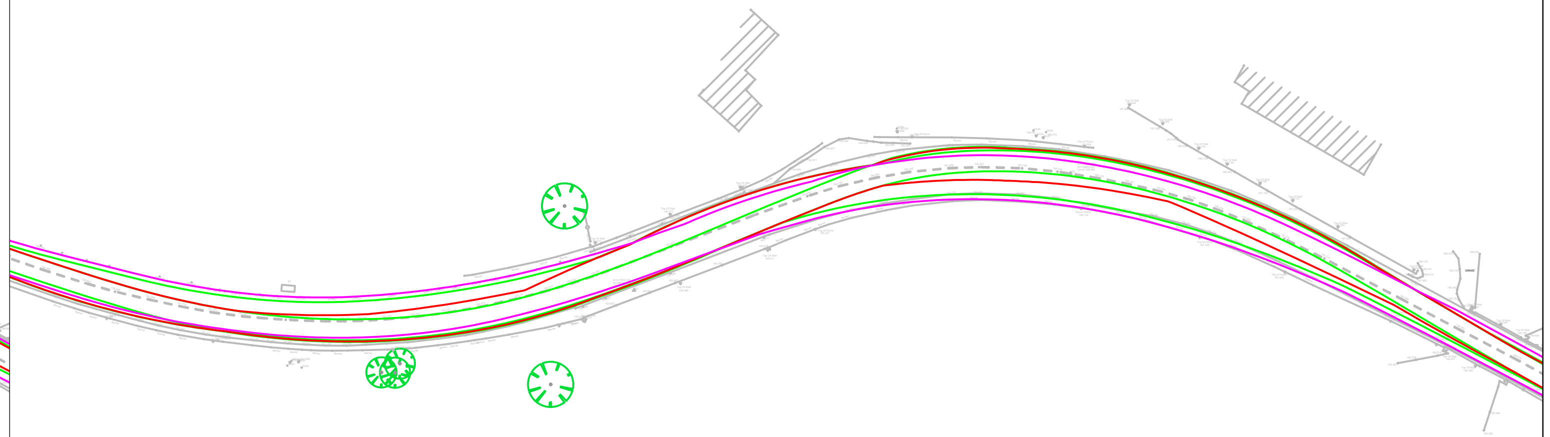
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade
Scissor Lift



Tower



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www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 East of Aonach Eagach Car Park

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		29

Scale: 1:1000 @ A3

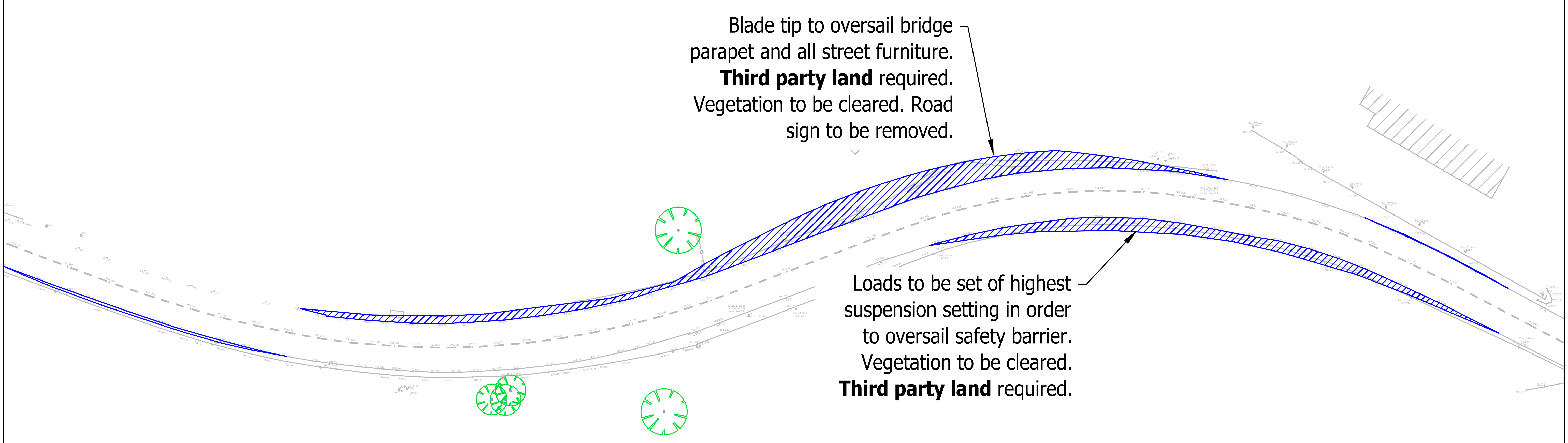
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK24

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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www.pellfrischmann.com

Project: Ladyfield Renewable Energy Park

Client: Ridge Clean Energy Ltd.

Drawing Title: V136 Blade and Tower

SPA Location: A82 East of Aonach Eagach Car Park

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		29

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

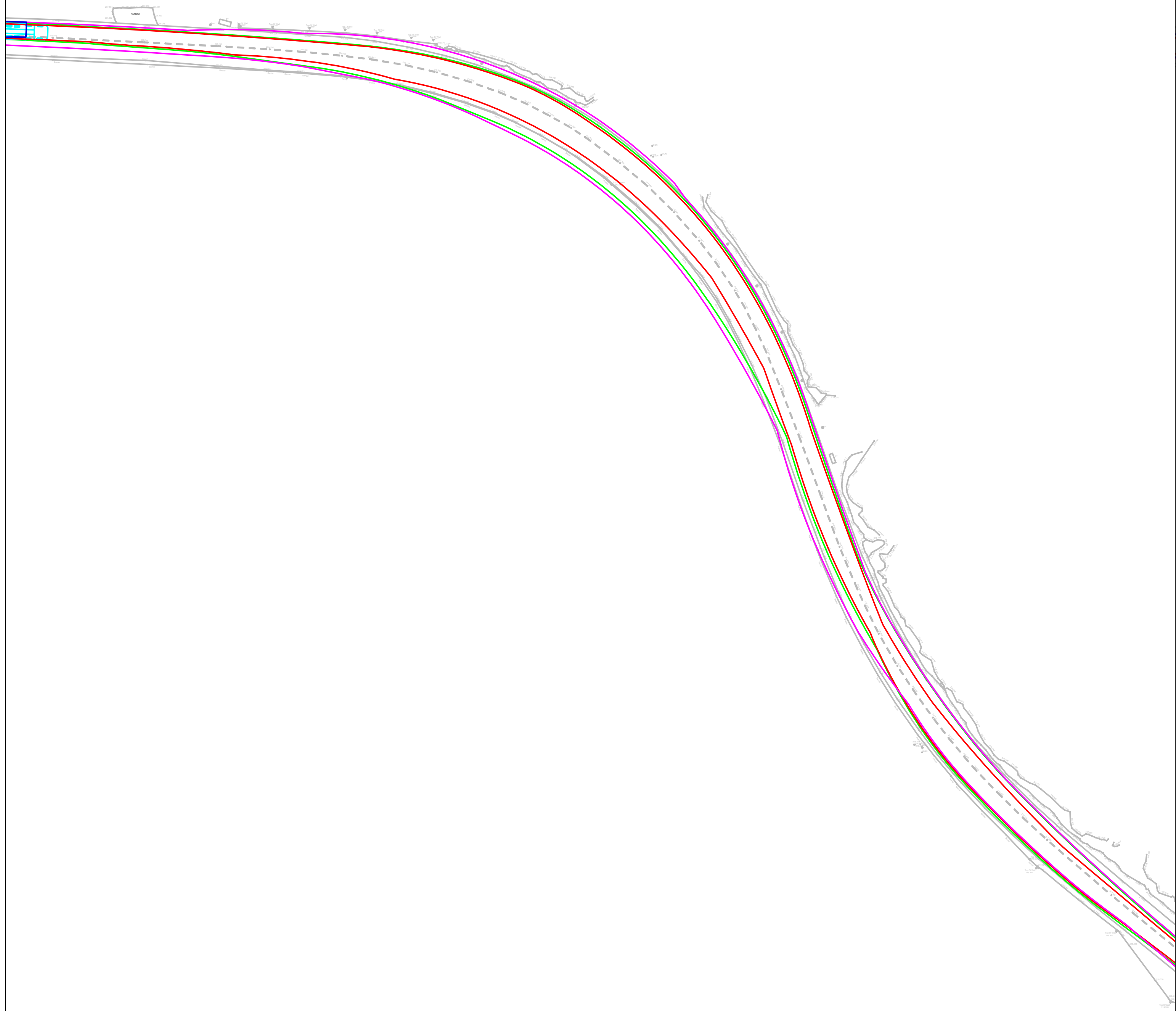
Drawing Status: Draft

Drawing No. SK24A

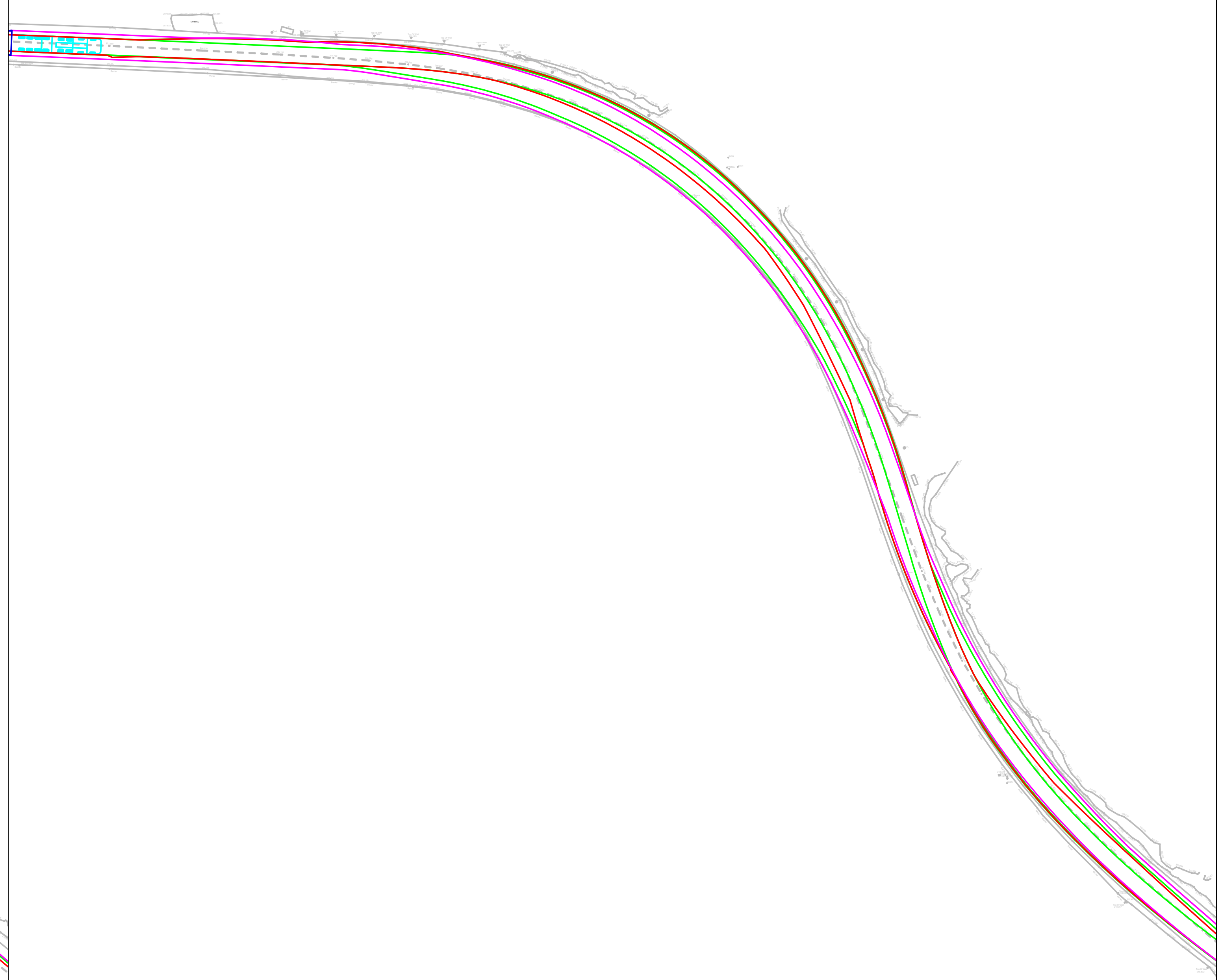
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade
Scissor Lift



Tower



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 West of Ralston Cairn

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	30	

Scale: 1:1000 @ A3

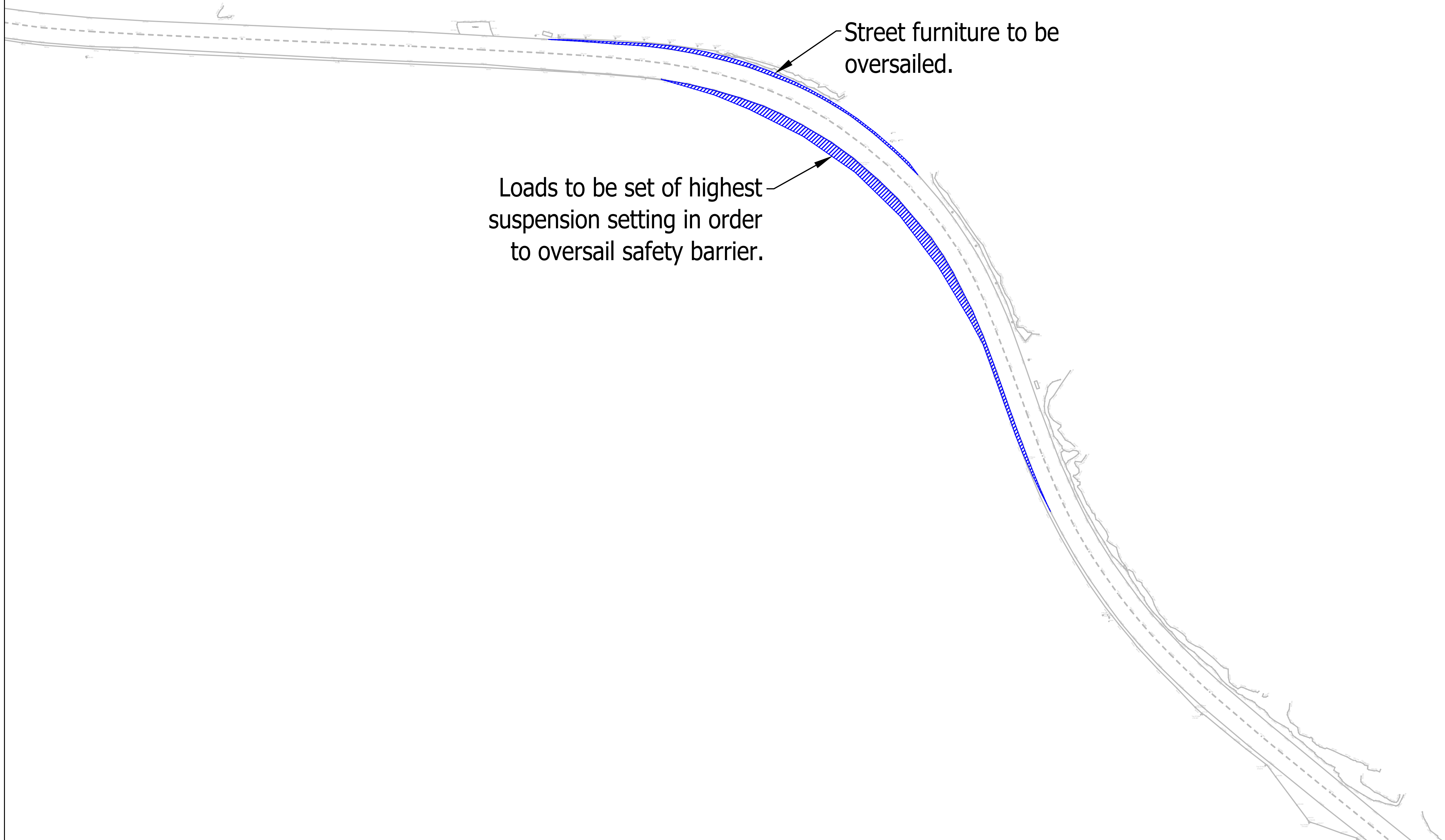
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK25

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 West of Ralston Cairn

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		30

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

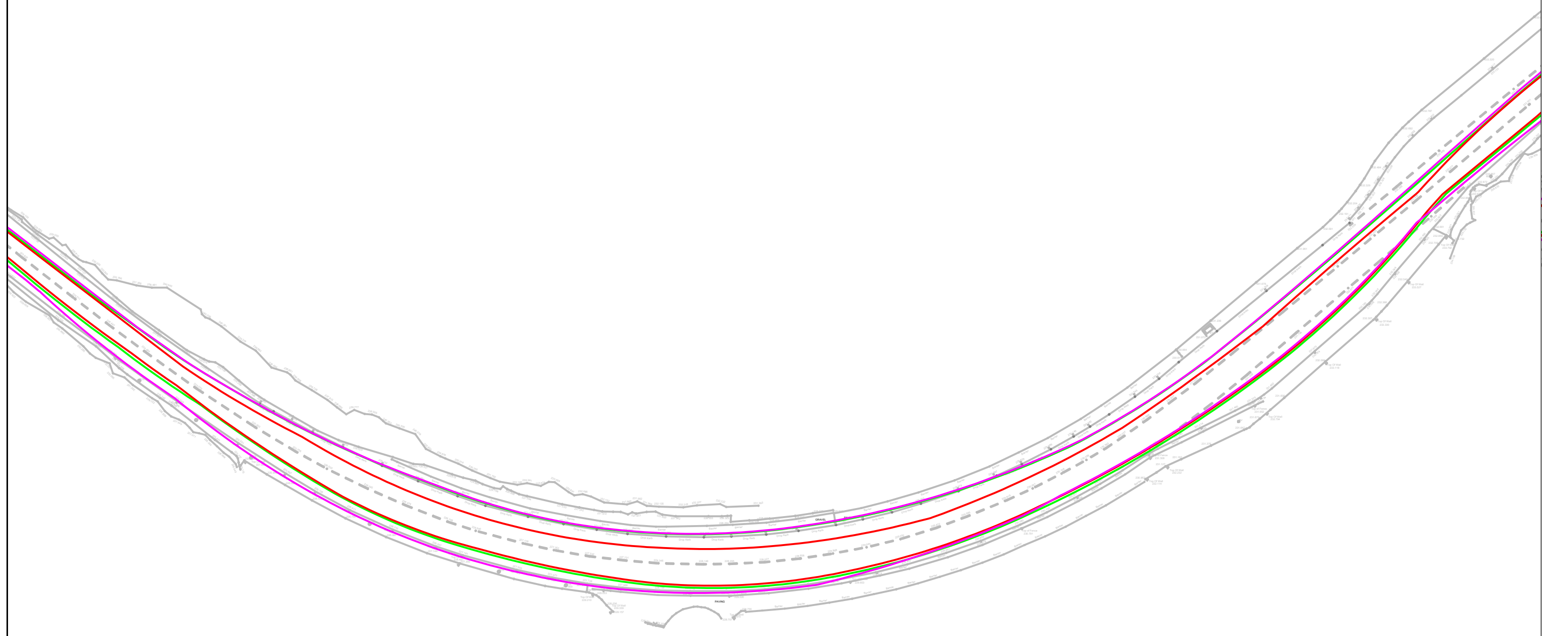
Drawing Status: Draft

Drawing No. SK25A

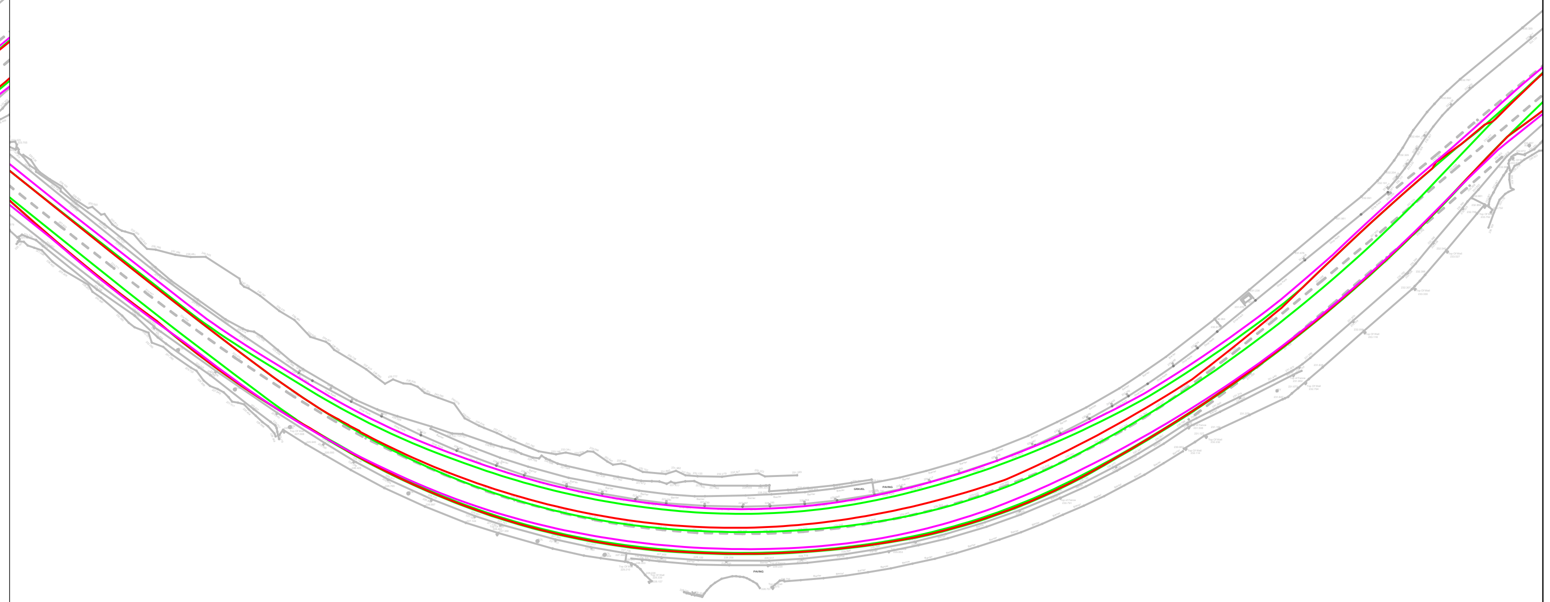
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade
Scissor Lift



Tower



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Client	Ridge Clean Energy Ltd.
Project	Ladyfield Renewable Energy Park
Drawing Title	V136 Blade and Tower
SPA Location	A82 Glencoe Waterfall

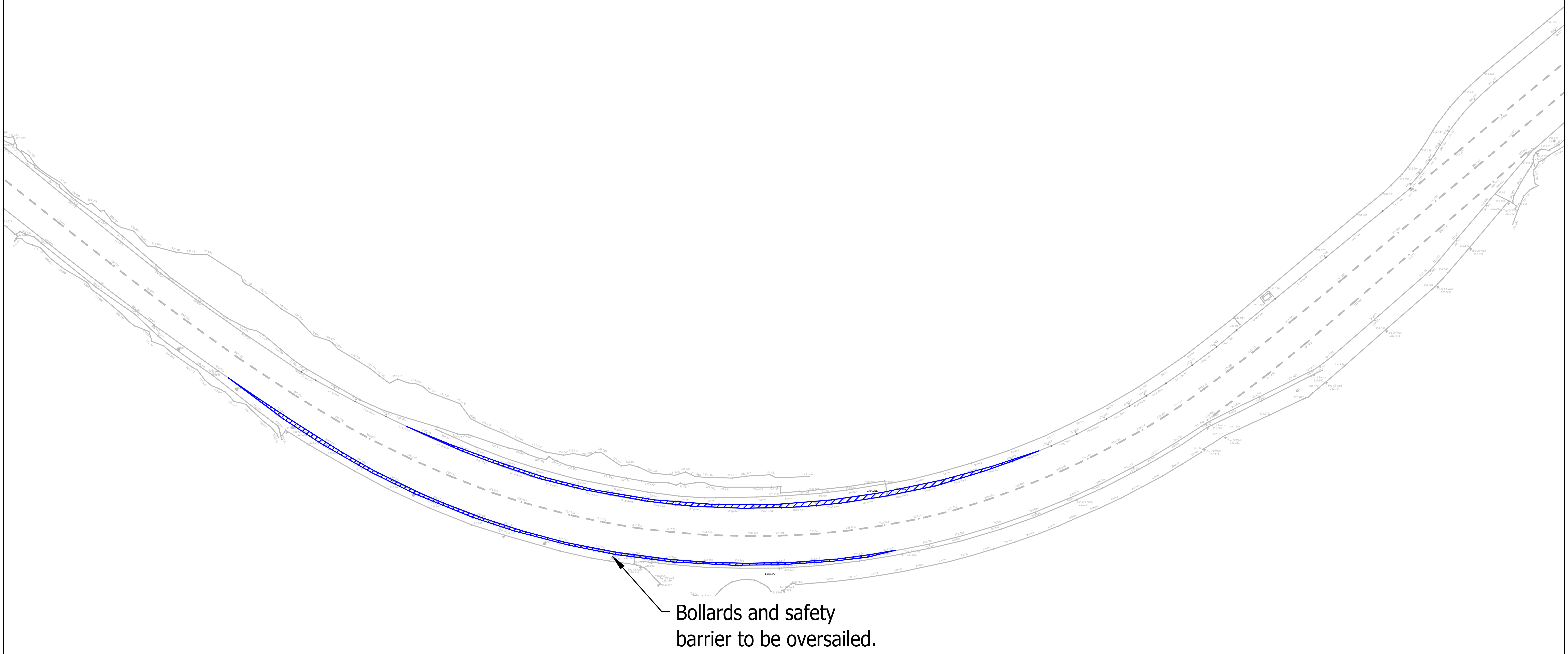
Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		31

Scale: 1:1000 @ A3
File No. 230725 Ladyfield V136 SPA.dwg
Drawing Status: Draft
Drawing No. SK26

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Glencoe Waterfall

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		31

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

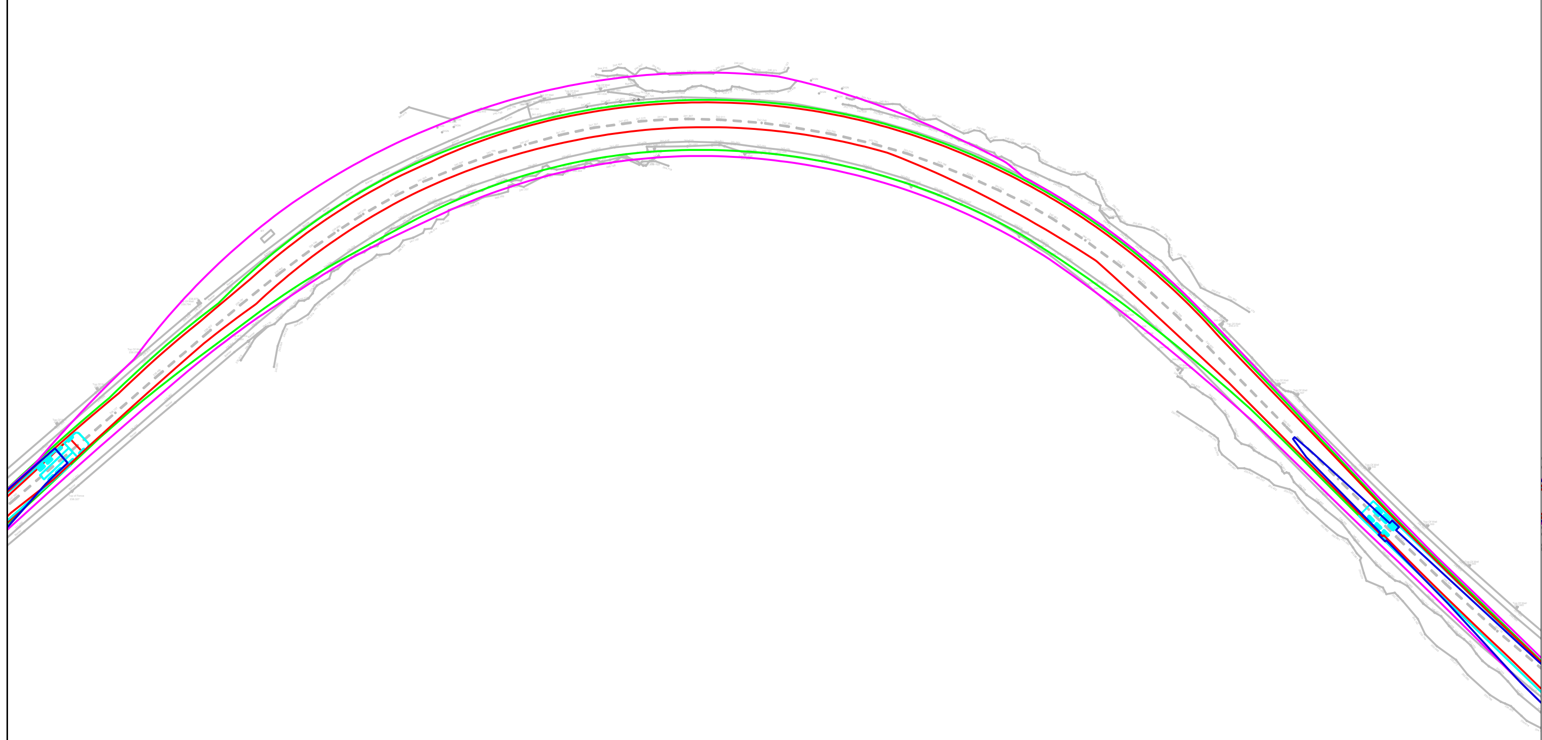
Drawing Status: Draft

Drawing No. SK26A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade
Scissor Lift



Tower

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Northwest of Glencoe Waterfall

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		32

Scale: 1:1000 @ A3

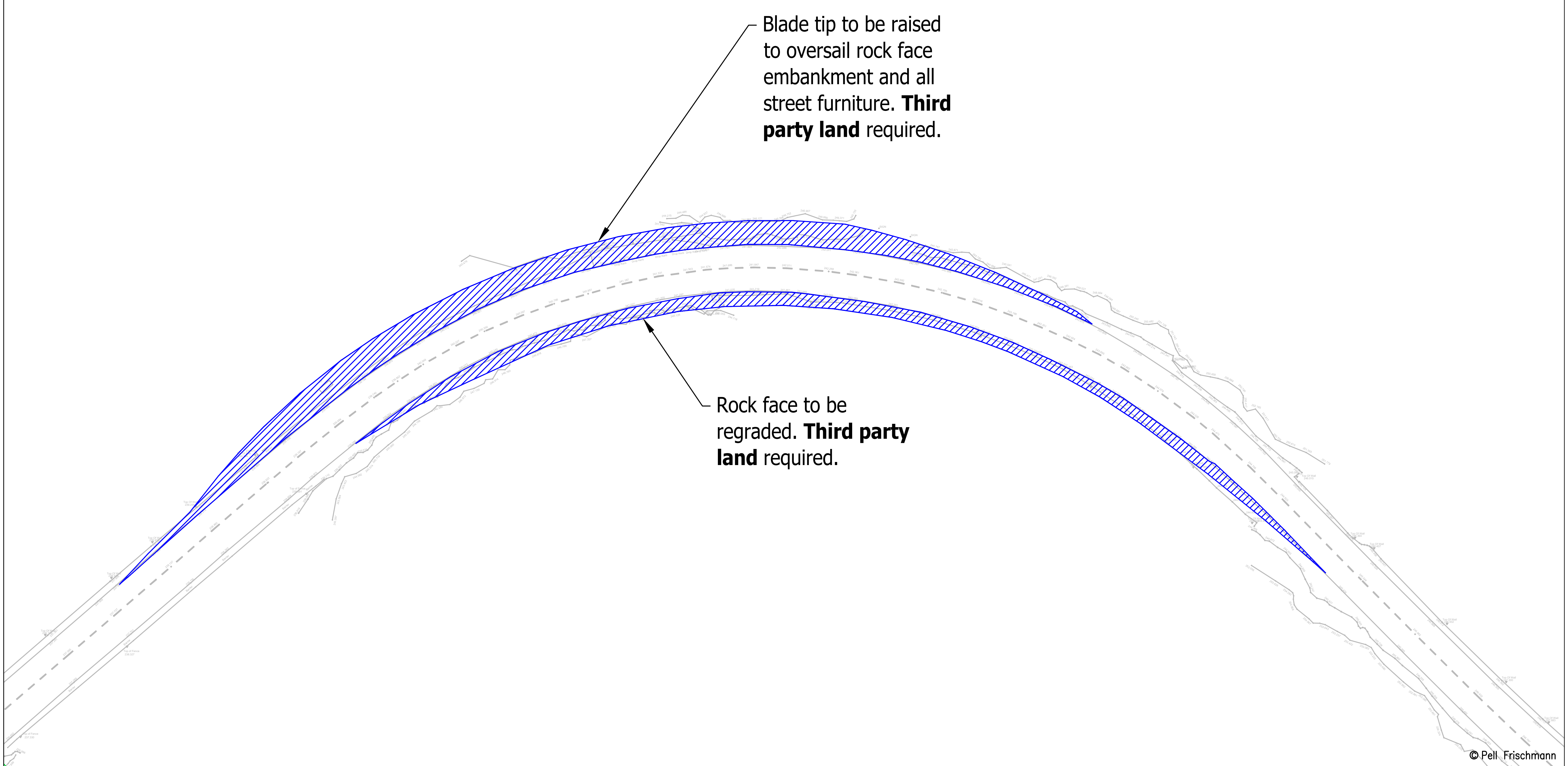
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK27

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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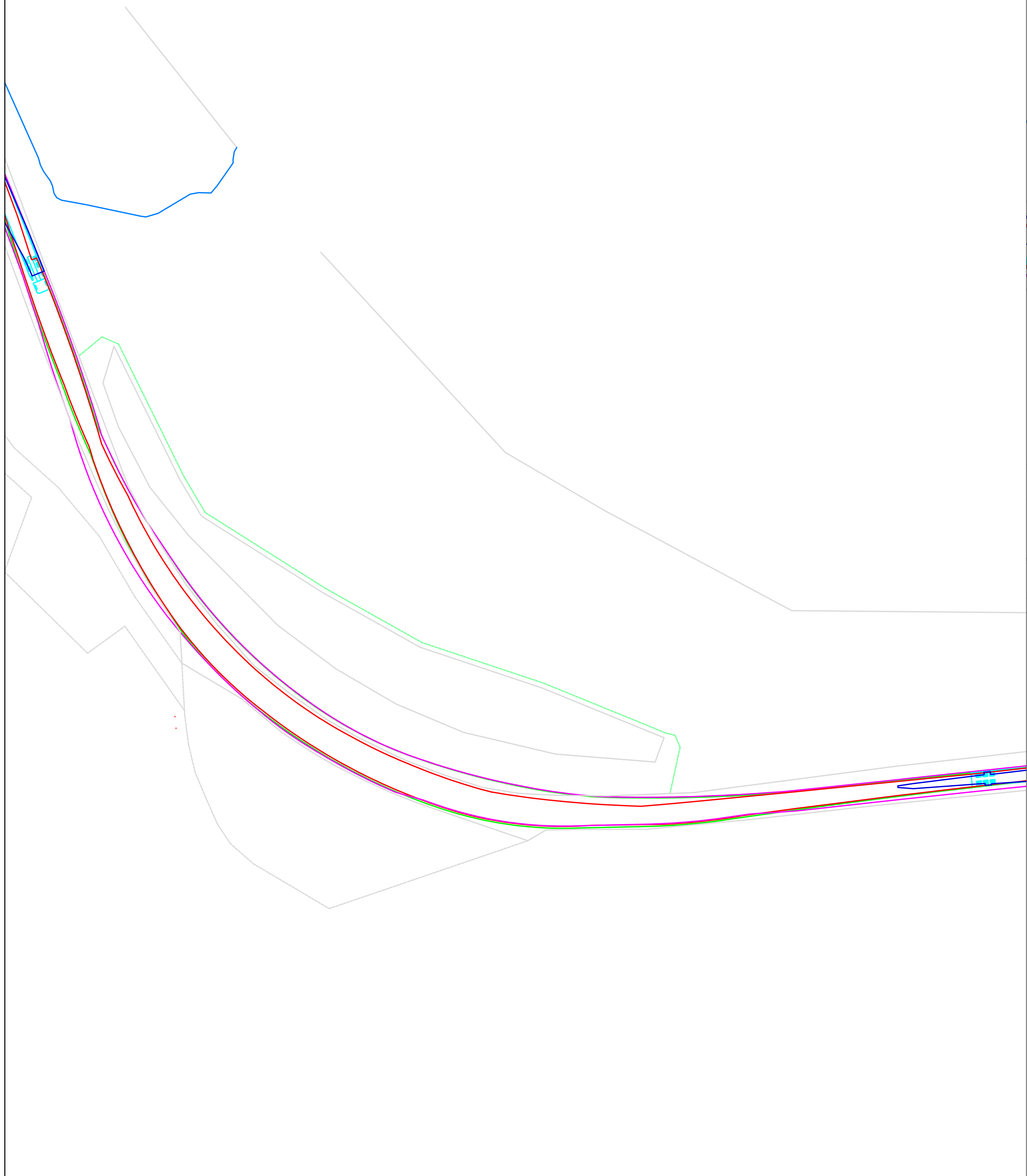
Project	Ladyfield Renewable Energy Park		Name	Date	Scale: 1:500 @ A3
		Drawn	JS	09/08/2023	
		Designed	TL	09/08/2023	File No. 230725 Ladyfield V136 SPA.dwg
Client	Ridge Clean Energy Ltd.	Checked	GB	09/08/2023	Drawing Status: Draft
Drawing Title	V136 Blade and Tower	Point of Interest		32	
SPA Location	A82 Northwest of Glencoe Waterfall	Drawing No. SK27A			Revision XXX

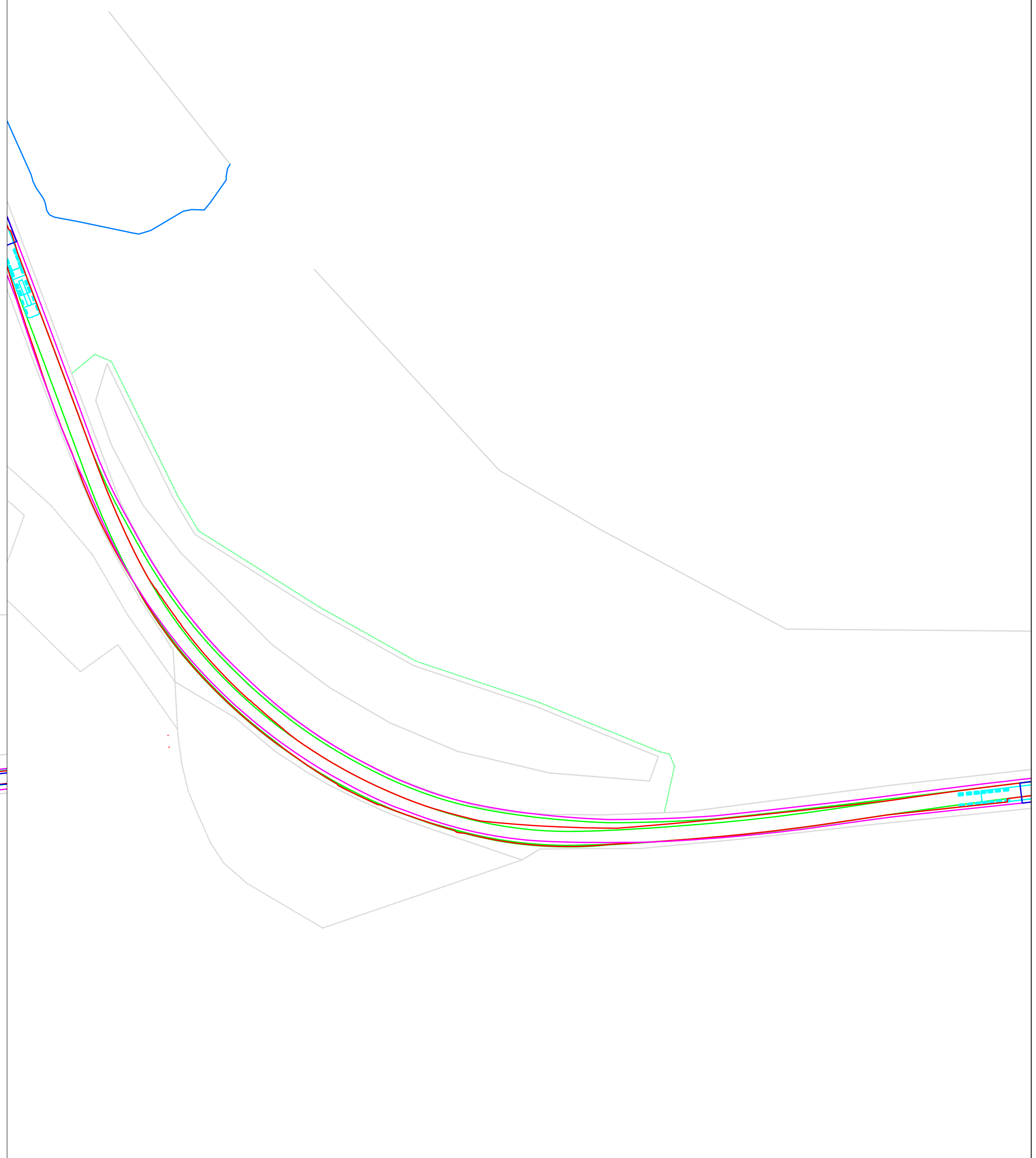
Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Blade



Tower



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Loch Tulla Viewpoint

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		34

Scale: Custom @ A3

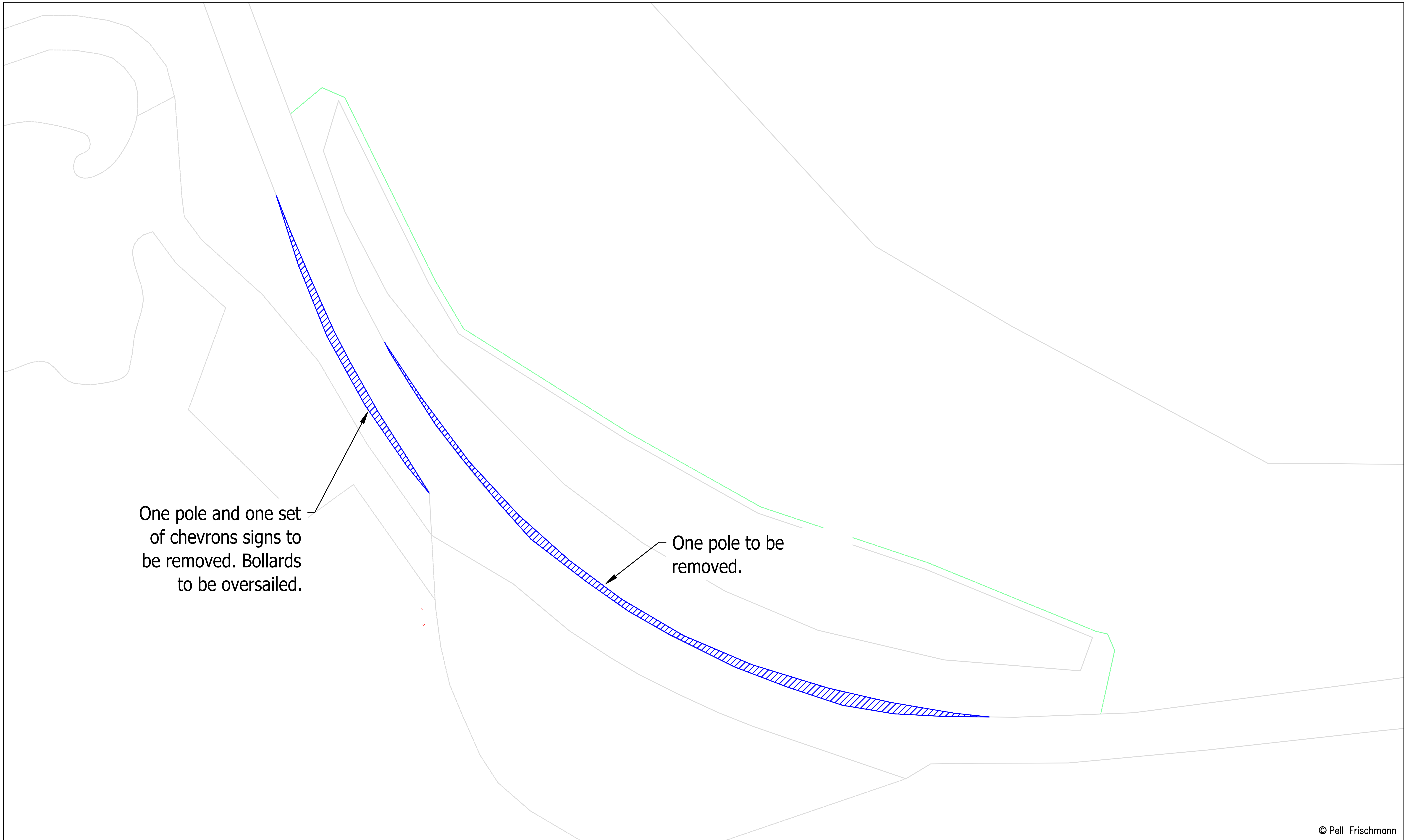
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK28

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Project: Ladyfield Renewable Energy Park

Client: Ridge Clean Energy Ltd.

Drawing Title: V136 Blade and Tower

SPA Location: A82 Loch Tulla Viewpoint

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	34	

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK28A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

Tower

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Left Bend, Northwest of Achallader

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		35

Scale: 1:1000 @ A3

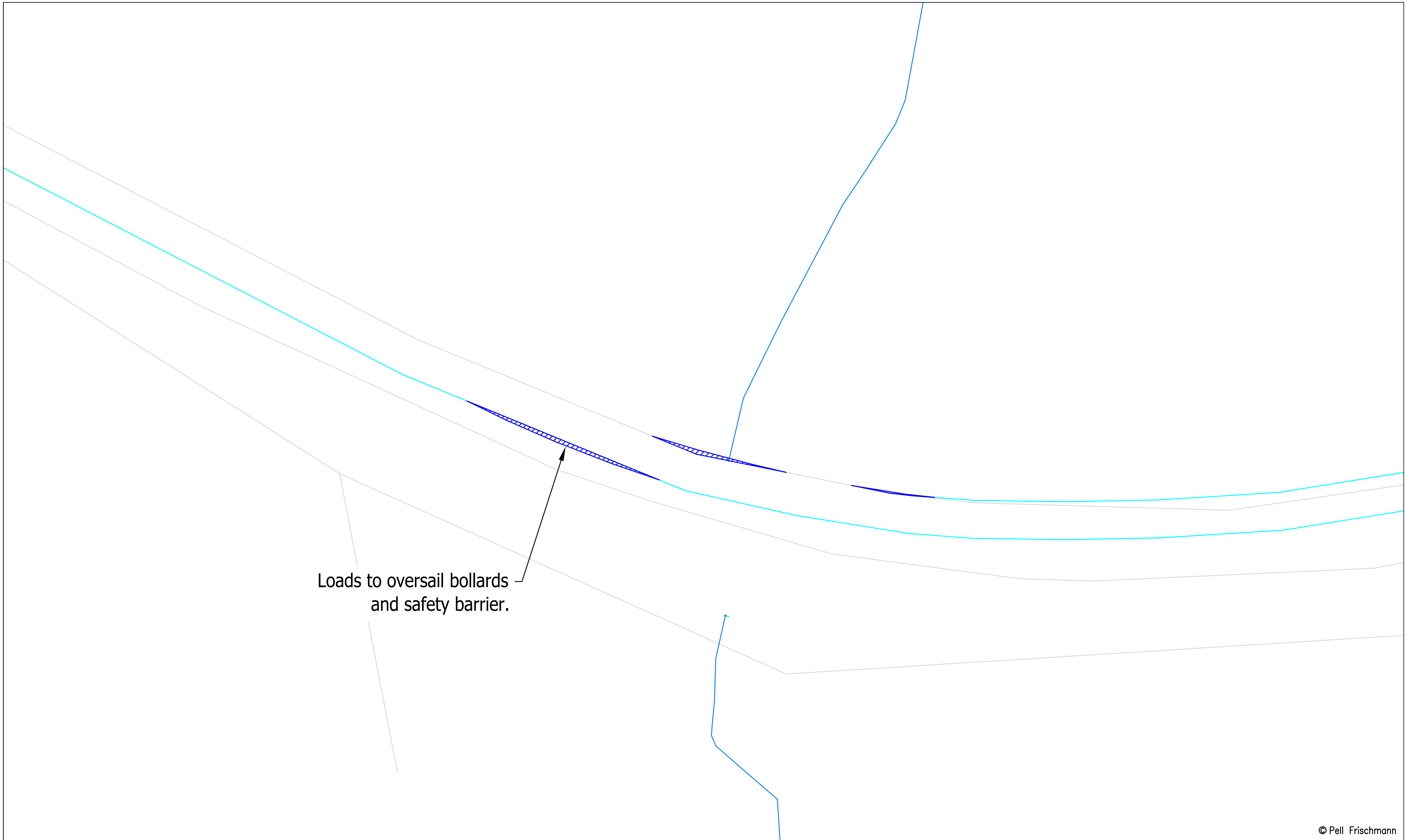
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK29

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Project: Ladyfield Renewable Energy Park

Client: Ridge Clean Energy Ltd.

Drawing Title: V136 Blade and Tower

SPA Location: A82 Left Bend, Northwest of Achallader

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		35

Scale: 1:500 @ A3

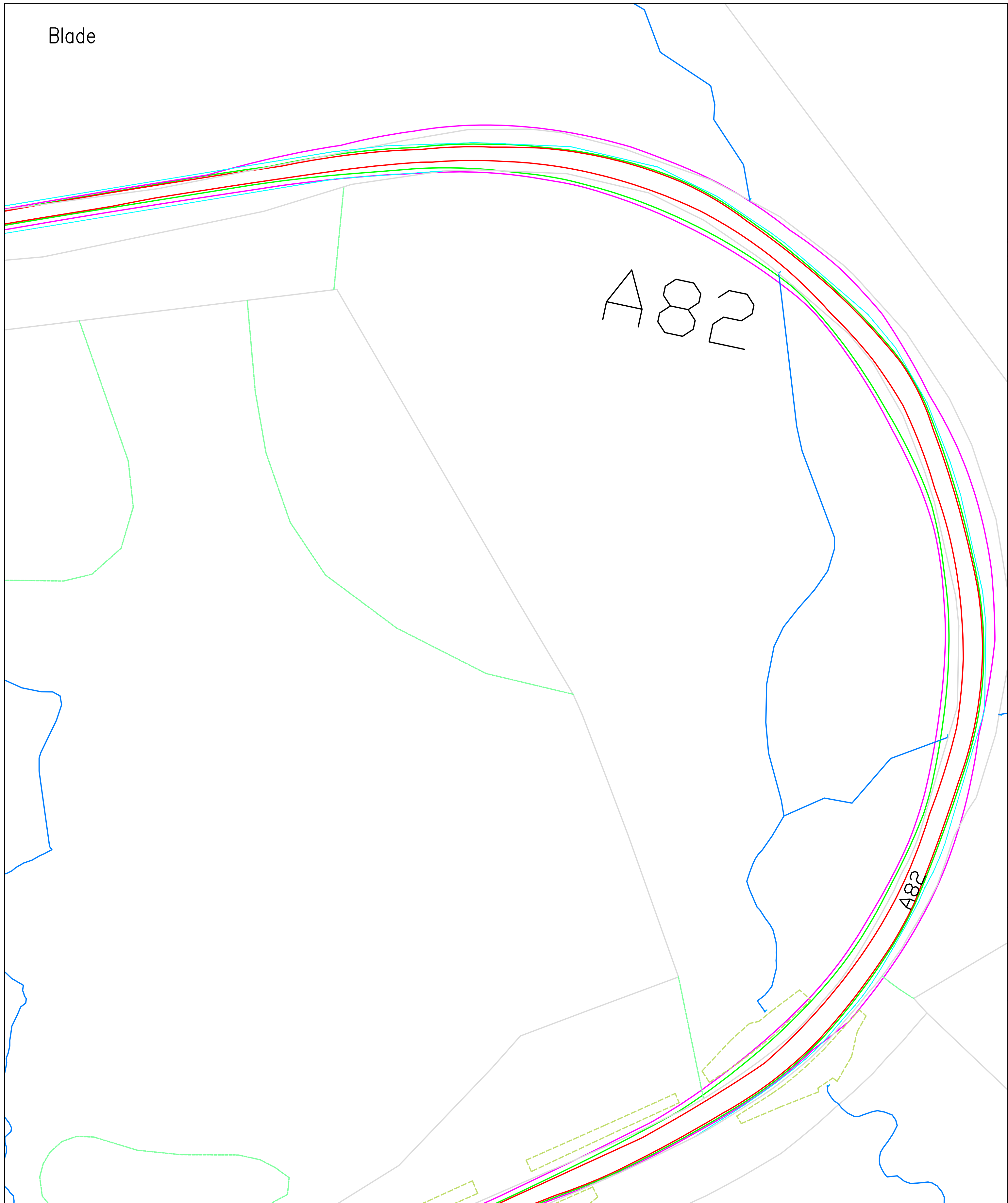
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK29A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Northwest of Achallader

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	36	

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK30

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 Northwest of Achallader

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		36

Scale: 1:1000 @ A3

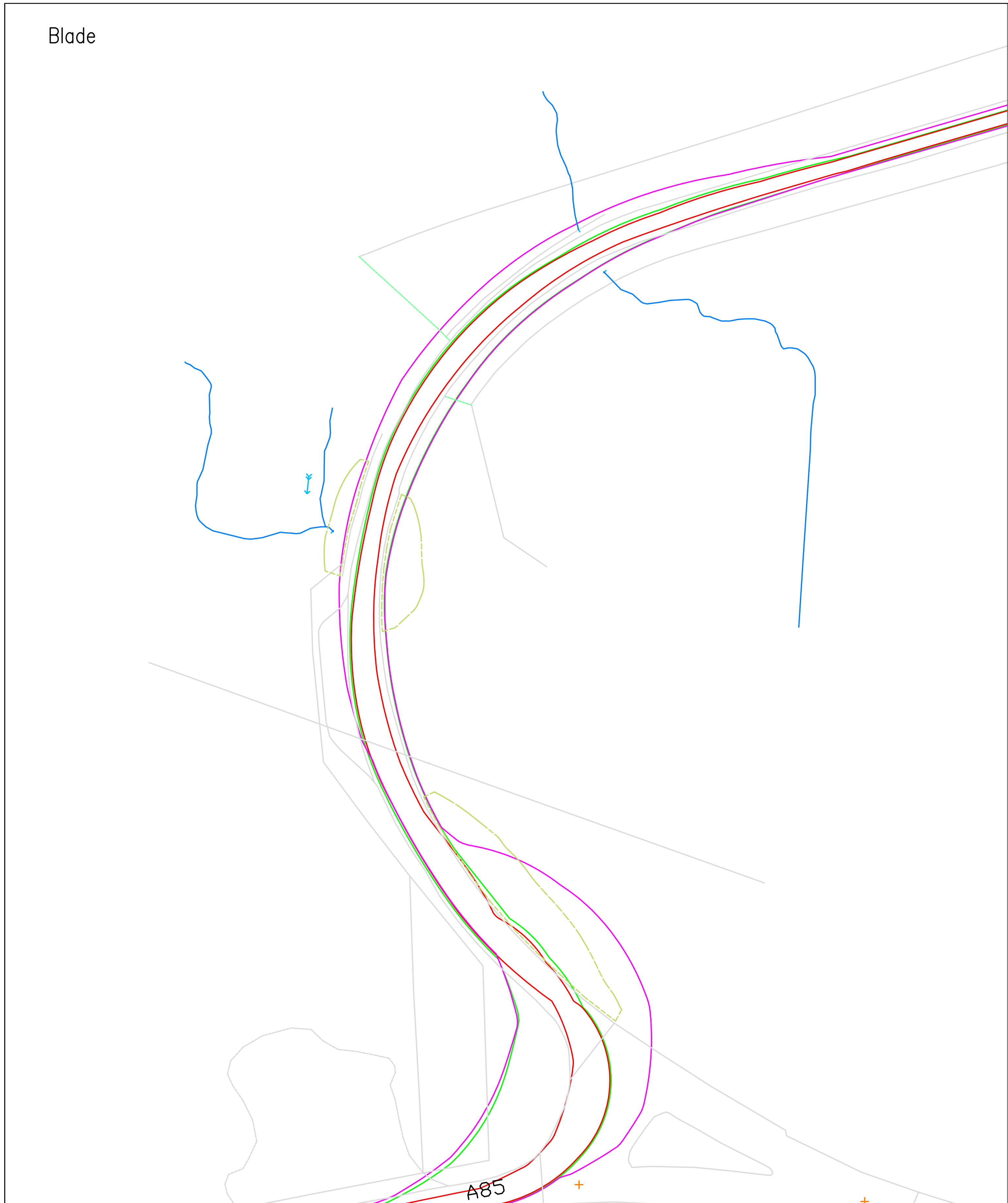
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK30A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 / A85 Junction

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	38,39	

Scale: 1:1000 @ A3

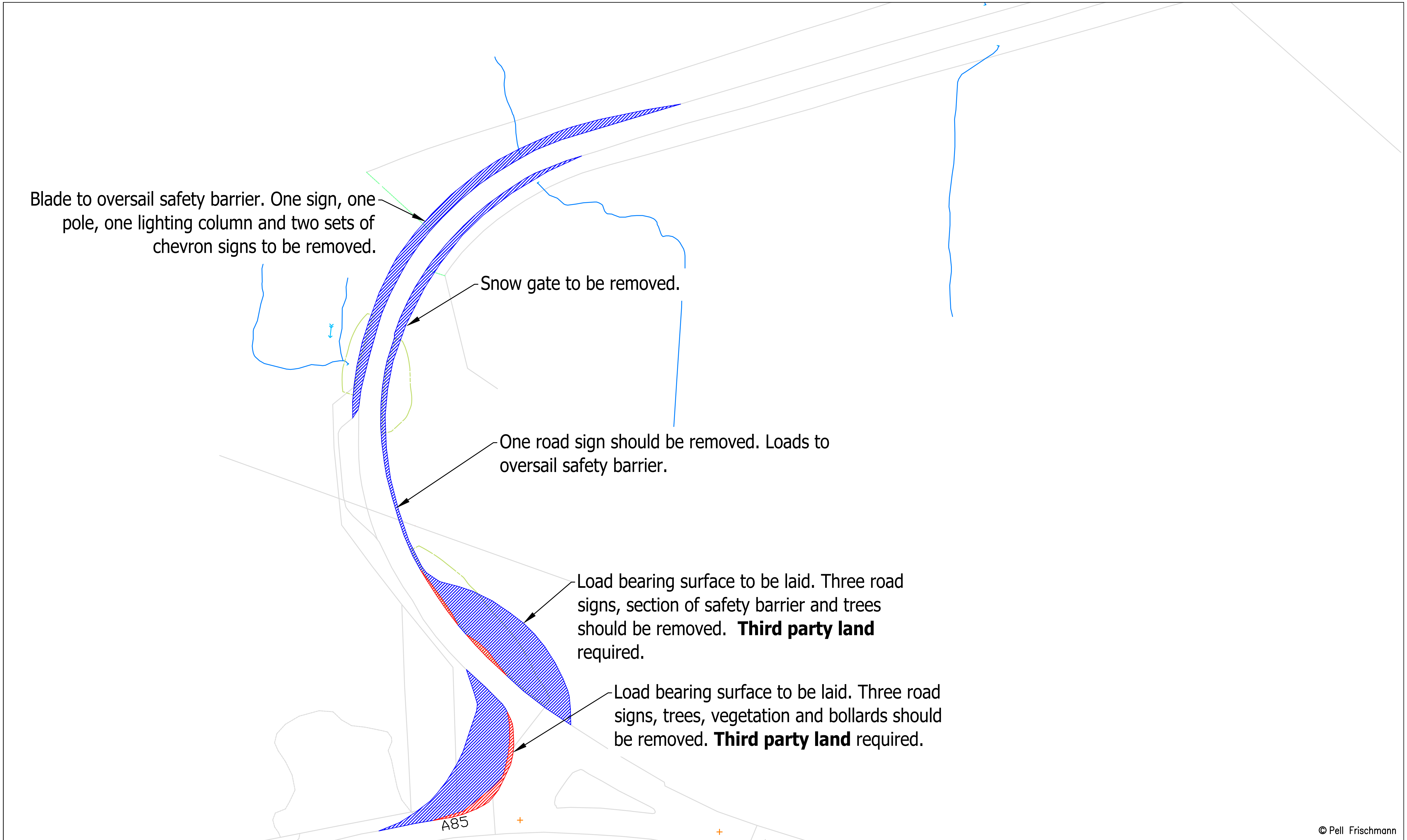
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK31

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A82 / A85 Junction

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		38,39

Scale: 1:1000 @ A3

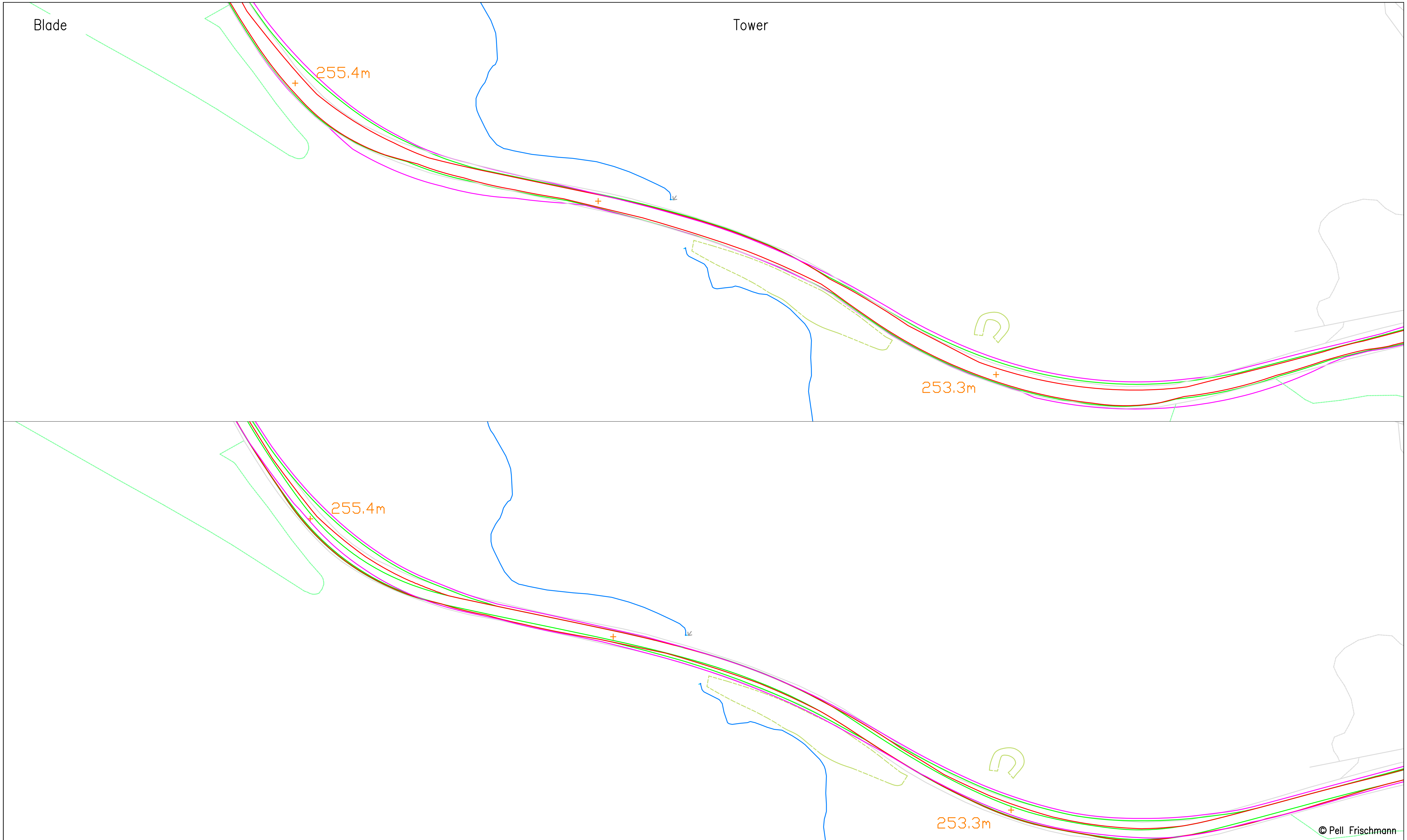
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK31A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 Clifton

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	40	

Scale: 1:1000 @ A3

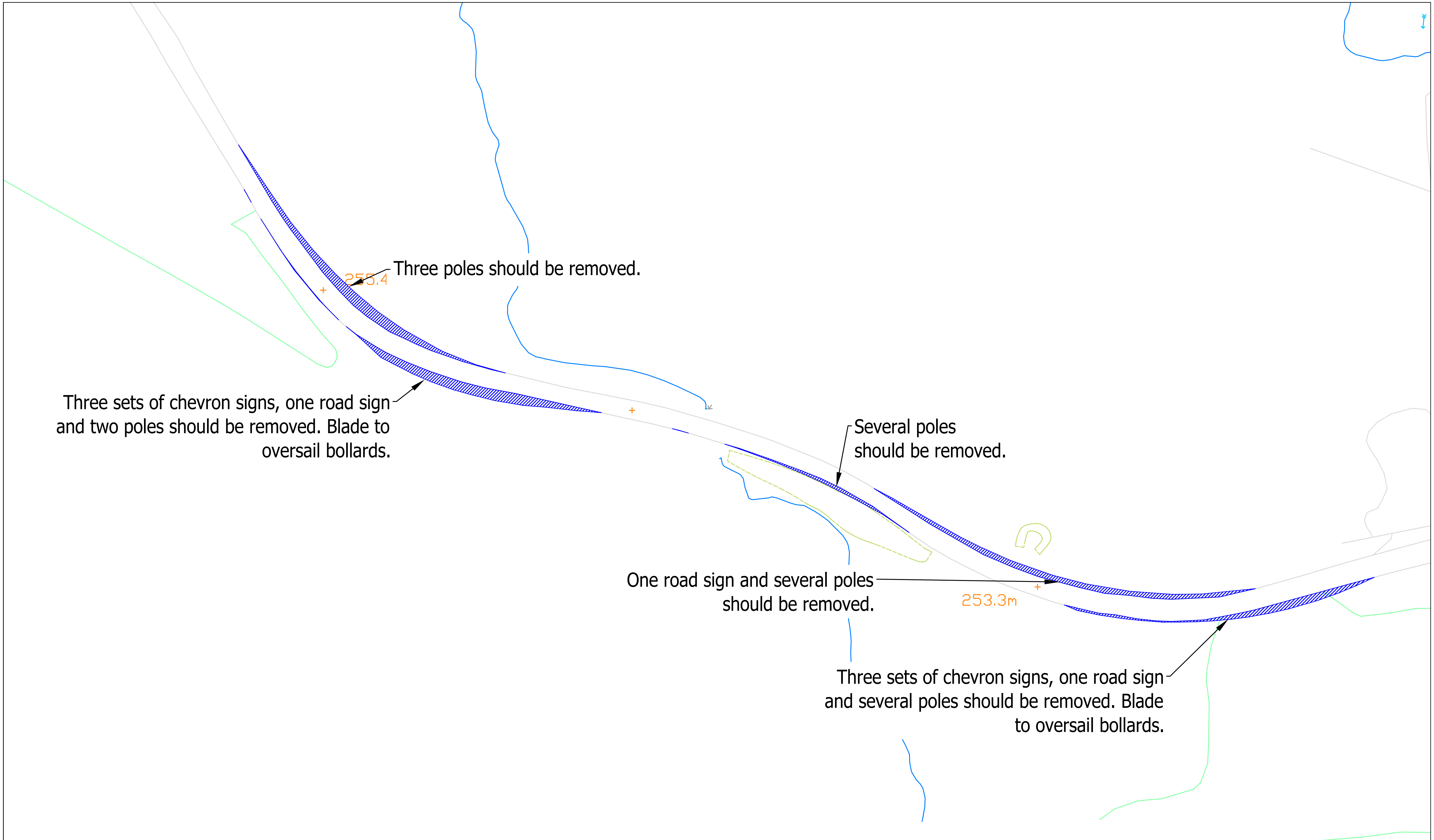
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK32

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Project	Ladyfield Renewable Energy Park		Name	Date
		Drawn	JS	09/08/2023
		Designed	TL	09/08/2023
		Checked	GB	09/08/2023
Client	Ridge Clean Energy Ltd.	Point of Interest	40	
Drawing Title	V136 Blade and Tower	Drawing No.	SK32A	
SPA Location	A85 Clifton			

Scale: 1:1000 @ A3

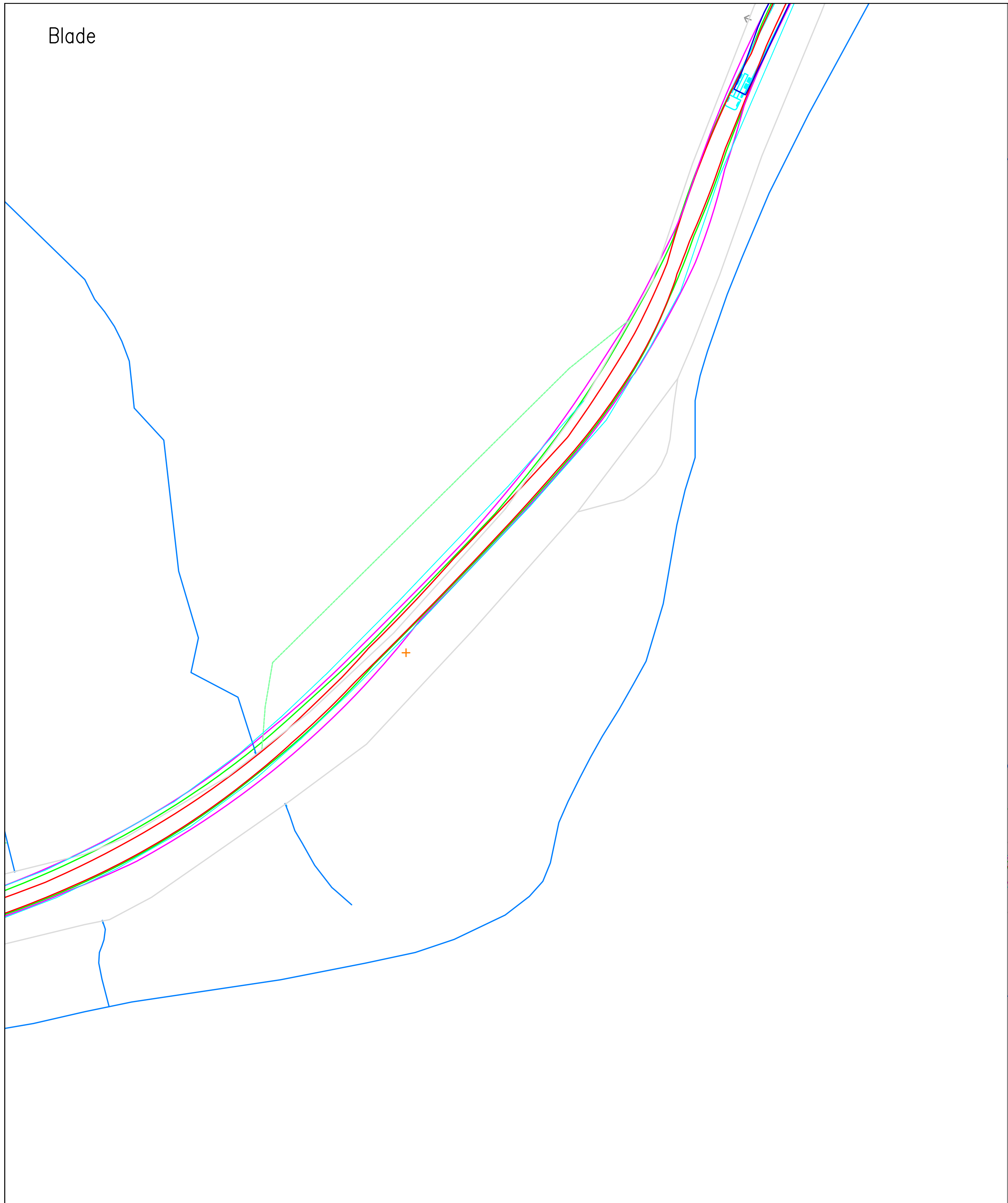
File No.: 230725 Ladyfield V136 SPA.dwg

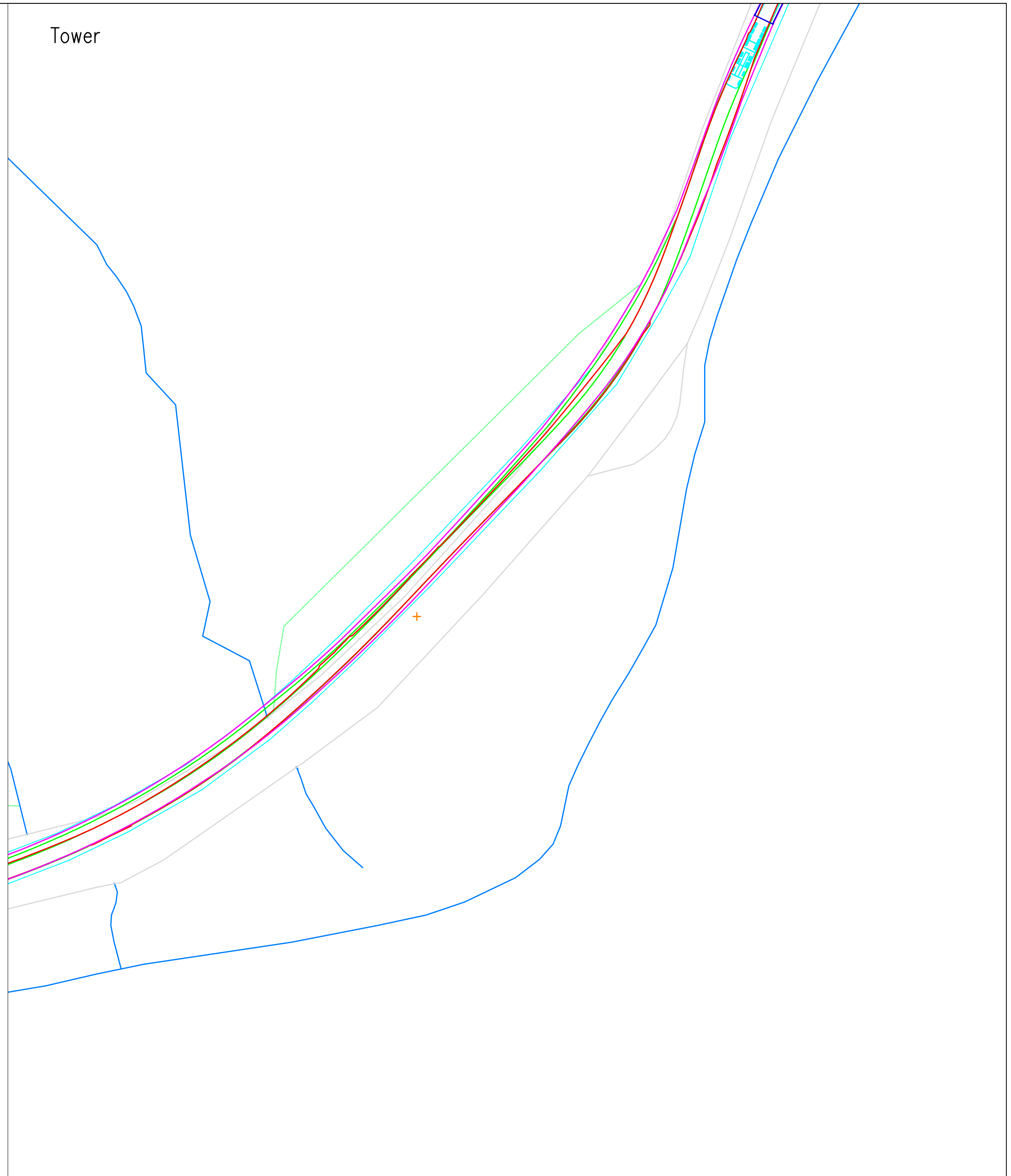
Drawing Status: Draft

Revision: XXX

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 Bends Southwest of Arrivain

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		43

Scale: 1:1000 @ A3

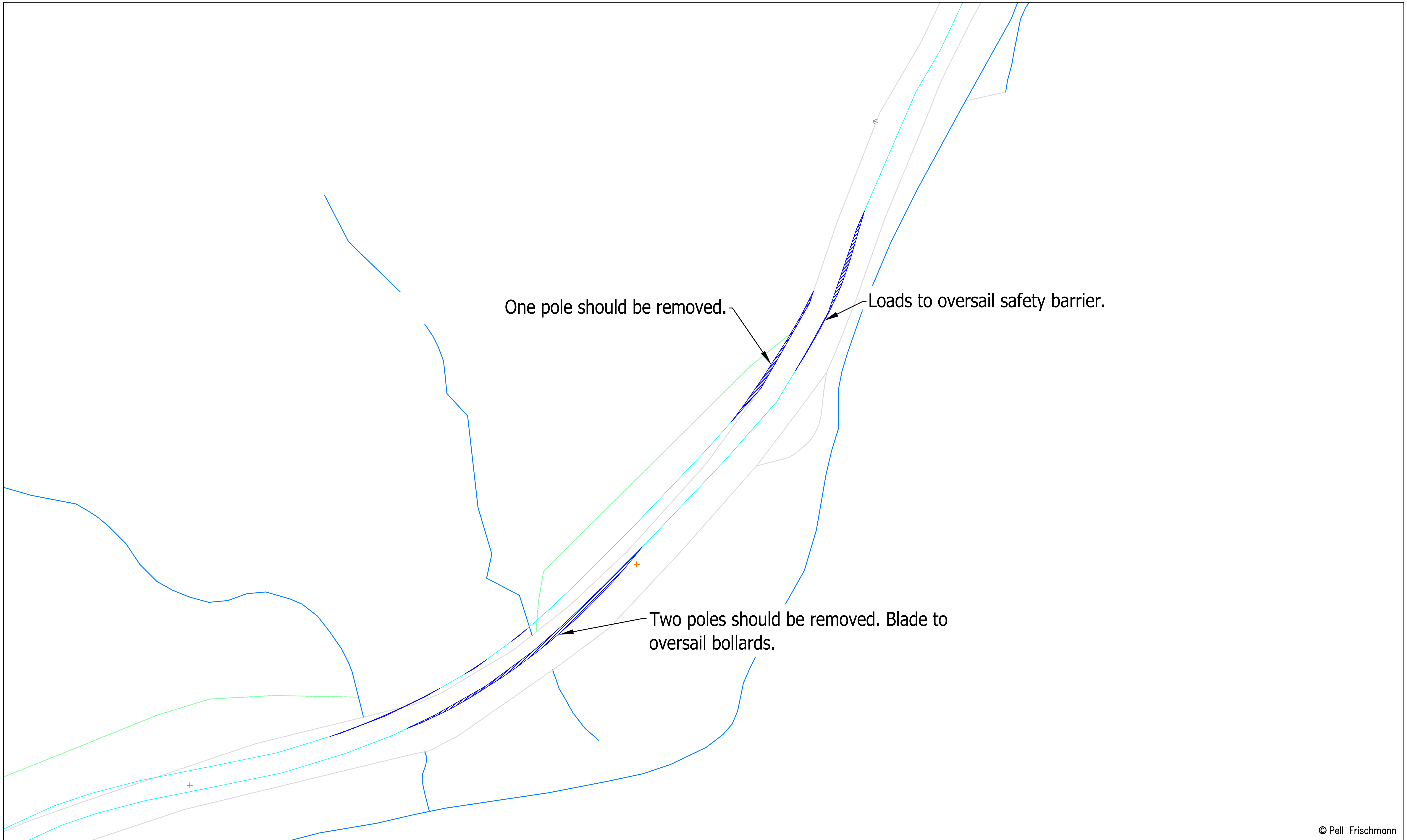
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK33

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 Bends Southwest of Arrivain

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		43

Scale: 1:1000 @ A3

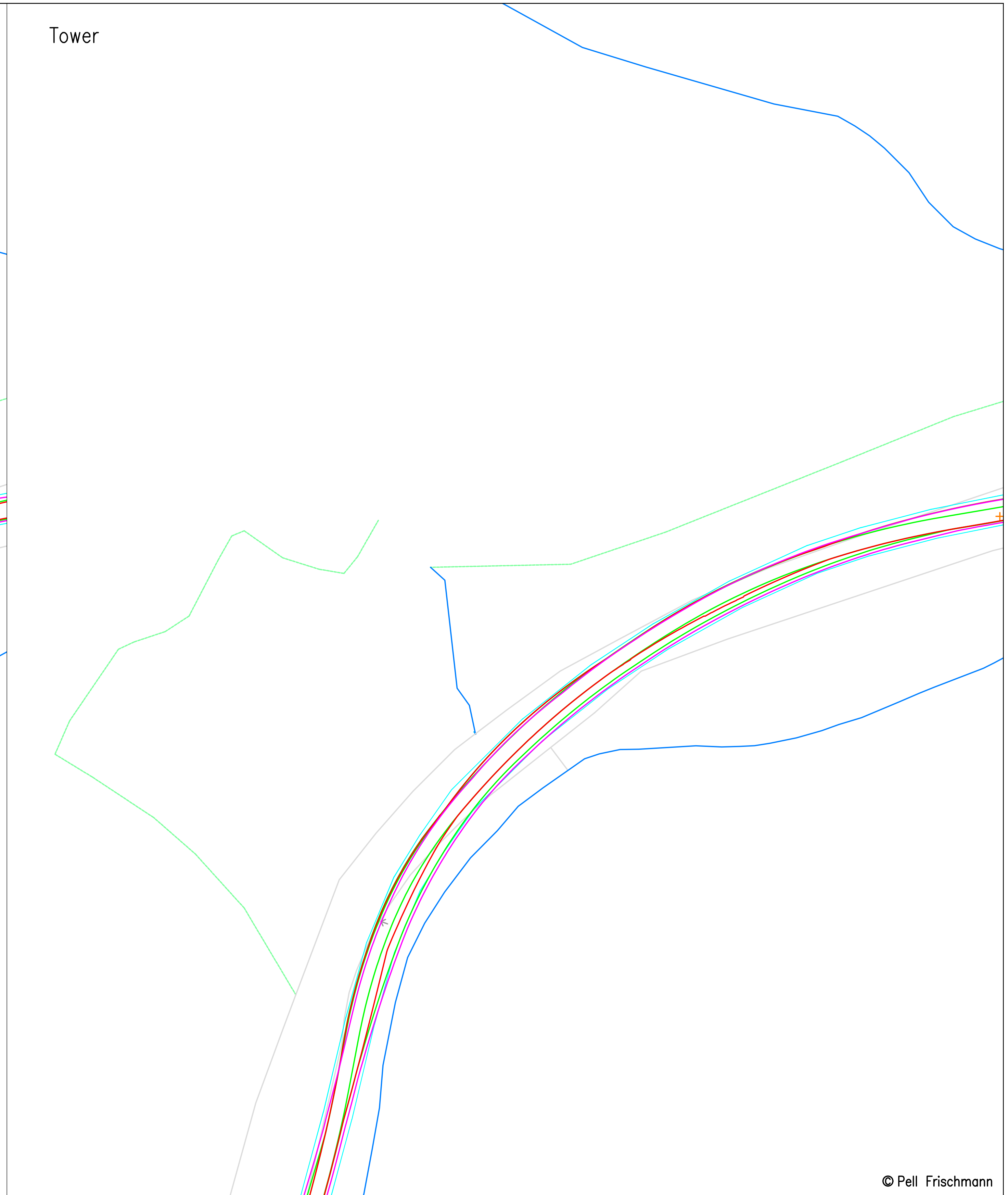
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK33A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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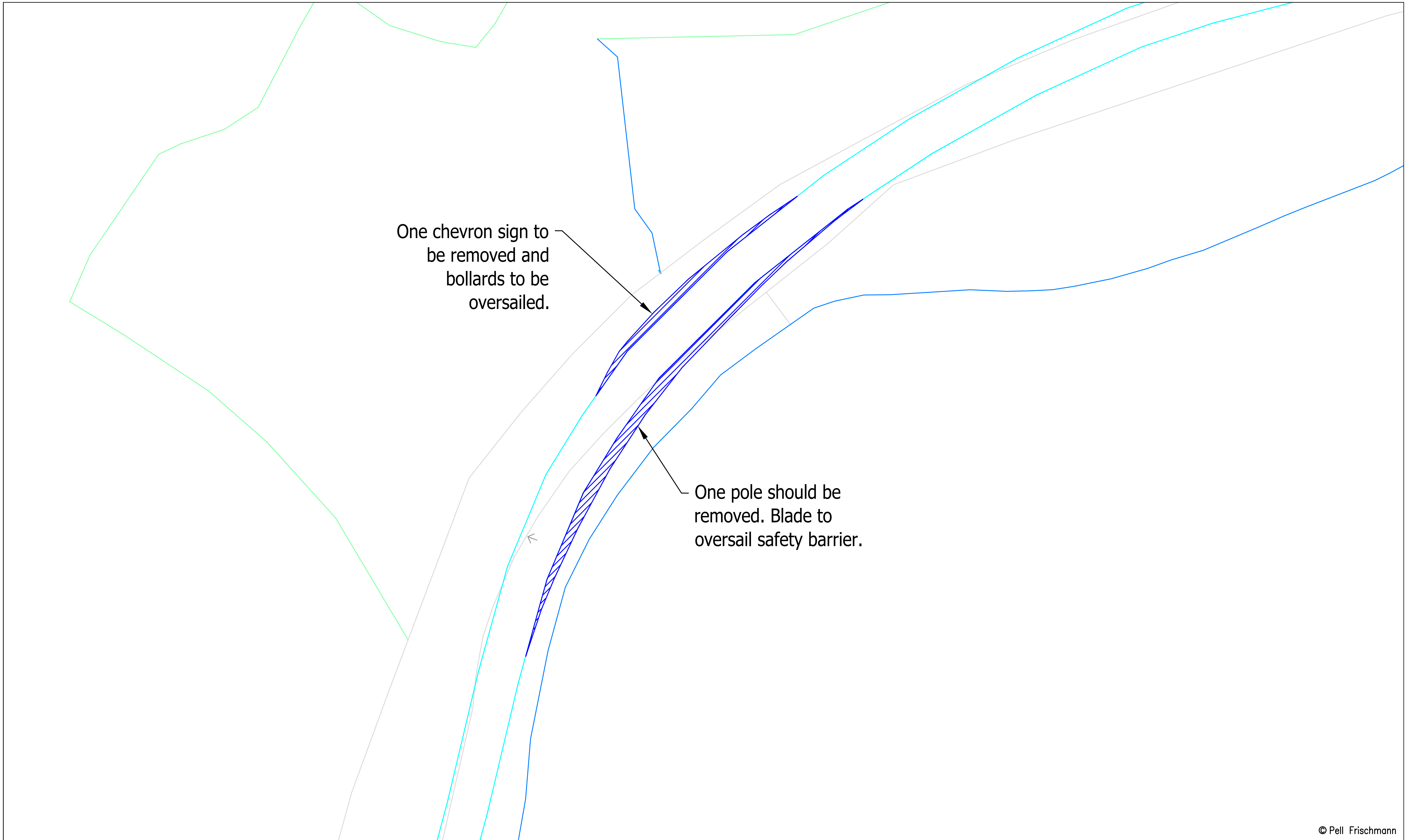
www.pellfrischmann.com

Client	Ridge Clean Energy Ltd.
Key	Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail
Project	Ladyfield Renewable Energy Park
Drawing Title	V136 Blade and Tower
SPA Location	A85 Bends Southwest of Arrivain

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		44

Scale	1:1000 @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK34
Revision	XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.



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www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 Bends Southwest of Arrivain

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		44

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK34A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

Tower

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over−run | Over−sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 Bends Southwest of Arrivain

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	45	

Scale: Custom @ A3

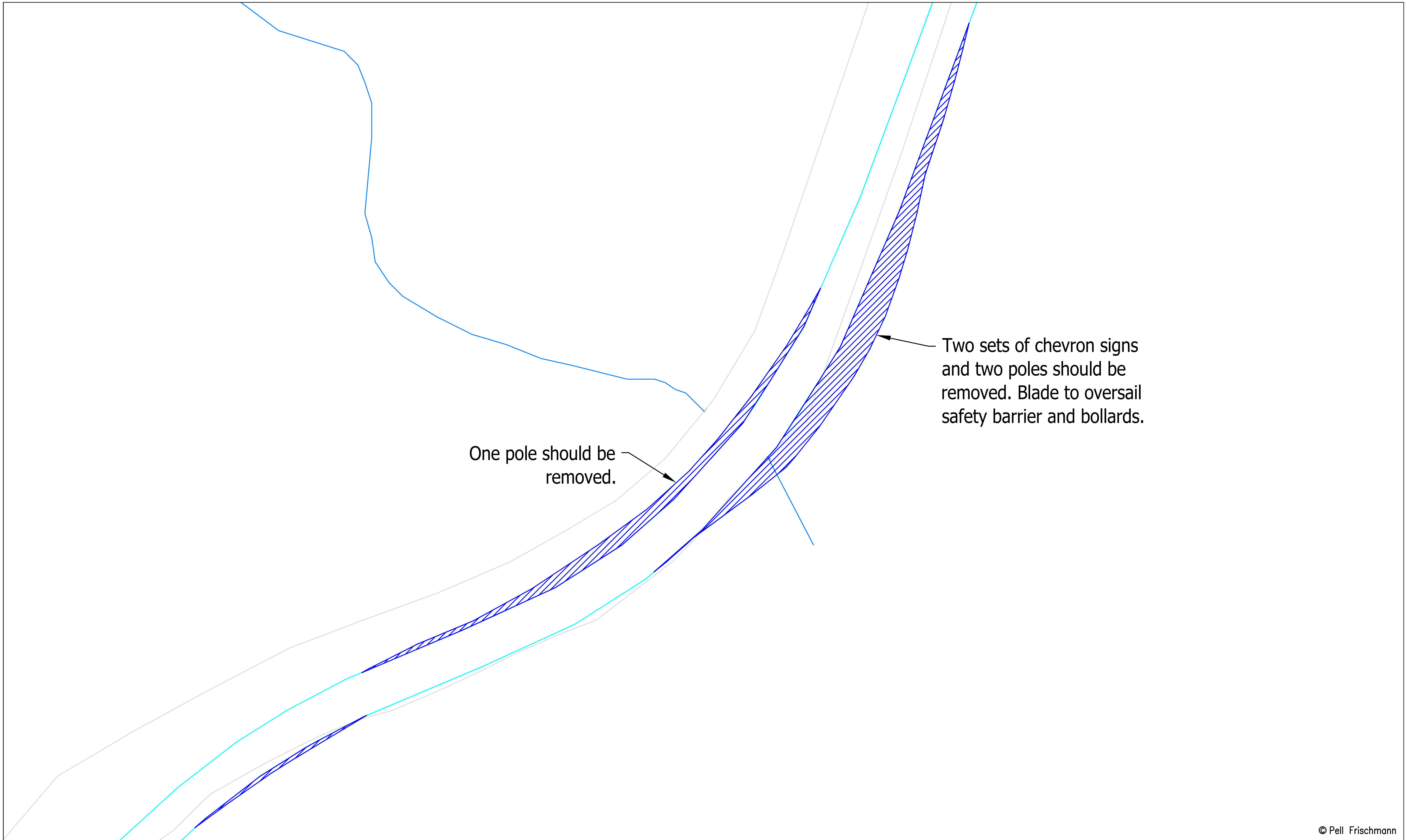
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK35

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 Bends Southwest of Arrivain

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	45	

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK35A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

Tower

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 Right Bend, Dalmally

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		51

Scale: 1:1000 @ A3

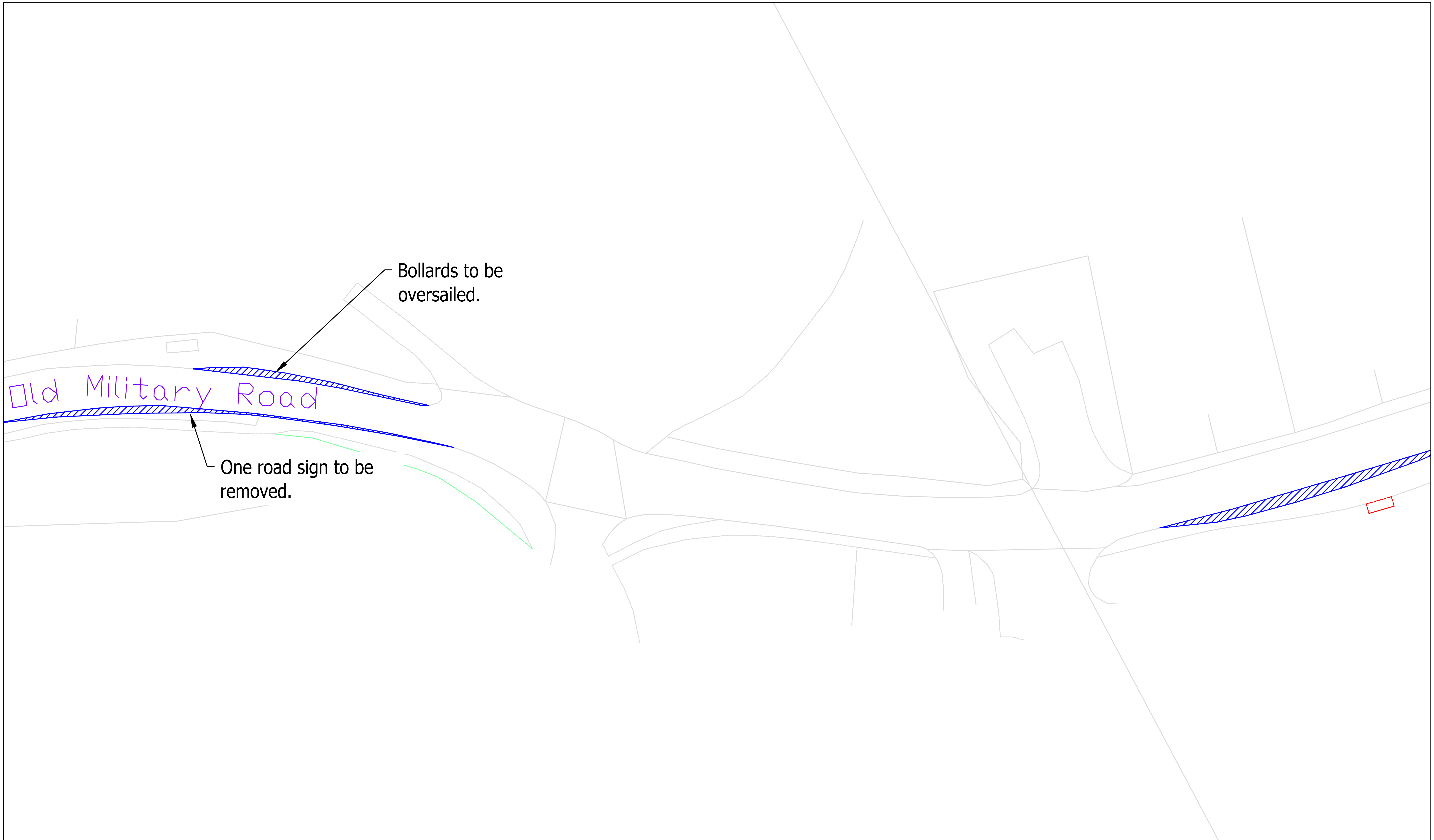
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK36

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 Right Bend, Dalmally

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		51

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK36A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade

Tower

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 / A819 Junction

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		53

Scale: 1:1000 @ A3

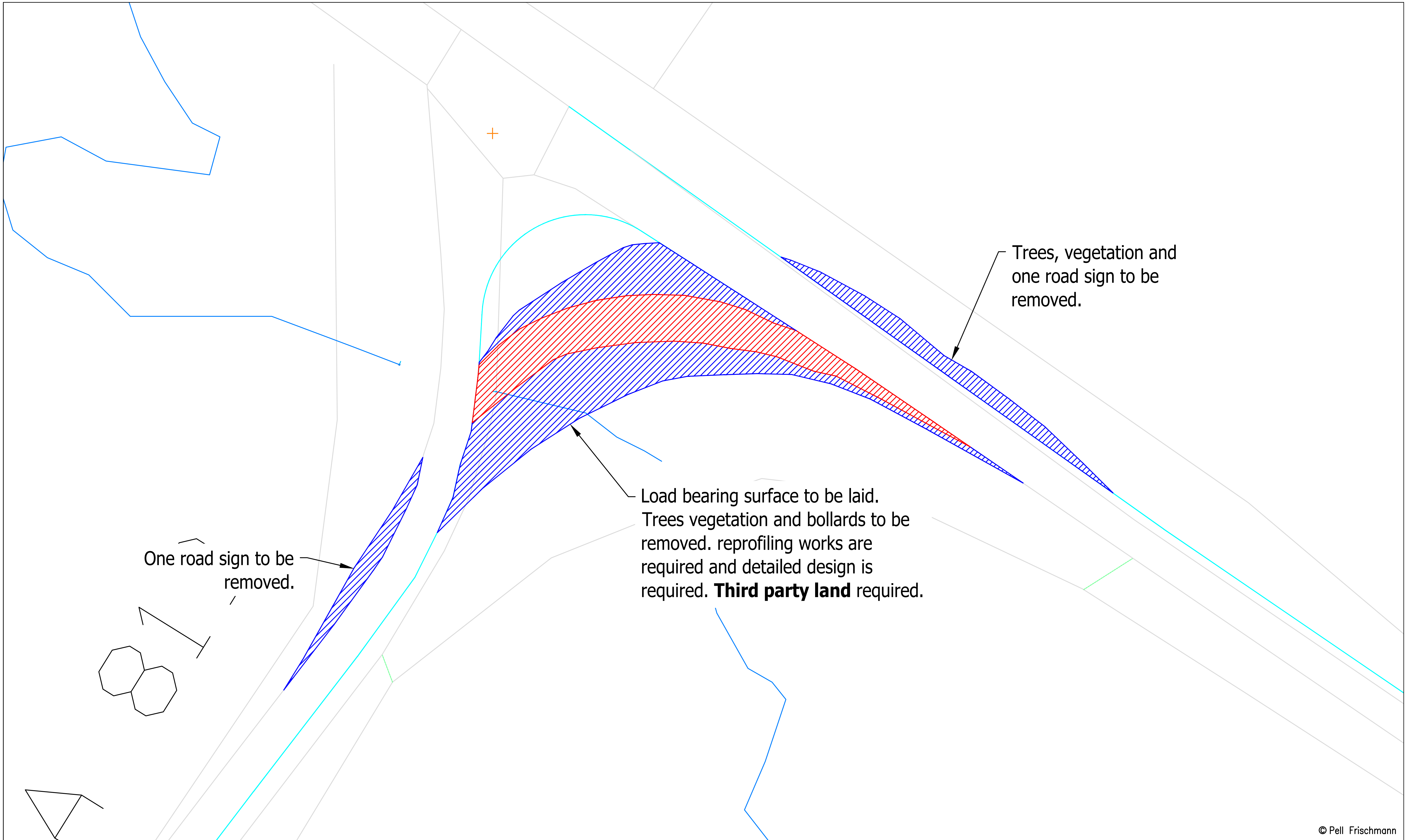
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK37

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A85 / A819 Junction

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	53	

Scale: 1:500 @ A3

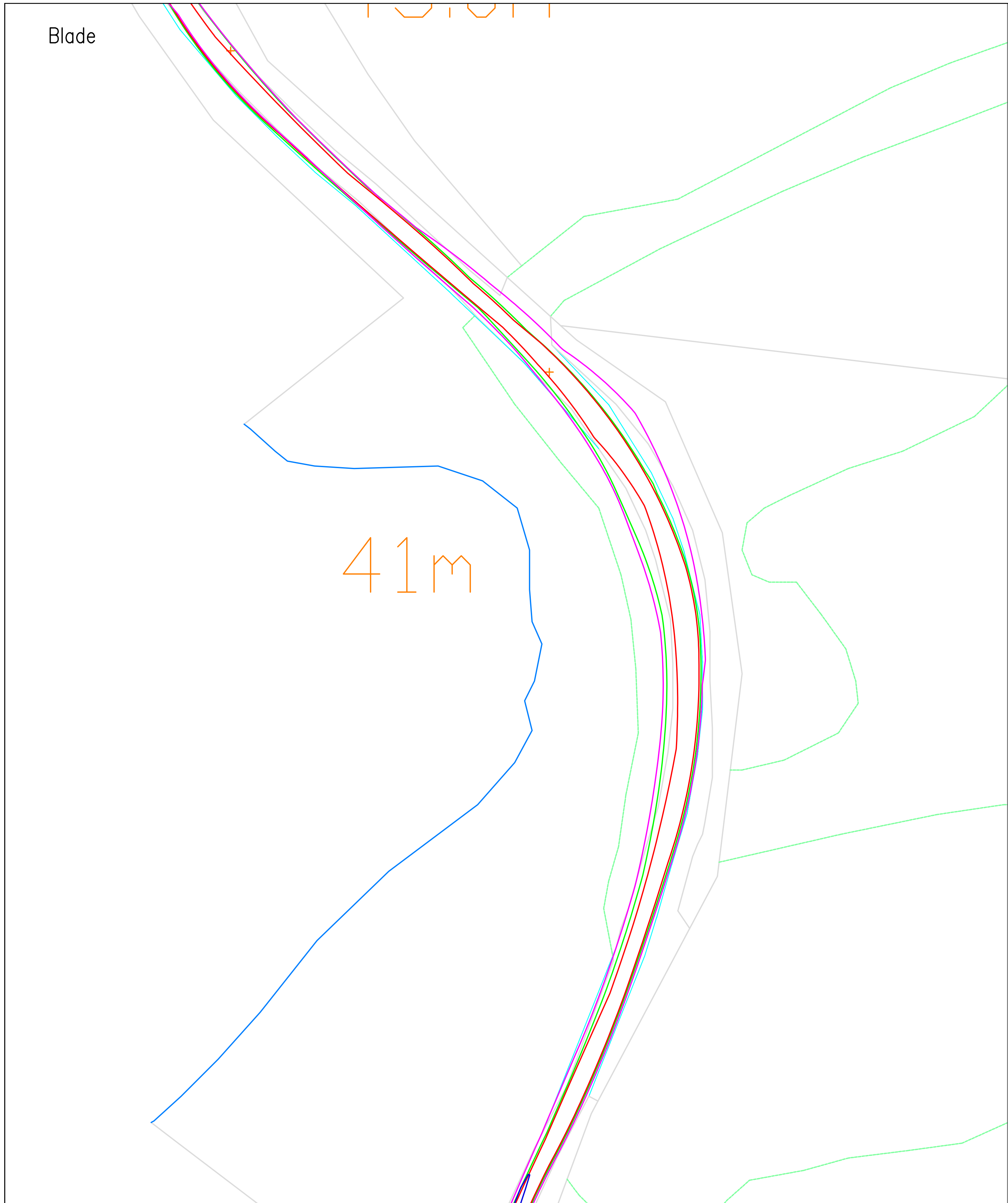
File No.: 230725 Ladyfield V136 SPA.dwg

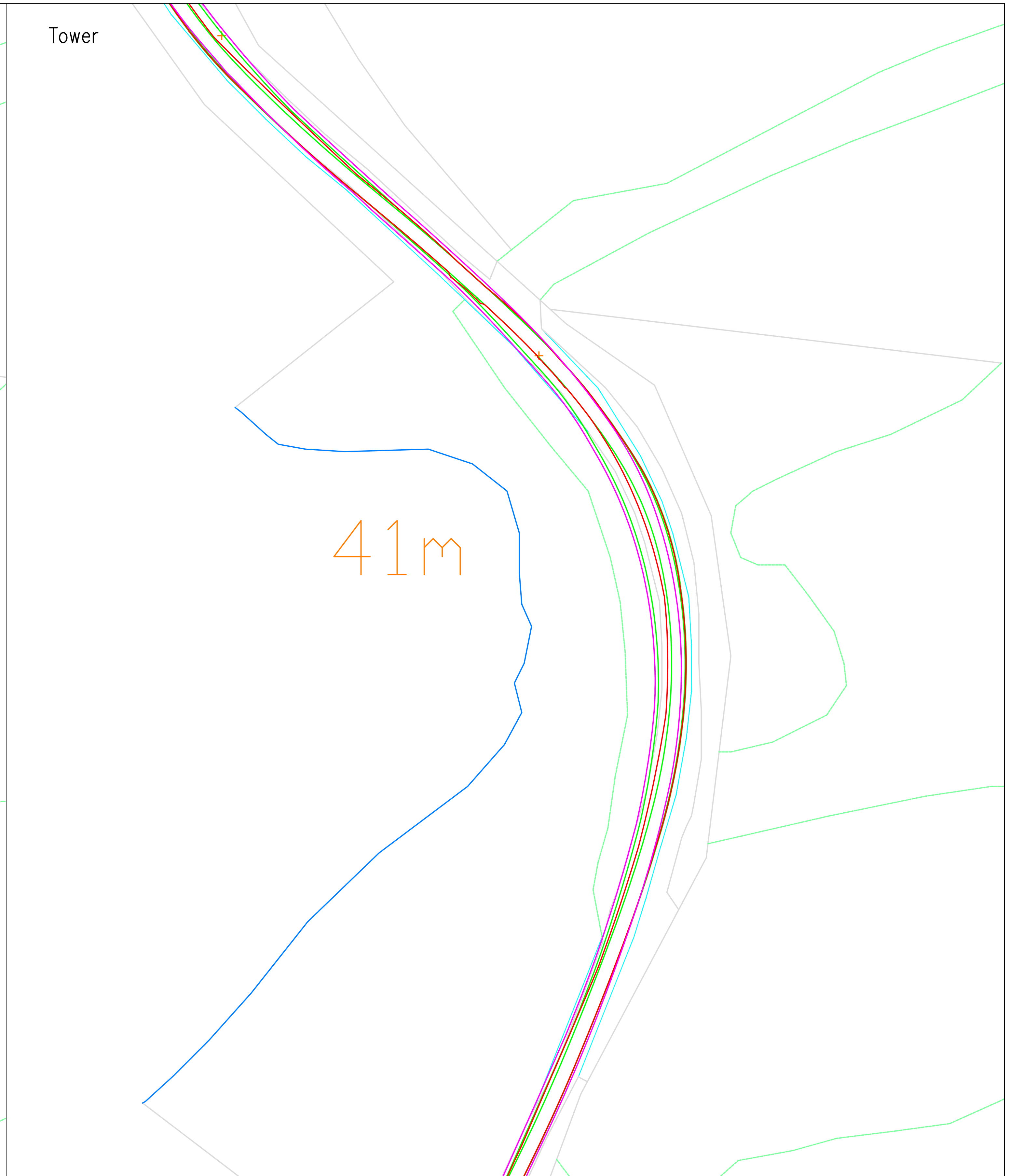
Drawing Status: Draft

Drawing No.: SK37A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 West of Ardteatle

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	57	

Scale: 1:1000 @ A3

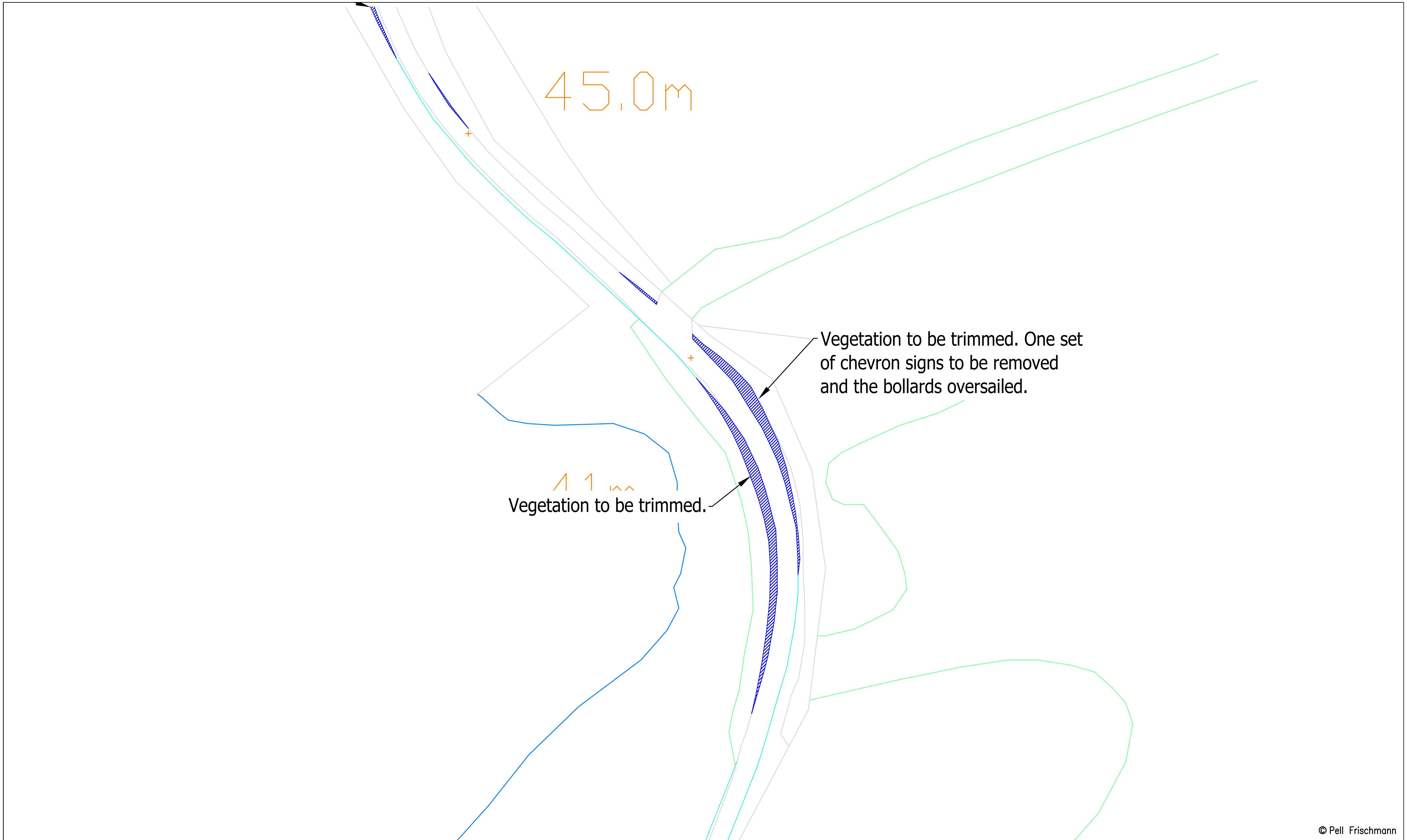
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK38

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 West of Ardteatle

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		57

Scale: 1:1000 @ A3

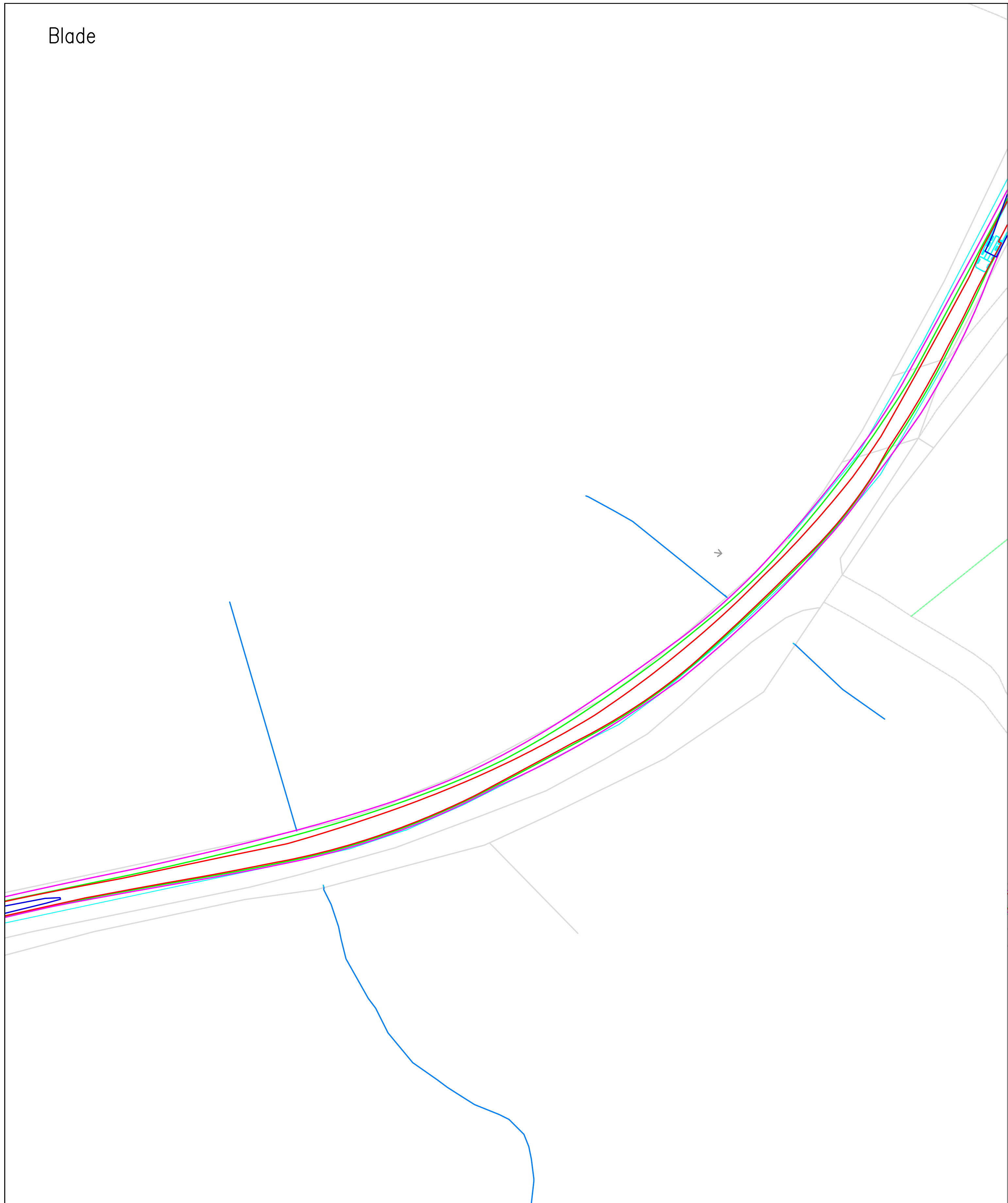
File No. 230725 Ladyfield V136 SPA.dwg

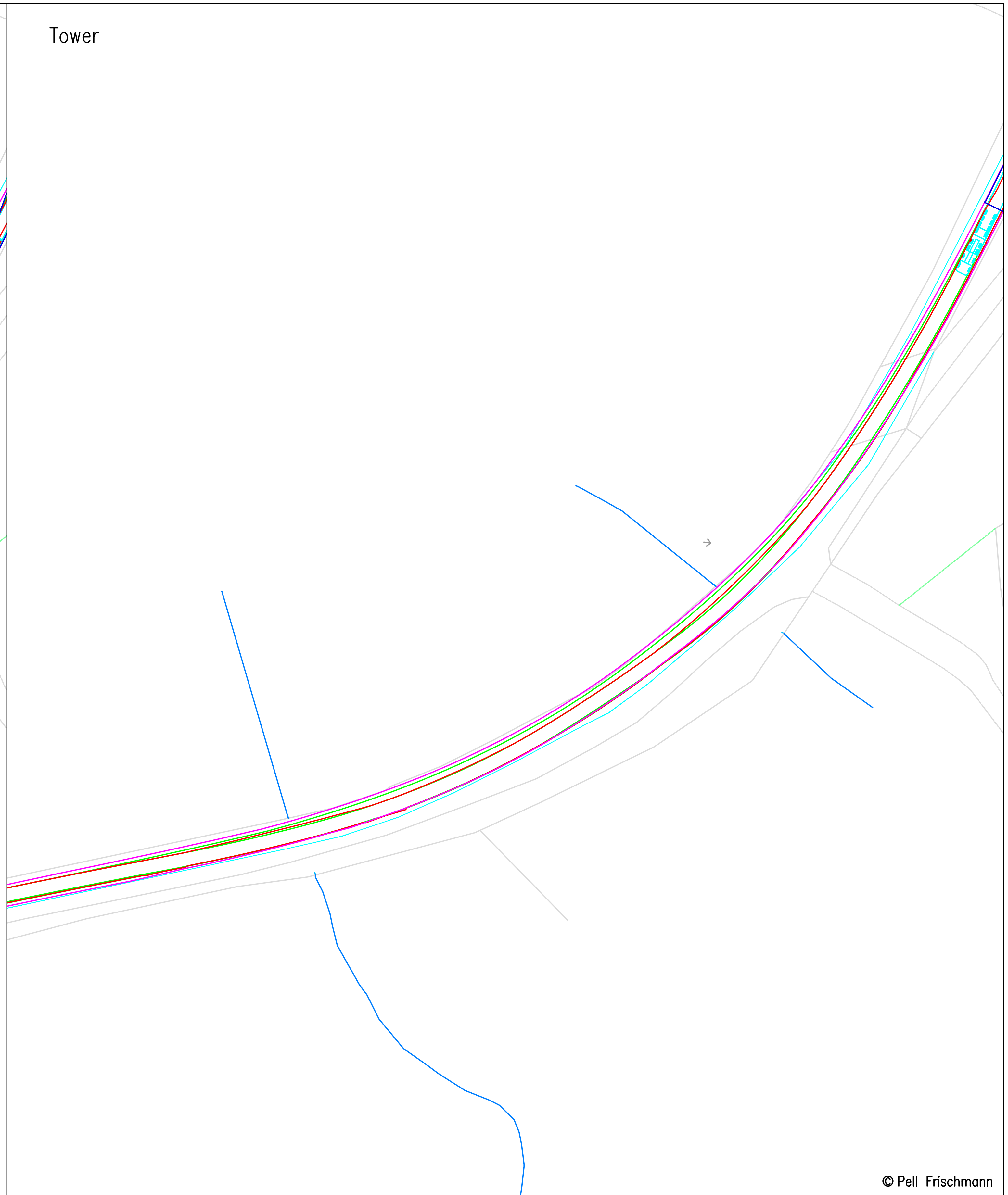
Drawing Status: Draft

Drawing No. SK38A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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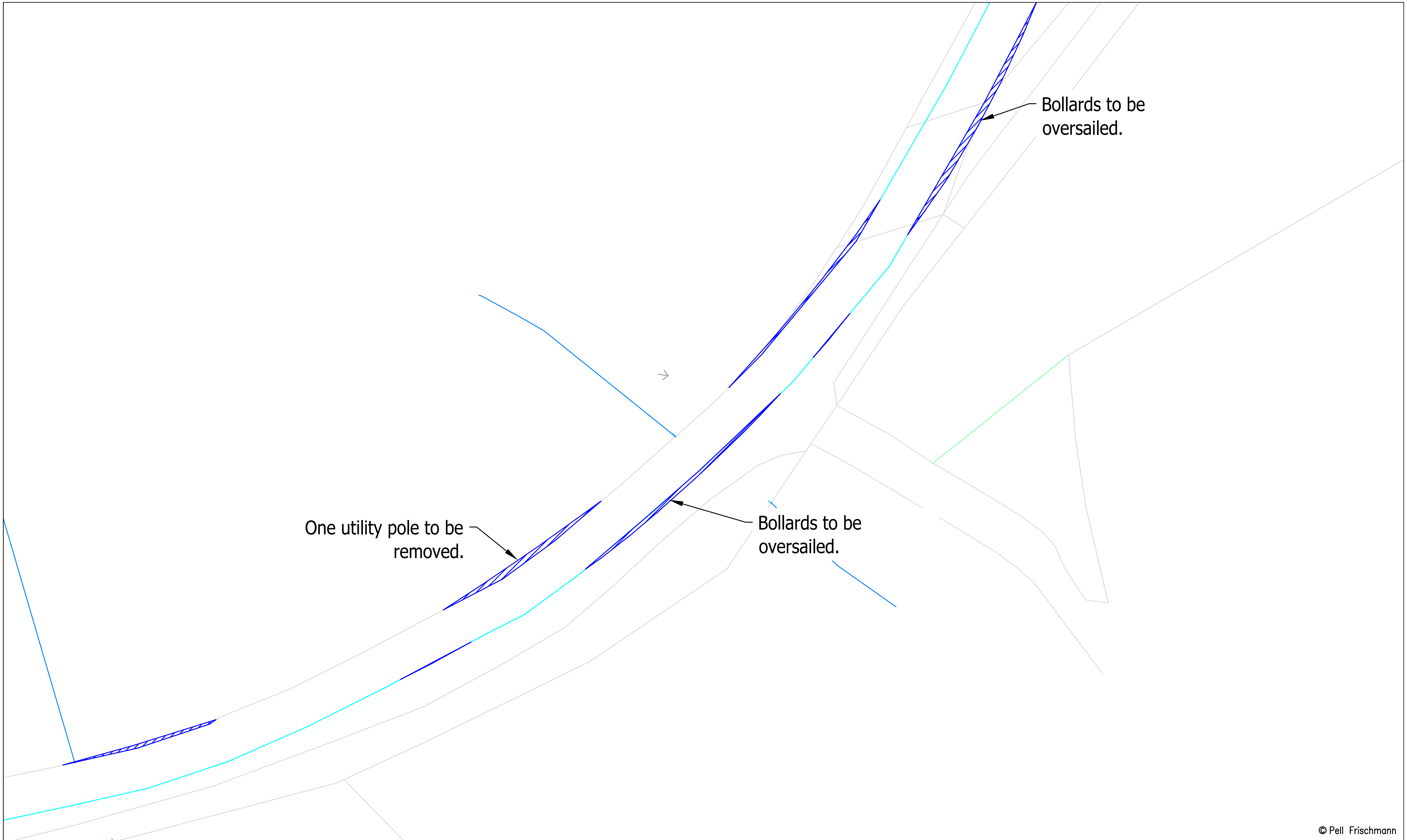
Project	Ladyfield Renewable Energy Park		
Client	Ridge Clean Energy Ltd.		
Drawing Title	V136 Blade and Tower		
SPA Location	A819 Achlian		

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest	58	

Scale	1:1000 @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK39
Revision	XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Achlian

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		58

Scale: 1:500 @ A3

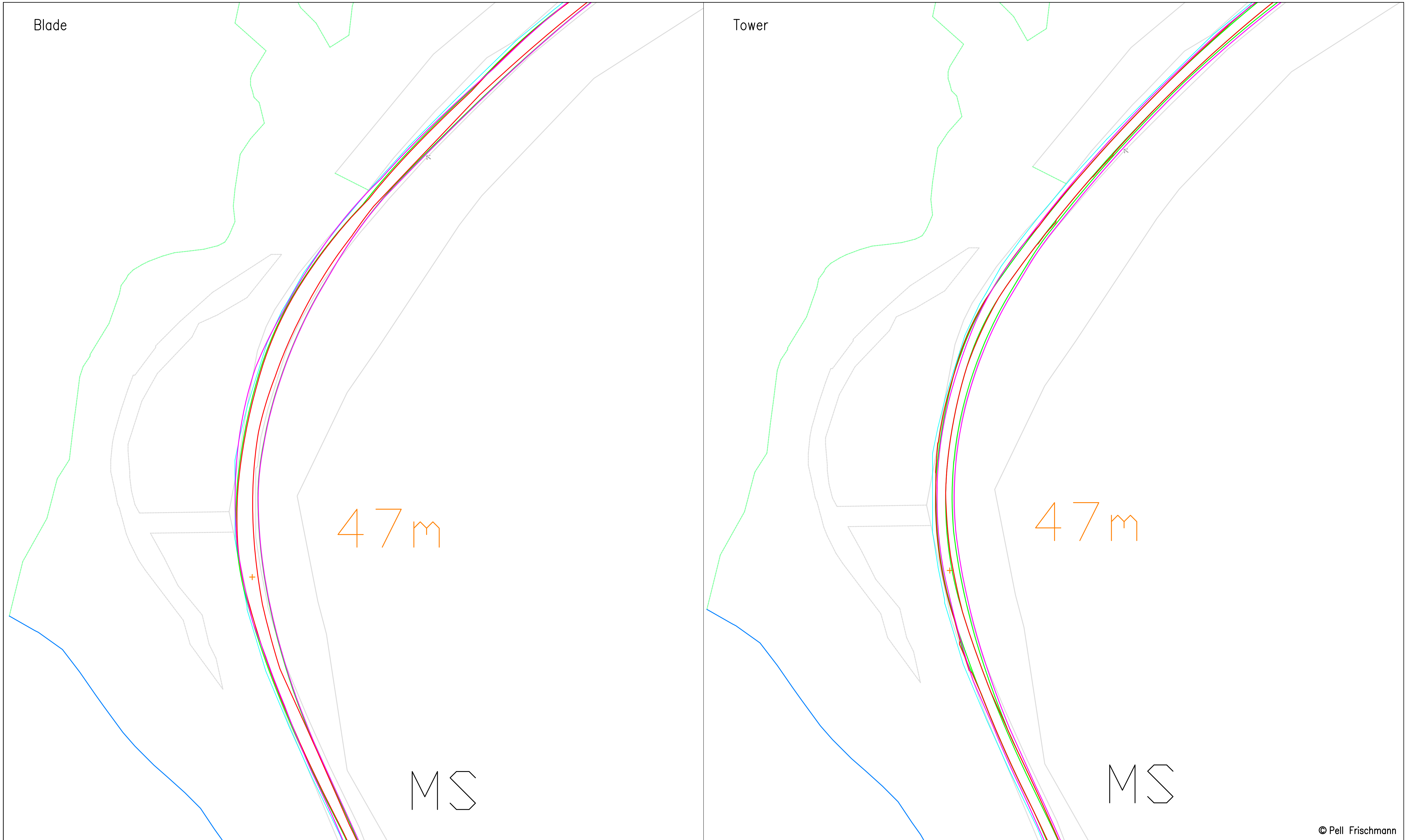
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK39A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Northeast of Inistrynich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		59

Scale: 1:1000 @ A3

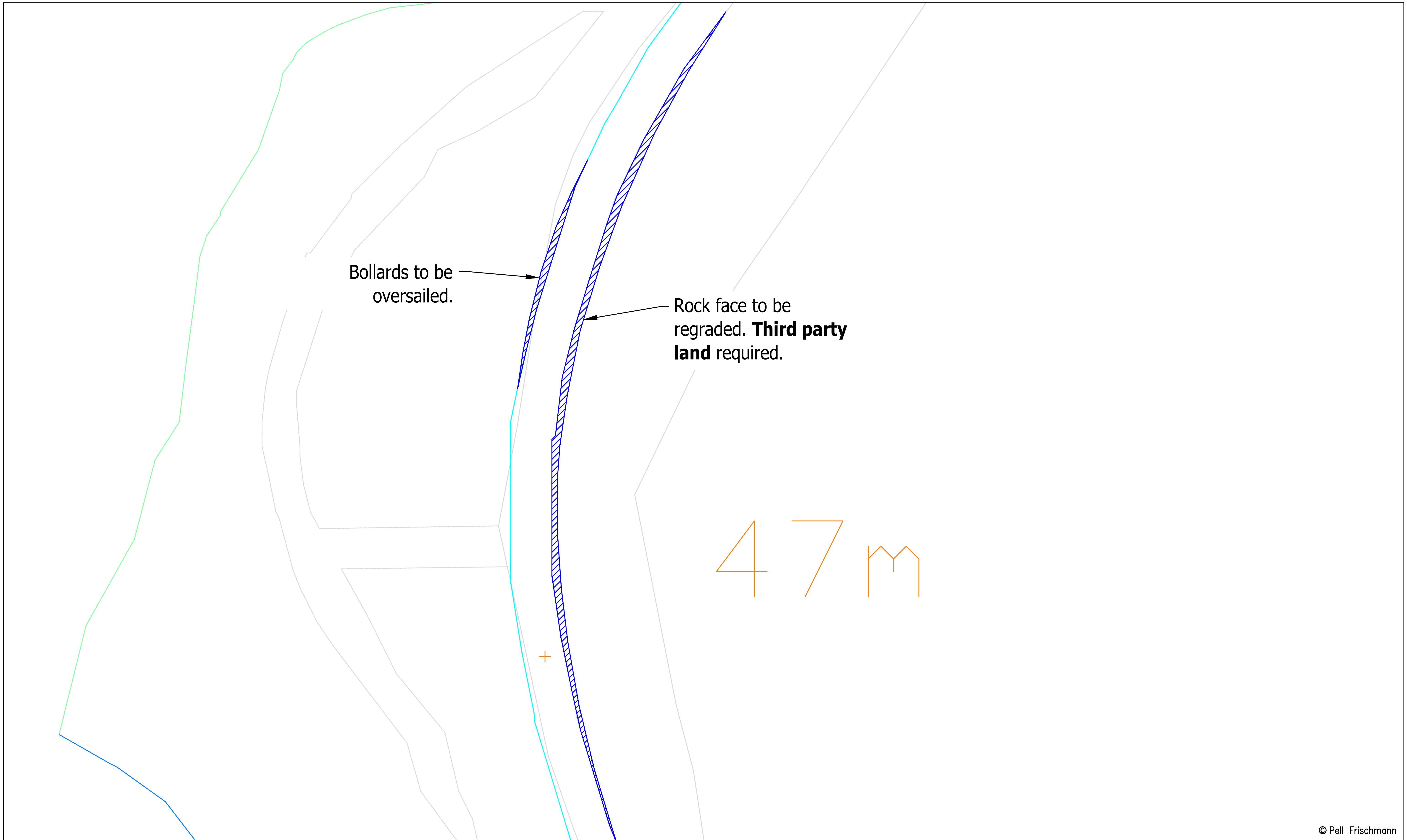
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK40

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Northeast of Inistrynich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		59

Scale: 1:500 @ A3

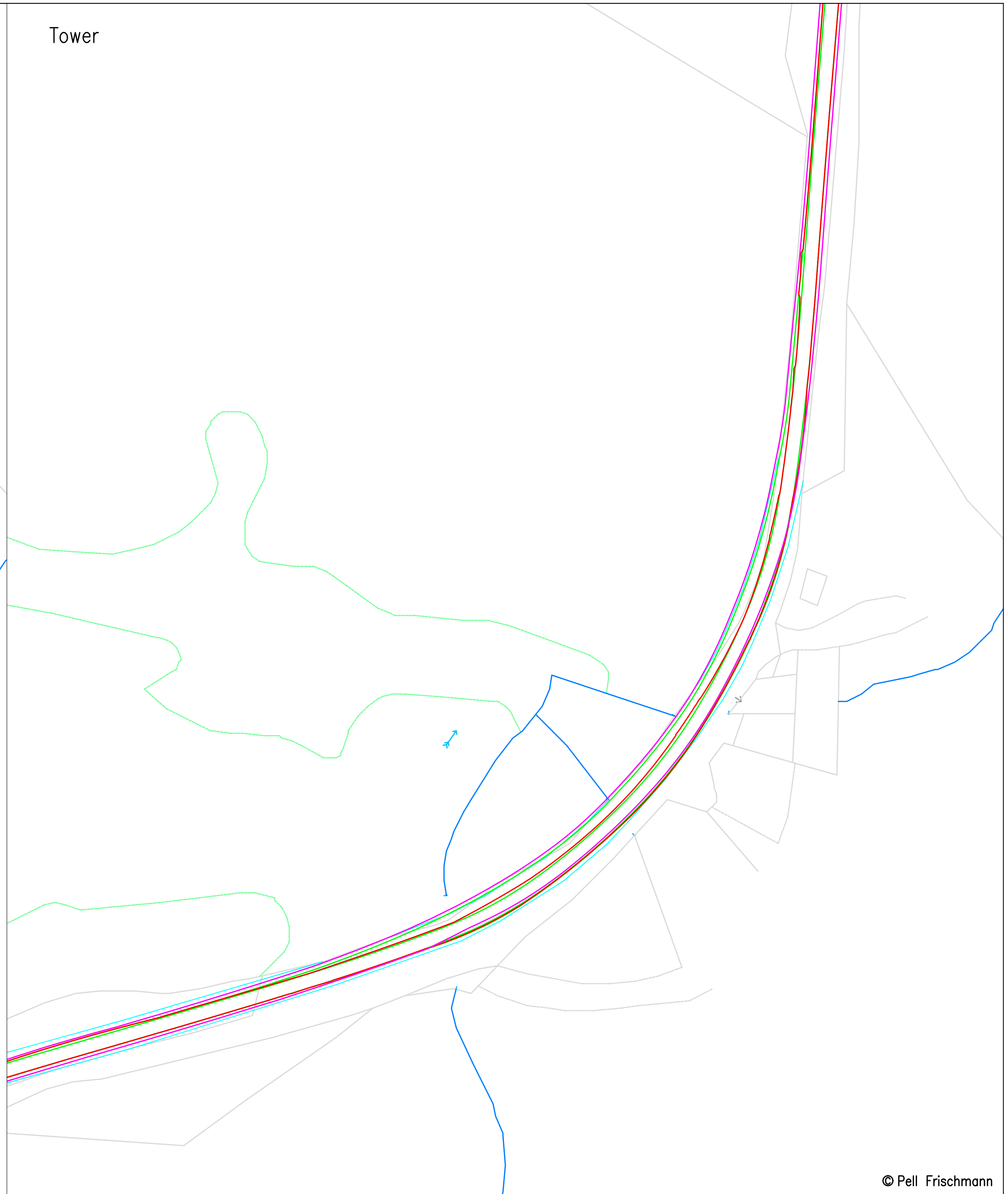
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK40A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 East of Inistrynich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		61

Scale: 1:1000 @ A3

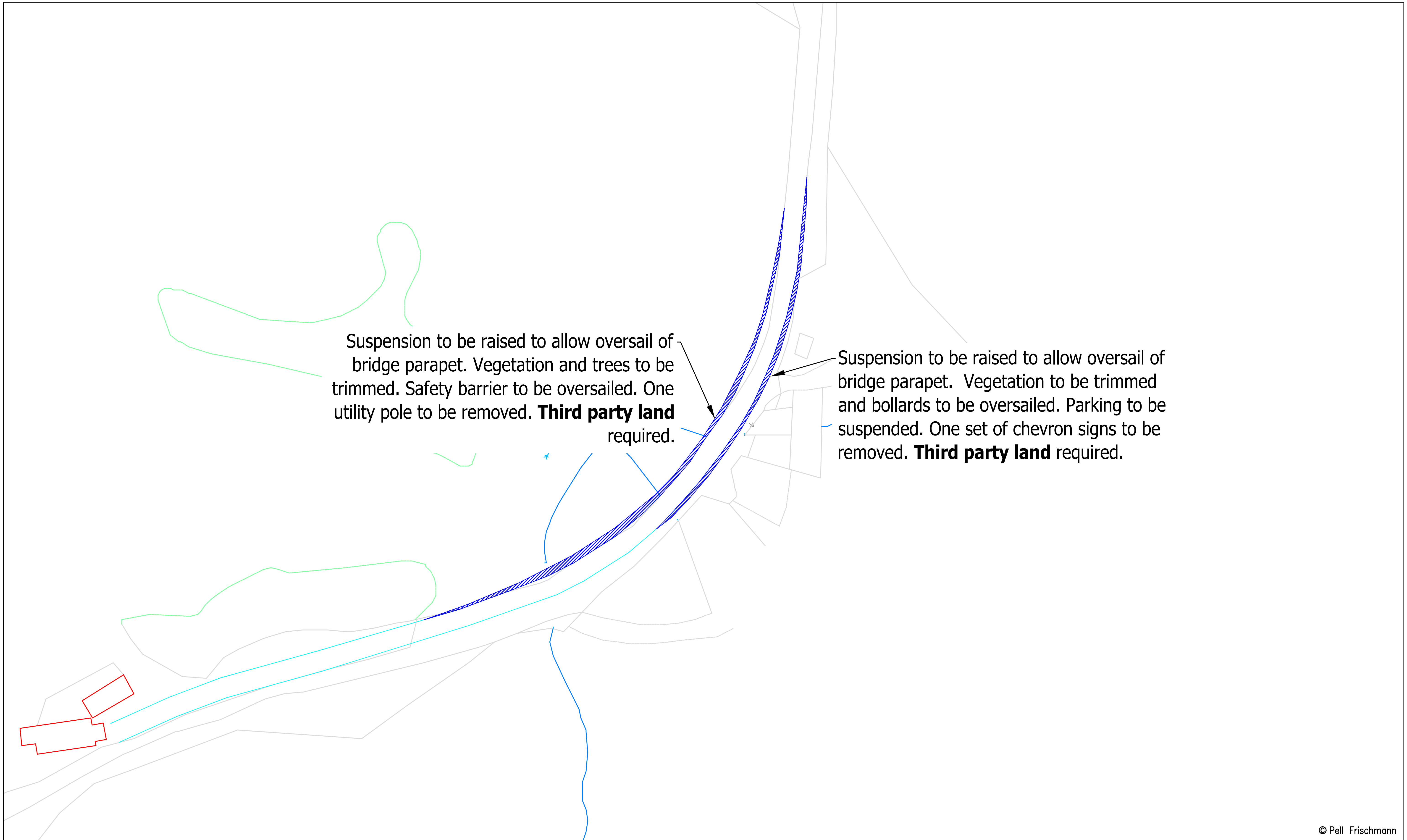
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK41

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 East of Inistrynich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		61

Scale: 1:1000 @ A3

File No.: 230725 Ladyfield V136 SPA.dwg

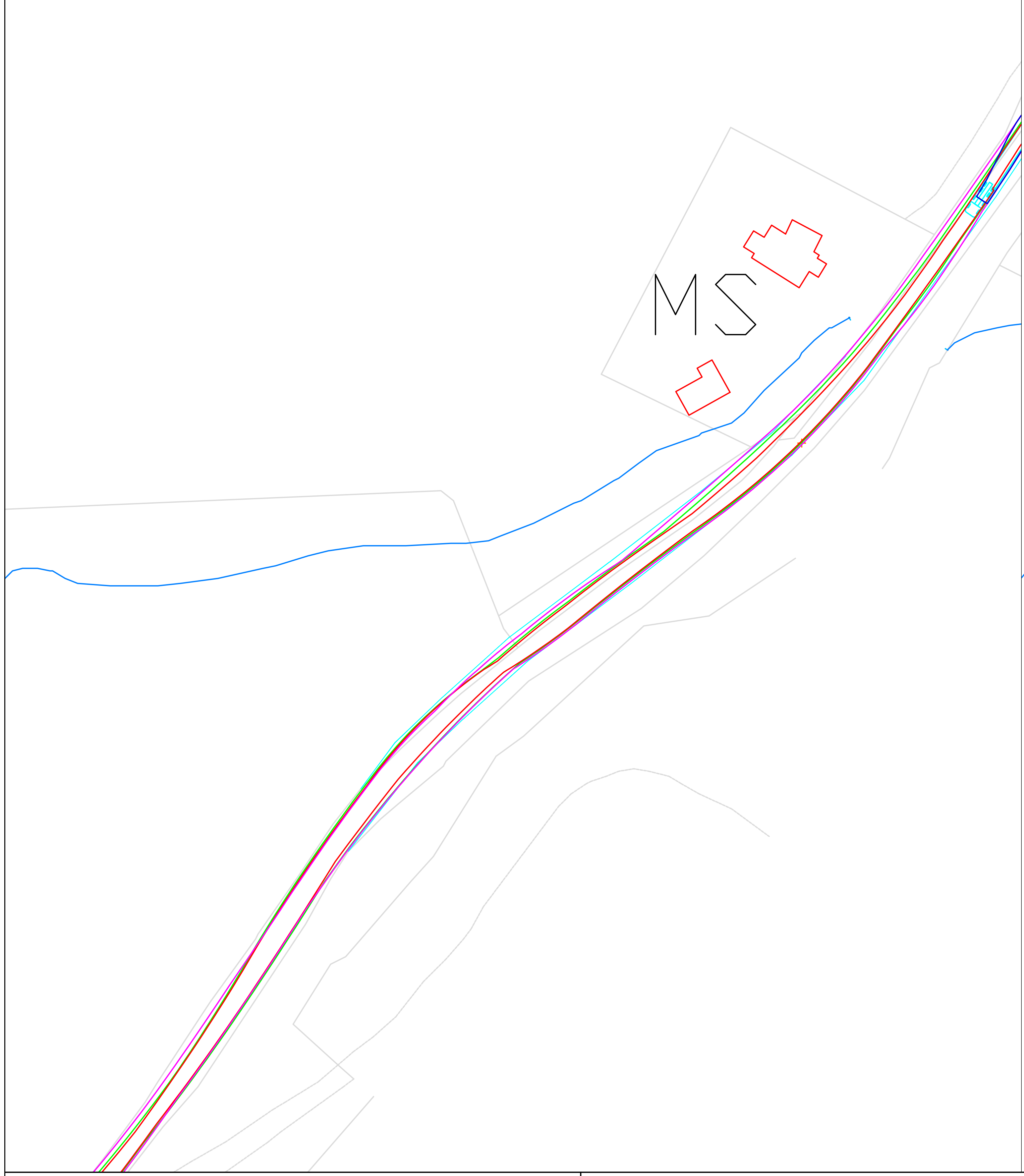
Drawing Status: Draft

Drawing No.: SK41A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower

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Email: pfedinburgh@pellfrischmann.com
www.pellfrischmann.com

Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 South of Inistrynich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		62

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK42

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 South of Inistrynich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		62

Scale: 1:500 @ A3

File No.: 230725 Ladyfield V136 SPA.dwg

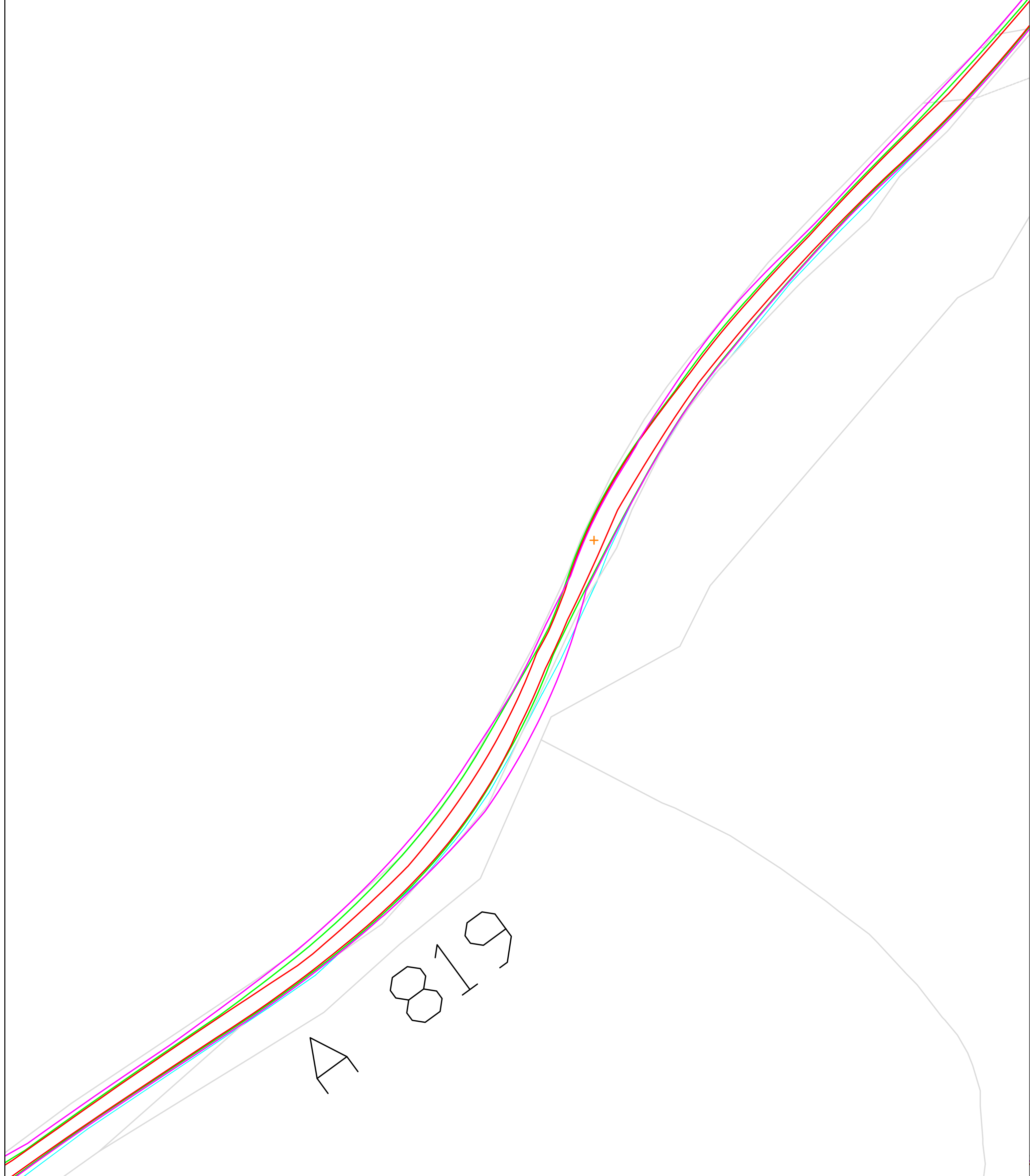
Drawing Status: Draft

Drawing No.: SK42A

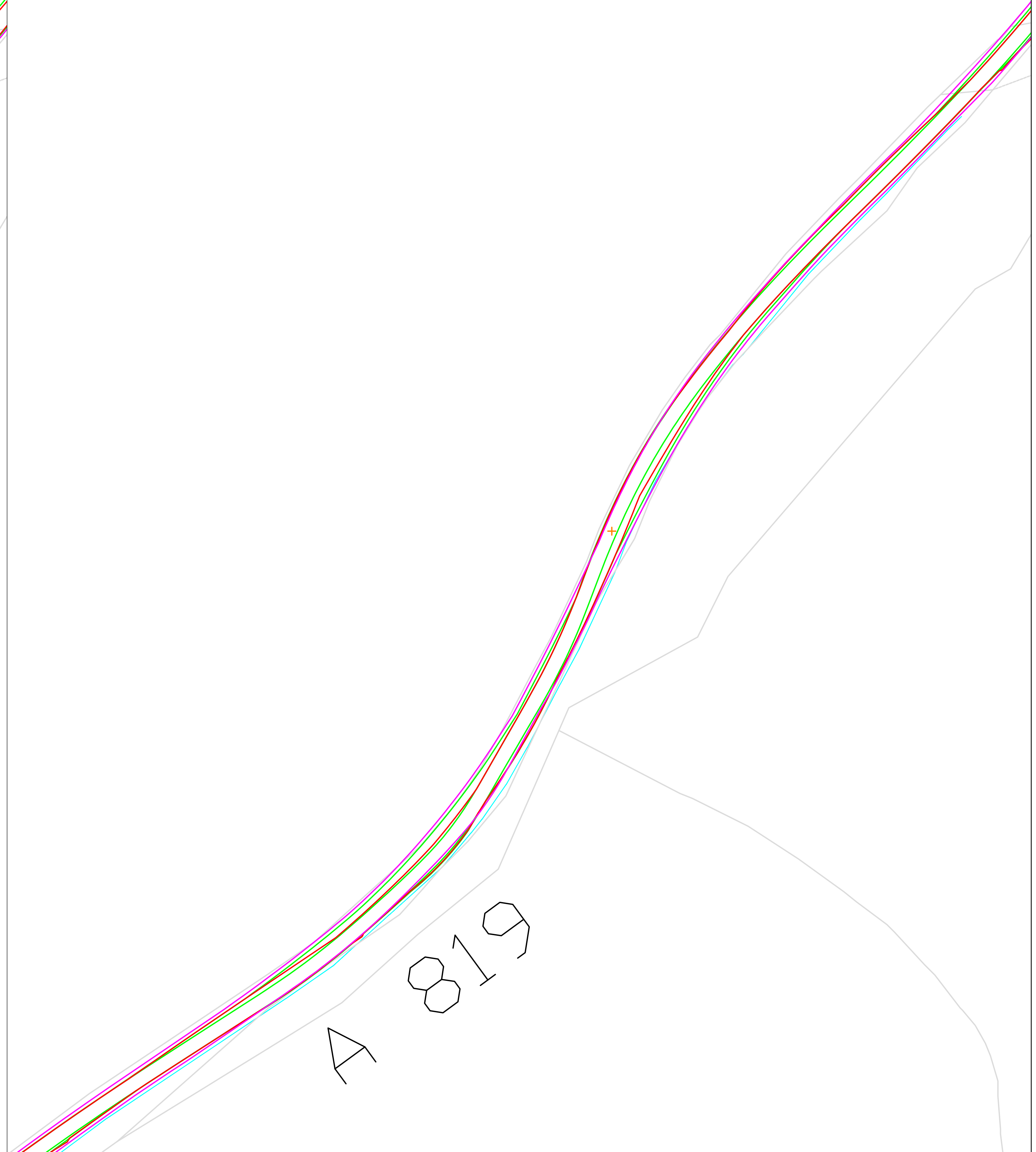
Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

Blade



Tower



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Bends Southwest of Cladich Farm

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		63

Scale: 1:1000 @ A3

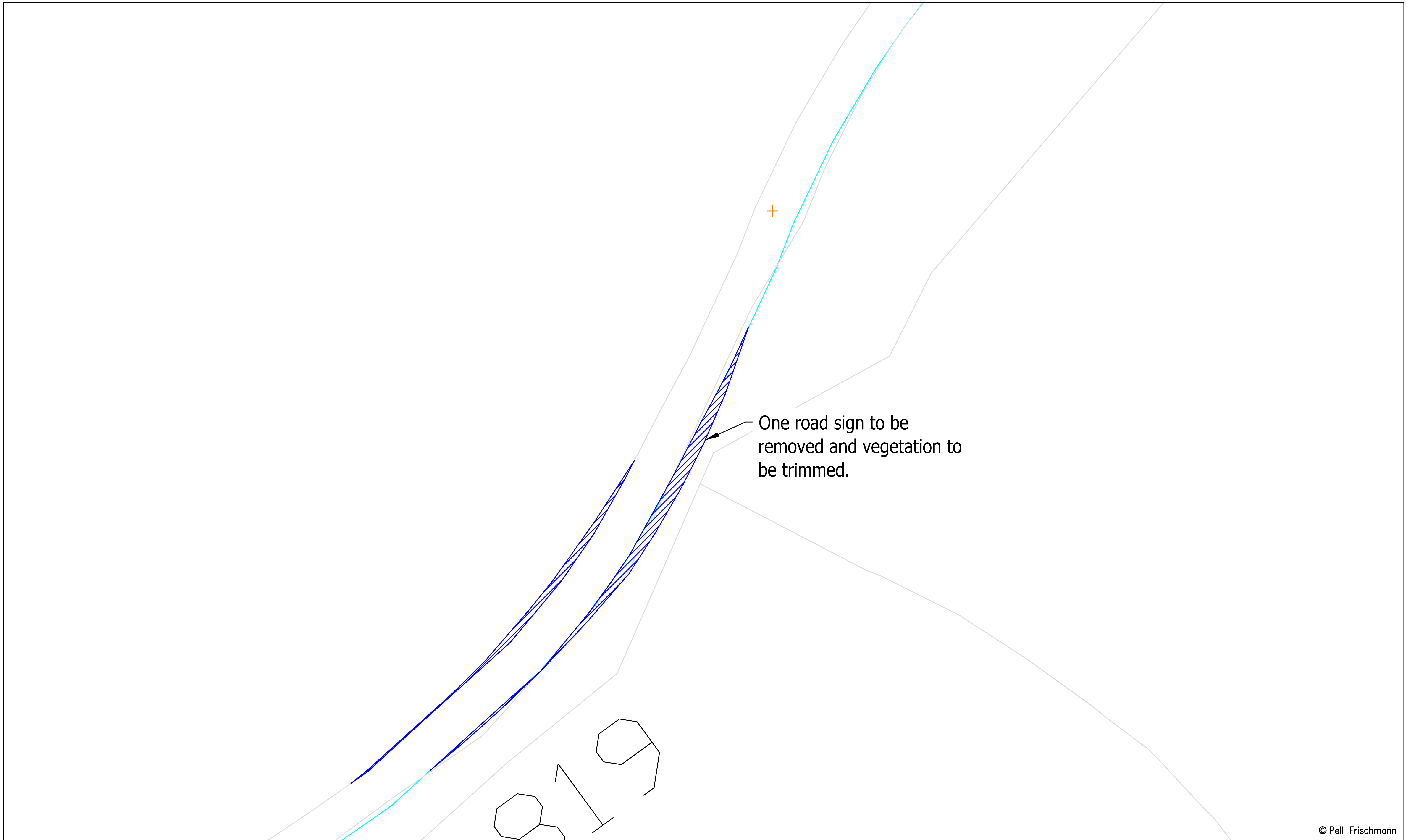
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK43

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Project: Ladyfield Renewable Energy Park

Client: Ridge Clean Energy Ltd.

Drawing Title: V136 Blade and Tower

SPA Location: A819 Bends Southwest of Cladich Farm

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		63

Scale: 1:500 @ A3

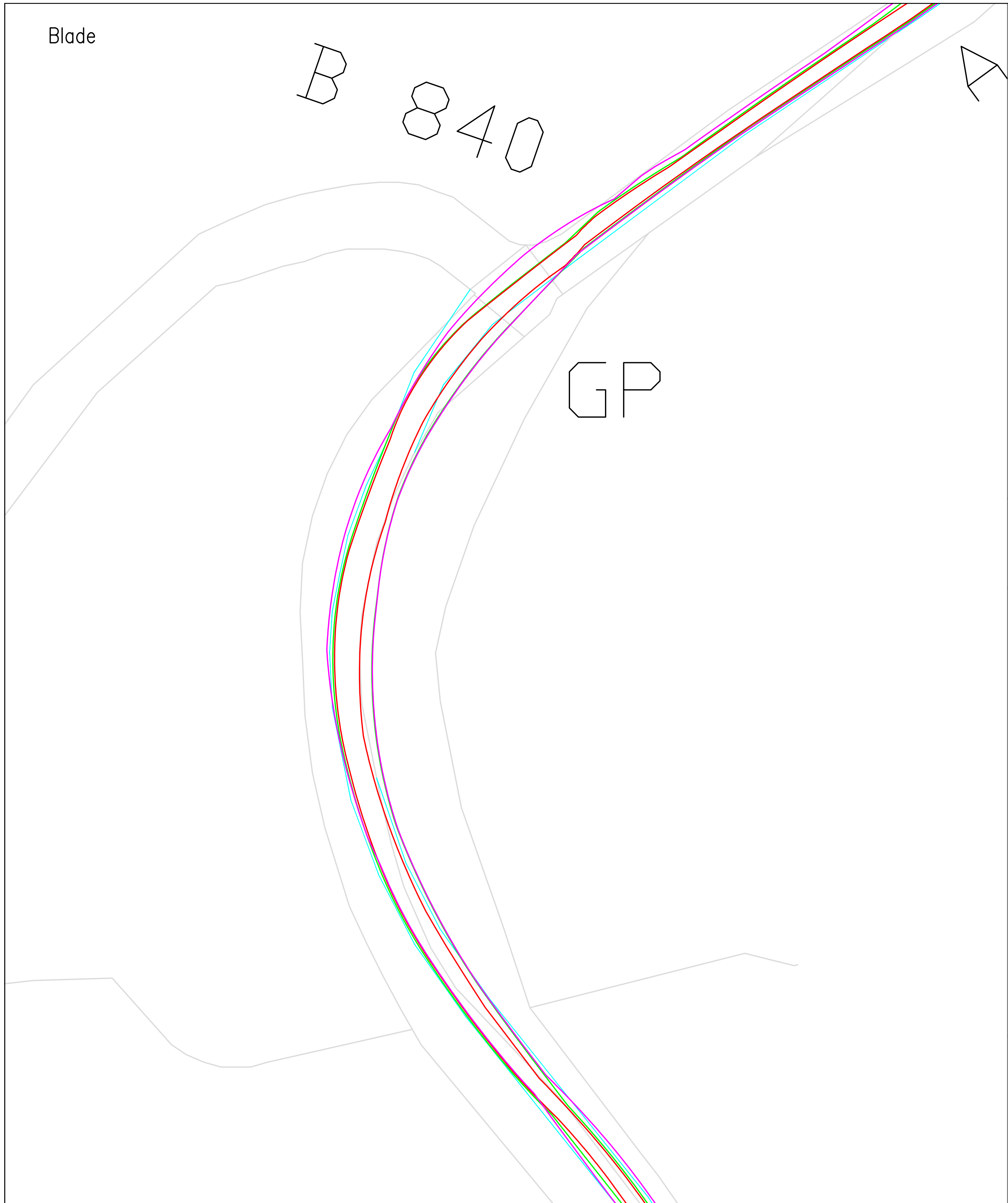
File No. 230725 Ladyfield V136 SPA.dwg

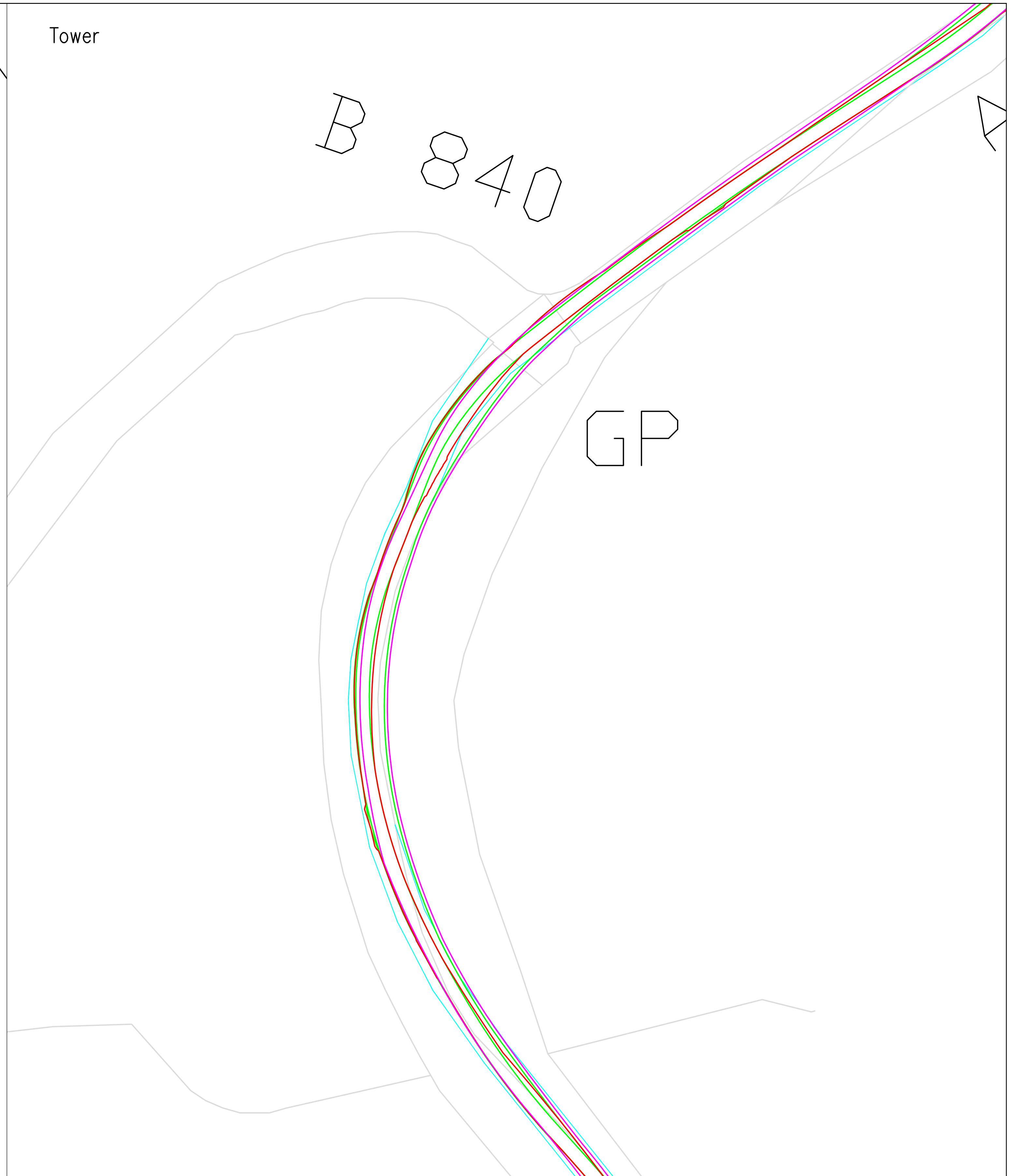
Drawing Status: Draft

Drawing No. SK43A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Left Bend, Cladich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		64

Scale: Custom @ A3

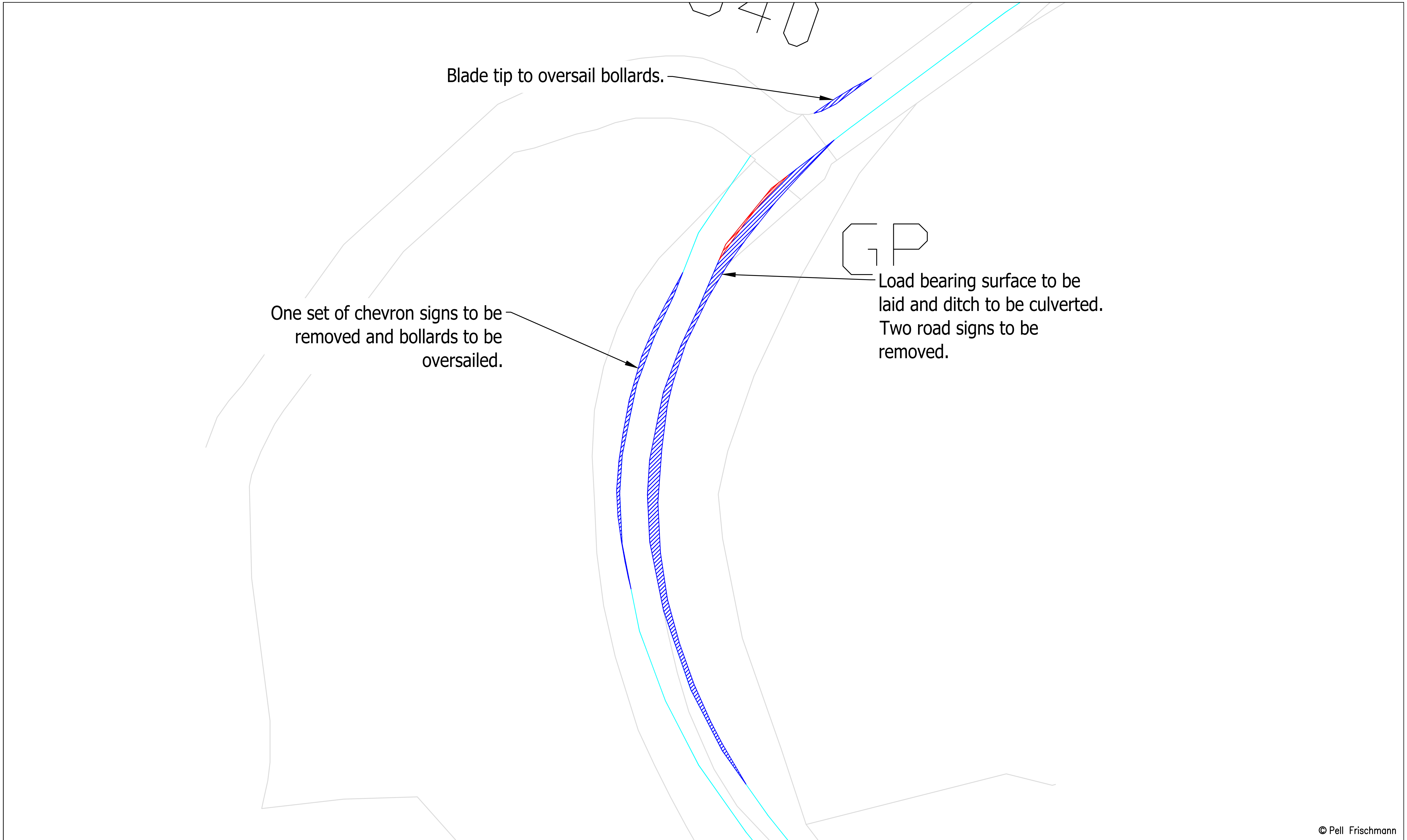
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK44

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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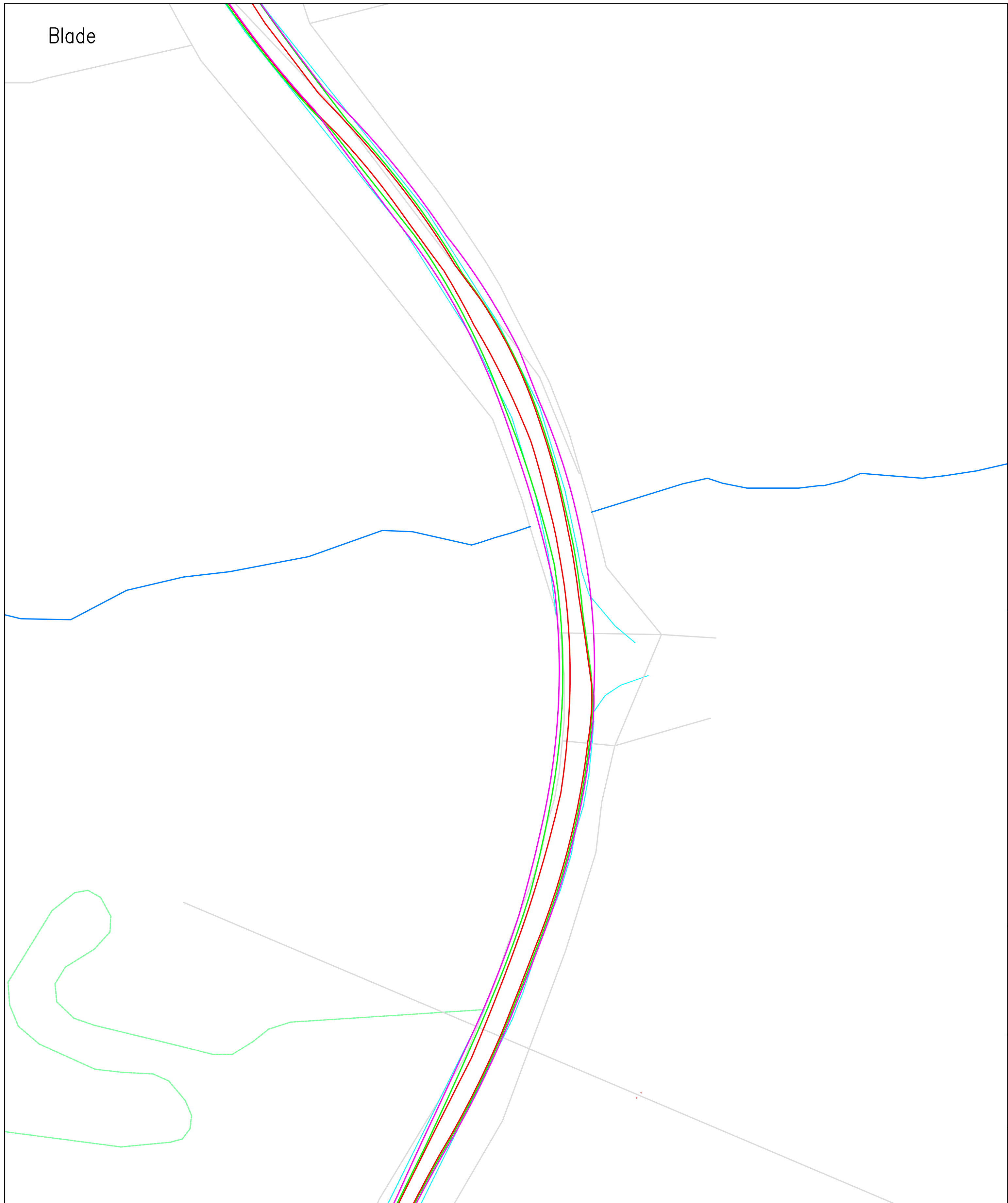
Project	Ladyfield Renewable Energy Park
Client	Ridge Clean Energy Ltd.
Drawing Title	V136 Blade and Tower
SPA Location	A819 Left Bend, Cladich

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		64

Scale	1:750 @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK44A
Revision	XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Right Bend, Cladich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		65

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK45

Notes:
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2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Right Bend, Cladich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		65

Scale: 1:1000 @ A3

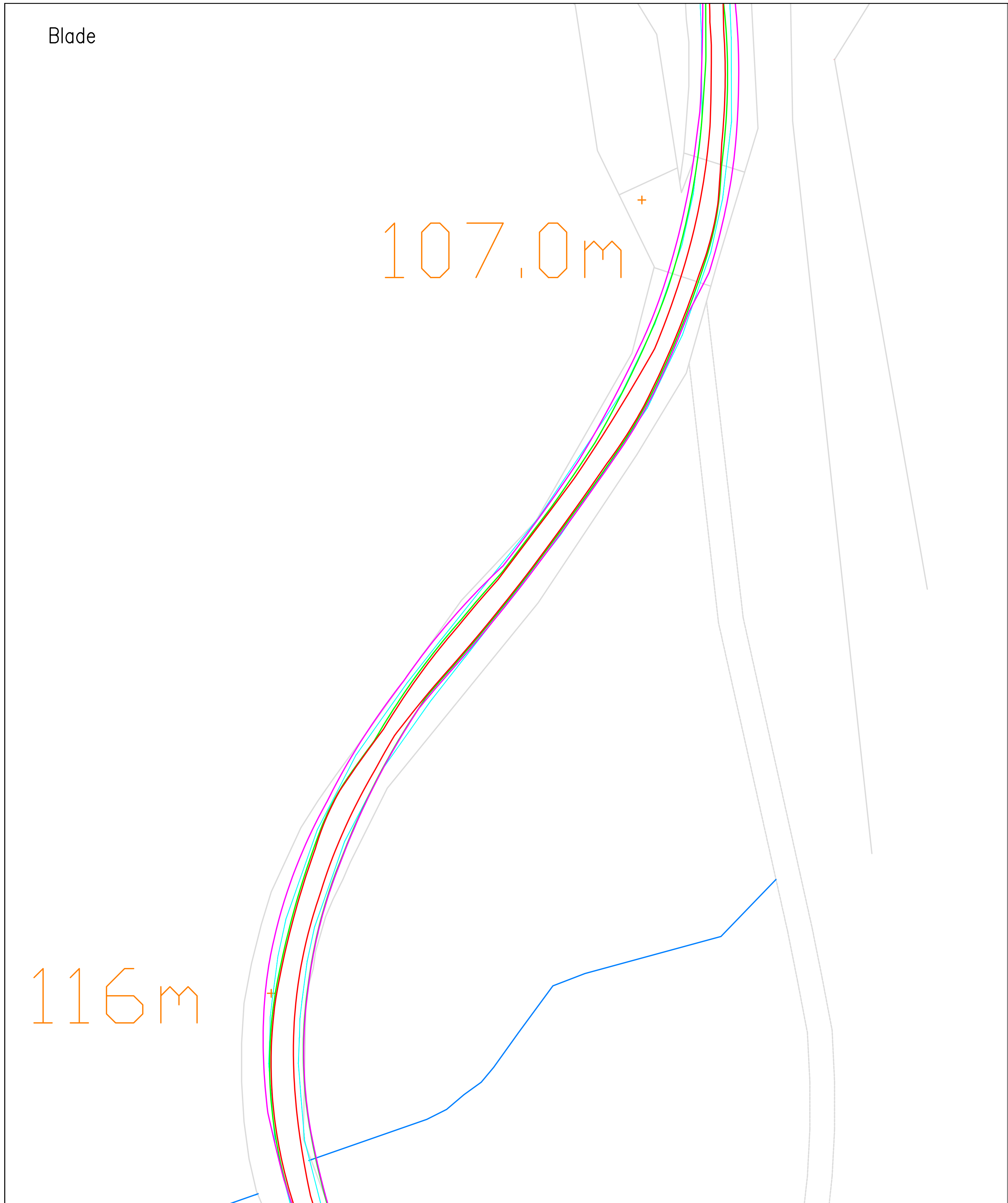
File No. 230725 Ladyfield V136 SPA.dwg

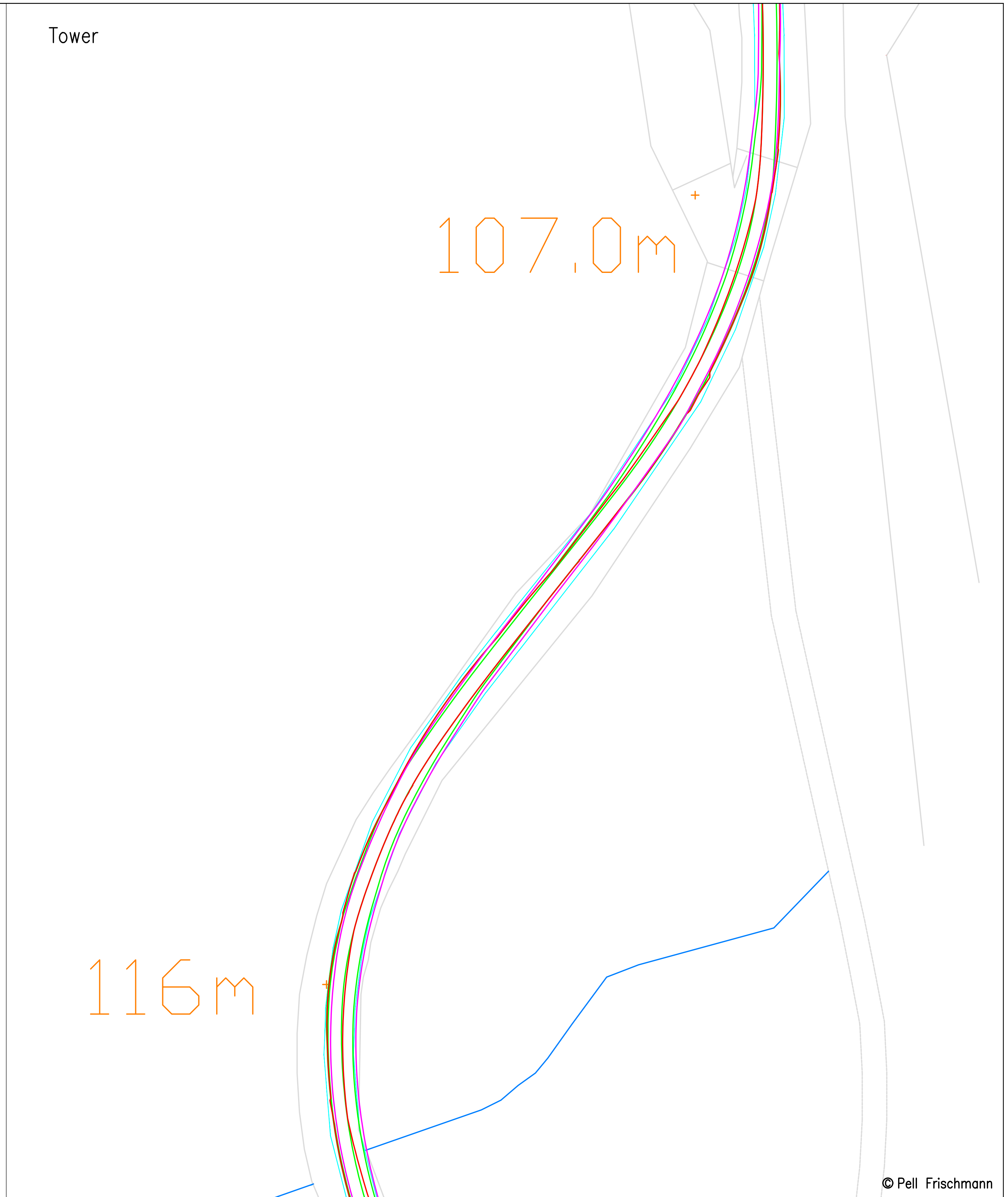
Drawing Status: Draft

Drawing No. SK45A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 South of Cladich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		66

Scale: 1:1000 @ A3

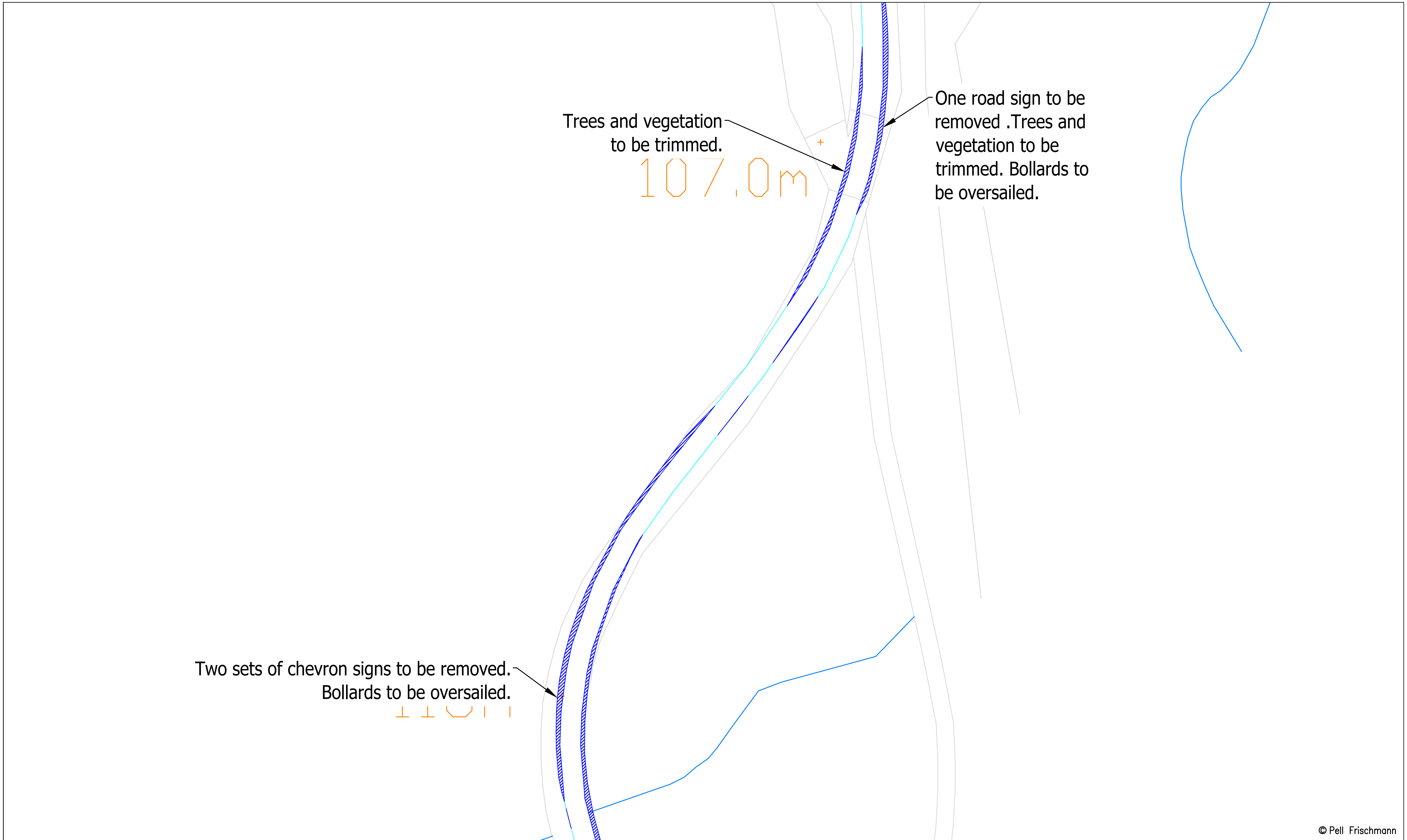
File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK46

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 South of Cladich

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		66

Scale: 1:1000 @ A3

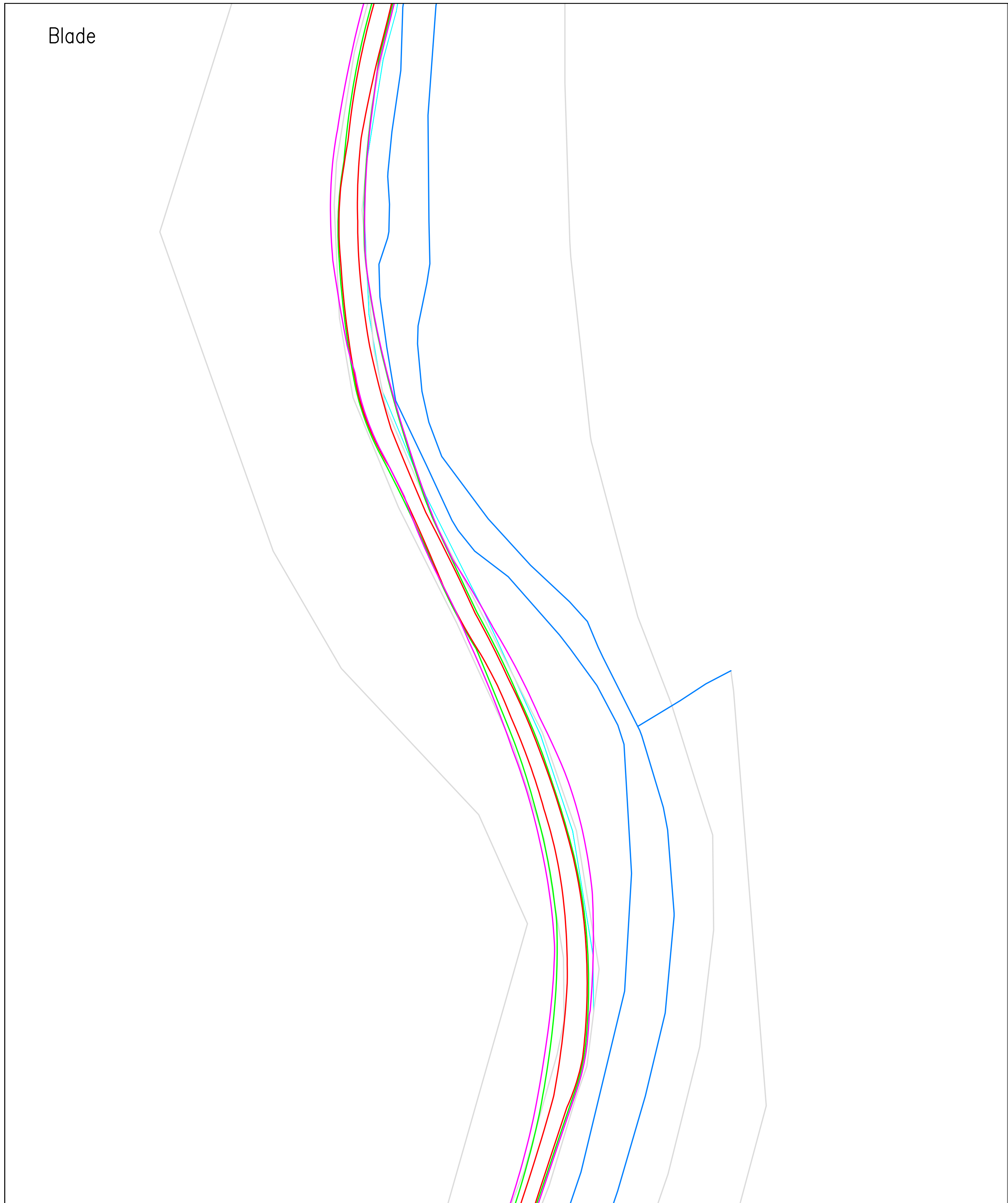
File No. 230725 Ladyfield V136 SPA.dwg

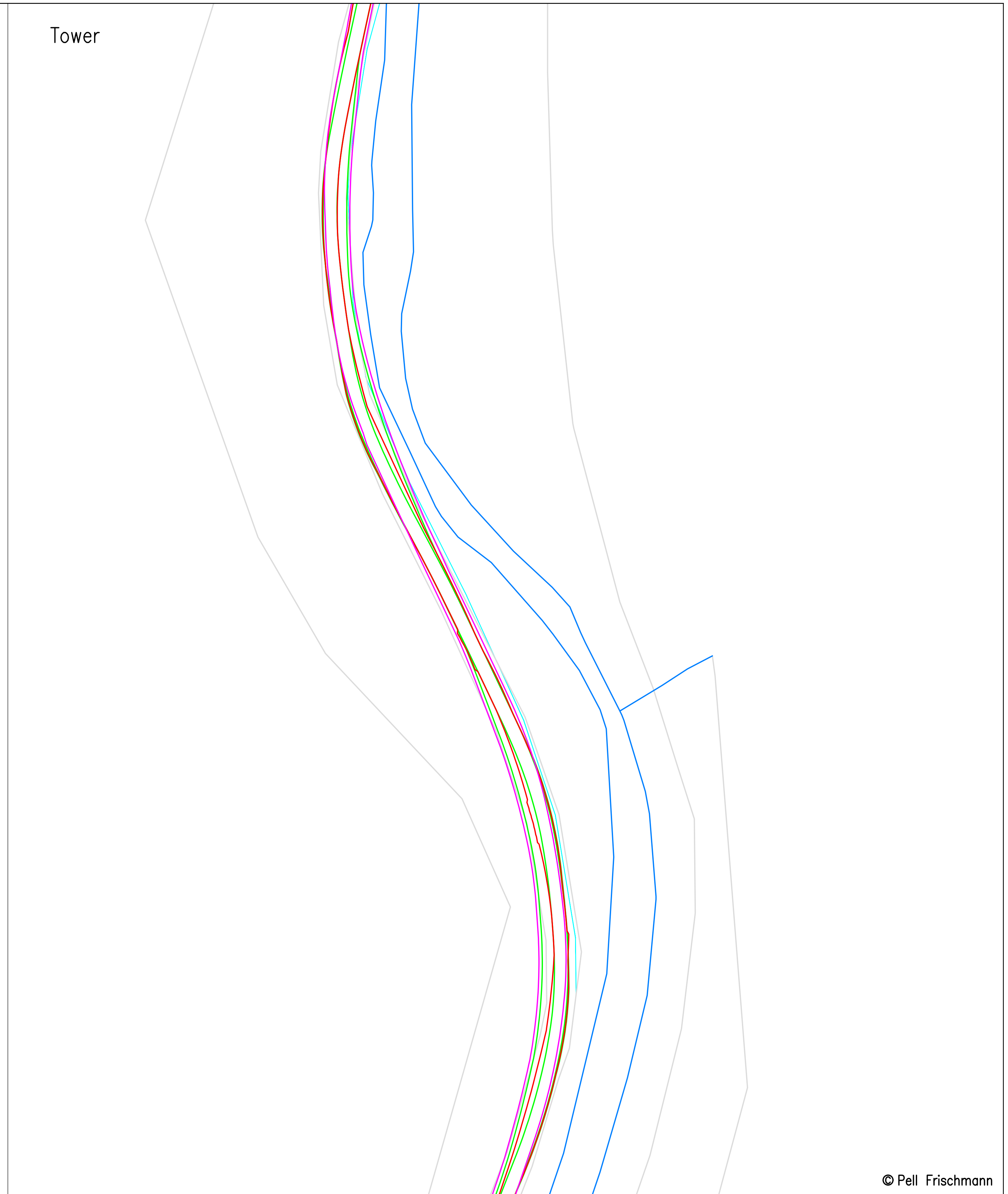
Drawing Status: Draft

Drawing No. SK46A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX





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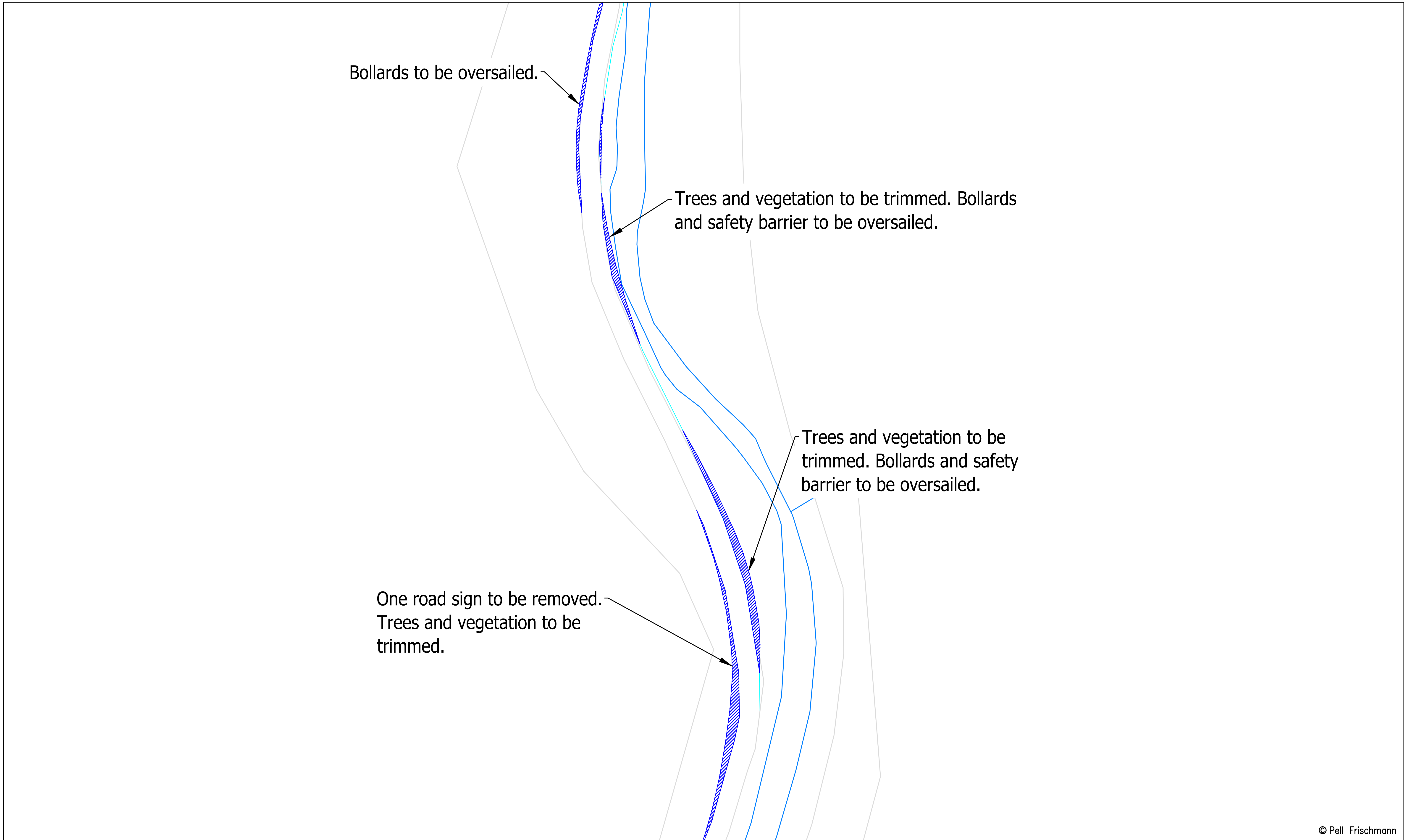
Client	Ridge Clean Energy Ltd.
Project	Ladyfield Renewable Energy Park
Drawing Title	V136 Blade and Tower
SPA Location	A819 North of Ladyfield

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over–run, Over–sail

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		67

Scale	Custom @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK47
Revision	XXX

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 North of Ladyfield

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		67

Scale: 1:1000 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK47A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Site Access Junction

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		68

Scale: 1:500 @ A3

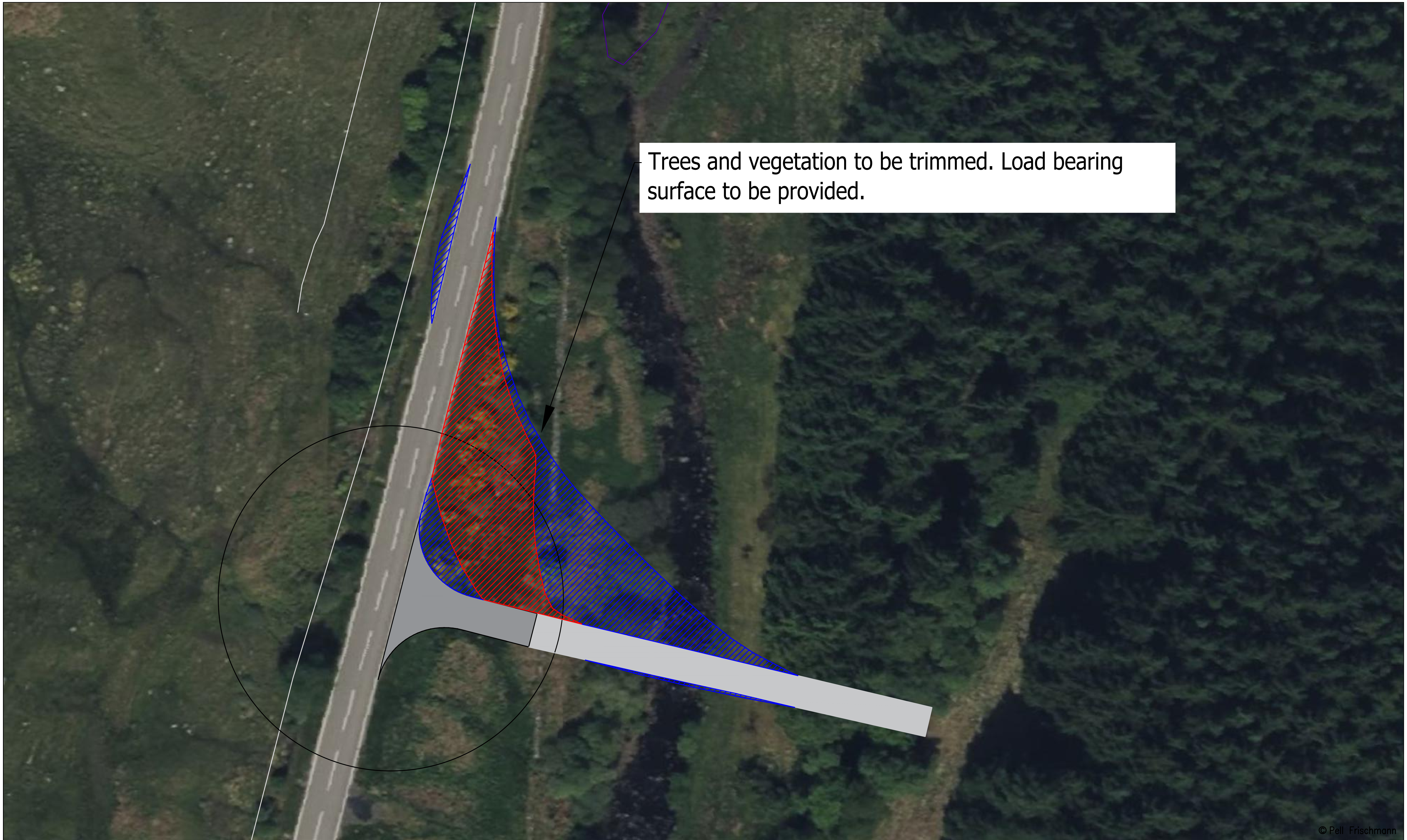
File No.: 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No.: SK48

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX



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Client: Ridge Clean Energy Ltd.

Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over–run | Over–sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Site Access Junction

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		68

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK48A

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

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Key: Wheel SPA | Body SPA | Load SPA | Indicative | Over-run | Over-sail

Project: Ladyfield Renewable Energy Park

Drawing Title: V136 Blade and Tower

SPA Location: A819 Site Access Junction – Southern Option

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		69

Scale: 1:500 @ A3

File No. 230725 Ladyfield V136 SPA.dwg

Drawing Status: Draft

Drawing No. SK49

Notes:
1. All mitigation is subject to confirmation through a test run.
2. This is not a construction drawing and is intended for illustration purposes only.

Revision: XXX

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Client	Ridge Clean Energy Ltd.
Key	Wheel SPA, Body SPA, Load SPA, Indicative, Over-run, Over-sail
Project	Ladyfield Renewable Energy Park
Drawing Title	V136 Blade and Tower
SPA Location	A819 Site Access Junction – Southern Option

	Name	Date
Drawn	JS	09/08/2023
Designed	TL	09/08/2023
Checked	GB	09/08/2023
Point of Interest		69

Scale	1:500 @ A3
File No.	230725 Ladyfield V136 SPA.dwg
Drawing Status	Draft
Drawing No.	SK49A
Revision	XXX

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Environmental Impact Assessment – Technical Appendix 13.2: Construction Program

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

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Appendix 13.2 - Construction Development Programme																									
Activity	**Month**																								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	
	HGV Excluding Concrete																								**Total**
Site Mobilisation/Demobilisation			46	46	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	76	472
Forestry Clearance	360	349	359																						1068
Access Track and Hardstanding Construction					355	351	351	351	351	351	351	355													2818
BESS, Control Building and Substation											40	22	22	20											104
Steel Imports etc. for Turbine Foundations									13	13	13	13	13	13	13	13									104
Electrical Cabling Delivery														9	9	9	9								36
Crane Delivery																	27					27			54
Turbine Erection																		65	65	65	65				260
Commissioning																							10	10	20
Fuel Delivery	0	0	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	528
Sub-Total	360	349	429	70	395	391	391	391	404	404	444	430	75	82	62	62	76	105	105	105	105	67	50	110	**5464**
	Concrete Delivery																								
Concrete Delivery for Turbine Foundations										250	500	500	500	500	500	250	250								
Sub-Total										250	500	500	500	500	500	250	250								**3250**
	Staff Cars and Vans																								
Site Mobilisation/Demobilisation			8	8																				16	32
Substation Escort															8										8
Crane Delivery Escort																	4					4			8
WTG Escort																		117	117	117	117				468
Commissioning																							40	40	80
Staff	0	0	1040	1040	1040	1040	1040	1040	3328	3328	3328	3328	3328	3328	3328	3328	3328	3328	3328	3328	3328	3328	1040	1040	54912
Sub-Total	0	0	1048	1048	1040	1040	1040	1040	3328	3328	3328	3328	3328	3328	3336	3328	3332	3445	3445	3445	3445	3332	1080	1096	**55508**
Total Excluding Concrete Delivery	360	349	1477	1118	1435	1431	1431	1431	3732	3732	3772	3758	3403	3410	3398	3390	3408	3550	3550	3550	3550	3399	1130	1206	60972
Overall Total	360	349	1477	1118	1435	1431	1431	1431	3732	3982	4272	4258	3903	3910	3898	3640	3658	3550	3550	3550	3550	3399	1130	1206	64222
Daily Average (26 Day Month) excluding concrete delivery	14	13	57	43	55	55	55	55	144	144	145	144	131	131	131	130	131	137	137	137	137	131	43	48	
Additional 250 HGV movements per day for 13 non-consecutive days (total) of concrete delivery										394	395	394	381	381	381	380	381	387							

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Environmental Impact Assessment – Technical Appendix 13.3: Bellmouth Design

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

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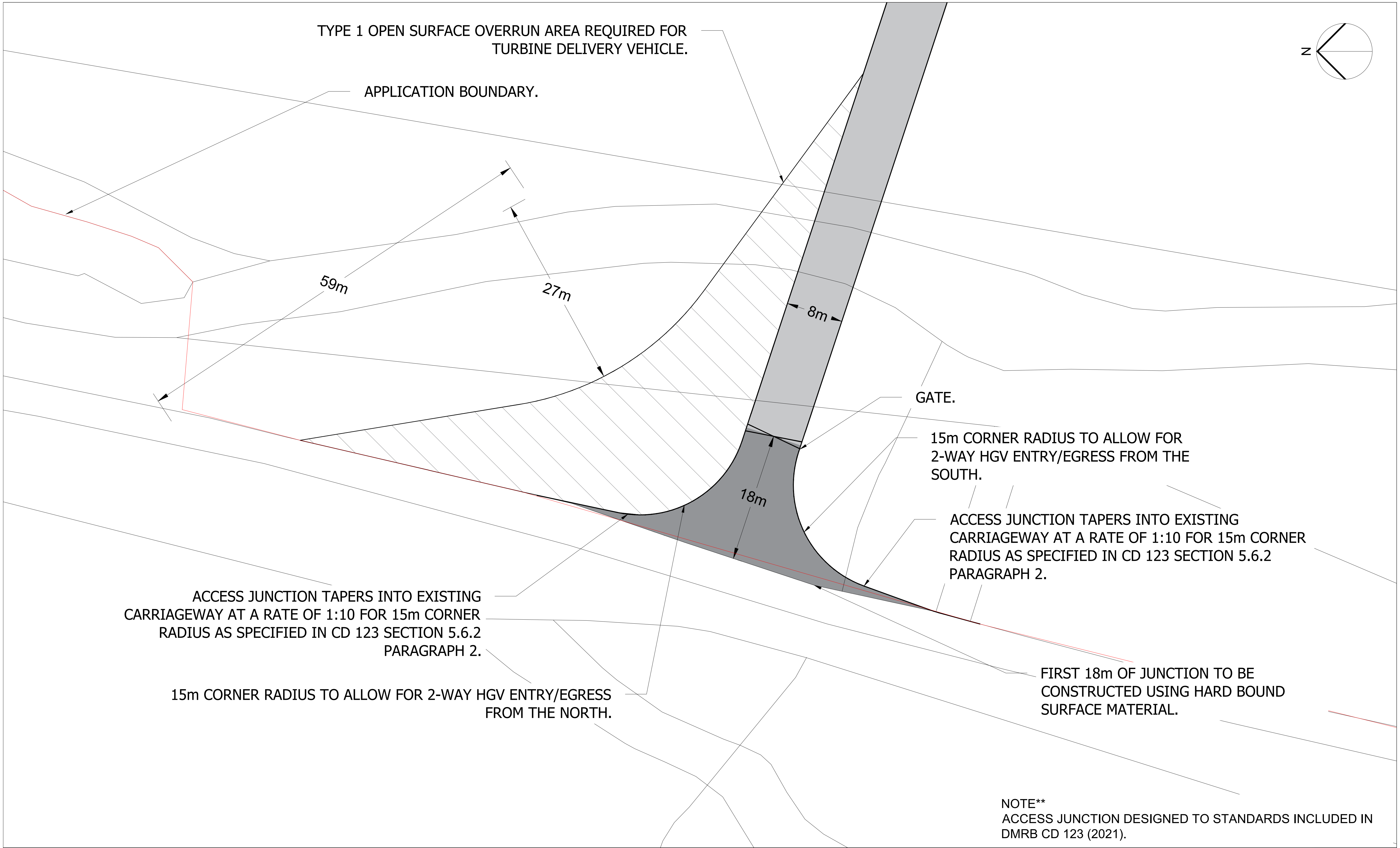

NOTE**
ACCESS JUNCTION DESIGNED TO STANDARDS INCLUDED IN DMRB CD 123 (2021).

Project Title: LADYFIELD RENEWABLE ENERGY PARK	Drawing Title: TECHNICAL APPENDIX 13.3 13.3.1 NORTHERN SITE ACCESS JUNCTION GENERAL ARRANGEMENT	Purpose of issue: PRELIMINARY			
		Designed: CR	Drawn: CR	Checked: TAT	Approved: TAT
Client: LADYFIELD RENEWABLE ENERGY PARK LTD		ERM Internal Project No. 4378		Date: 31/08/23	
		Scale @ A3: 1:1000			

Drawing Number	Rev
4378_DR_P_0006	1

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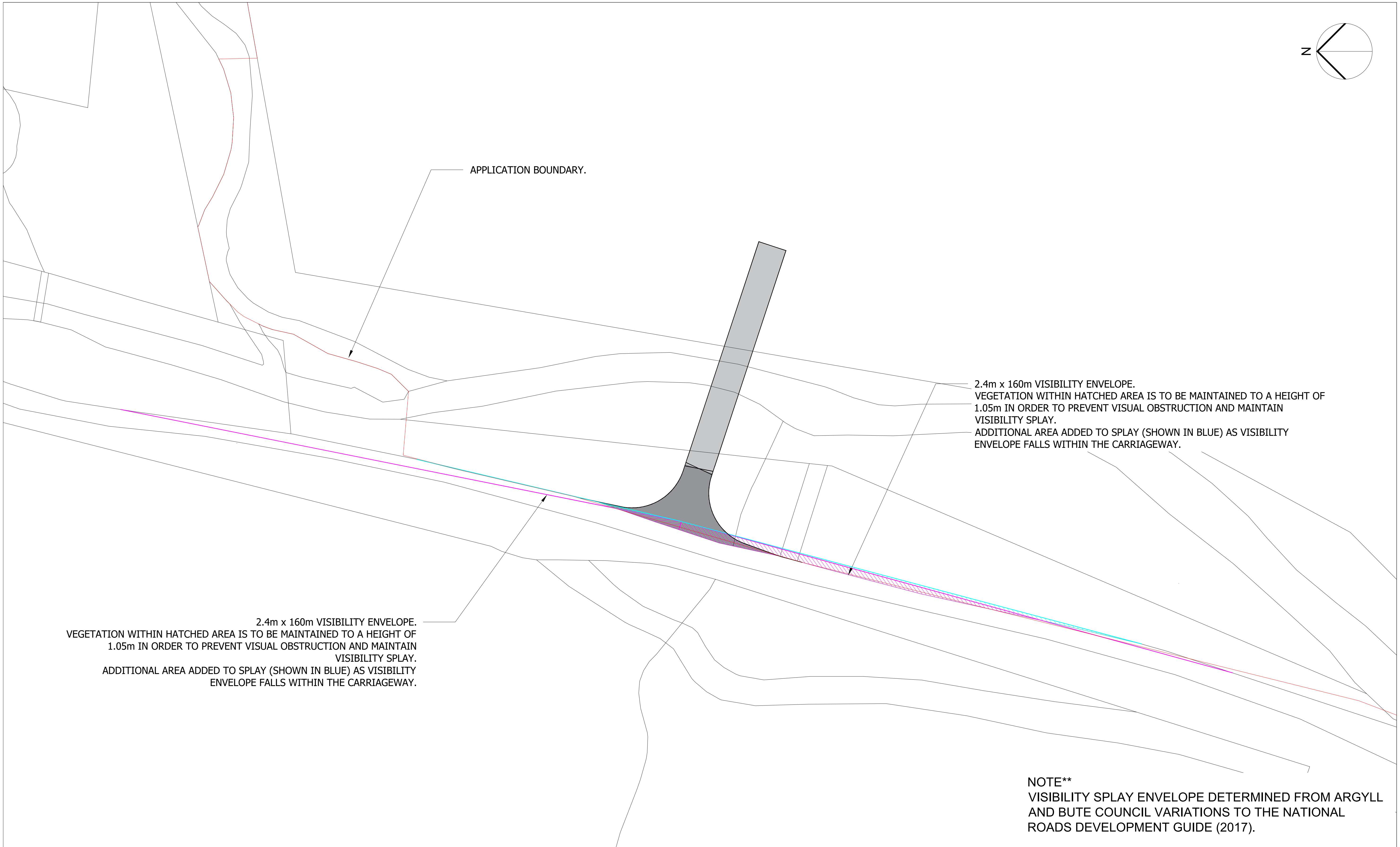
Plot Date : 31 August 2023 14:49:37
File Name :Y:\CAD\4378 LADYFIELD\01-WORKING\01_01-DRAWINGS\4378-DR-P-0002 - P4



NOTE**
VISIBILITY SPLAY ENVELOPE DETERMINED FROM ARGYLL AND BUTE COUNCIL VARIATIONS TO THE NATIONAL ROADS DEVELOPMENT GUIDE (2017).

Plot Date : 31 August 2023 14:49:40
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Project Title	LADYFIELD RENEWABLE ENERGY PARK
Client	LADYFIELD RENEWABLE ENERGY PARK LTD
Drawing Title	TECHNICAL APPENDIX 13.3 13.3.2 NORTHERN SITE ACCESS JUNCTION VISIBILITY SPLAY ASSESSMENT
Purpose of issue	PRELIMINARY
Designed	CR
Drawn	CR
Checked	TAT
Approved	TAT
ERM Internal Project No.	4378
Date	31/08/23
Scale @ A3	1:1000
Drawing Number	4378_DR_P_0004
Rev	1

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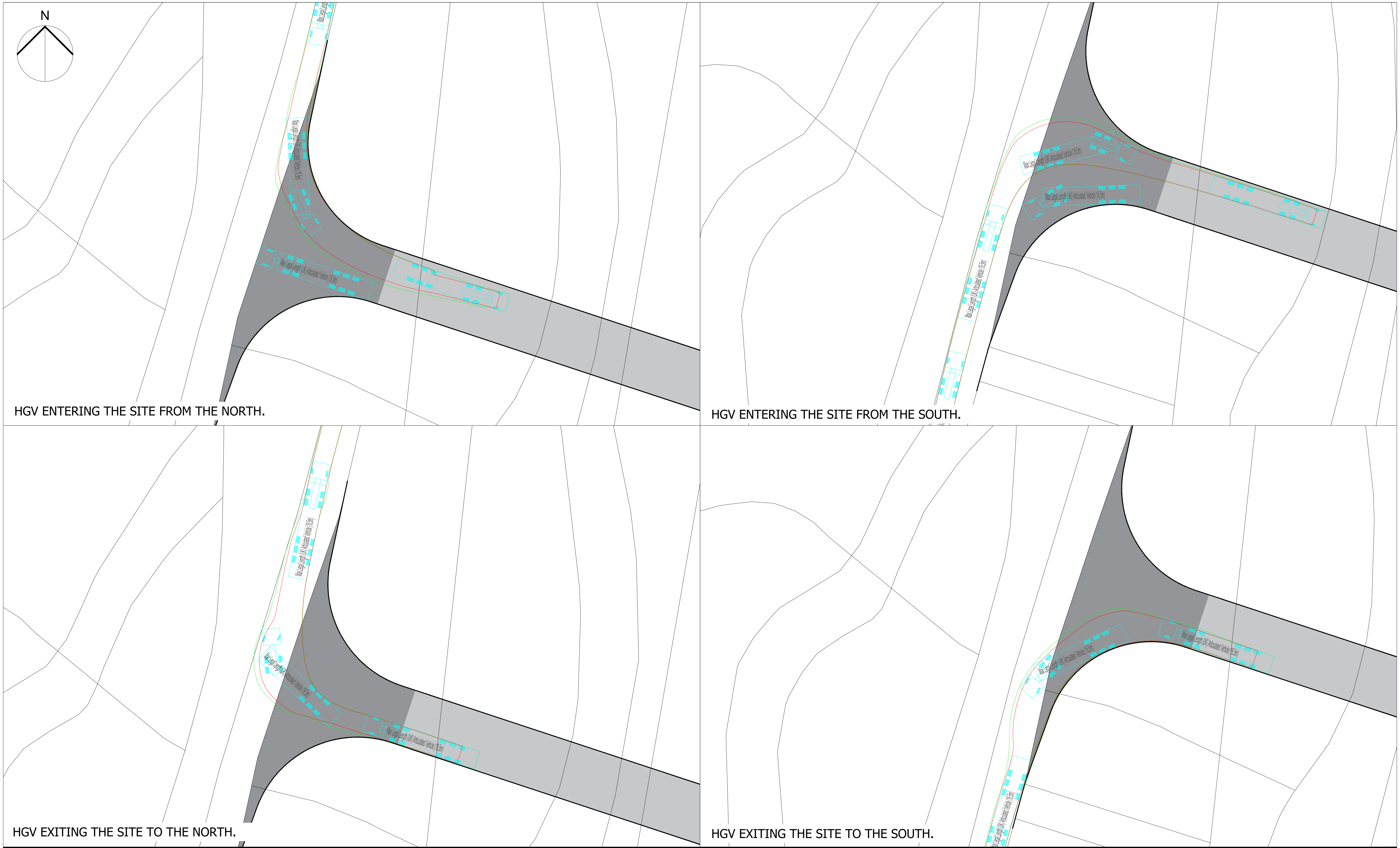

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Project Title	LADYFIELD RENEWABLE ENERGY PARK
Client	LADYFIELD RENEWABLE ENERGY PARK LTD
Drawing Title	TECHNICAL APPENDIX 13.3 13.3.3 NORTHERN SITE ACCESS JUNCTION SWEPT PATH ANALYSIS
Purpose of issue	PRELIMINARY
Designed	CR
Drawn	CR
Checked	TAT
Approved	TAT
ERM Internal Project No.	4378
Date	31/08/23
Scale @ A3	1:500
Drawing Number	4378_DR_P_0005
Rev	1

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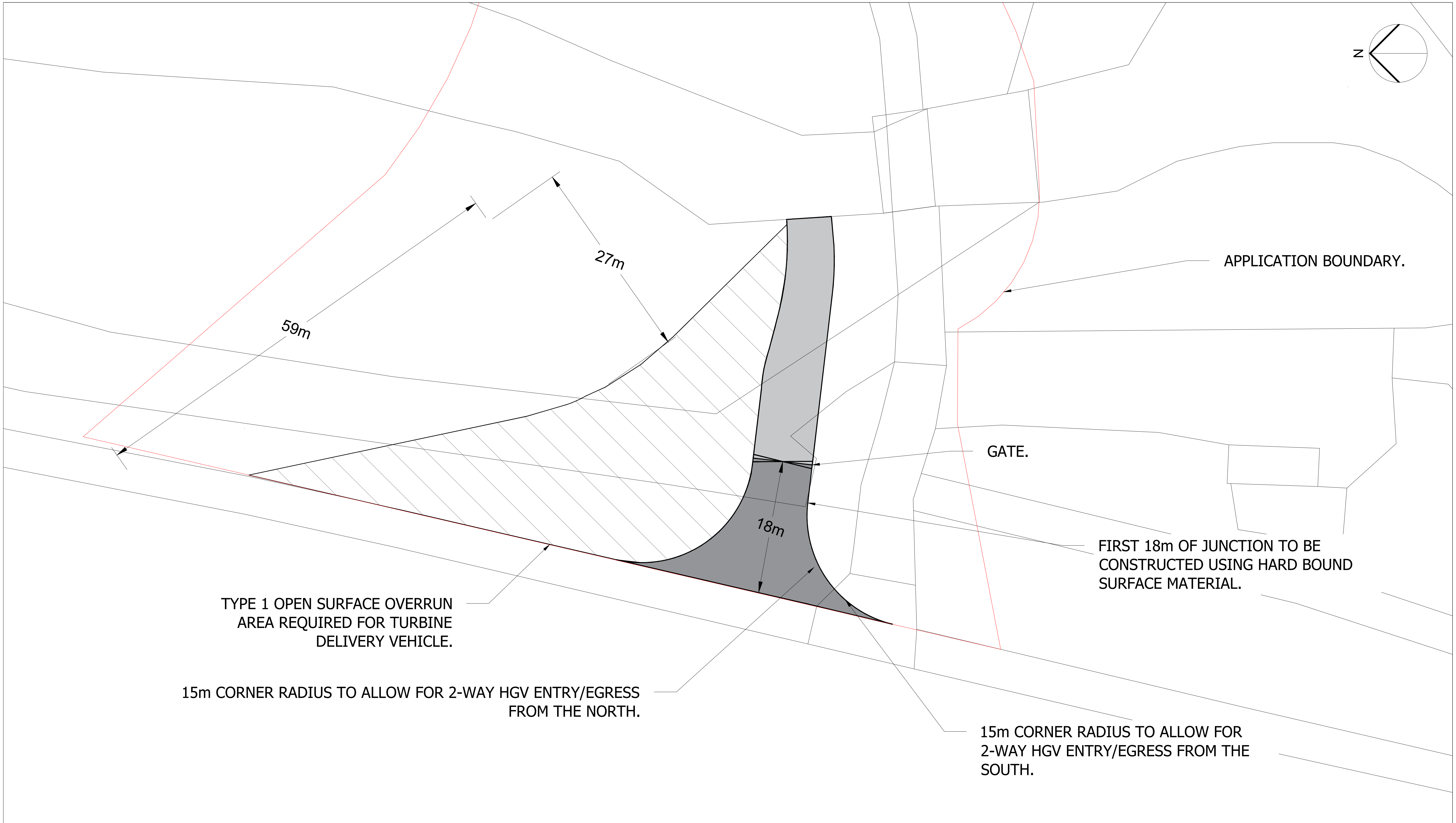

NOTE**
ACCESS JUNCTION DESIGNED TO STANDARDS INCLUDED IN DMRB CD 123 (2021).

Project Title: LADYFIELD RENEWABLE ENERGY PARK	Drawing Title: TECHNICAL APPENDIX 13.3 13.3.4 SOUTHERN SITE ACCESS JUNCTION GENERAL ARRANGEMENT	Purpose of issue: PRELIMINARY	
Client: LADYFIELD RENEWABLE ENERGY PARK LTD		Designed: CR	Drawn: CR
		Checked: TAT	Approved: TAT
		ERM Internal Project No.: 4378	Date: 31/08/23
		Scale @ A3: 1:500	

Drawing Number: 4378_DR_P_0008
Rev: 1

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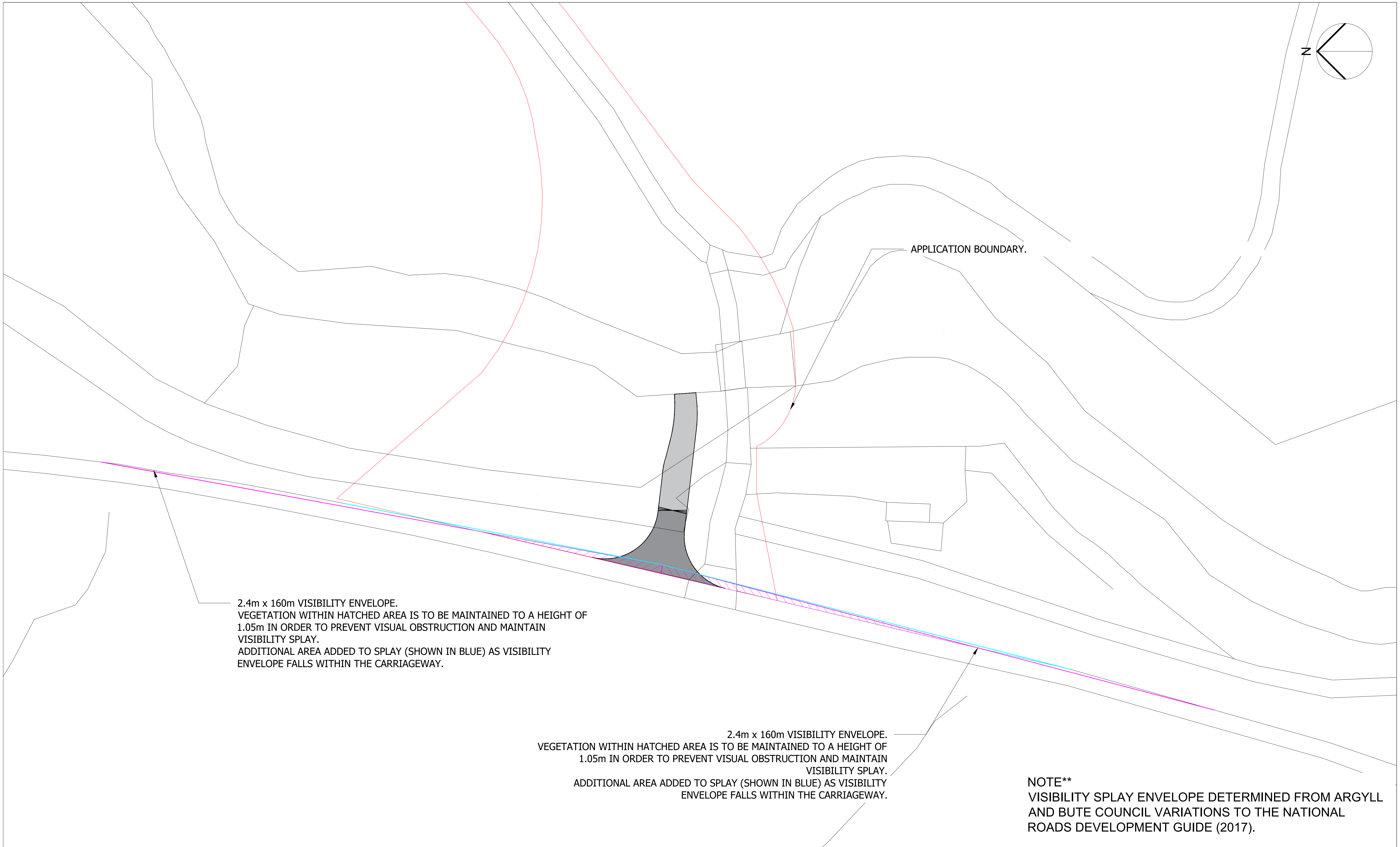
Plot Date : 31 August 2023 14:49:50
File Name :Y:\CAD\4378 LADYFIELD\01-WORKING\01_01-DRAWINGS\4378-DR-P-0002 - P4



NOTE**
VISIBILITY SPLAY ENVELOPE DETERMINED FROM ARGYLL AND BUTE COUNCIL VARIATIONS TO THE NATIONAL ROADS DEVELOPMENT GUIDE (2017).

Plot Date : 31 August 2023 14:49:55
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Project Title: LADYFIELD RENEWABLE ENERGY PARK	Drawing Title: TECHNICAL APPENDIX 13.3 13.3.5 SOUTHERN SITE ACCESS JUNCTION VISIBILITY SPLAY ASSESSMENT	Purpose of issue: PRELIMINARY			
Client: LADYFIELD RENEWABLE ENERGY PARK LTD		Designed: CR	Drawn: CR	Checked: TAT	Approved: TAT
		ERM Internal Project No. 4378		Date: 31/08/23	
		Scale @ A3: 1:1000			

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Drawing Number: 4378_DR_P_0009
Rev: 1

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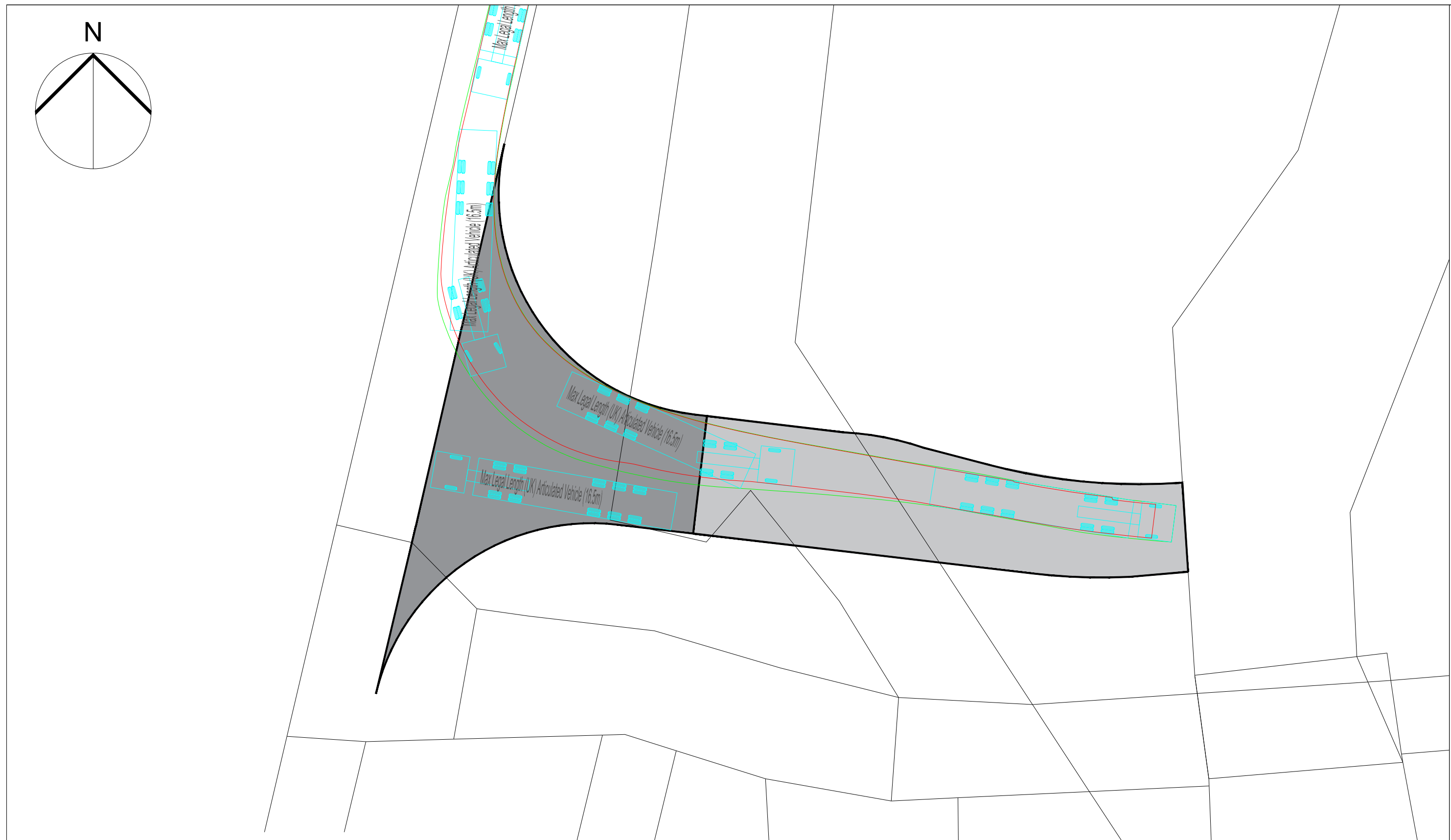
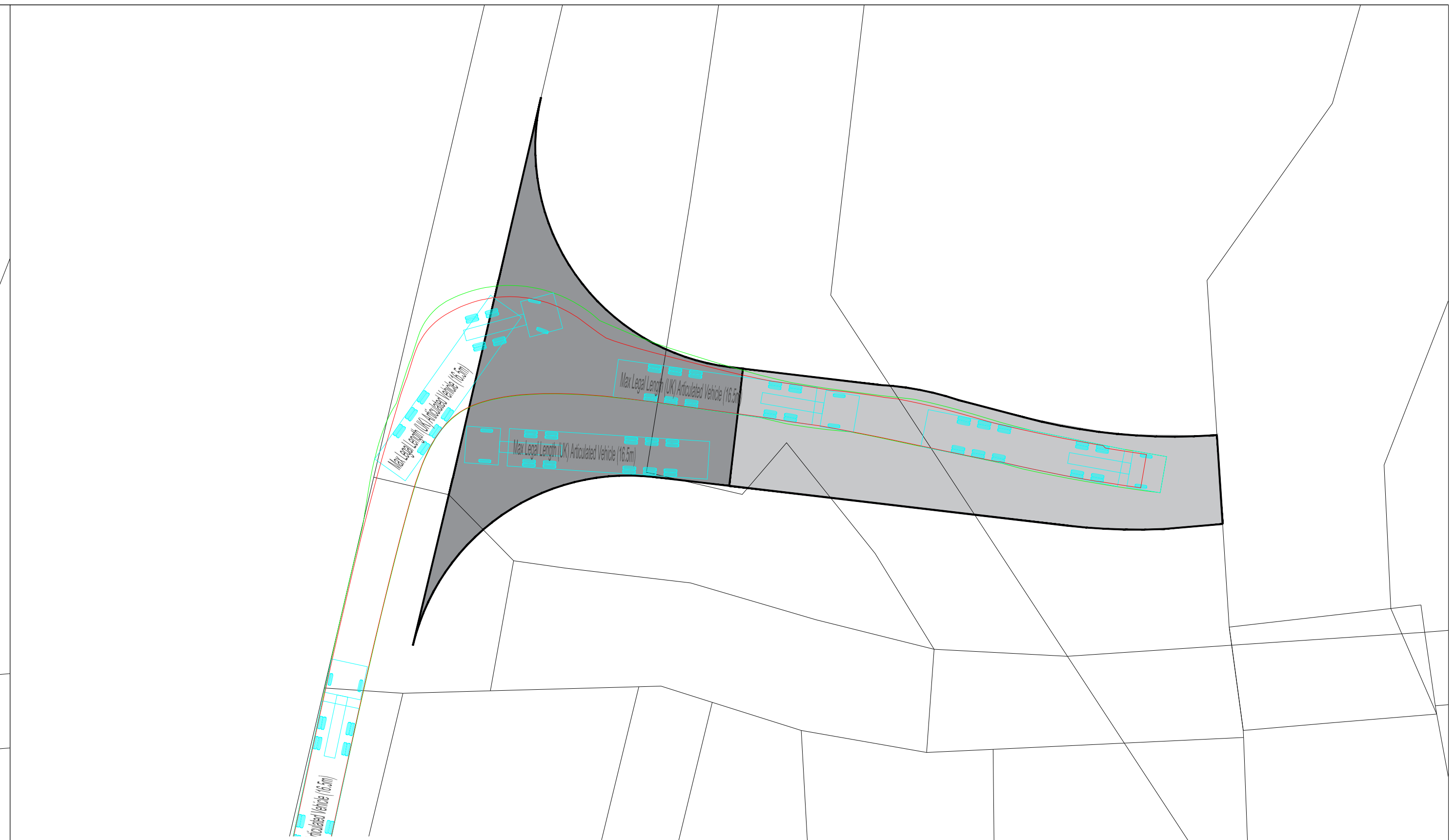
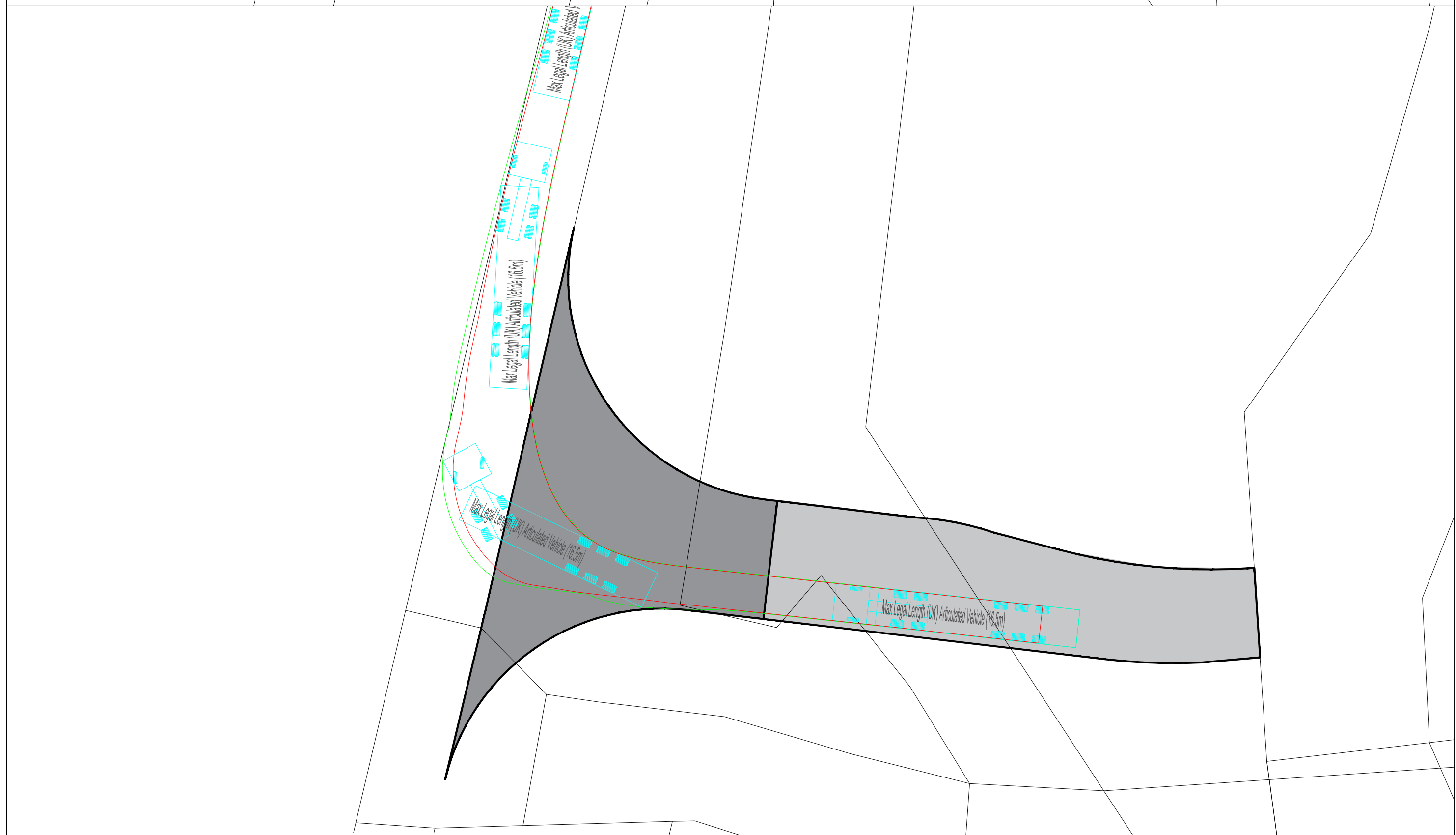


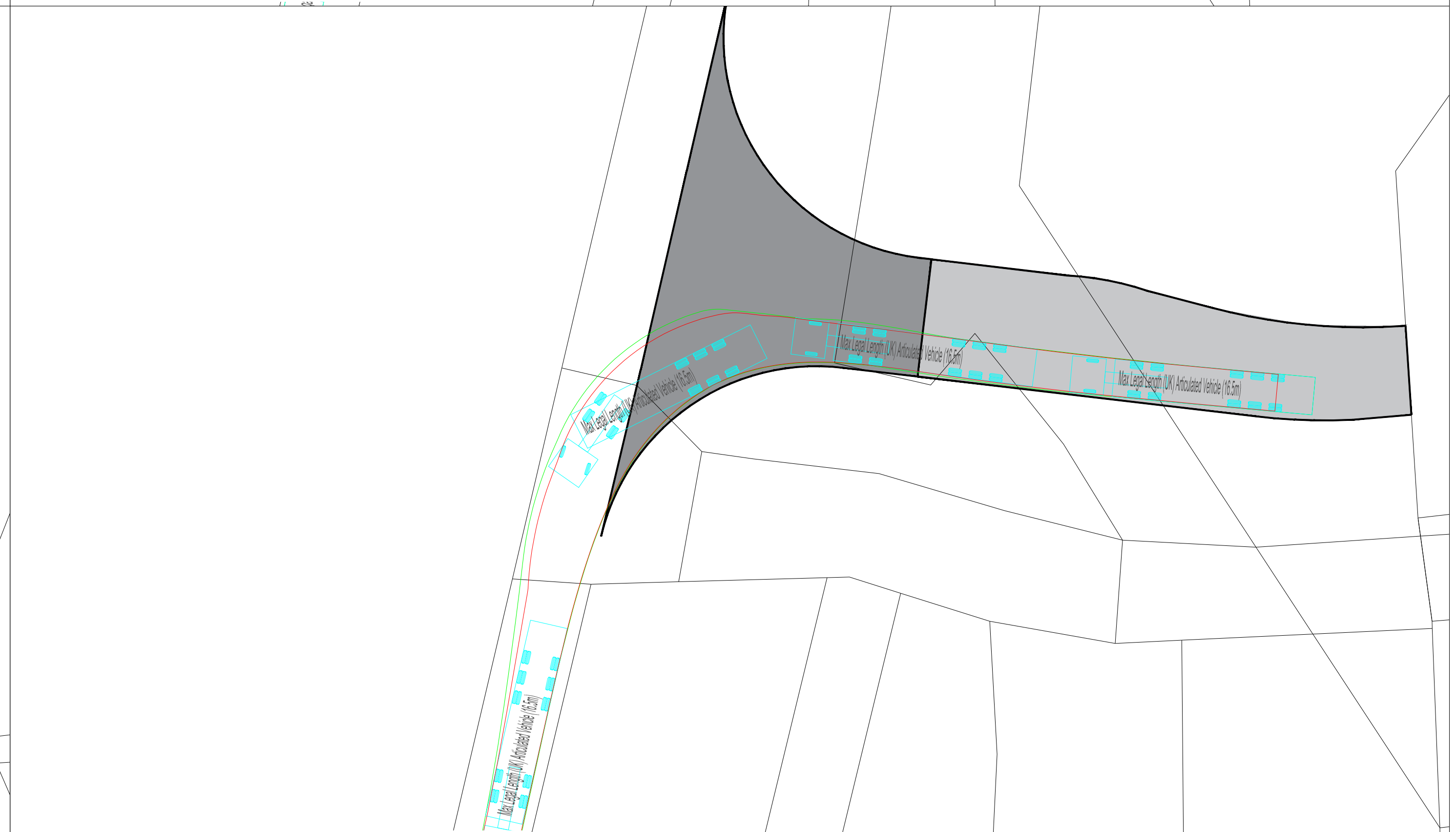
HGV ENTERING THE SITE FROM THE NORTH.



HGV ENTERING THE SITE FROM THE SOUTH.



HGV EXITING THE SITE TO THE NORTH.



HGV EXITING THE SITE TO THE SOUTH.

Project Title
LADYFIELD RENEWABLE ENERGY PARK

Client LADYFIELD RENEWABLE ENERGY PARK LTD

Drawing Title
TECHNICAL APPENDIX 13.3
13.3.6
SOUTHERN SITE ACCESS JUNCTION
SWEPT PATH ANALYSIS

Purpose of issue	PRELIMINARY		
Designed CR	Drawn CR	Checked TAT	Approved TAT
ERM Internal Project No. 4378		Date 31/08/23	
Scale @ A3 1:500			

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Environmental Impact Assessment – Technical Appendix 16.1: Carbon Balance Calculations

Ladyfield Renewable Energy Park

October 2023

Project No.: 0669622

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	Expected Values	Minimum	Maximum	Source of Data
Dimensions				
No. of Turbines	13	13	13	Chapter 1 Introduction
Duration of consent (years)	40	40	40	Chapter 2 Development description
Performance				
Power rating of 1 turbine (MW)	Candidate turbine is Vestas V136 4.5 MW . Hence 4.5 MW	4.5	4.5	Chapter 2 Development description
Capacity Factor (MW)	32.4	30.4	34.4	% calculated as rolling average of the past five years for wind from the DUKES 2023 statistics.
Fraction of output to backup (%)	Extra capacity required for backup. If 20% of national electricity is generated by wind energy, the extra capacity required for backup is 5% of the rated capacity of the wind plant (Dale et al 2004).	5	5	Standard values as per the guidance.
Additional emissions due to reduced thermal efficiency of the reserve generation (%)	10	10	10	Default value in the calculator
CO2 emissions from turbine life (tCO2/MW)				
				Opted to calculate as a percentage of turbine capacity, as the model offers

Application reference MV20 EO4E BHQ1

	Expected Values	Minimum	Maximum	Source of data
Type of Peatland	Acid bog	Acid Bog	Acid Bog	Geology and soils chapter: The different peat classes that are recorded on the Site are classified as follows: • Class 5 Peat: “Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat.” • Class 3 Peat: “Dominant vegetation cover is not priority peatland habitat but is associated with wet and acidic type. Occasional peatland habitats can be found. Most soils are carbon-rich soils, with some areas of deep peat.” • Class 2 Peat: “Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential.”
Average annual air temperature at site °C	9.405	6.17	12.64	Met Office Reference: https://www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages/gcvwqum6h. Have used Lephinmore as the closest available weather station. Average calculated by determining the midpoint between the annual average maximum temperature and the annual average minimum temperature.
Average depth of peat at site (m)	0.5	0	7.2	Average from the phase 1 and phase 2 assessments PSRA
C Content of dry peat (% by weight)	53.23	19.57	64.28	Default value for the average C content of all Scottish peats surveyed by the Soil Survey of Scotland
Average extent of drainage around drainage features at site (m)	10	5	50	Not measured in field directly. Guidance values used: https://informatics.sepa.org.uk/CarbonCalculator/assets/Carbon_calculator_User_Guidance.pdf
Average water table depth at site (m)	0.1	0.05	0.3	Not measured in field directly. Guidance values used: https://informatics.sepa.org.uk/CarbonCalculator/assets/Carbon_calculator_User_Guidance.pdf
Dry soil bulk density (g cm-3)	0.132	0.072	0.293	Dry bulk density should be measured by standard analytical procedures. Dry bulk density can be measured by placing samples of peat (core) into metal pots of known volume (approx. 200 cm3) and weighing (to two decimal places) before and after drying at 105 °C (Bengtsson and Enell, 1986). Care should be taken to avoid compacting the peat into the pots; and the sampling and filling of pots should be done in as consistent a manner as possible, incorporating all different components of the peat matrix. Bulk density results can be expressed in g cm-3. A value for bulk density for peat as derived from the National Soil Inventory of Scotland (Lilly et al., 2010), is 0.2 g cm-3. Dryburgh (1978) report a range of typical bulk density of sod peat slightly higher, as being between 0.25 and 0.45 g/cm-3. For details and values for particle density in peat please see reports of the Scottish Peat Committee, e.g. Department of Agriculture and Fisheries for Scotland, 1962, Second Report of the Scottish Peat Committee, HMSO, Edinburgh. For further information on peat survey, see Scottish Government Guidance on Developments on Peatlands - Site Surveys: https://www.gov.scot/publications/peatland-survey-guidance/

	Expected Values	Minimum	Maximum	Source of data
Time Requested for regeneration of bog plants after restoration (years)	5	2	10	Technical estimation - not expected to deviate from standard regeneration timescales
Carbon accumulation due to C fixation by bog plants in undrained peats (tC ha-1yr-1)	0.25	0.12	0.31	SNH Guidance - Carbon Payback Calculator: Guidelines on Measurements

	Expected Values	Minimum	Maximum
Method used to calculate Co2 loss from forest felling	Enter simple data	Enter simple data	Enter simple data

Minimal method chosen as felling picture too complex across multiple ages of trees. Given that the Site is within a forestry plantation, it would be difficult to determine the exact areas, ages, soil types, and carbon emissions from each bit of forestry felling. The 'simple' approach has therefore been taken to determine the impact of the entirety of the forestry felling rather than separating it into individual areas.

	Expected Values	Minimum	Maximum
Area of forestry plantation to be felled (ha)	79.3	79.2	79.4
Average rate of carbon sequestration in timber	3.6	2.5	4.7

Source of Data
Forestry chapter. Min and max estimates added to satisfy C model
Scottish Government and NatureScot Guidance

	Expected Values	Minimum	Maximum
Coal-fired plant emission factor (tCO2 MWh-1)	1.002	1.002	1.002
Grid-mix emission factor (tCO2MWh-1)	0.19338	0.19338	0.19338
Fossil fuel-mix emission factor (tCO2MWh-1)	0.432	0.432	0.432

	Expected Values	Minimum	Maximum	Source of Data
No. of borrow pits	1	1	1	The plan is to extend an existing quarry already present on site. So technically 1 borrow pit. EIA report assumes worst case scenario that the borrow pit is used to its full extents.
Average length of pits (m)	50	45	55	Chapter 2 Development Description
Average width of pits (m)	40	35	45	Chapter 2 Development Description
Average depth of peat removed from pit (m)	0	0	0	N/A - No peat present in this location.

*associated with each turbine	Expected Values	Minimum	Maximum	Source of data
Method used to calculate CO2 loss from foundations and hard-standing	Circular			Entered detailed construction information
Average length of turbine foundation (m)	25	25	25	Chapter 2 Development description- assumes circular foundation with 12.5m radius
Average width of turbine foundation (m)	25	25	25	
Average depth of peat removed from turbine foundations (m)	0.5	0.5	0.5	Based on average depth of peat across site from Peatland tab
Average length of hard-standing (m)	65	65	65	Chapter 2 Development description
Average width of hardstanding (m)	25	25	25	Chapter 2 Development description
Average depth of peat removed from hard-standing (m)	0.5	0.5	0.5	Based on average depth of peat across site from Peatland tab
Volume of concrete used in construction of the ENTIRE windfarm (m3)	9,750	9,750	9,750	EIA Chapter 2: Development Description

	Expected Values	Minimum	Maximum	Source of data
Existing track length (m)	4034	4033	4035	Provided by Applicant
Floating road				
Length of access track (m)	319	318	320	Provided by Applicant
Floating road width (m)	5.5	5.4	5.6	Provided by Applicant
Floating road depth (m)	0	0	0	Provided by Applicant
Length of floating road that is drained (m)	2150	2149	2151	Provided by Applicant
Average depth of drains associated with floating roads (m)	0.2	0.1	0.3	Provided by Applicant
Excavated road				
Length of access track (m)	9358	9357	9359	Provided by Applicant
Excavated road width (m)	5.5	5.4	5.6	Provided by Applicant
Average depth of peat excavated for road (m)	0.75	0.74	0.76	Provided by Applicant
Rock filled road				
Length of access track (m)	0	0	0	Assume none being used
Rock filled road width (m)	0	0	0	Assume none being used
Rock filled road depth (m)	0	0	0	Assume none being used
Length of rock filled road that is drained (m)	0	0	0	Assume none being used
Average depth of drains associated with rock filled roads (m)	0	0	0	Assume none being used
Total				
Total length of access track (m)	13711	13708	13714	Provided by Applicant

	Expected Values	Minimum	Maximum
Length of any cable trench on peat that does not follow access tracks and is lined with a permeable medium (e.g. sand) (m)	0	0	0
Average depth of peat cut for cable trenches (m)	0	0	0

Source of Data
Assuming that cable trenches all follow the track alignment, so there is no cable trench meeting this criteria.

*not already accounted above	Expected Values	Minimum	Maximum
Volume of additional peat excavated (m3)	2789.6	2788.6	2790.6
Area of additional peat excavated (m2)	5579.2	5578.2	5580.2
Peat Landslide Hazard and Risk Assessments			
Peat Landslide Hazard	negligible		

Source of Data
This is based on the figures in the peat management plan: site compound= 203m3, BESS compound= 2,333m3, plus a 10% Bulk factor contingency.
As average peat depth across site is 0.5m, have assumed this is the volume above divided by 0.5.

0	Expected Values	Minimum	Maximum	Source of Data	
Improvement of degraded bog					
Area of degraded bog to be improved (ha)	67.89	27.89	67.89	BNG tool / Outline Biodiversity Enhancement Plan	27.89 ha to be enhanced within Search Areas A and B which is currently classified as degraded wet modified bog or blanket bog. 40 ha of bog habitat to be created from conifer plantation in Search Area A.
Water table depth in degraded bog before improvement (m)	0.1	0	0.5	ERM estimation	Detailed Ground Investigation have not been undertaken so estimate provided.
Water table depth in degraded bog after improvement (m)	0.05	0	0.3	ERM estimation	Detailed Ground Investigation have not been undertaken so estimate provided.
Time required for hydrology and habitat of bog to return to its previous state on improvement (years)	20	15	30	BNG tool / Outline Biodiversity Enhancement Plan	20 years is used in BNG calculator for conifer forest conversion, based on current habitat conditions (mix of scattered forest and bog, and even within conifer plantation there is some poor bog habitat already). For restoration of degraded wet modified bog and blanket bog, 15 years minimum has been assumed, 30 years is usually taken to be the timeframe for bog restoration from forestry, so that would be considered a precautionary value.
Period of time when effectiveness of the improvement in degraded bog can be guaranteed (years)	20	15	30	BNG tool / Outline Biodiversity Enhancement Plan	20 years is used in BNG calculator for conifer forest conversion, based on current habitat conditions (mix of scattered forest and bog, and even within conifer plantation there is some poor bog habitat already). For restoration of degraded wet modified bog and blanket bog, 15 years minimum has been assumed, 30 years is usually taken to be the timeframe for bog restoration from forestry, so that would be considered a precautionary value.
Improvement of felled plantation land					
Area of felled plantation to be improved (ha)	54.14	40	54.14	BNG tool / Outline Biodiversity Enhancement Plan	40 ha to be converted to blanket bog, 14.4 ha to be converted to native broadleaved woodland (within Search Area A).
Water table depth in felled area before improvement (m)	0.5	0.1	1	ERM estimation	Detailed Ground Investigation have not been undertaken so estimate provided.
Water table depth in felled area after improvement (m)	0.25	0	0.5	ERM estimation	Detailed Ground Investigation have not been undertaken so estimate provided.
Time required for hydrology and habitat of felled plantation to return to its previous state on improvement (years)	15	15	30	BNG tool / Outline Biodiversity Enhancement Plan	15 years is used in BNG calculator based on current habitat conditions (mix of scattered forest and bog, and even within conifer plantation there is some poor bog habitat already). 30 years is usually taken to be the timeframe for bog restoration from forestry, so that would be considered a precautionary value.
Period of time when effectiveness of the improvement in felled plantation can be guaranteed (years)	15	15	30	BNG tool / Outline Biodiversity Enhancement Plan	15 years is used in BNG calculator based on current habitat conditions (mix of scattered forest and bog, and even within conifer plantation there is some poor bog habitat already). 30 years is usually taken to be the timeframe for bog restoration from forestry, so that would be considered a precautionary value.
Restoration of peat removed from borrow pits					
Area of borrow pits to be restored (ha)	0	0	0	No peat to be removed form borrow pits	
Depth of water table in borrow pit before restoration with respect to the restored surface (m)	0	0	0		No borrow pit restoration for Outline Biodiversity Enhancement Plan
Depth of water table in borrow pit after restoration with respect to the restored surface (m)	0	0	0		No borrow pit restoration for Outline Biodiversity Enhancement Plan
Time required for hydrology and habitat of borrow pit to return to its previous state on restoration (years)	3	1	5		No borrow pit restoration for Outline Biodiversity Enhancement Plan
Period of time when effectiveness of the restoration of peat removed from borrow bits can be guaranteed (years)	3	2	5		No borrow pit restoration for Outline Biodiversity Enhancement Plan
Early Removal of drainage from foundations and hardstanding					
Water table depth around foundations and hardstanding before restoration (m)	0.5	0.1	1	ERM estimation.	Detailed Ground Investigation have not been undertaken so estimate provided.
Water table depth around foundations and hardstanding after restoration (m)	0.05	0.01	0.3	ERM estimation. Active forest drainage in place around infrastructure is not expected to be removed so there is unlikely to be a change in water table depth after restoration.	Detailed Ground Investigation have not been undertaken so estimate provided.
Time to completion of backfilling, removal of any surface drains, and full restoration of the hydrology (years)	3	1	5	Restoration will take c.12 months Active forest drainage in place around infrastructure is not expected to be removed so there is unlikely to be a change in water table depth after restoration.	

	Expected Values (yes, no, not applicable)	Minimum	Maximum	Notes
Will the hydrology of the site be restored on decommissioning?				
Will you attempt to block any gullies that have formed due to the windfarm?	No	No	No	No plans within Outline Biodiversity Enhancement Plan
Will you attempt to block all artificial ditches and facilities rewetting?	No	No	No	No plans within Outline Biodiversity Enhancement Plan
Will the habitat of the site be restored on decommissioning?				
Will you control grazing on degraded areas?	No	No	No	No plans within Outline Biodiversity Enhancement Plan. Deer control or fencing may be required during operational phase.
Will you manage areas to favour reintroduction of species?	No	No	No	Integral to Outline Biodiversity Enhancement Plan for operational phase, but no plans for decommissioning.

Choice of methodology for calculating emission factors	Expected Values
Choice of methodology for calculating emission factors	Site specific (required for planning applications)
Will the habitat of the site be restored on decommissioning?	
Lat	56.293829
Lon	-5.068656
Windfarm name	Ladyfield Renewable Energy Park
Operator name	Ladyfield Renewable Energy Park Ltd

Notes
Planning applications must always select Site specific as the methodology for calculating emission factors.
Converted from National Grid References (NGR) 210197, 715498
Converted from National Grid References (NGR) 210197, 715498

Windfarm Characteristics	Expected Values	Min	Max
Distance to nearest biofuel plant (km)			
Total wind farm area (ha)	790		
Height of turbines (m)	180		
Average Site Windspeed	8.5		
Estimated downtime for maintenance (%)			
Emissions from Felling	0		
Emissions of CO2 associated with transportation			

** won't be burnt as fuel - timber will go to a different source

Tab not required for model

After editing the
...t process for
...od, softwood,
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...ble forest
management" to only cover mechanical harvesting operations (harvester, forwarder, skidder) the emission factor is 8.85 kg CO_2/m3 wood (430 kg dry mass).

VUWS-TR24-YG37

	Expected Values	Minimum	Maximum	Source of Data
Name of the Area	Ladyfield			
Number of turbines in this area	13	13	13	Chapter 2 Development description
Turbine foundations				
Average peat depth excavated when constructing foundations (m)	0.5	0.5	0.5	Based on average depth of peat across site from Peatland tab
Approximate geometric shape of hole dug when construction foundations	Circular			Chapter 2 Development description- assumes circular foundation with 12.5m radius
	25	25	25	
	25	25	25	
Hardstanding				
Average peat depth excavated when constructing hardstanding (m)	0.5	0.5	0.5	Based on average depth of peat across site from Peatland tab
Approximate geometric shape of hole dug when construction hardstanding	Rectangular			Chapter 2 Development description
	65	65	65	
	25	25	25	
	65	65	65	
	25	25	25	
Piling				
Is piling used?	No			Chapter 2 Development description
Volume of concrete				
Volume of concrete used (m3) in the entire area	9750	9750	9750	Chapter 2 Development description: 750 m3 of concrete per turbine base X 13 turbines= 9750m3

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