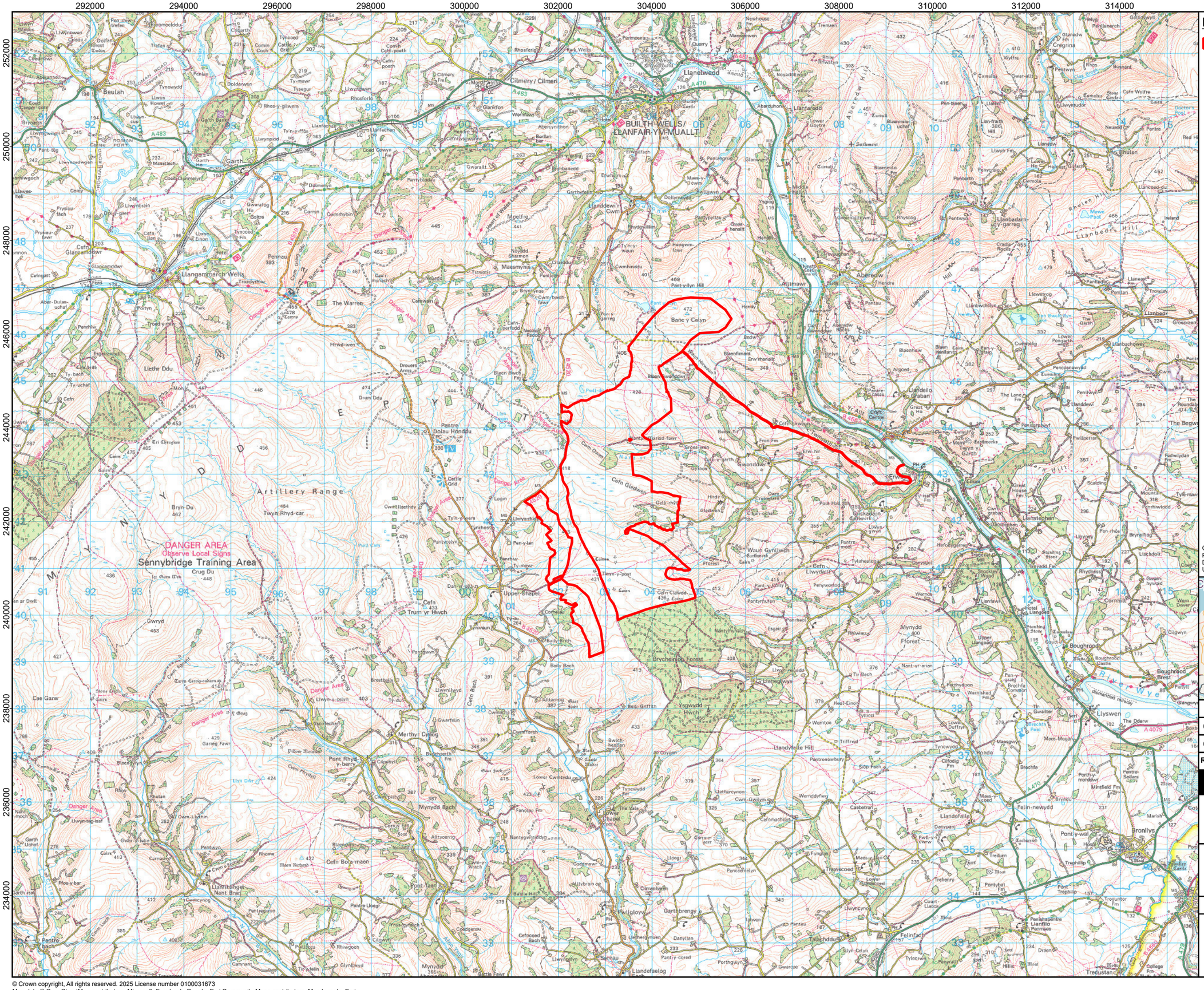
APPENDIX A – SITE BOUNDARY PLAN



Legend:

- Site Boundary

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

Rev	Date	Description	Drn	Chk	App
01	12/02/2025	Site Boundary inc access	NH	HH	HH
00	24/02/2023	First Draft	NH	HH	DP

Banc y Celyn Energy Park

RSK

TITLE:

Appendix A:
Site Boundary Plan

ID:P663563_SCO_App_A_Site_Boundary_Plan

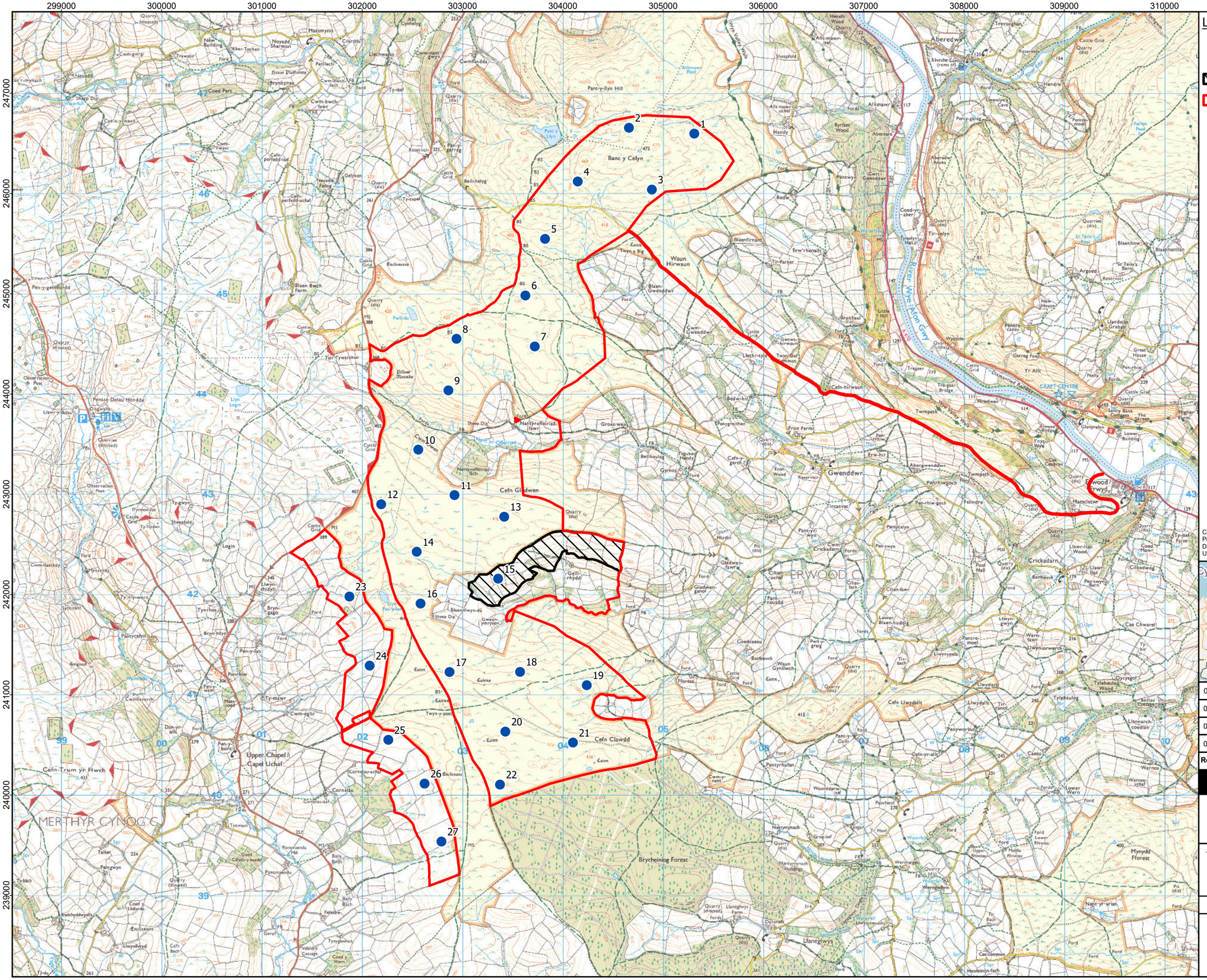
0 1 2
Kilometres
Scale: 1:75,000 @ A3

N
W E
S

REV 01

Path: C:\Users\NHogben\RSK Group\RSK Environment GIS Projects - 663563 - Banc Y Celyn Wind Farm\01 - GIS\P663563_SCO aprx\App_A_Site_Boundary_Plan

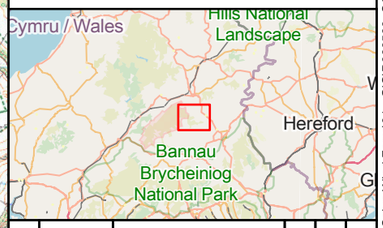
APPENDIX B – INDICATIVE PROPOSED DEVELOPMENT LAYOUT



Legend:

- Indicative Proposed Development Layout
- Indicative Solar PV Area
- Site Boundary

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
03	12/02/2025	Access track in Site Bdy	NH	HH	HH
02	04/07/2023	Site Boundary update	NH	HH	DP
01	24/02/2023	Site Boundary update	NH	HH	DP
00	07/02/2023	First Draft	NH	HH	DP

Banc y Celyn Energy Park

RSK

TITLE:

Appendix B:
Proposed Development Layout

ID:P663563_SCO_App_B_Proposed_Development_Layout

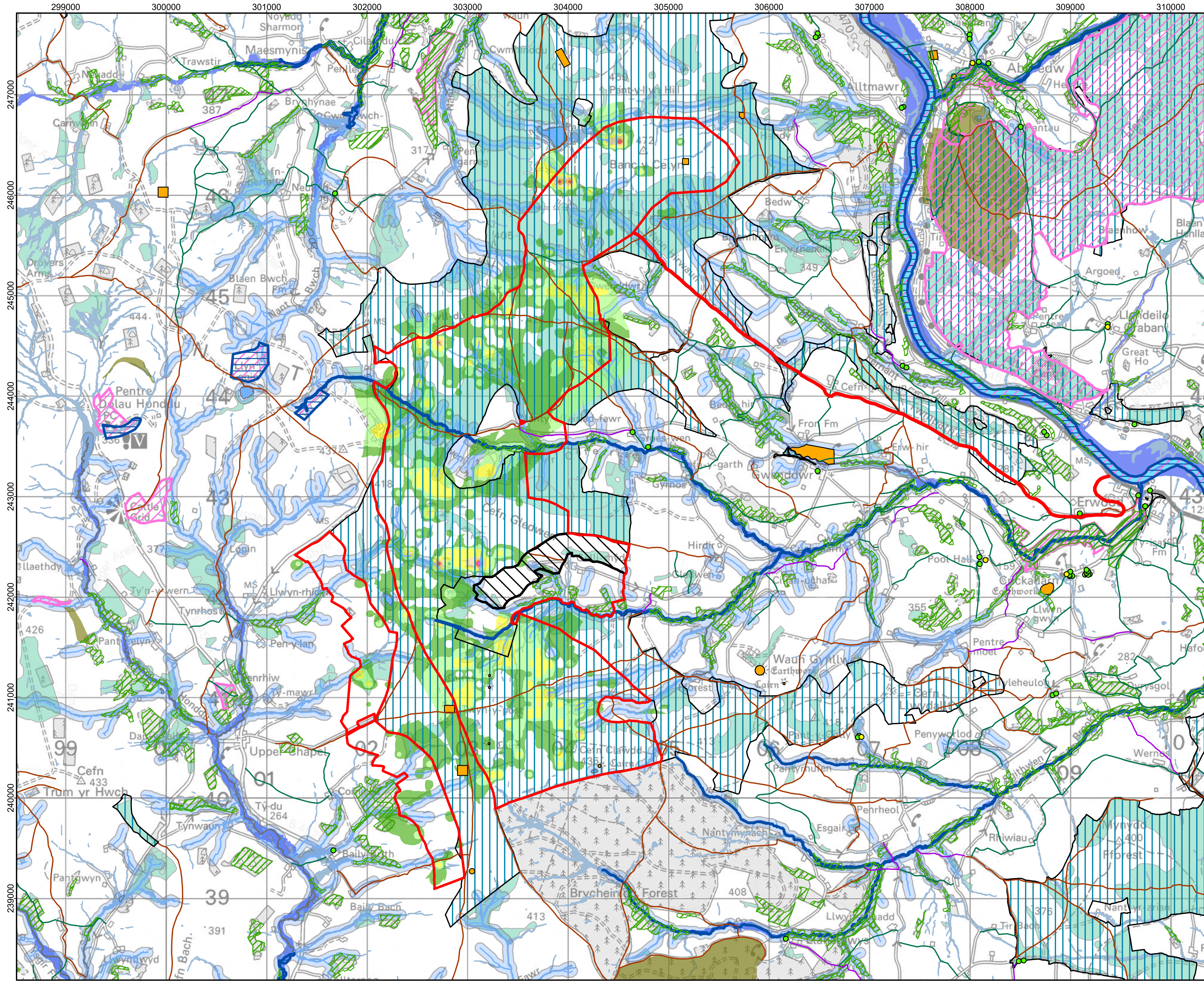
0 500 1,000
Metres

Scale: 1:35,000 @ A3

REV 03

Path: C:\Users\NHogben\RSK Group\RSK Environment GIS Projects - 663563 - Banc Y Celyn Wind Farm\01 - GIS\P663563_SCO.aprx\App_B_Proposed_Development_Layout

APPENDIX C – ENVIRONMENTAL AND PLANNING FEATURES



Legend:

- Site Boundary
- Indicative Solar PV Area
- Special Area of Conservation
- Site of Special Scientific Interest
- Ancient Woodland
- Watercourses
- Waterbodies
- Watercourse Buffer (50m)
- Main River
- Scheduled Monument

Listed Building

- Grade II*
- Grade II
- Open Access - Registered Common Land
- Regionally Important Geodiversity Site
- Priority Habitat - High Sensitivity (WOM21)

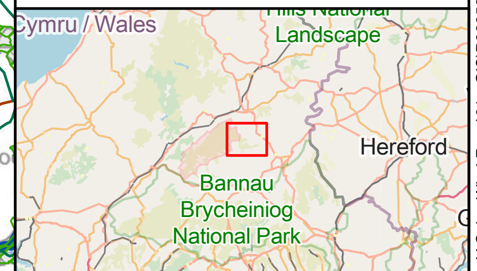
Public Right of Way

- Bridleway
- Footpath
- Restricted Byway

Peat Depth (m)

- 0.30 - 0.40
- 0.40 - 0.50
- 0.50 - 0.75
- 0.75 - 1.00
- 1.00 - 1.25
- 1.25 - 1.50
- > 1.50
- Potential Flooding - RIvers
- Potential Flooding - Surface Water

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



Rev	Date	Description	Drn	Chk	App
01	12/02/2025	Site update & constraints	NH	HH	HH
00	24/02/2023	First Draft	NH	HH	DP

Banc y Celyn Energy Park

RSK

TITLE:

Appendix C:
Environmental and Planning Features

ID:P663563_SCO_App_C_Environmental_and_Planning_Features

0 0.5 1
Kilometres
Scale: 1:35,000 @ A3

N E S W

REV 01

Path: C:\Users\NHogben\RSK Group\RSK Environment GIS Projects - 663563 - Banc Y Celyn Wind Farm\01 - GIS\P663563_SCO.aprx\App_C_Environmental_and_Planning_Features

APPENDIX D – PROPOSED STRUCTURE OF THE ENVIRONMENTAL STATEMENT

Volume I Non-Technical Summary

Volume II Main Text

Introductory Chapters

- Chapter 1: Introduction
- Chapter 2: Location of the Proposed Development
- Chapter 3: Description of the Proposed Development
- Chapter 4: Reasonable Alternatives Considered
- Chapter 5: Approach to EIA

Technical Chapters

- Chapter 6: Climate
- Chapter 7: Cultural Heritage
- Chapter 8: Land, Soils, and Water
- Chapter 9: Landscape and Visual
- Chapter 10: Noise and Vibration
- Chapter 11: Biodiversity
- Chapter 12: Ornithology
- Chapter 13: Traffic and Movement
- Chapter 14: Cumulative Effects

Volume III Supporting Technical Appendices

Volume IV Supporting Figures and Plans

APPENDIX E – TELECOMMUNICATIONS ASSESSMENT

PAGERPOWER
Urban & Renewables

Telecommunications Impact Assessment

RSK Group PLC

Banc Y Celyn Wind Farm

January 2023





PLANNING SOLUTIONS FOR:

- Solar
- Telecoms
- Railways
- Defence
- Buildings
- Wind
- Airports
- Radar
- Mitigation

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ADMINISTRATION PAGE

Job Reference:	11226B
Date:	January 2023
Author:	Waqar Qureshi
Telephone:	01787 319001
Email:	waqar@pagerpower.com

Reviewed By:	Aaron Williams
Email:	aaron@pagerpower.com

Issue	Date	Detail of Changes
1	30th January 2023	Initial issue

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EXECUTIVE SUMMARY

Report Overview

Pager Power has been commissioned to investigate the potential impact of a proposed wind development located south of Builth Wells, Powys, Brecknockshire, Wales, upon wireless communications infrastructure (point-to-point links) in the surrounding area.

The proposed wind development comprises 26 wind turbines with a maximum tip height of 200 metres above ground level (agl) and a hub height of 125 metres agl.

Overall Results

Arqiva, BT, MBNL, The Joint Radio Company (JRC), Virgin Media/O2, and Vodafone have confirmed that they do not operate any communication links within close vicinity of the proposed development and therefore have no objections to the proposed development.

Atkins forwarded Pager Power's consultation request onto Welsh Water, who have confirmed that they have no objections to the proposed development.

Airwave (Motorola Solutions) has been contacted for their own assessment for a fee. A response has not yet been received.

Next Steps

Determining the most suitable mitigation option is only possible if a specific impact has been identified. In the case of the proposed development, mitigation is not expected to be a requirement for the proposed development based on the currently available link information. An overview of possible mitigation strategies has been provided for reference (See Section 5).

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

PAGERPOWER
Urban & Renewables

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LIST OF FIGURES

LIST OF TABLES

ABOUT PAGER POWER

Pager Power is a dedicated consultancy company based in Suffolk, UK. The company has undertaken projects in 53 countries within Europe, Africa, America, Asia and Australasia.

The company comprises a team of experts to provide technical expertise and guidance on a range of planning issues for large and small developments.

Pager Power was established in 1997. Initially the company focus was on modelling the impact of wind turbines on radar systems. Over the years, the company has expanded into numerous fields including:

- Renewable energy projects.
- Building developments.
- Aviation and telecommunication systems.

Pager Power prides itself on providing comprehensive, understandable, and accurate assessments of complex issues in line with national and international standards. This is underpinned by its custom software, longstanding relationships with stakeholders and active role in conferences and research efforts around the world.

Pager Power's assessments withstand legal scrutiny and the company can provide support for a project at any stage.

1 BACKGROUND

1.1 Introduction

Pager Power has been commissioned to investigate the potential impact of a proposed wind development located south of Builth Wells, Powys, Brecknockshire, Wales, upon wireless communications infrastructure (point-to-point links) in the surrounding area.

The proposed wind development comprises 26 wind turbines with a maximum tip height of 200 metres above ground level (agl) and a hub height of 125 metres agl.

In detail, this report contains:

- Site description;
- Ofcom and stakeholder consultation to identify relevant:
    - Microwave links;
    - UHF Telemetry links.
- Technical assessment methodology.
- High-level overview of common mitigation options.

2 PROPOSED WIND DEVELOPMENT DETAILS

2.1 Proposed Development Layout

The layout of the proposed development is shown in Figure 1 below.

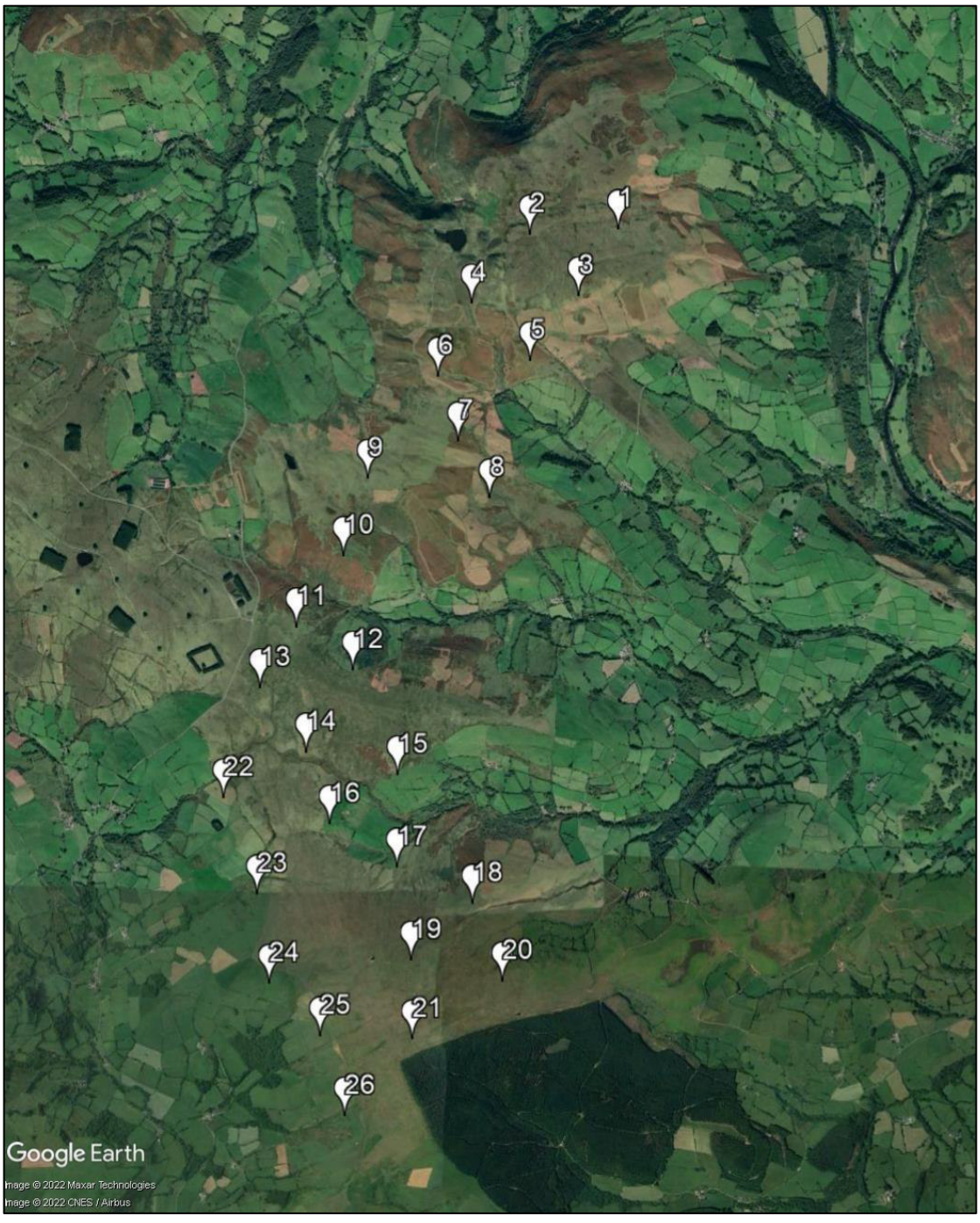

Figure 1 *Proposed development layout*

2.2 Coordinate Data

The proposed turbine coordinates are shown in Table 1 below.

Turbine ID	Easting (British National Grid)	Northing (British National Grid)	Height
1	305209	246641	Tip height is 200 metres above ground level. Hub height is 125 metres above ground level.
2	304491	246611	
3	304875	246103	
4	304002	246062	
5	304460	245591	
6	303703	245480	
7	303863	244946	
8	304104	244478	
9	303120	244655	
10	302905	244030	
11	302505	243456	
12	302962	243095	
13	302205	242966	
14	302564	242433	
15	303308	242233	
16	302742	241841	
17	303279	241476	
18	303898	241171	
19	303397	240722	
20	304138	240538	
21	303391	240078	
22	301879	242072	

Turbine ID	Easting (British National Grid)	Northing (British National Grid)	Height
23	302129	241279	Tip height is 200 metres above ground level. Hub height is 125 metres above ground level.
24	302221	240549	
25	302627	240111	
26	302815	239452	

Table 1 *Proposed turbine coordinates*

3 TELECOMMUNICATIONS CONSULTATION SUMMARY

3.1 Process

Consultation was undertaken directly with the most prevalent operators[1] in order to obtain link details. At the time of writing, no further information from Ofcom has been made available.

3.2 Consultation Overview

Table 2 below presents a summary of the consultation to date.

Stakeholder	Summary
Ofcom	Ofcom were not consulted as they are not currently responding to consultation requests. See https://www.pagerpower.com/news/uk-ofcom-suspends-microwave-link-consultation-due-to-gdpr/
Airwave (Motorola Solutions)	Airwave is a company that safeguards fixed communication links for the emergency services and does not provide link details due to confidentiality reasons. An Airwave assessment has been progressed.
Arqiva	14/07/22 – PP requested link details. 19/07/22 – Response received. **No objection.**
Atkins	14/07/22 – PP requested link details. 19/07/22 – Request forwarded by Atkins to Welsh Water. 29/07/22 – PP sent follow up email to Welsh Water. 12/09/22 – PP sent chaser email to Welsh Water. 10/10/22 – PP sent chaser email to Welsh Water. 24/01/23 – PP sent chaser email to Welsh Water. 27/01/23 – Response received. **No objection.**
BT	14/07/22 – PP requested link details. 26/07/22 – Response received. **No objection.**

[1] Based on Pager Power's experience and contacts database.

Stakeholder	Summary
MBNL	14/07/22 – PP requested link details. 18/07/22 – Response received. **No objection.**
JRC	14/07/22 – PP requested link details. 22/07/22 – Response received. **No objection.**
Virgin Media/O2	22/07/22 – PP requested link details. 25/07/22 – Response received. **No objection.**
Vodafone	14/07/22 – PP requested link details. 25/07/22 – Response received. **No objection.**

Table 2 *Telecommunications stakeholder consultation*

4 TECHNICAL ASSESSMENT

4.1 Methodology

Microwave and UHF[2] wireless communication links are used to transmit information between two antennae via radio waves within a particular frequency band. The following subsections present an overview of the interference mechanisms and methodology.

4.1.1 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.

4.1.2 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 boresight[3]. This kind of blocking is called 'diffraction'.

There are various approaches to safeguarding microwave links against 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 wind turbine upon microwave links and the 0.6th Fresnel zone when assessing UHF links.

4.1.3 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. Reflection effects are not anticipated as no UHF links have been identified. 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.

4.2 Identified Telecommunications Links

No telecommunications links have been identified for technical assessment.

---

[2] Ultra-High Frequency
[3] This is the straight line between the two antennae.

5 MITIGATION

5.1 Overview

Although mitigation is not expected to be a requirement for the proposed development based on the currently available link information, an overview of potential mitigation options for microwave links is given below, and on the following page for UHF links, for reference purposes.

5.2 Microwave Link Mitigation

5.2.1 Overview

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.

5.2.2 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 end is likely to remove any potential impact.

5.2.3 Re-networking Solution

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.

5.2.4 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.

5.3 UHF Telemetry Links

5.3.1 Overview

Three of the most common and cost-effective mitigation options for UHF telemetry link that are affected by wind turbines are:

- Micrositing / Layout Optimisation;
- Use of an alternative scanner;
- Replacement of the UHF telemetry link with a microwave link.

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

- Use of a leased line or fibre optic connection;
- Construction of a new scanning station;
- 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.

5.3.2 Micrositing / Layout Optimisation

This is potentially the simplest solution, depending on the available site area. Relocation of any turbines that have the largest interference contribution could prevent any impacts on the link.

Relocating problem turbines away from the link paths may be sufficient to overcome the operator's concerns. Ensuring that replanted turbines remain more than 500 metres from a UHF link end is likely to remove any potential impact.

5.3.3 Use of an Alternative Scanner

In some cases, it is possible to direct the outstations to an alternative scanner. Discussions with the link operator would be required to establish the suitability of such a solution.

5.3.4 Replacement of the UHF Link with a Microwave Link

In cases where reflection issues are the only concern, replacement of the UHF link with a microwave link. This is because microwave links are not prone to reflection issues in the way that UHF telemetry links are. However, microwave links do require radio line of sight to operate, which UHF telemetry links do not. Therefore, detailed assessment of the technical feasibility of such a solution would be required. This would include assessment of radio line of sight between the link ends and establishment of whether the intervening terrain would obstruct the appropriate Fresnel zone.

6 CONCLUSIONS

6.1 Overall Results

Arqiva, BT, MBNL, The Joint Radio Company (JRC), Virgin Media/O2, and Vodafone have confirmed that they do not operate any communication links within close vicinity of the proposed development and therefore have no objections to the proposed development.

Atkins forwarded Pager Power's consultation request onto Welsh Water, who have confirmed that they have no objections to the proposed development.

Airwave (Motorola Solutions) has been contacted for their own assessment for a fee. A response has not yet been received.

6.2 Next Steps

Determining the most suitable mitigation option is only possible if a specific impact has been identified. In the case of the proposed development, mitigation is not expected to be a requirement for the proposed development based on the currently available link information. An overview of possible mitigation strategies has been provided for reference (See Section 5).

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

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APPENDIX F: SIGNIFICANCE CRITERIA

CONTENTS

1 LANDSCAPE AND VISUAL

1.1.1 "*Landscape and Visual Impact Assessment is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and people's views and visual amenity*." (GLVIA3, paragraph 1.1). Wherever possible, identified effects are quantified, but the nature of landscape and visual assessment requires interpretation using professional judgement. To provide a level of consistency to the assessment, the prediction of magnitude and assessment of significance of the residual landscape and visual effects have been based on pre-defined criteria.

1.1.2 The Guidelines for Landscape and Visual Assessment (Third Edition) (GLVIA3) states that "*professional judgement is a very important part of the LVIA*" (paragraph 2.23) and that "*in all cases there is a need for the judgements that are made to be reasonable and based on clear and transparent methods so that the reasoning applied at different stages can be traced and examined by others*." (paragraph 2.24). It goes on at paragraph 3.32 to state that "*there are no hard and fast rules about what effects should be deemed 'significant" but LVIAs should always distinguish clearly between what are considered to be the significant and non-significant effects*."

1.1.3 Landscape and Visual Assessments are separate, though linked processes which GLVIA3 notes are "*related but very different considerations*". The assessment of the potential effect on the landscape is carried out as an effect on the environmental resource (i.e. the landscape). Visual effects are assessed as an inter-related effect on people.

1.1.4 Landscape effects derive from changes in the physical landscape elements which may give rise to changes in their distinctive character and how this is experienced, including consideration of aesthetic and perceptual aspects.

1.1.5 Visual effects relate to changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes and to the overall effects with respect to visual amenity.

1.2 Establishing the baseline

1.2.1 The **baseline** for consideration of landscape and visual effects is evaluated through desk study and site work and is the current situation at the time of the assessment, unless noted otherwise. Operational developments and those under construction are considered as part of the baseline and included as part of the assessment of landscape and visual effects.

1.2.2 The **future baseline** is considered to be changes to the landscape which are considered certain or likely to happen – including consented proposals which

are not yet present in the landscape but are expected to be constructed. These may or may not be included as part of the landscape and visual baseline depending on individual project circumstances and the approach and reasoning is set out within the assessment.

1.3 Landscape effects

1.3.1 The starting point for any assessment is a desk-based assessment of published landscape studies, which may include landscape character assessments, sensitivity and capacity studies and/or landscape designation reviews. These documents are listed in the assessment references and relevant extracts may be included as appendices where this is judged appropriate.

1.3.2 The landscape effects of the Proposed Development are considered against the key characteristics of the receiving landscape. The degree to which the Proposed Development changes "*distinct and recognisable pattern of elements, or characteristics, in the landscape that make one landscape different from another, rather than better or worse*" ('An Approach to Landscape Character Assessment', Natural England, 2014), enables a judgement to be made as to the significance of the effect in landscape character terms.

1.3.3 Direct and indirect landscape effects are defined in GLVIA3. Direct effects may be defined as resulting *"directly from the development itself"* (paragraph 3.22). An indirect (or secondary) effect is one that results *"from consequential change resulting from the development"* (paragraph 3.22) and is often produced away from the site of the proposed development or as a result of a complex pathway or secondary association. The direct or physical landscape effects of the Proposed Development would generally be limited to within the planning application boundary. The indirect landscape effects are concerned with the visual effects and relate to effects associated with the introduction of the development seen in the context of the existing landscape and visual character of the view.

1.3.4 In order to reach an understanding of the effects of development upon the landscape resource it is necessary to consider different aspects of the landscape baseline including:

- **Landscape fabric / elements**: The individual features of the landscape, such as hills, valleys, woods, hedges, tree cover, vegetation, buildings and roads which can usually be described and quantified.
- **Landscape key characteristics**: The particularly notable elements or combinations of elements which make a particular contribution to defining or describing the character of an area, which may include experiential characteristics such as wildness and tranquility.

1.3.5 The **sensitivity** (high, medium, low) of the landscape to a particular development is considered on a case by case basis and considers the susceptibility of the landscape, which varies depending on the type of development proposed and the particular site location, and the landscape value (identified as national, regional, or community). As stated in GLVIA3, '*LVIA sensitivity is similar to the concept of landscape sensitivity used in the wider arena of landscape planning, but is not the same*'.

1.3.6 **Landscape value**: The importance attached to a landscape, often used as a basis for designation or recognition which expresses national or local authority consensus, because of its special qualities / attributes. The factors which are considered in landscape include aesthetic or perceptual aspects such as scenic beauty, tranquillity or wildness or cultural associations as well as recreational / community value, conservation interests, landscape character and condition and representativeness / rarity.

1.3.7 **Landscape susceptibility** according to GLVIA3 means "*the ability of the landscape to accommodate the Proposed Development without undue consequences for maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies*". Judgements on landscape susceptibility (high, medium, low) include references to both the physical and aesthetic characteristics and the potential scope for mitigation.

1.3.8 Susceptibility of landscape character areas are influenced by their characteristics and are often considered (though often recorded as 'sensitivity' rather than susceptibility) within landscape character assessments and capacity studies.

1.3.9 Susceptibility of designated landscapes is influenced by the nature of the special qualities and purposes of designation and/or the valued elements, qualities or characteristics, indicating the degree to which these may be unduly affected by the development proposed.

1.3.10 The criteria and the detailed judgements regarding susceptibility and value of landscape receptors are identified in the sensitivity table below (**Table 1.1**).

1.3.11 Sensitivity is judged by taking into account the component judgments about the value and susceptibility of the receptor, as illustrated by the table below. Where sensitivity is judged to lie between levels, an intermediate assessment will be adopted.

Table 1.1: Landscape sensitivity

LANDSCAPE RECEPTORS	Susceptibility		
	High	Medium	Low

Value	**National**	High	High/Medium	Medium
	Regional	High/Medium	Medium	Medium/Low
	Community	Medium	Medium/Low	Low

1.3.12 The **magnitude of landscape change** arising from the Proposed development at any particular location is assessed in terms of its size or scale, geogDaphic extent of the area or receptor that is influenced and its duration and reversibility.

1.3.13 The **scale** of the change takes account of:

- degree of loss or alteration to key landscape features / elements; characteristics; and for designated areas – special qualities and/or purposes of designation;
- distance from the development;
- landscape context to the development.

1.3.14 The approach to assessing effects on landscape character is to consider the key characteristics for the Landscape Character Type (LCT) within which the Proposed Development is located (host) and the adjacent LCT's (non-host) and identify which of these the Proposed Development would affect. For the host LCTs, a large scale change in landscape character is likely to occur where key characteristics would be lost or substantially changed. Where particular views are a key characteristic of a landscape type, large or medium scale landscape character effects may occur where the Proposed Development becomes a key feature of those views. A similar approach applies to designated landscapes, for which the effects on the defined purposes of designation and special qualities are considered.

1.3.15 Having established the size / scale of change (large, medium, small, negligible) to the landscape baseline, the geographic **extent** of the change can be identified (wide, intermediate, localised or limited) and a judgement made as to the degree of change for each landscape receptor.

1.3.16 **Duration** and reversibility can be linked depending on the nature of the development. Reversibility is a judgement about the ability and practicality of the Proposed Development to be reversible (such as wind farms which are predominantly reversible), partially reversible to something similar (such as mineral extraction[1]) or a permanent change in the landscape (such as housing). Duration reflects how long the change will last. The duration of the change would be considered short term when lasting less than 2 years; medium term

[1] GLVIA3 page 91, paragraph 5.52

when lasting between 2 and 10 years; or long term when lasting between 10 and 40 years, and permanent for more than 40 years.

1.3.17 Magnitude is considered taking into account the three contributory factors as illustrated by the diagrams included below.

1.4 Visual effects

1.4.1 In order to identify the significance of a visual effect it is necessary to establish the relative sensitivity of the viewers and the magnitude of the change they experience. In this case sensitivity is a combination of both susceptibility of the viewer to the proposed change and the value of the views.

1.4.2 Those living within view of the scheme are usually regarded as the highest susceptibility group as well as those engaged in outdoor pursuits for whom landscape experience is the primary objective. The susceptibility of potential visual receptors will also vary depending on the activity of the receptor. For visual receptors susceptibility and value are closely linked - the most valued views are also likely to be those where viewer's expectations will be highest.

1.4.3 The **value** of public views, which is the focus of GLVIA3, is identified as national, regional or community and will vary depending on the nature, location and context of the view and the recognised importance of the view. Considerations include cultural associations; designation or policy protection; views of or from landmarks; and/or the scenic quality of the view. The value attributed relates to the value of the view, for example a National Trail is nationally valued for access, but not always for the available views from every section.

1.4.4 Visual receptor **susceptibility** is defined as in accordance with the criteria below:

- **High** - Local residents; users of outdoor recreation focused on the appreciation of views including footpaths, beauty spots and picnic areas; people experiencing views to or from important features of physical, visual, cultural or historic interest.
- **Medium** - Local road users and travelers on trains. People engaged in outdoor recreation with some appreciation of the landscape e.g. road cycling, nature conservation, golf and water-based recreation.
- **Low** - Workers, users of facilities and commercial buildings (indoors) experiencing views from buildings. Road and rail users on fast moving commuting or trunk routes. Visual receptors where views are incidental to the activity and/or location.

1.4.5 Sensitivity is judged by taking into account the component judgments about the value and susceptibility of the receptor as illustrated by **Table 1.2** below. Where

sensitivity is judged to lie between levels, an intermediate assessment will be adopted.

Table 1.2: Visual sensitivity

VISUAL RECEPTORS		Susceptibility		
		High	**Medium**	**Low**
Value	**National**	High	High/Medium	Medium
	Regional	High/Medium	High/Medium	Medium/Low
	Community	Medium	Medium/Low	Low

1.4.6 The **magnitude of visual change** arising from the Proposed Development at any particular location is assessed in terms of its size or scale (large, medium, small, negligible), geographic extent of the area or receptor that is influenced (wide, localised, limited) and its duration (short, medium, long, permanent).

1.4.7 The representative viewpoints are used as 'samples' on which to base judgements of the scale of effects on visual receptors. The wider extent of the effect and its duration are not captured in the viewpoint analysis (as a viewpoint cannot capture these factors for an entire route or area). As duration and extent are necessary considerations in determining magnitude of change, magnitude and significance judgements are provided for visual receptors and not for all representative viewpoints. The exceptions to this are specific viewpoints, where people visiting that location to look at the view are assessed as a visual receptor group.

1.4.8 With the exception of specific viewpoints, each route and receptor group will encompass a range of possible views, which might vary from no view of the development to very clear, close views. Therefore, effects are described in such a way as to identify where views towards the development are likely to arise and what the scale and duration and **extent** (wide, intermediate, localised, limited) of those views are likely to be. In some cases, this will be further informed by a nearby viewpoint and in others it will be informed with reference to ZTV studies, aerial photography and site visits. Each of these individual effects are then considered together in order to reach a judgement of the effects on the visual receptors along that route, or in that place.

1.4.9 The **scale of effect** arising from the Proposed Development at any particular viewpoint reflects the degree to which the nature of the views from that location would be changed and is taking into account:

- The distance of the viewpoint from the development;
- the degree to which the development is visible or screened;

- the angle of view in relation to main receptor activity or main focus of the view;
- the horizontal and vertical field of view occupied by the development; and
- the extent and nature of other built development visible.

1.4.10 The approach to assessing effects on views is to consider the full 360 degree view from any given receptor, not just those towards the development and/or shown in visualisations. It is assumed that the change would be seen in clear visibility and the assessment is carried out on that basis. Where there are operational (and consented) developments considered as part of the baseline, the visual effects consider the effects of adding the Proposed Development to that baseline. Where appropriate, comment may be made on lighting and weather conditions.

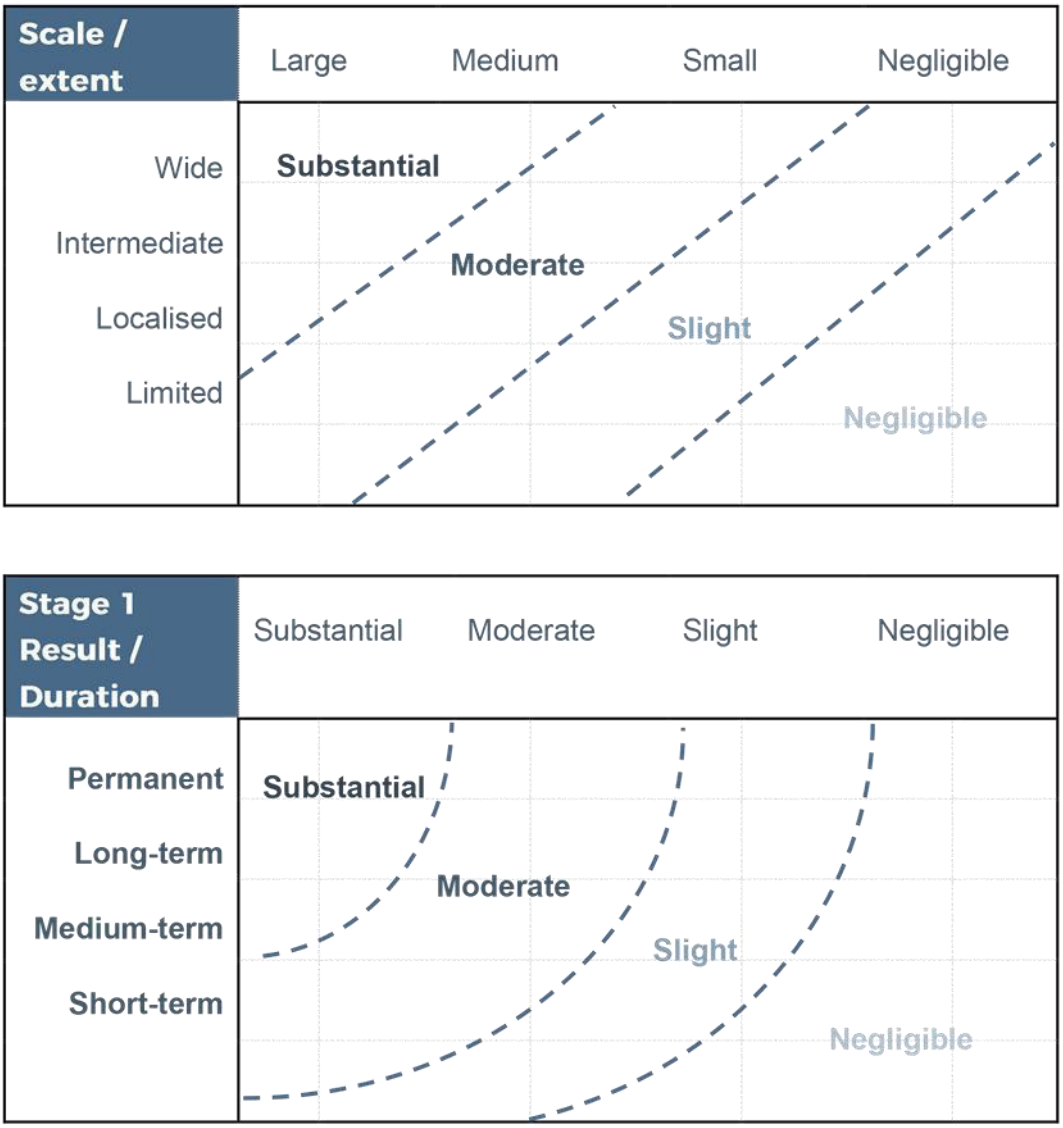
1.4.11 **Duration** reflects how long the change will last and are rated in the same way as described above for landscape effects. The effects as a result of the Proposed Development would be considered short term when lasting less than 2 years; medium term when lasting between 2 and 10 years; or long term when lasting between 10 and 40 years, and permanent for more than 40 years. For visual receptors moving through the landscape (e.g. road and rail users), the length of their journey during which they would see the development is reflected in the judgement of the geographic extent of effects.

1.4.12 Magnitude is considered taking into account the three contributory factors as illustrated by the diagrams included below.

1.5 Magnitude of landscape and visual change

1.5.1 Scale of effect is the first factor in determining magnitude, which may be higher if the effect is particularly widespread and/or long lasting, or lower if it is constrained in geographic extent and/or timescale. **Table 1.3** below illustrates how this judgement is considered as a two-step process. Firstly, scale and extent are considered, for which the outcomes are illustrated by the first part of the table; the second part of the table illustrates the influence of duration on this initial judgement. Where magnitude is judged to lie between levels, an intermediate assessment will be adopted.

Table 1.3: Magnitude of change



1.5.2 Where magnitude is judged to lie between levels, an intermediate assessment will be adopted.

1.6 Significance of landscape and visual effects

1.6.1 The significance of any identified landscape or visual effect is assessed as **Major**, **Moderate**, **Minor** or **Negligible**. These categories are based on the consideration of sensitivity with the predicted magnitude of change. **Table 1.4** below is not used as a prescriptive tool and illustrates the typical outcomes, allowing for the exercise of professional judgement. In some instances, a particular parameter may be considered as having a determining effect on the analysis.

Table 1.4: Significance

		Magnitude of Change			
		Substantial	**Moderate**	**Slight**	**Negligible**
Receptor Sensitivity	**High**	Major	Major/ Moderate	Moderate	Minor
	Medium	Major/ Moderate	Moderate	Moderate/ Minor	Minor/ Negligible
	Low	Moderate	Moderate/ Minor	Minor	Negligible

1.6.2 Where the effect has been classified as **Major** or **Major** / **Moderate** this is considered to be equivalent to likely **Significant** effects referred to in the EIA Regulations. Where '**Moderate'** effects are predicted, professional judgement will be applied to ensure that the potential for significant effects arising has been thoroughly considered.

1.7 Beneficial / adverse effects

1.7.1 Landscape and visual effects can be beneficial or adverse and in some instances may be considered neutral. Neutral effects are those which overall are neither adverse nor positive but may incorporate a combination of both. Whether an effect is beneficial, neutral or adverse is identified based on professional judgement. GLVIA 3rd edition as defined indicates at paragraph 2.15 that this is a "*particularly challenging*" aspect of assessment, especially in the context of a changing landscape.

1.8 Cumulative effects

1.8.1 In a broad generic sense, cumulative impacts "*result from the incremental changes caused by other past, present or reasonably foreseeable actions together with the project"*[2]. However, an assessment of cumulative effects should focus on whether there are any potential cumulative impacts which are reasonably foreseeable and which are likely to influence the decision making of the Proposed Development, rather than an assessment of every potential cumulative effect[3], which in practice means focusing on other nearby development proposals and the effects that might arise from the combined influence of those developments on landscape and visual receptors.

[2] GLVIA3 page 120, paragraph 7.1 quoting Hyder, 1999 ' *Guidelines for the assessment of indirect and cumulative impacts as well as impact interactions*'
[3] GLVIA3 page 121 paragraph 7.5.

1.8.2 As recommended by the NatureScot cumulative guidance, this assessment focusses on the "*additional cumulative change which would be brought about by the proposed development*"[4].

1.8.3 As noted above, operational developments are included in the baseline. Consented developments which are expected to be constructed, form part of the future baseline and will be included as such. However, where there is some uncertainty regarding the future construction of consented developments, they may be considered as the first scenario of the cumulative assessment.

1.8.4 Proposals in planning are considered where there is good reason to assume that the timing of decisions may be similar and significant cumulative effects are likely. The assessment of effects is considered within the cumulative assessment.

1.8.5 Proposals in scoping are noted but not considered within the cumulative assessment as there is no certainty that these proposals will progress to planning submissions and the nature of the proposed schemes may be subject to change. Sites that have reached PAC will be included in the cumulative assessment as the design of these sites is less likely to change, and there is greater certainty that a full application will be submitted.

1.8.6 The assessment is based on the same landscape and visual baseline and receptor groups as the main LVIA, and the methodology is also the same in terms of forming and expressing judgements.

1.8.7 Cumulative effects on landscape receptors arise from combined direct and/or indirect effects on the same receptor – such as two developments within the same character area; or one development within, and one visible from, a designated area.

1.8.8 Cumulative effects on visual receptors arise either from two (or more) developments both being visible from the same place; or from sequential views as people travel.

1.8.9 In order to simplify what may otherwise be a complex assessment, the following approaches are also used:

- The cumulative assessment considers scenarios within which developments may be 'grouped' - for instance two nearby cumulative proposals may be considered in one scenario if it is considered that the cumulative effects arising if one or both are developed are likely to be similar.
- Receptors judged to receive **Negligible** or **Slight-Negligible** magnitude effects are not considered for cumulative effects on the basis that any

[4] Assessing the Cumulative Impact of Onshore Wind Energy Developments, NatureScot, 2021

significant effects arising would primarily be caused by the cumulative developments and would be unlikely to be contributed to by the Proposed Development.

- Only those receptors judged likely to experience effects from the cumulative development(s) being considered within a given scenario are described within that scenario.

1.8.10 Qualitative assessment of design and aesthetic considerations arising as a result of cumulative development, and/or considerations set out within local guidance provided in relation to cumulative development, is also provided where relevant.

2 ORNITHOLOGY

2.1 Assessing the sensitivity of features

2.1.1 The sensitivity of ornithological features on or near to the Proposed Development site is assessed in line with best practice guidance, legislation, statutory designations and professional judgement.

2.1.2 Determination of the level of sensitivity of an ornithological feature is based on a combination of the feature's National Conservation Importance (NCI) and conservation status. There are three levels of NCI as detailed in **Table 2.1** below.

Table 2.1: Determining factors of a feature's nature conservation importance (NCI)

Importance	Description
High	Populations receiving protection by an SPA, proposed SPA, Ramsar Site, SSSI or which would otherwise qualify under selection guidelines. Species present in nationally important numbers (>1 % national breeding or wintering population).
Medium	The presence of breeding species listed on Schedule 1 of the Wildlife and Countryside Act 1981. The presence of breeding species listed in Annex I of the Birds Directive (but population does not meet the designation criteria under selection guidelines). The presence of rare, Red-listed breeding species noted on the latest Birds of Conservation Concern (BoCC) Red list (Stanbury *et al*. 2021). Regularly occurring migratory species, which are either rare or vulnerable, or warrant special consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the Proposed Development. Species present in regionally important numbers (>1 % regional breeding population).
Low	All other species' populations not covered by the above categories.

2.1.3 Important Ornithological Features (IOFs, as per CIEEM 2018, updated 2022) to be assessed for the purposes of the EIA Report, are taken to be those species of high or medium NCI.

2.1.4 As defined by NatureScot (SNH 2018a)[5], the conservation status of a species is "*the sum of the influences acting on it which may affect its long-term distribution and abundance, within the geographical area of interest*". Conservation status is considered by NatureScot (SNH 2018a) to be 'favourable' under the following circumstances:

- "population dynamics indicate that the species is maintaining itself on a long-term basis as a viable component of its habitats;
- the natural range of the species is not being reduced, nor is likely to be reduced for the foreseeable future; and
- there is (and probably will continue to be) a sufficiently large habitat to maintain its population on a long-term basis."

2.1.5 NatureScot (SNH 2018a) recommends that "*the concept of favourable conservation status of a species should be applied at the level of its Scottish population, to determine whether an impact is sufficiently significant to be of concern. An adverse impact on a species at a regional scale (within Scotland) may adversely affect its national conservation status*". Thus, "*An impact should therefore be judged as of concern where it would adversely affect the existing favourable conservation status of a species or prevent a species from recovering to favourable conservation status, in Scotland*."

2.1.6 In the case of non-designated sites in Wales, the relevant regional scale may include distinct subpopulations, reintroduced populations or established 'regions' that have formed the basis of national censuses or other long-term monitoring programmes.

2.1.7 For wintering or migratory species, the national UK population or flyway population is considered to be the relevant scale for determining effects on the conservation status, unless there are other more appropriate geographical populations to use for a species.

2.2 Assessing the Magnitude of Impact

2.2.1 An impact is defined as a change of a particular magnitude to the abundance and/or distribution of a population as a result of the Proposed Development. Impacts can be adverse, neutral or favourable.

[5] NatureScot guidance on bird populations and onshore wind farms applies to England and Wales as well as Scotland.

2.2.2 In determining the magnitude of impacts, the resilience of a population to recover from temporary adverse conditions is considered in respect of each potentially affected population.

2.2.3 The sensitivity of individual species to anthropogenic activities is considered when determining spatial and temporal magnitude of impact and is assessed using guidance described by Bright *et al.* (2006), Hill *et al.* (1997) and Goodship and Furness (2022).

2.2.4 Impacts are judged in terms of magnitude in space and time. There are five levels of spatial and temporal impact magnitude as detailed respectively in the **Table 2.2** and **Table 2.3** below.

Table 2.2: Spatial magnitude of impact

Spatial Magnitude	Description
Very high	Total / near total loss of a bird population due to mortality or displacement. Total/near total loss of productivity in a bird population due to disturbance. Guide: >80% of population lost or increase in additive mortality.
High	Major reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 21-80% of population lost or increase in additive mortality.
Medium	Partial reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 6-20% of population lost or increase in additive mortality.
Low	Small but discernible reduction in the status or productivity of a bird population due to mortality or displacement or disturbance. Guide: 1-5% of population lost or increase in additive mortality.

Table 2.3: Temporal magnitude of impact

Temporal Magnitude	Description
Permanent	Impacts continuing indefinitely beyond the span of one human generation (taken as approximately 25-30 years), except where there is likely to be substantial improvement after this period. Where this is the case, long-term may be more appropriate.

Temporal Magnitude	Description
Long-term	Approximately 15-25 years or longer (see above).
Medium-term	Approximately 5-15 years.
Short-term	Up to approximately 5 years.
Negligible	<12 months.

2.3 Criteria for Assessing Significance

2.3.1 The potential significance of effect was determined through a standard method of assessment based on professional judgement, considering both sensitivity and magnitude of impact as detailed in **Table 2.4** below. **Major** and **Moderate** effects are considered '**Significant'** in the context of the EIA Regulations.

Table 2.4: Determining significance of effects

Significance of Effect	Definition
Major	The temporal and/or spatial impacts are judged to result in a long-term significant effect on the integrity of a feature.
Moderate	The impact is likely to result in a medium term or potentially significant effect on the integrity of a feature.
Minor	The impact is likely to affect a feature at an insignificant level by virtue of its limitations in terms of duration or extent, but there will probably be no effect on its integrity.
Negligible	No material impact.

3 BIODIVERSITY

3.1.1 The sensitivity of the baseline conditions, including the importance of environmental features on or close to the Proposed Development or the sensitivity of potentially affected features, will be assessed in line with best practice guidance, legislation, statutory designations and/or professional judgement.

3.1.2 Determination of the level of sensitivity of an Important Ecological Feature (IEF) is based on a combination of the feature's nature conservation value and conservation status.

3.1.3 Nature conservation value is defined on the basis of the geographic context given in the **Table 3.1** below (which follows CIEEM guidance).

3.1.4 Determination of the level of importance of ecosystems, habitats and species is based on professional judgement and a combination of factors, such as level of protection, rarity, conservation status, population trends, and quality/extent of the feature in the study area. Published evaluation criteria (e.g. JNCC Guidelines on selection of biological SSSIs) are used where relevant.

3.1.5 Attributing a value to an ecological feature is generally straightforward in the case of designated sites, as the designations themselves are normally indicative of an importance level. For example, a Special Area of Conservation (SAC) designated under the Habitats Directive is implicitly of European (International) importance. In the case of species, assigning value is less straightforward as contextual information about distribution and abundance is fundamental, including trends based on historical records. This means that even though a species may be protected through legislation at a national or international level, the relative value of the population on site may be quite different (e.g., the site population may consist of a single transitory animal, which within the context of a thriving local/ regional / national population of a species, is therefore of local or regional value rather than national or international).

3.1.6 As per CIEEM guidance, it is not necessary to carry out detailed assessments on features that are sufficiently widespread, unthreatened, and resilient to effects of the Proposed Development. Ecological features affected by the Proposed Development and deemed to be of at least Local importance are termed IEFs and are taken forward for assessment.

Table 3.1: Approach to valuing ecological features

Value of Feature in Geographical Context	Description
International	An internationally designated site (e.g., SAC).
	Site meeting criteria for international designations or qualifying species of an SAC where there is connectivity.
	Species present in internationally important numbers (>1% of biogeographic populations).
National (UK)	A nationally designated site (SSSI, or a National Nature Reserve (NNR)), or sites meeting the criteria for national designation or qualifying species where there is connectivity.
	Species present in nationally important numbers (>1% UK population).
Regional (Natural Heritage Zone or Local Authority Area)	Species present in regionally important numbers (>1% of Natural Heritage Zone population).
	Areas of habitat falling below criteria for selection as a SSSI (e.g., areas of semi-natural ancient woodland larger than 0.25 ha or other local non-statutory designation).
Local	Local Nature Reserves (LNR).
	Areas of semi-natural ancient woodland smaller than 0.25 ha.
	Areas of habitat or species considered to appreciably enrich the ecological resource within the local context, e.g., species-rich flushes or hedgerows.
Negligible	Usually widespread and common habitats and species that do not meet the above criteria. Features falling below local value are not normally considered in detail in the assessment process.

3.1.7 Effect magnitude refers to changes in the extent and integrity of an ecological feature. A suitable definition of ecological 'integrity' is defined by the Office of the Deputy Prime Minister (ODPM) Circular 06/2005 on Biodiversity and Geological Conservation (ODPM, 2005) where the integrity of a designated site

refers to “coherence of ecological structure and function…that enables it to sustain the habitat, complex of habitats and/or levels of populations of species for which it was classified”.

3.1.8 .

3.1.9 The magnitude of potential effects will be identified through consideration of the Proposed Development, the degree of change to baseline conditions predicted as a result of the Proposed Development, how the ecological features are likely to respond to the Proposed Development, the duration and reversibility of an effect and professional judgement, best practice guidance and legislation. This change can occur during construction or operation of the Proposed Development, and effects can be positive, neutral or negative.

3.1.10 Effects are judged in terms of magnitude in space and time. There are five levels of spatial effects and five levels of temporal effects as described in the **Table 3.2** and **Table 3.3** below.

Table 3.2: Definition of spatial effect magnitude upon the IEFs

Magnitude of Effects	Definition
Very High	Would cause the loss of the majority of a feature (for example >80%) or would be sufficient to damage a feature sufficient to immediately affect its viability.
High	Would have a major effect on the feature or its viability. For example, more than 20% habitat loss or damage.
Moderate	Would have a moderate effect on the feature or its viability. For example, between 10 – 20% habitat loss or damage.
Low	Would have a minor effect upon the feature or its viability. For example, less than 10% habitat loss or damage.
Negligible	Minimal change on a very small scale; effects not dissimilar to those expected within a ‘do nothing’ scenario.

Table 3.3: Definition of temporal effect magnitude upon the IEFs

Magnitude of Effects	Definition
Permanent	Effects continuing indefinitely beyond the span of one human generation (taken as approximately 25-30 years), except where there is likely to be substantial improvement after this

Magnitude of Effects	Definition
	period in which case the category Long Term may be more appropriate.
Long term	Between 15 years up to (and including) 25 years.
Medium term	Between 5 years up to (but not including) 15 years.
Short term	Up to (but not including) 5 years.
Negligible	No effect.

3.1.11 The significance of potential effects is determined through a standard method of assessment based on professional judgement and available evidence, considering the sensitivity (nature conservation value and conservation status) of the IEF and the nature and magnitude of effect, in a reasoned way.

3.1.12 A significant effect is an effect that either supports or undermines biodiversity conservation objectives. Significant effects include those which result from impacts on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).

3.1.13 CIEEM guidance is quite clear in that it requires a clear distinction to be made between significant effects and those effects that are considered to be non-significant. Taking account of the spatial and temporal aspects outlined above together with the nature conservation value of an Important Ecological Features a decision is made as to whether a particular effect is **Significant** or not and if so in what geographical context – for example **Significant** at the local level.

4 LAND, SOILS AND WATER

4.1.1 Significance of effects is assessed using a matrix based on sensitivity of the receptor, magnitude of effect and likelihood of effect. Four levels of significance are applicable: **'Negligible'**, **'Minor'**, **'Moderate'** and **'Major'**. Effects of **'Moderate'** and **'Major'** significance are considered to be **'significant'**.

4.1.2 All of the ratings are based on the guidance in NatureScot and Historic Environment Scotland's Environmental Impact Assessment Handbook (2018), modified using professional judgement to be specific to geology, hydrogeology, hydrology and peat. Although this is Scottish guidance, much of it is general and can be used to assist in the production of any EIA. We consider it to be the most extensive and relevant guidance on EIA methodology available to date and therefore use it as a basis for this assessment. No Welsh EIA guidance is currently available.

4.1.3 We use likelihood as well as sensitivity (**Table 4.1**) and magnitude (

4.1.4 **Table** 4.2) because events like sediment release can be small but cumulative, there is no way to prevent it entirely.

Table 4.1: Sensitivity

Sensitivity	Definition
Very High	The receptor has very limited ability to absorb change without fundamentally altering its present character, is of very high environmental value and/or is of international importance (e.g., Special Areas of Conservation (SAC), Ramsar sites).
High	The receptor has limited ability to absorb change without significantly altering its present character, is of high environmental value and/or is of national importance (e.g., National Nature Reserves (NNR), Sites of Special Scientific Interest (SSSI)).
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has moderate environmental value and/or is of regional importance (e.g., Geological Conservation Review sites).
Low	The receptor is tolerant of change without detriment to its present character, is of low environmental value and/or of local importance (e.g., Local Nature Reserves, Local Geodiversity Sites).

Table 4.2: Magnitude of effect

Magnitude	Definition
Substantial	Substantial changes, over a significant area, to key characteristics or to the geological/hydrogeological/peatland classification or status for more than 2 years.
Moderate	Noticeable but not substantial changes for more than 2 years or substantial changes for more than 6 months but less than 2 years, over a substantial area, to key characteristics or to the geological/hydrogeological/peatland classification or status.
Slight	Noticeable changes for less than 2 years, substantial changes for less than 6 months, or barely discernible changes for any length of time.
Negligible or No Change	Any change would be negligible, unnoticeable or there are no predicted changes.

4.2 Likelihood of effect

4.2.1 The likelihood of an effect occurring is evaluated to three levels: **unlikely**, **possible** or **likely** (**Table 4.3**).

Table 4.3: Effects significance matrix

Sensitivity	Magnitude of Effect	Likelihood of Effect	Significance of Effect
Very High	Substantial	Likely	**Major**
		Possible	**Major**
		Unlikely	**Moderate**
	Moderate	Likely	**Major**
		Possible	**Moderate**
		Unlikely	**Moderate**
	Slight	Likely	**Moderate**
		Possible	Minor
		Unlikely	Minor
		Likely	Minor

Sensitivity	Magnitude of Effect	Likelihood of Effect	Significance of Effect
	Negligible/No Change	Possible	Negligible
		Unlikely	Negligible
High	Substantial	Likely	**Major**
		Possible	**Major**
		Unlikely	**Moderate**
	Moderate	Likely	**Moderate**
		Possible	**Moderate**
		Unlikely	Minor
	Slight	Likely	Minor
		Possible	Minor
		Unlikely	Minor
	Negligible/No Change	Likely	Minor
		Possible	Negligible
		Unlikely	Negligible
Medium	Substantial	Likely	**Major**
		Possible	**Moderate**
		Unlikely	Minor
	Moderate	Likely	**Moderate**
		Possible	Minor
		Unlikely	Minor
	Slight	Likely	Minor
		Possible	Minor
		Unlikely	Negligible
	Negligible/No Change	Likely	Negligible
		Possible	Negligible
		Unlikely	Negligible
Low	Substantial	Likely	**Moderate**
		Possible	Minor

Sensitivity	Magnitude of Effect	Likelihood of Effect	Significance of Effect
		Unlikely	Negligible
	Moderate	Likely	Minor
		Possible	Minor
		Unlikely	Minor
	Slight	Likely	Minor
		Possible	Negligible
		Unlikely	Negligible
	Negligible/No Change	Likely	Negligible
		Possible	Negligible
		Unlikely	Negligible

5 CULTURAL HERITAGE

5.1.1 Analysis of historic assets and historic mapping will allow synthesis and interpretation of the historic development of the site to be established in accordance with Cadw's heritage impact assessment in Wales (section 4.2) and conservation principles for the sustainable management of the historic environment in Wales. This analysis will also establish what comprises the setting for the historic assets, and what elements of that setting contribute to how the asset is experienced, understood and appreciated. Assessment of the heritage importance (sensitivity) of all assets that may be affected would use the criteria in the following table (**Table 5.1**).

Table 5.1: Criteria for establishing importance of heritage assets

Importance of the Asset	Criteria
Very high	World Heritage Sites; assets of acknowledged international importance; assets that can contribute significantly to acknowledged international research objectives; historic landscape of international value (designated or not) and extremely well-preserved historic landscapes with exceptional coherence, time depth or other critical factor(s).
High	Scheduled Monuments and non-designated assets of schedulable quality and importance; Grade I and II* Listed Buildings and Grade II Listed buildings that can be shown to have exceptional qualities in their fabric or associations; Protected Wreck Sites; Registered Battlefields; Grade I and II* Registered Historic Parks and Gardens. Conservation Areas containing very important buildings or with other exceptional qualities; non-designated structures of clear national importance; designated and non-designated historic landscapes of historic interest; assets that can contribute significantly to acknowledged national research objectives.
Medium	Grade II Listed Buildings (which do not justify a higher level of importance), Grade II Registered Historic Parks and Gardens, non-designated assets that contribute to regional research objectives; Locally listed buildings (historic unlisted buildings) that have exceptional qualities; Conservation Areas.

Low	Non-designated historic assets of local importance including those compromised by poor preservation; assets of limited value but with the potential to contribute to local research objectives; other locally listed buildings (which do not justify a higher level of importance); robust non-designated historic landscapes.
Negligible	Assets with very little surviving archaeological interest; buildings of little architectural or historic note; landscapes with little significant historic interest. Negligible or no heritage significance.

5.2 Magnitude of impact

5.2.1 The impact will reflect the scale of change which would be caused by the Proposed Development and the effect this would have on the ability to interpret significance and appreciate the historic asset. Impacts can result either from physical changes to a historic asset or through sensory changes within its setting.

5.2.2 An impact may be positive where for example, as part of the Proposed Development, an intrusive building or feature is removed or replaced with a more harmonious one; historic features are restored or revealed; a new feature is added which adds to public appreciation; new views are introduced that add to public experience of an asset; or public interpretation or access is improved to an asset or its setting.

5.2.3 Impacts may impart major change, for example where groundworks completely destroy important archaeological remains, to minor change to part of a historic asset's setting, leading to a limited impact on our ability to interpret it, or its context.

5.2.4 Utilising the key principles for assessing the implications of change outlined above, an assessment of the magnitude of impact will be implemented for each baseline historic heritage asset using the criteria presented in **Table 5.2** below.

5.2.5 Conclusions of the assessed magnitude of impacts are a product of the consideration of the elements of an asset and its setting that contribute to its heritage significance and the degree to which the Proposed Development would change these contributing elements. The assessment therefore reflects the varying degrees of sensitivity of different assets to change brought about by different types of development. Utilising the key principles for assessing the implications of change outlined above, an assessment of the magnitude of impact will be implemented for each baseline historic asset using the criteria in the following table.

5.2.6 This definition of magnitude and assessment methodology applies to likely effects resulting from change in the setting as well as likely physical effects on the fabric of an asset.

Table 5.2: Criteria for classifying magnitude of impact

Magnitude	Summary
High beneficial	Elements of the asset's physical fabric which would otherwise be lost, severely compromising its heritage significance, are preserved in situ; or Elements of the asset's setting, which were previously lost or unintelligible, are restored, greatly enhancing its heritage significance.
Medium beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to an appreciable but partial loss of heritage significance, are preserved in situ; or Elements of the asset's setting are considerably improved, appreciably enhancing its heritage significance; or Research and recording leads to a considerable enhancement to the archaeological or historical interest of the asset.
Low beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to a slight loss of heritage significance, are preserved in situ; or Elements of the asset's setting are improved, slightly enhancing its heritage significance; or Research and recording leads to a slight enhancement to the archaeological or historical interest of the asset.
Neutral/None	The asset's fabric and/or setting is changed in ways which do not materially affect its heritage significance.
Low Adverse	Elements of the asset's fabric and/or setting which are of very limited relevance to its significance are lost or changed, resulting in a very slight loss of heritage significance; or Elements of the asset's fabric and/or setting which contribute to its significance are affected, but to a limited extent, resulting in an appreciable but partial loss of the asset's heritage significance.
Medium adverse	Elements of the asset's fabric and/or setting which contribute to its significance are affected, but to a limited extent,

	resulting in an appreciable but partial loss of the asset's heritage significance.
High adverse	Key elements of the asset's fabric and/or setting are lost or fundamentally altered, such that the asset's heritage significance is lost or severely compromised.

5.3 Significance of effect

5.3.1 The assessment of effects will combine analysis of the data gathered during the desk-based assessment and site visit, photographs and any wireline visualisations of the topography and Proposed Development.

5.3.2 These assessments will be carried out using professional judgement, taking into account designations and heritage significance as assessed against national standards. Significance of effect will be based on a combination of importance (in other disciplines sometimes referred to as sensitivity of the receptor) and magnitude of impact (incorporating contribution from setting where relevant) to establish the likely significance of effect. The significance of effect matrix is presented in **Table 5.3** below and provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly where the importance or impact magnitude levels are not clear or are borderline between categories. EIA significance may be described on a continuous scale from **Negligible** to **Major**.

5.3.3 It is also common practice to identify effects as **Significant** or **Not Significant**, and in this sense **Major** and **Moderate** effects are regarded as **Significant**, while minor and negligible effects are **Not Significant**.

5.3.4 Where **Table 5.3** provides two possible options for the significance of effect this will be a matter of professional judgement, taking into account the relative importance and heritage significance of the asset, the magnitude of impact and the reversibility or otherwise.

Table 5.3: Criteria for assessing the significance of effect

Magnitude of impact	Heritage Importance				
	Very high	High	Medium	Low	Negligible
High beneficial	Major	Major	Major or moderate	Moderate or minor	Minor or negligible
Medium beneficial	Major	Major or moderate	Moderate or minor	Minor	Minor or negligible
Low beneficial	Major or moderate	Moderate or minor	Minor	Negligible	Negligible
Neutral/ None	Negligible	Negligible	Negligible	Negligible	Negligible
Low adverse	Major or moderate	Moderate or minor	Minor	Negligible	Negligible
Medium adverse	Major	Major or moderate	Moderate or minor	Minor	Minor or negligible
High adverse	Major	Major	Major or moderate	Moderate or minor	Minor or negligible

6 CLIMATE CHANGE (CARBON EMISSIONS)

6.1.1 The significance of the effects relating to climate change caused by the Proposed Development will be assessed using IEMA's Guidance to Assessing GHG Significance (2022).

6.1.2 Given the international urgency of climate change, the sensitivity of the receptor (i.e. global climate) to fluctuations in GHG emissions is considered 'Very High'. Thus, the level of the significance of effects is determined by the magnitude, and timing, of GHG emissions and the likelihood of avoiding severe climate change (**Table 6.1**).

Table 6.1: IEMA's Guidance to assessing GHG significance (2022) framework for assessment of significant effects

Significance	Level	Criteria
Significant	Major adverse	Project adopts a business-as-usual approach, not compatible with the national Net Zero trajectory, or aligned with the goals of the Paris Agreement (i.e., a science-based 1.5°C trajectory). GHG impacts are not mitigated or reduced in line with local or national policy for projects of this type.
	Moderate adverse	Project's GHG impacts are partially mitigated, and may partially meet up-to-date policy; however emissions are still not compatible with the national Net Zero trajectory, or aligned with the goals of the Paris Agreement.
Not significant	Minor adverse	Project may have residual emissions, but the project is compatible with the goals of the Paris Agreement, complying with up-to-date policy and good practice.
	Negligible	Project has minimal residual emissions and goes substantially beyond the goals of the Paris Agreement, complying with up-to-date policy and best practice.
Significant	Beneficial	Project causes GHG emissions to be avoided or removed from the atmosphere, substantially exceeding the goals of the Paris Agreement with a positive climate impact.

7 TRAFFIC AND MOVEMENT

7.1.1 Sensitivity of receptors will be assessed using IEMA Guidelines for the Environmental Assessment of Traffic and Movement (Institute of Environmental Management and Assessment, 2023) and professional judgement. Classification is considered for users based on the characteristics of the roads and locations that may be impacted by traffic related to the Proposed Development. This is summarised in **Table 7.1** below.

Table 7.1: Sensitivity of a receptor

Receptor	Sensitivity			
	High	Medium	Low	Negligible
Users of Roads	Where the road is a minor rural road, not designed to accommodate frequent use by HGVs. Includes roads with traffic control signals, waiting and loading restrictions, traffic calming measures.	Where the road is a local A or B class road, capable of regular use by HGV traffic. Includes roads where there is some traffic calming or traffic management measures.	Were the road is Trunk or A-road class, constructed to accommodate significant HGV composition. Includes roads with little or no traffic calming or traffic management measures.	Where roads have no adjacent settlements. Includes new strategic trunk roads that would be little affected by additional traffic and suitable for abnormal loads and new strategic road junctions capable of accommodating abnormal loads.
Users / Residents of Locations	Where a location is a large rural settlement containing a high number of community and public services and facilities.	Where a location is an intermediate sized rural settlement, containing some community or public facilities and services.	Where a location is a small rural settlement, few community or public facilities or services.	Where a location includes individual dwellings or scattered settlements with no facilities.

7.2 Magnitude of impact (change)

7.2.1 The IEMA Guidelines identify the key impacts that are most important when assessing the magnitude of traffic impacts from an individual development. The impacts and levels of magnitude are discussed below.

7.2.2 Based on the IEMA Guidelines, the following factors have been identified as being the most discernible potential environmental impacts likely to arise from changes in traffic movements. Therefore, these are considered in the assessment which may arise from changes in traffic flows resulting from the Proposed Development:

7.2.3 **Severance of communities** - The perceived division that can occur within a community when it becomes separated by major transport infrastructure. The term is used to describe a complex series of factors that separate people from places and other people. Severance may result from the difficulty of crossing a heavily trafficked road or a physical barrier created by infrastructure.

7.2.4 **Road vehicle driver and passenger delay** - Traffic delays impacting non-development traffic can occur at points on the road network surrounding a development site including site entrance, roads passing a development site where there is likely to be additional traffic and the flow might be affected by additional parked cars, key intersections along a road and side roads where the availability of gaps between vehicles to circumvent delay are reduced.

7.2.5 **Non-motorised user delay** - Changes in volume, composition or speed of traffic may affect the ability of people to cross a road. In general, increases in traffic levels are likely to lead to greater increases in delay. This is also dependent on existing level of activity, visibility and general physical conditions of the Site.

7.2.6 **Non-motorised amenity** - Defined as the relative pleasantness of a journey, and is affected by traffic flow, traffic composition and pavement width/separation from traffic.

7.2.7 **Fear and intimidation on and by road users** - IEMA Guidelines states that measuring the extent of fear and intimidation as a result of development traffic is dependent on the following factors:

- The total volume of traffic;
- The heavy vehicle composition;
- The speed these vehicles are passing; and
- The proximity of traffic to people - and/or the feeling of the inherent lack of protection created by factors such as a narrow pavement median, a narrow path or a constraint (such as a wall or fence) preventing people stepping further away from moving vehicles.

7.2.8 IEMA Guidelines suggest defining the degree of hazard to pedestrians in three stages:

- Fear & Intimidation (F&I) Degree of Hazard - By calculating average (a) 18hr total traffic flow, (b) 18hr heavy vehicle flow and (c) average speed (Mph). Each with suggested thresholds of traffic number flows and average vehicle speeds. These thresholds in-turn sort the assessment results into a 'degree of hazard' score of 0-30. This is calculated for baseline traffic flows and baseline + development traffic flows.
- Levels of F&I - Levels of F&I are categorized as: 'Extreme', 'Great', 'Moderate' or 'Small' according to a total hazard score provided by combining the elements of stage 1 - (a)+(b)+(c).
- F&I Magnitude of Impact - The level of impact is then approximated with reference to the changes in the level of fear and intimidation from baseline conditions. Magnitude of impact is categorized according to 'change in step/traffic flows from baseline conditions as:

  - 'high' (two step changes in level);

  - 'medium' (One step change in level with >400 vehicle increase in average 18hr all traffic flow and/or >500 increase in total 18hr HGV flow);

  - 'low' (one step change in level with <400 vehicle increase in average 18hr total vehicle flow and/or <500 HGV flow increase in total 18hr HGV flow); and

  - 'negligible' (no change in step changes).

7.2.9 **Road user and pedestrian safety** - Consists of an approximation of the potential for road safety impacts through the calculation of collision rates (slight, serious and fatal). Collision clusters are identified by a detailed review of the baseline characteristics to determine the road safety sensitivity of discrete areas of the road network.

7.2.10 **Hazardous/large loads** - Some developments may involve the transportation of dangerous or hazardous loads by road. Such movements may involve specialist loads that might be involved in the construction or decommissioning phases of the development (e.g. wind turbine generator components).

7.2.11 The magnitude of impact or change will be considered according to the criteria defined in **Table 7.2** below.

Table 7.2: Thresholds for magnitude of impact

Impact	Negligible	Low	Medium	High
Severance of Communities	Changes in total traffic flow of less than 30%	Changes in total traffic flow of 30%-60%	Changes in total traffic flow of 60%-90%	Change in total traffic flow over 90%
Road Vehicle Driver and Passenger Delay	< 10 % Increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels.		
Non-Motorised User Delay	< 10 % Increase in traffic	An increase in total hourly traffic of approximately 30% can double the delay experienced by pedestrians attempting to cross a road. Whether or not the increase in traffic results in a significant effect should be determined using professional judgement.		
Non-Motorised Amenity	Assessment of this link is based on a desktop review of non-motorised user facilities on links used by construction traffic.			
Fear and Intimidation on and by road users	No change in step changes.	One step change in level, with • <400 vehicles increase in average 18hr all vehicle two-way all vehicle flow; and/or • <500 heavy vehicle increase in total 18hr HV flow	One step change in level, but with • >400 vehicles increase in average 18hr all vehicle two-way all vehicle flow; and/or • >500 heavy vehicle increase in total 18hr HV flow	Two step changes in level.

Impact	Negligible	Low	Medium	High
Road User and Pedestrian Safety	< 10 % Increase in traffic	Professional judgement would be used to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents. Collision cluster analysis is required. A cluster corresponds to a high concentration of accidents in a specific location (e.g. a specific junction) within the analysed time frame. In this assessment, a collision cluster = 3 accidents within a 100m radius are assumed where no specific criteria for collision cluster analysis is provided by the respective Local Highway Authority. It should be noted a commonly used criterion is 5 accidents within a 100m radius over a five-year period).		
Hazardous/Large Loads	< 30 % increase in traffic	Quantitative assessment of road capacity based on existing traffic flows and predicted future levels.		

7.2.12 Significance of impacts will be assessed using IEMA Guidelines for the Environmental Assessment of Traffic and Movement (Institute of Environmental Assessment, 2023) and professional judgement on a scale of Major, Moderate, Minor and Negligible. impacts judged to be 'Moderate' or 'Major' are considered Significant, with 'Minor' and 'Negligible' effects considered to be Not Significant. The following matrix will be used, developed from the Design Manual for Roads and Bridges, LA 104 – Revision 1, Environmental assessment and monitoring (Highways England, Transport Scotland, Llywodraeth Cymru – Welsh Government, and An Roinn Bonneagair – Department for Infrastructure of Northern Ireland, 2020) in **Table 7.3** below.

Table 7.3: Significance of effect

Sensitivity	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major / Moderate	Moderate / Minor	Minor
Medium	Major / Moderate	Moderate	Minor	Minor / Negligible
Low	Moderate / Minor	Minor	Minor	Minor / Negligible
Negligible	Minor	Minor	Minor / Negligible	Negligible

8 NOISE AND VIBRATION

8.1.1 The criteria for significance are based upon threshold values taken from ETSU-R-97, BS 4142 and BS 5228 for operational noise and construction noise respectively. ETSU-R-97 thresholds are adjusted based upon anticipated requirements from Powys County Council (PCC).

8.1.2 Where noise levels exceed these thresholds, significant effects are predicted to occur. Noise effects are predicted to be not significant where noise levels remain below the applicable thresholds. In determining the thresholds for such effects, all receptors are considered to have the same sensitivity for construction noise, while two general categories of sensitivity are identified for operational noise, depending on the financial involvement of properties in relation to the Proposed Development.

8.2 Construction noise

8.2.1 Annex E.3.2 of BS 5228-1 provides an example method ('ABC method') for the assessment of construction noise effects, where Table E.1. sets out the thresholds, depending on the ambient *sound levels.* This table is reproduced below in **Table 8.1.**

Table 8.1: Table E.1 in Annex E.3.2 from BS 5338-1. Thresholds of ambient sound levels.

Assessment category and threshold value period	Threshold value, in decibels (dB) (LA_{eq}, T)		
	Category A (A)	Category B (B	Category C (C)
Night-time (23.00–07.00)	45	50	55
Evenings and weekends D)	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75
NOTE 1 A potential significant effect is indicated if the LA_{eq}, T noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total LA_{eq}, T noise level for the period increases by more than 3 dB due to site noise. NOTE 3 Applied to residential receptors only.			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			

Assessment category and threshold value period	Threshold value, in decibels (dB) (LA_{eq}, T)		
	Category A (A)	Category B (B	Category C (C)
D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

8.2.2 It is assumed that ambient noise levels are at or below the Category A values as a worst-case assumption. The Category A values therefore represent the significance thresholds for construction noise. In determining significant effects, consideration is also given to the duration of effects, weighed against the extent of the exceedance of such thresholds, using professional judgement.

8.3 Operational noise (wind)

8.3.1 The acceptable limits for wind turbine operational noise are clearly defined in the ETSU-R-97 document and these limits should not be breached. Consequently, the test applied to operational noise is whether or not the calculated wind turbine noise emission levels at nearby noise sensitive properties lie below the noise limits derived in accordance with ETSU-R-97.

8.3.2 Depending on the levels of background noise, the satisfaction of the ETSU-R-97 derived limits (or simplified ETSU absolute level of 35 dB(A)) can lead to a situation whereby, at some locations under some wind conditions and for a certain proportion of the time, wind turbine noise may be audible. However, noise levels at the properties in the vicinity of the Proposed Development will still be within levels considered acceptable under the ETSU-R-97 assessment method 3.5.2. The thresholds for operational noise are determined based on background sound levels (varied based on wind speed), day or night-time time-period, and the category of the receptor in terms of its financial involvement in the Proposed Development (**Table 8.2**).

Table 8.2: Criteria for assessing operational noise

Category	Time Period	Noise Threshold Criteria
Not financially involved	Day	5 dB above background sound levels for wind speeds between 3 m/s and 12 m/s, subject to a lower limiting value of 35-40 dB
	Night	5 dB above background sound levels for wind speeds between 3 m/s and 12 m/s, subject to a lower limiting value of 43 dB
Financially involved	Day	5 dB above background sound levels for wind speeds between 3 m/s and 12 m/s, subject to a lower limiting value of 45 dB
	Night	

8.4 Operational noise (BESS/solar)

8.4.1 BS 4142 describes the methods for rating and assessing noise from industrial or commercial sources. The standard is applicable to the assessment of sound affecting residential receptors, through the determination of a specific level of an industrial or commercial noise source.

8.4.2 The procedure contained in BS 4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur. It is noted that a BS 4142 assessment is reliant on measuring relevant background sound levels.

8.4.3 Where certain acoustic features are present at the assessment location, a character correction should be applied to the specific sound level to give the rating level to be used in the assessment. Acoustic features can include tones, impulsivity, intermittency or a type of noise that is distinct from the existing noise environment.

8.4.4 The assessment of the impact from a commercial or industrial sound can be carried out as follows:

- A difference of around +10 dB or more, between the rating and background noise levels, is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of adverse impact depending on the context.

8.4.5 Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact depending on the context.