
**THREE OAKS RENEWABLE
ENERGY PARK
EXTENSION**

**Environmental
Statement Appendix 10.1:
Telecommunications Impact Assessment**

MAY 2026



Telecommunications Impact Assessment

Ridge Clean Energy Ltd

Three Oaks Renewable Energy Park Extension

May 2026



ADMINISTRATION PAGE

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Issue	Date	Details of Changes
1	30 September 2025	Initial issue
2	12 January 2026	Updated turbine coordinates
3	2 February 2026	Updated turbine coordinates
4	10 February 2026	Administrative revisions
5	18 February 2026	Administrative revisions
6	30 March 2026	Administrative revisions
7	27 May 2026	Administrative revisions

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EXECUTIVE SUMMARY

Report Purpose

Pager Power has been commissioned to investigate the potential impact of the proposed Three Oaks Renewable Energy Park Extension wind development upon wireless communications infrastructure (point-to-point links) in the surrounding area.

Arqiva, Atkins, BT Group, the Joint Radio Company (JRC), Mobile Broadband Network Limited (MBNL), MLL Telecom, Virgin Media O2 and Vodafone have been contacted as part of the assessment. The Ofcom Spectrum Information Portal (SIP) was also reviewed as part of the assessment.

Results

Arqiva, Atkins, BT Group, MLL Telecom, Virgin Media O2, and Vodafone have confirmed that their link infrastructure does not operate within close vicinity of the proposed development, and therefore have no objections.

MBNL have provided the safeguarding distances for their link infrastructure within proximity to the proposed development:

- Two turbines infringe the link operator's exclusion zones for two links.
- When considering the Fresnel Zone of these links for an assumed frequency, one turbine is clear of the Fresnel Zone plus an additional 25m buffer for one link.
- One turbine infringes the Fresnel Zone for one link.

The exclusion zone charts map the infrastructure considering the link operator's requested clearances, and Fresnel Zone + 25m buffer relative to the proposed turbine locations (see Section 3.7).

Airwave have confirmed that their link infrastructure is not predicted to be impacted by the proposed development, and therefore has no objections.

A separate assessment by the JRC has been undertaken and used to inform the design of the turbine layout to avoid infringement of their infrastructure. The JRC's concerns have been addressed by micrositeing turbines clear of their infrastructure.

Recommendations and Mitigation

Mitigation is predicted to be a requirement due to the infringement of the link operator's exclusion zone and/or a link's Fresnel Zone. An overview of possible mitigation strategies has been provided for reference (see Section 4). Through micrositeing allowance (25m for Turbines 1-5 and 10m for Turbine 6), it is predicted that the Proposed Development has the ability to be clear of the Fresnel Zones.

If any significant changes are made to the proposed development layout and/or turbine dimensions, then the consultees should be contacted again with the updated layout.



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ABOUT PAGER POWER

Pager Power is a specialist technical consultancy based in the United Kingdom and has been providing independent expertise on planning issues for solar, wind, and building developments for over 20 years.

Established in 1997, the company initially specialised in assessing the impact of wind turbines on radar systems. Pager Power has since expanded into a multidisciplinary technical planning consultancy that offers a comprehensive range of services and has supported renewable and building projects in more than 60 countries.

Pager Power's core competencies now include:

- Aviation and Radar;
- Daylight, Sunlight and Overshadowing;
- Glint and Glare;
- Shadow Flicker;
- Telecommunications

Using proprietary modelling software, each study is tailored to the individual project, ensuring that results are relevant, defensible, and aligned with current national and international standards. The company also provides planning support and stakeholder consultation across all service areas, helping clients to understand constraints, explore potential mitigation options, and forge a path forward for their projects.

Pager Power's work helps clients identify potential risks, inform project design, and support the decision-making process. The company can provide support at any stage of a project, from initial feasibility through to completion. Pager Power's assessments – recognised for their objectivity, accuracy, and technical integrity – are designed to withstand legal scrutiny and are trusted by developers and stakeholders alike.

1 PROPOSED DEVELOPMENT

1.1 Turbine Details

Table 1 below presents the turbine details.

Turbine	Easting	Northing	Hub Height (m)	Tip Height (m)	Rotor Diameter (m)
1	510534	465648	91.4	149.9	117
2	511084	465710	91.4	149.9	117
3	511722	465975	91.4	149.9	117
4	510772	464846	91.4	149.9	117
5	511340	465110	91.4	149.9	117
6	511771	465303	91.4	149.9	117

Table 1 *Turbine details*

2 TELECOMMUNICATIONS CONSULTATION SUMMARY

2.1 Overview

Pager Power has consulted wireless link operators to establish the most up-to-date wireless link network in the vicinity of the proposed development. Consultation was undertaken directly with the most prevalent operators in order to obtain link details.

Ofcom were not consulted as they are not currently responding to consultation requests¹. The Ofcom Spectrum Information Portal (SIP) has been reviewed to identify fixed communication links (see Section 3.5).

Airwave (Motorola Solutions) is a company that safeguards fixed communication links for the emergency services and does not provide link details due to confidentiality. An Airwave assessment has been undertaken and no objection has been confirmed.

2.2 Consultation Overview

Table 2 below and on the following page presents a summary of consultation undertaken with link operators to date.

Stakeholder	Summary
Airwave	09/10/2025 – Assessment requested 18/12/2025 – Assessment received No objection
Arqiva	30/09/2025 – Link details requested 03/10/2025 – Response received No objection
Atkins	30/09/2025 – Link details requested 03/10/2025 – Response received No objection
BT	30/09/2025 – Link details requested 03/10/2025 – Response received No objection
JRC	30/09/2025 – Link details requested 02/10/2025 – Response received Objection raised – details of link infrastructure not provided stating confidentiality A separate assessment undertaken by the JRC has informed the design

¹ <https://www.pagerpower.com/news/uk-ofcom-suspends-microwave-link-consultation-due-to-gdpr/>

Stakeholder	Summary
JRC	Objection addressed by micrositeing
MBNL	30/09/2025 – Link details requested 06/10/2025 – Response received Safeguarding distances specified – details of link infrastructure not provided stating confidentiality
MLL Telecom	30/09/2025 – Link details requested 14/10/2025 – Response received No objection
Virgin Media O2	30/09/2025 – Link details requested 17/10/2025 – No objection 18/12/2025 – Reconsulted on updated layout 23/12/2025 – Response received No objection
Vodafone	30/09/2025 – Link details requested 03/10/2025 – Response received No objection

Table 2 Overview of consultation

3 TECHNICAL ASSESSMENT

3.1 Overview

Microwave and UHF² wireless communication links are used to transmit information between two antennae via radio waves within a particular frequency band.

The exclusion zones associated with the identified links have been calculated based on the telecommunications data provided, and industry experience for assumed frequencies. Further three-dimensional clearance calculations have then been undertaken to determine the extent of any clearance or infringement of the proposed development. The following subsections present an overview of the interference mechanisms and methodology.

3.2 Fresnel Zones

A Fresnel Zone takes the form of an ellipsoid surrounding a link path and represents the area in which obstructions should not be sited in order to avoid diffraction losses. The width of the zone at any point along the link path is determined by the Fresnel Zone number, the frequency of the link and the distance from each link end. The width of the zone is maximal at the midpoint of the link path.

3.3 Diffraction – Microwave and UHF Links

Obstructions such as wind developments which are sited in between two microwave link antennae can partially block the radio signal passing between them, thereby reducing the functionality of the link. This can occur even if the obstruction is not directly between the antennae but close to the link boresight³. This kind of blocking is called ‘diffraction’. There are various approaches to safeguarding microwave links from obstruction via wind developments. The most common approaches are:

1. Implementation of a fixed stand-off distance around the link boresight;
2. Safeguarding the relevant Fresnel Zone (discussed below).

The first approach is used by many operators who request a set buffer distance. Set stand offs are occasionally conservative and produce a large exclusion zone distance. The second approach is to assess an obstruction on a case-by-case basis to calculate the most accurate exclusion zone. Pager Power considers the Second Fresnel zone when assessing the effect of a turbine/wind development upon microwave links in accordance with guidance adopted

² Ultra-High Frequency

³ This is the straight line between the two antennae.



by Ofcom⁴ and 60% of the First Fresnel zone when assessing UHF links in accordance with guidance published by the JRC⁵.

3.4 Reflections – UHF Links

Obstructions can affect UHF links by reflecting the signal between transmitter and receiver. This is not a significant concern for microwave links because they are highly directional. Typically, diffraction effects are likely to be the most significant concern due to the greater abundance of microwave point-to-point links and because both microwave and UHF links are safeguarded against diffraction effects.

3.5 Identified Telecommunication Links

Table 3 on the following page summarises the link details provided by link operators and specified safeguarding criteria.

The Ofcom SIP has been reviewed to ascertain further information regarding any links potentially impacted by the proposed development. No further telecommunication infrastructure has been identified.

⁴ Also referred to as the 'Bacon Method', coinciding with 'A proposed method for establishing an exclusion zone around a terrestrial fixed radio link outside of which a wind turbine will cause negligible degradation of the radio link performance' published by D.F Bacon

⁵ JRC, December 2014, Calculation of Wind Turbine clearance zones for JRC managed fixed services with particular reference to UHF (460 MHz) Telemetry Systems when turbine sizes and locations are accurately known, Issue 4.2, Joint Radio Company Ltd.



Link Operator	Link Type	Link ID/Reference	Frequency	Safeguarding Distance	A End	Z End
MBNL	Not specified The assessment has assumed that the infrastructure pertains to microwave infrastructure based on industry experience	9121505	Not specified The assessment has assumed 3 GHz as a worst case based on industry experience	MBNL request 100m clearance from the link path and 250m clearance from masts The assessment has considered the distances as outlined by MBNL, and the second Fresnel Zone in accordance with Ofcom recommended methodology and an additional 25m buffer	E 511116.9 N 466180.3	E 514164.9 N 464140.3
		9115766			E 511814.8 N 461337.5	E 511116.8 N 466178.5

Table 3 *Telecommunication links via consultation*



3.6 Overview of 2D Exclusion Zones

The exclusion zone for each communications link is defined by the Fresnel zone radius [B], rotor radius [A/2], and an additional 25-metre buffer zone [E]. This is shown in Figure 1 below. A 250-metre exclusion zone is applied to the link masts as outlined by MBNL.

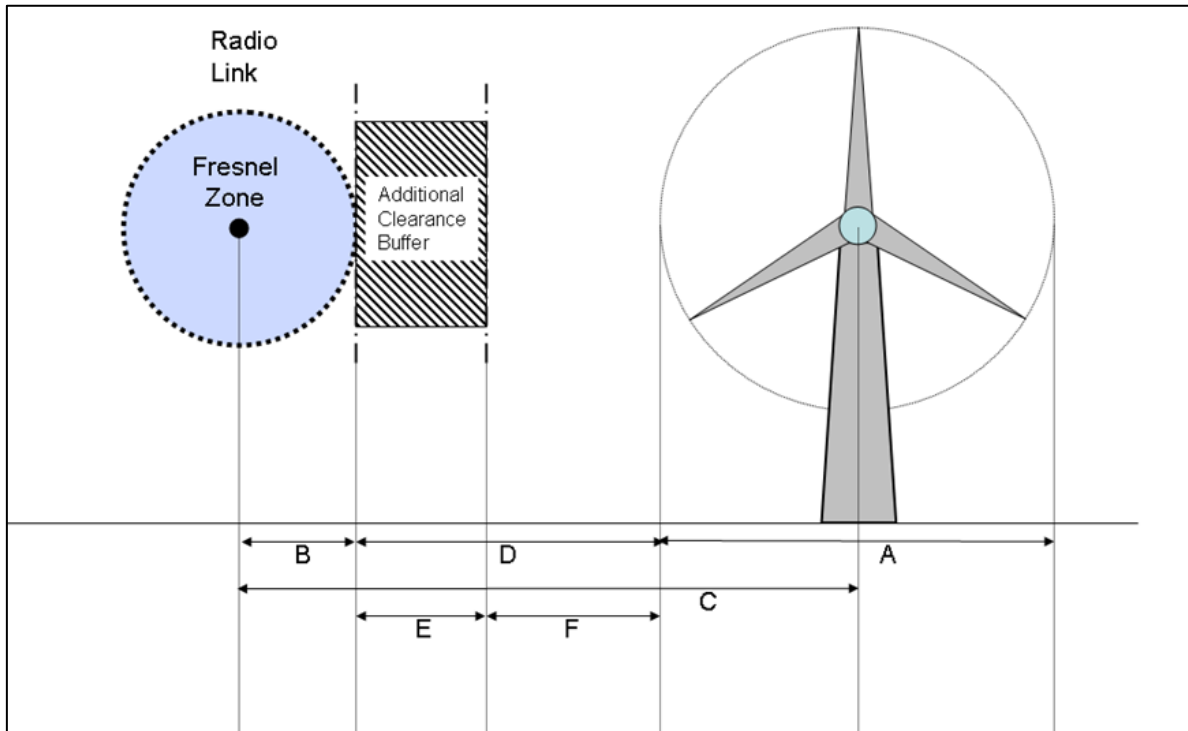


Figure 1 Exclusion zone calculation

3.7 Exclusions Zones Chart

Figures 2 and 3 on the following pages show the exclusion zones associated with the identified links. The following two exclusion zones have been considered:

1. The link operator's requested exclusion zone (Figure 2);
2. The Fresnel Zone (as per Ofcom recommended methodology) plus an additional 25m buffer (Figure 3).

The exclusion zone is shown by two lines, marking the edges of the exclusion zones. The exclusion zones also include the maximum rotor radius. Any turbines located between the lines would infringe the zone in two dimensions.

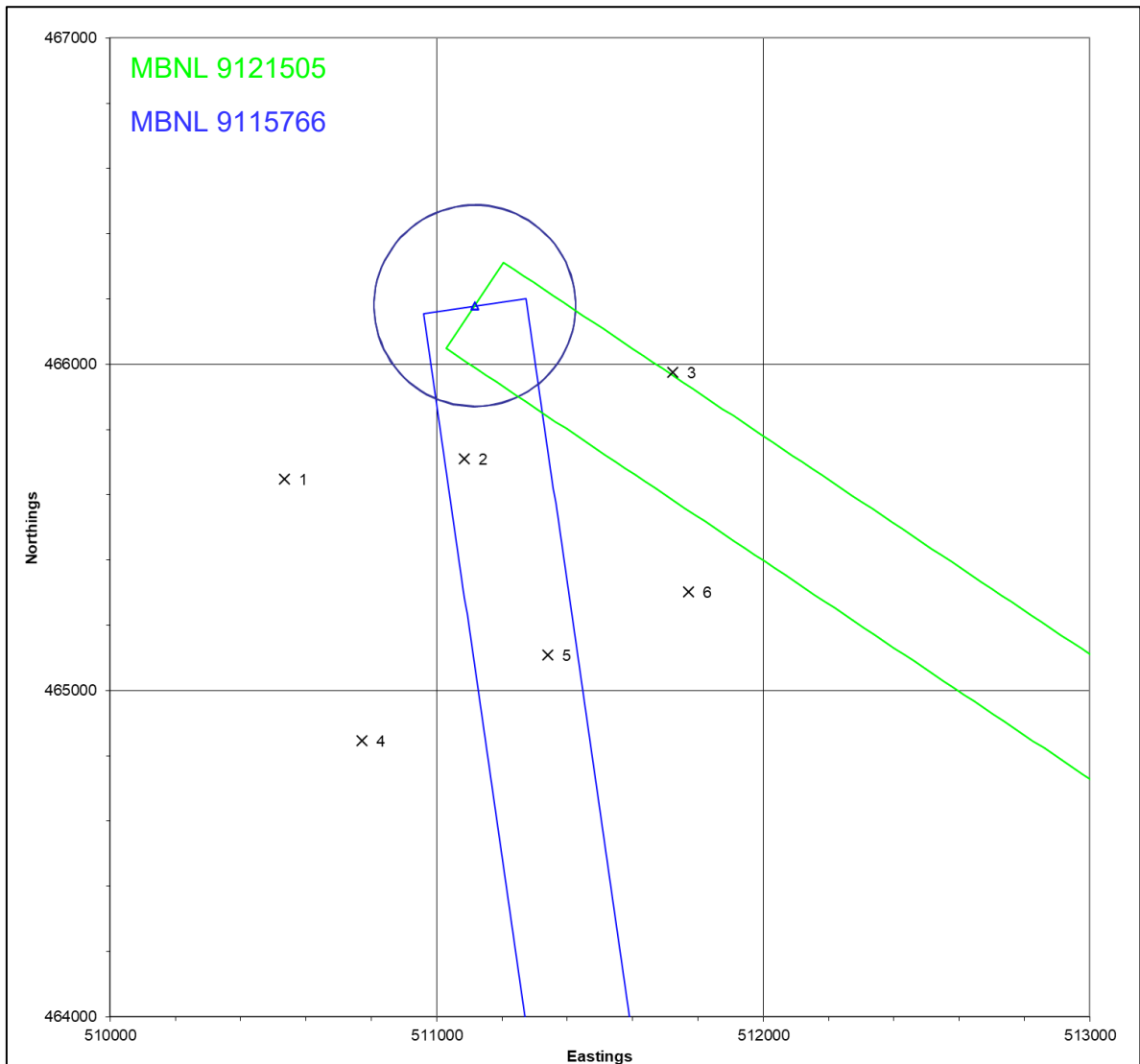


Figure 2 Exclusion zones chart 1 (100m buffer + 250m Masts)

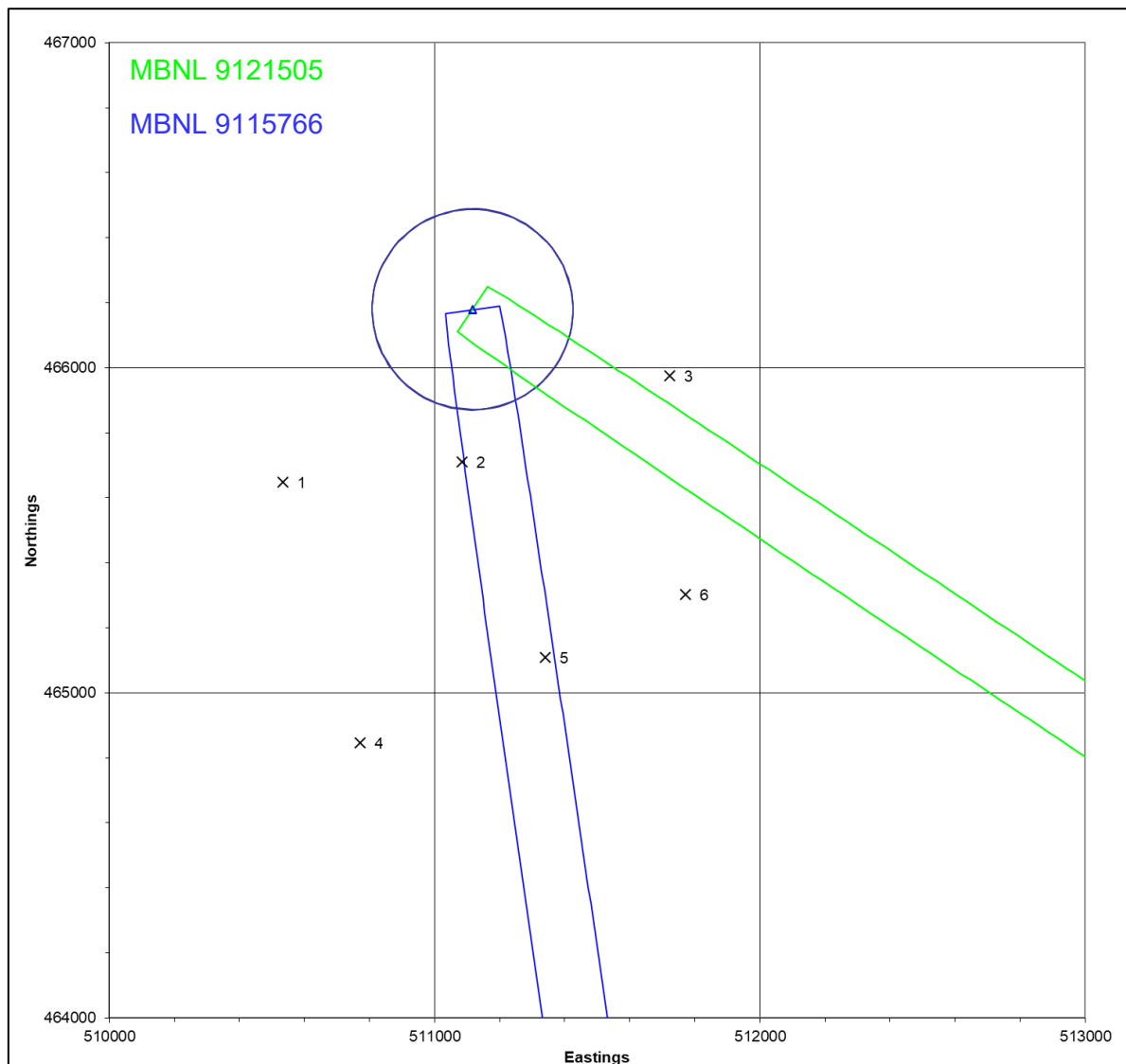


Figure 3 Exclusion zones chart 2 (Fresnel Zones + 25m Buffer + 250m Masts)

3.8 Assessment Results

Table 4 on page 18 summarises the clearance and infringement calculations of the exclusion zones. The calculations consider the following two exclusion zones separately:

1. 100m clearance from link path as specified by the link operator;
2. Clearance of the Fresnel Zone (as per Ofcom recommended methodology) for an assumed frequency plus an additional 25m buffer.

3.9 Assessment Conclusions

- Turbines 1, 3, 4 and 6 are clear of the link operator's 100m-buffer for both MBNL links;
- Turbine 2 is clear of the link operator's 100m-buffer for one MBNL link (ID/reference 9121505), but infringes the 100m-buffer for another MBNL link (ID/reference 9115766) by 59.18m. When mitigating this by microsting the turbine and considering the Fresnel Zone of this link (MBNL link ID/reference 9115766) for the assumed frequency of 3 GHz, Turbine 2 is clear of the Fresnel Zone by 31.71m; and clear of the Fresnel Zone + additional 25m buffer by 6.71m;
- Turbine 5 is clear of the link operator's 100m-buffer for one MBNL link (ID/reference 9121505), but infringes the 100m-buffer for another MBNL link (ID/reference 9115766) by 90.07m. When mitigating this by microsting the turbine and considering the Fresnel Zone of this link (MBNL link ID/reference 9115766) for the assumed frequency of 3 GHz, Turbine 5 infringes the Fresnel Zone by 3.08m; and infringes the Fresnel Zone + additional 25m buffer by 28.08m;
- Through microsting allowance (25m for Turbines 1-5 and 10m for Turbine 6), it is predicted that the Proposed Development has the ability to be clear of the Fresnel Zones;
- All turbines are clear of the link operator's 250m safeguarding distance for all masts.

Mitigation is expected to be required due to the infringement of the link operator's exclusion zones and/or Fresnel Zone. An overview of technical mitigation options are presented in Section 4.

Turbine	Link ID/Reference	2D Clearance/Infringement		
		100m Buffer	Fresnel Zone	Fresnel Zone + 25m Buffer
1	MBNL 9121505	Clear by 630.88m	Clear by 730.88m	Clear by 705.88m
	MBNL 9115766	Clear by 494.04m	Clear by 585.08m	Clear by 560.08m
2	MBNL 9121505	Clear by 250.64m	Clear by 344.02m	Clear by 319.02m
	MBNL 9115766	Infringes by 59.18m	Clear by 31.71m	Clear by 6.71m
3	MBNL 9121505	Clear by 7.45m	Clear by 97.32m	Clear by 72.32m
	MBNL 9115766	Clear by 411.46m	Clear by 504.11m	Clear by 479.11m
4	MBNL 9121505	Clear by 1142.2m	Clear by 1233.27m	Clear by 1208.27m
	MBNL 9115766	Clear by 372.93m	Clear by 459.22m	Clear by 434.22m
5	MBNL 9121505	Clear by 606.87m	Clear by 695.79m	Clear by 670.79m
	MBNL 9115766	Infringes by 90.07m	Infringes by 3.08m	Infringes by 28.08m
6	MBNL 9121505	Clear by 206.76m	Clear by 294.58m	Clear by 269.58m
	MBNL 9115766	Clear by 364.06m	Clear by 451.64m	Clear by 426.64m

Table 4 Exclusion zone calculation results



4 MITIGATION

4.1 Overview

Mitigation is predicted to be a requirement for the proposed development as per the current layout. A high-level overview of the most common mitigation options is presented in the following sections for reference.

4.2 Link Mitigation

The recommended solutions to consider for microwave communications links include:

- Micrositing / Layout optimisation;
- Re-networking of the link via existing telecommunications sites;
- Use of a leased line.

Further information regarding these options is given below. Other options that can be considered are:

- Construction of a new telecommunications site for the purpose of re-networking solution;
- Use of an alternative technology such as a satellite link.

These options are less likely to be feasible and are not discussed in detail. They could be explored if an impact could not be mitigated by other means.

4.3 Micrositing / Layout Optimisation

This is potentially the simplest solution, depending on the available site area.

Ensuring that replanted turbines remain outside the exclusion zones associated with the microwave links and remain more than 250 metres from a microwave link and 500 metres from a UHF link end to remove any potential impact.

4.4 Re-networking Solutions

In some cases, it is possible to re-network a microwave link via an existing telecommunications site that lies away from the wind farm.

This involves adding an extra node on the link path, so that instead of the signal being sent from End A to End B, it is sent from End A to a re-networking site, and from the re-networking site to End B.

Implementation of such a solution requires identification of a suitable re-networking site, and assessment of the intervening terrain to ensure the appropriate Fresnel zone would not be infringed by terrain for the re-networked link.

The costs and timescales associated with such a solution are variable, however it is likely to be more cost-effective and have a shorter timescale than construction of a new telecommunications site.

4.5 Use of a Leased Line

In some cases, it is possible to replace the wireless link with a leased line between the link ends, thereby avoiding potential interference due to the wind development.

The feasibility of such a solution is dependent on the accessibility of each link end with regard to installation of a leased line.

The costs and timescales of the solution are variable and dependent on the individual site locations and the distance between them.





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