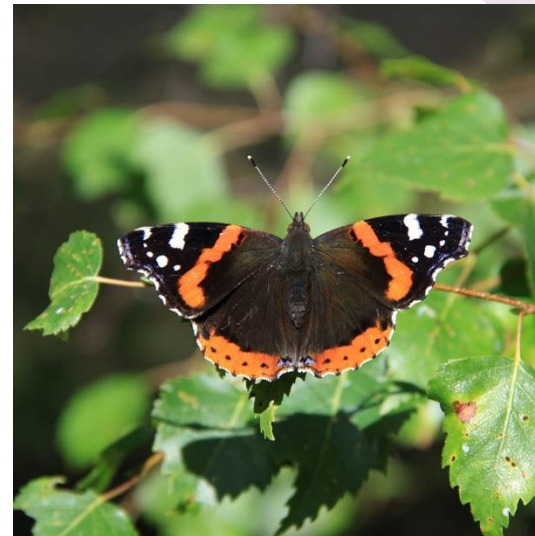




Pennant Walters (FoelT) Limited

Foel Trawsnant Wind Farm

Section 73 Application -
Environmental Statement Addendum



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1. Introduction

1.1 Overview of the Proposed Development

- 1.1.1 On 25 November 2021 Neath Port Talbot County Borough Council (NPTCBC) granted planning permission (Decision Notice reference DN P2014/0825) for the installation of 11 wind turbines with a maximum blade tip height of 145m together with ancillary infrastructure (hereafter 'the approved development') at a site known as Foel Trawsant, under *The Town and Country Planning Act 1990 (as amended)*¹ (TCPA).
- 1.1.2 The permission includes 40 planning conditions. Following initial discussions with officers at NPTCBC it is the intention of Pennant Walters (FoelT) Ltd ('the Applicant') to submit a Section 73 (S73) TCPA application to vary planning condition 3 (List of Approved Plans) to authorise the following:
- 1.1.3 An increase in the maximum rotor diameter from up to 90m to up to 133m, whilst maintaining the maximum height to blade tip of 145m.
- 1.1.4 Whilst the approved development (by way of planning permission ref. P2014/082 and subsequent Non-Material Amendment (NMA) permission LPA Ref. P2022/0344) is for the installation of up to 11 turbines, the Applicant is currently proposing to only install eight of these. This document therefore considers and assesses the installation of eight turbines in the context of the proposed variation to condition 3, as set out above and discussed in more detail in **Chapter 5: Description of the Proposed Development**.

1.2 Purpose of the ES addendum

- 1.2.1 The Proposed Development falls within Schedule 2 of The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (as amended) (the 'EIA Regulations'). An EIA was undertaken, and an Environmental Statement (ES) submitted in 2019 alongside the planning application for the approved scheme, as referenced in paragraph 1.1.1. A technical note was also submitted in June 2019 in response to a Regulation 19 request by NPTCBC for Further Environmental Information (FEI).
- 1.2.2 It has been agreed with NPTCBC that the potential environmental effects arising from the proposed increase in rotor diameter, and reduction in turbine numbers, can be presented in an addendum to the 2019 ES and 2019 FEI. This document presents environmental information that is either supplemental to, or replaces, the information presented in the 2019 ES and 2019 FEI. Where the ES addendum does not supplement or replace the information contained in the 2019 ES or 2019 FEI such information remains valid and up to date (see Section 1.3 for further details). It is recognised that this ES addendum must therefore be read alongside the 2019 ES and 2019 FEI in order to fully understand the likely significant environmental effects of the Proposed Development as a whole. The 2019 ES is available in **Appendix 1A** and 2019 FEI is available in **Appendix 1B** of this ES Addendum.

¹ Town and Country Planning Act 1990 [online]. Available at: <https://www.legislation.gov.uk/ukpga/1990/8/contents> [Accessed 17 January 2022]

1.3 Scope of the ES addendum

- 1.3.1 A scope of works for the ES addendum was submitted to NPTCBC in December 2021².
- 1.3.2 The NPTCBC Biodiversity Officer has also requested that further ornithological surveys are undertaken to understand its current usage by protected species and potential effects arising from the proposed increase in rotor diameters. Winter bird surveys have been undertaken during 2021/22 and breeding bird surveys are proposed for March – July 2022 (see **Chapter 10: Ornithology** for further details). It has been agreed with officers that the results of the breeding bird surveys which will continue to July are to be submitted to supplement and support the application once completed. This information will be the subject of further consultation at the time before taking to determination.
- 1.3.3 No trees are proposed to be removed as part of the development and a tree survey was not required for the 2019 ES or planning application. Any requirements for cut back etc. for transportation of the turbine components will be agreed in line with the application of Condition (5) regarding the provision of a Construction Environmental Management Plan (CEMP) and Condition (6) regarding the provision of the Abnormal Indivisible Load Test Run of the existing permission (ref: P2014/0825).
- 1.3.4 The structure of the ES addendum reflects that of the 2019 ES as presented in **Table 1.1**. The table also identifies the original technical scope of the ES addendum and the revised scope reflecting the above.

Figures are provided at the end of each chapter as appropriate.

Table 1.1 Foel Trawsnant Wind Farm – structure and scope of ES addendum

Chapter	Original Scope (December 2021)	Revised Scope
1. Introduction	N/A	N/A
2. Approach to Environmental Impact Assessment	N/A	N/A
3. Scoping and consultation	N/A	N/A
4. Wind farm site selection and design	N/A	N/A
5. Description of the proposed development	N/A	N/A
6. Legislative and policy overview	N/A	N/A
7. Landscape and Visual Impact Assessment	Viewpoint analysis focusing on viewpoints predicted to sustain a moderate (not significant) level of effect in the ES LVIA	No change

² Wood (2021). Foel Trawsnant Wind Farm: Proposed Environmental Scope for S73 Planning Application.

Chapter	Original Scope (December 2021)	Revised Scope
	- Analysis of a small number of other viewpoints (e.g. those representative of non-significant distant views and significant close-distance views) to ensure an understanding of the likely impact of the proposed change in a range of contexts. - Analysis would be supported by wireframe visualisations illustrating the permitted and proposed windfarm from each viewpoint included in the analysis. - Reporting in an ES addendum chapter	
8. Historic environment	No change from 2019 ES	
9. Non-Avian Ecology	- Review of baseline including re-calculation of stand-off distances for turbines - Construction – assessment of effects from any additional habitat removal if required - Operation – assessment of collision risk for bats from longer blades - Reporting in an ES addendum chapter	No change
10. Ornithology	- Review of baseline - Collision risk modelling (red kite and golden plover) - Reporting in an ES addendum chapter	- Review of baseline - Provisional assessment of effects on bird assemblage arising from the proposed changes to the development - Reporting in an ES addendum chapter
11. Noise	Subject to consultation with NPTCBC Environmental Health Officer (EHO) it is considered that a reduction in hub height as a result of a larger rotor would have beneficial effects on wind turbine noise at residential locations due to increased screening and ground absorption. Therefore, agreement will be sought from the EHO to cover the assessment of change within the ES addendum.	Update to noise modelling to account for change to turbine dimensions and reduction in number from 11 to 8.
12. Water Resources and Ground Conditions	No change from 2019 ES	
13. Traffic & Transport	- An update of Swept Path Analysis (SPA) for all locations assessed in the 2018 Construction Traffic Management Plan (CTMP)³ - Swept Path Analysis of two further locations that could present potential	- Swept Path Analysis (SPA) of the revised haulage route for AIL vehicles through Maesteg (see Appendix 13A for further details). - Swept Path Analysis of an additional location on the A4063 (Maesteg Road)

³ Wood (2018). Foel Trawsant Wind Farm Amended Scheme: Construction Traffic Management Plan. Doc ref 40217rr062i1

Chapter	Original Scope (December 2021)	Revised Scope
	issues for the passage of a longer abnormal indivisible load (AIL) vehicles – Bridgend Road and Neath Road in Maesteg Reporting in a standalone technical note as an appendix to the ES addendum.	that could present potential issues for the passage of a longer AIL vehicles Reporting in an updated CTMP as an appendix to the ES addendum.
14. Socio-economics	No change from 2019 ES	Consideration or removal of proposed diversions to public rights of way and implementation of alternative routes across the site
15. Shadow Flicker	- ReSoft WindFarm software will be used to produce a potential shadow flicker impact area map to identify potential receptors - Shadow flicker modelling will determine the theoretical shadow flicker incidences for all sensitive residential receptors identified within the study area - All residential receptors within 10x rotor diameter of the worst-case increase from that previously assessed will be considered - Reporting in the ES addendum	No change
16. Aviation and Telecomms	No change from 2019 ES	
17. Cumulative effects	In the 2019 ES this chapter considered potential inter-related (intra-project) cumulative effects. The chapter has been updated for the ES addendum to reflect revised technical assessments, and a section added to discuss inter-project cumulative effects.	

1.4 The Project Team

- 1.4.1 This ES addendum has been prepared on behalf of the Applicant by Wood Group UK Limited (hereafter referred to as 'Wood').
- 1.4.2 Wood is registered with the Institute of Environmental Management and Assessment (IEMA)'s EIA Quality Mark scheme. The scheme allows organisations that lead the co-ordination of EIAs in the UK to make a commitment to excellence in their EIA activities and have this commitment independently reviewed.

2. Approach to Environmental Impact Assessment

- 2.1.1 As identified in *The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017* ('the EIA Regulations') one of the requirements of an ES is to set out the conclusions that have been reached about the likely significant environmental effects resulting from the Proposed Development.
- 2.1.2 For this ES addendum the scope of the detailed assessment for the Proposed Development has been established by assessing whether the proposed differences between the approved development and the Proposed Development have the potential to result in a change to the conclusions previously made in the 2019 ES and FEI and result in new or different likely significant effects.
- 2.1.3 The approach to significance evaluation methodology for this ES addendum is the same as described in Chapter 2 of the 2019 ES, and within the individual technical chapters of that document, and is not repeated here. Details of topic-specific assessment methodologies are provided in Chapters 7-17 of the 2019 ES as appropriate.

3. Scoping and consultation

- 3.1.1 Chapter 3 of the 2019 ES details the approach to scoping and consultation for the approved development and is relevant to Proposed Development. It is not repeated here.
- 3.1.2 Details of the scope of the ES addendum and the consultation undertaken is provided in **Section 1.3** of this document.

4. Wind farm site selection and design

4.1 Introduction

- 4.1.1 The site selection and design process is discussed in Chapter 4 of the 2019 ES and remains relevant to Proposed Development. It is not repeated here.

4.2 Need for the Project

- 4.2.1 The UK and Welsh governments are committed to reducing greenhouse gas (GHG) emissions. The Climate Change Act 2008 (as amended) sets out a legally binding commitment for the UK to achieve a 100% reduction in GHG emissions ('net zero') on 1990 baseline levels by 2050⁴. Wales is also committed to achieving net zero emissions in 2050 under the Environment (Wales) Act 2016 (as amended)⁵. A series of carbon budgets are set to achieve reductions in emissions over five year periods up to 2050. Within Wales the carbon budget for the period 2021-25 is for a reduction of 37% below the baseline and for 2026-30 to be 58% below the 1990 baseline⁶.
- 4.2.2 The Welsh Government declared a climate emergency in 2019 to help co-ordinate the action required to combat the threat of climate change. Planning Policy Wales (edition 11) (PPW11) sets out national planning policy and states that "*the planning system plays a key role in tackling the climate emergency through the decarbonisation of the energy system and the sustainable management of natural resources*" (para. 3.30). Future Wales: The National Plan 2040 (Future Wales) sets out the national development framework and seeks to help address the climate emergency. Outcome 11 of Future Wales states that: "*The challenges of the climate emergency demand urgent action on carbon emissions and the planning system must help Wales lead the way in promoting and delivering a competitive, sustainable decarbonised society.*" These plans reflect the 'sustainable development principle' established by the Welsh Government in the Well-being of Future Generations (Wales) Act (2015) to ensure that public bodies act in a manner which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs.
- 4.2.3 Future Wales (page. 96) is clear that "*generating renewable energy is a key part of [the Welsh Government's] commitment to decarbonisation and tackling the climate emergency.*" The Welsh Government has set a target for energy from renewable sources. It seeks to achieve 70% of consumed energy from renewable sources by 2030. The latest Energy in Wales Report⁷ estimates that the figure for energy generated from renewable sources stands at 51%. Additionally, Wales seeks to achieve one gigawatt of renewable energy capacity in local ownership by 2030. Future Wales Policy 17 states that the need to meet the renewable energy target and Wales' international commitments on climate change should be given significant weight by decision makers.
- 4.2.4 Wales has one of the windiest climates in the UK, giving the country great potential to use this resource to generate electricity. Capitalising on Wales's wind resource is identified by the Welsh

⁴ The Climate Change Act 2008 (2050 Target Amendment) Order 2019 which amended the requirement for greenhouse gas emissions from 80% to 100% by 2050 came into force on 27 June 2019.

⁵ The Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021 amend the Environment (Wales) Act 2016 to require a reduction in greenhouse gas emissions from 80% to 100% by 2050 and came into force on 19 March 2021.

⁶ Under the Climate Change (Wales) Regulations 2021

⁷ Welsh Government (2020) Energy Generation in Wales 2019. Available online:

<https://gov.wales/sites/default/files/publications/2021-01/energy-generation-in-wales-2019.pdf/>

Government as crucial to increasing renewable energy and combating climate change. PPW11 (para. 5.9.16) states that “*Wales has an abundant wind resource and, as a result, wind energy forms a key part of meeting the Welsh Government’s vision for future renewable energy production.*” Future Wales identifies a series of Pre-Assessed Areas (PAA) for Wind (one of which covers the Proposed Development site) within which large-scale wind energy developments are supported in principle (under Policy 17) to help meet the need for renewable energy.

- 4.2.5 Dependant on the final turbine choice, the Proposed Development would likely produce between 33-35MW of renewable energy and will therefore contribute towards meeting the target to increase renewable energy in Wales, taking advantage of Wales’ abundant wind resource, and further reduce the reliance on fossil fuels.
- 4.2.6 There is a demonstrable need to tackle climate change, with renewable energy developments seen as a key element in this. Energy from wind is identified by the Welsh Government as being of critical importance. The Welsh Government has set a target for the generation of energy from renewable sources in 2030 which has yet to be met whilst it also seeks increases in local ownership of energy generation. Increasing the wind energy capacity through the planning system is crucial to meeting the Welsh Government’s target for renewable energy generation. The Proposed Development would be expected to see an increase in the MW capacity of renewable energy generated compared to the approved scheme and would make a contribution to the achievement of Wales’ renewable energy generation and climate change targets.

4.3 Consideration of Alternatives

- 4.3.1 The EIA Regulations⁸ require an ES to include “A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the applicant or appellant which are relevant to the proposed development and its specific characteristics and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”
- 4.3.2 The Site Selection and Design chapter of the 2019 ES (**Chapter 6**) describes the development site identification process and design criteria, including the examination of alternative layout designs (e.g. alternative turbine numbers and locations). This ES addendum considers a further proposed design alternative to the approved development as outlined in **Chapter 5: Description of the Proposed Development** – namely:
- Increasing the rotor diameter of five of the consented turbines (T5, T6, T9, T10 and T11) to 133m; and
 - Increasing the rotor diameter of three of the consented turbines (T1, T2 and T8) to 117m.
- 4.3.3 The Applicant is not proposing and has not considered any changes beyond the above, with all changes accommodated in the approved red line boundary, and it is not considered necessary to revisit site selection and design evolution as this was assessed within the 2019 ES and FEI. It is therefore considered that this ES addendum, when considered alongside the 2019 ES, is compliant with the requirements relating to alternatives under the EIA Regulations.

⁸ Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017

5. Description of the Proposed Development

5.1 Introduction

- 5.1.1 This chapter describes the Proposed Development, highlighting in particular the proposed changes to the development which was approved by NPTCBC in November 2021 (Reference DN P2014/0825).

5.2 Development Description

Site Location and surroundings

- 5.2.1 Details of the location of the proposed Foel Trawsnant Wind Farm and its surroundings were provided in Chapter 5: Description of the proposed development of the 2019 ES⁹. No changes to the site or its surroundings have taken place since this time and therefore these details remain the same and are not repeated here.
- 5.2.2 A site location plan is provided as **Figure 5.1**.

Development Proposals

- 5.2.3 The approved development comprises the following infrastructure:
- Up to eleven wind turbines with a maximum height to blade tip of 145m;
 - A permanent substation and compound;
 - Two temporary construction compounds;
 - Temporary site offices;
 - Crane pads and cabling;
 - Access track construction; and
 - Minor highways works on the B4282 to accommodate a new site access.
- 5.2.4 The Applicant is seeking permission for a revised development ('the Proposed Development') which differs from the approved development in the following respects:
- An increase in the rotor diameter of five of the consented turbines (T5, T6, T9, T10 and T11) to 133m; and
 - An increase in the rotor diameter of three of the consented turbines (T1, T2 and T8) to 117m.
- 5.2.5 As stated in **Chapter 1**, although the approved development is for 11 turbines the Applicant is currently proposing to install eight of the turbines. This document therefore considers the construction and operation of eight turbines, with turbines T3, T4 and T7, and associated infrastructure including crane pads, cabling and connecting site access tracks from the approved development being removed.

⁹ Wood (2019). Foel Trawsnant Wind Farm Amended Scheme: Environmental Statement. Doc ref 40217rr066i1

- 5.2.6 Changes to the approved development (described in Chapter 5 of the 2019 ES) resulting from the proposed amendments (as above) are detailed in this chapter. All other details remain as per the approved development (described in Chapter 5 of the 2019 ES) with all elements accommodated within the approved red line planning boundary, which it is not proposed to change. A site layout plan for the Proposed Development is provided as **Figure 5.2**.
- 5.2.7 In practice the generating capacity will be limited by the size of available turbines which can be accommodated within the varied physical turbine parameters for the Proposed Development. It is therefore considered unnecessary to impose any specific upper limit on the MW capacity of any individual turbines of the Proposed Development as a whole.
- 5.2.8 **Table 5.1** shows the dimensions and grid references of turbines for the approved development and Proposed Development for comparative purposes. The proposed turbine dimensions are illustrated on **Figure 5.3a and 5.3b**.

Table 5.1 Turbine Comparison between Approved and Proposed Development

Turbine	Approved Development	Proposed Development
T1	Hub height: 100m Rotor diameter: 90m Grid reference: E283979, N193524	Hub height: 86.5m Rotor diameter: 117m Grid reference: E283979, N193530
T2	Hub height: 100m Rotor diameter: 90m Grid reference: E283842, N193719	Hub height: 86.5m Rotor diameter: 117m Grid reference: E283853, N193719
T3	Hub height: 100m Rotor diameter: 90m Grid reference: E283693, N193910	REMOVED
T4	Hub height: 100m Rotor diameter: 90m Grid reference: E283428, N194260	REMOVED
T5	Hub height: 100m Rotor diameter: 90m Grid reference: E283092, N194327	Hub height: 78.5m Rotor diameter: 133m Grid reference: E283096, N194329
T6	Hub height: 100m Rotor diameter: 90m Grid reference: E282867, N194591	Hub height: 78.5m Rotor diameter: 133m Grid reference: E282868, N194591
T7	Hub height: 100m Rotor diameter: 90m Grid reference: E284155, N193809	REMOVED
T8	Hub height: 100m Rotor diameter: 90m Grid reference: E284009, N194034	Hub height: 86.5m Rotor diameter: 117m Grid reference: E283996, N194025
T9	Hub height: 100m Rotor diameter: 90m Grid reference: E283761, N194191	Hub height: 78.5m Rotor diameter: 133m Grid reference: E283748, N194174
T10	Hub height: 100m Rotor diameter: 90m Grid reference: E283728, N194431	Hub height: 78.5m Rotor diameter: 133m Grid reference: E283726, N194429
T11	Hub height: 100m	Hub height: 78.5m

Turbine	Approved Development	Proposed Development
	Rotor diameter: 90m Grid reference: E283513, N194700	Rotor diameter: 133m Grid reference: E283512, N194698

Site access

- 5.2.9 The access to the site is unchanged from the 2019 ES and 2019 FEI, i.e. access will be from the B4282 which links Maesteg and the village of Bryn, north of Maesteg Golf Club.

Haulage routes

Abnormal Loads

- 5.2.10 Due to the increased dimensions of the proposed turbine blades, the proposed haulage route for abnormal indivisible load (AIL) vehicles through Maesteg has been revised from that presented in the 2018 Construction Traffic Management Plan (CTMP)¹⁰. Swept path analysis has therefore been undertaken of the proposed revised route through Maesteg and reported in an update to the CTMP in **Appendix 13A**.

General Construction Traffic

- 5.2.11 Details of the type and routing of general construction traffic are unchanged from the 2019 ES. Please refer to the 2019 ES Chapter 13: Traffic and Transport, or **Appendix 13A** of this ES addendum, for details.

Micrositing

- 5.2.12 To accommodate the larger rotor diameters within the approved red line planning boundary, use has been made of the approved micrositing distances for each turbine.
- 5.2.13 The proposed site layout is informed by a number of ground investigation surveys, and the Applicant is confident in the location of the turbines and would not need any margin for change through micrositing. Details of the ground investigation works are submitted alongside the S73 application.

On-site infrastructure

- 5.2.14 The Applicant's intention to not construct turbines T3, T4 and T7 from the approved development would result in a reduction in the total area of the temporary and permanent site infrastructure from 9.6ha in the approved development to 6.53ha.

Access tracks

- 5.2.15 The approved development included approximately 5.5km of site access tracks which included 1.8km of the existing forestry track which leads from the entrance off the B4282 to the site. The proposed removal of T3, T4 and T7 would result in the length of new site access tracks required reducing by 580m to approximately 1.22km.

¹⁰ Wood (2018). Foel Trawsnant Wind Farm Amended Scheme: Construction Traffic Management Plan. Doc ref 40217rr062i1

- 5.2.16 Other than the reduction in total length, the details of the access tracks are unchanged from the 2019 ES as detailed in Chapter 5 of that document.

Crane Pads

- 5.2.17 The design of crane pads is unchanged from the 2019 ES as detailed in Chapter 5 of that document.

6. Legislative and policy overview

6.1 Introduction

- 6.1.1 This chapter sets out the key changes in legislation and planning policy since the ES and FEI were submitted in 2019. As the chapter only sets out changes of relevance it should be read in conjunction with Chapter 6: Legislative and policy overview of the 2019 ES, and the FEI.
- 6.1.2 The relevant EIA Regulations are The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017.

6.2 Legislative context

- 6.2.1 Section 6.2 of Chapter 6 of the 2019 ES set out the legislative context relevant to the consideration of the application. This section sets out the main changes in legislation that are relevant to Proposed Development including amendments to acts of parliament. It then considers strategies and plans relevant to the consideration of the proposals.

Climate Change Act 2008 (as amended) / Climate Change Act 2008 (2050 Target Amendment) Order 2019

- 6.2.2 One of the key provisions of the original 2008 Act was the introduction of legally binding targets on greenhouse gas (GHG) emissions comprising reductions of at least 80% GHG emissions by 2050, and reductions in emissions of at least 26% by 2020, against a 1990 baseline. The Climate Change Act 2008 (2050 Target Amendment) Order 2019 came into force on 27 June 2019. This amended the legally binding target to reduce GHG emissions set in section 1 of the Climate Change Act 2008 from 80% to 100% against a 1990 baseline, achieving 'net zero' emissions. The Act also requires the Government to establish 5-year carbon budgets. The generation of electricity by renewable means, such as wind energy, is considered to be a key contributor towards meeting these targets.

Environment (Wales) Act 2016 (as amended) / The Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021

- 6.2.3 The Environment (Wales) Act 2016 (as amended) places a duty on the Welsh Ministers to reduce GHG emissions in Wales by at least 100% in 2050¹¹. The target of net zero emissions (rather than 80% as originally stated in the Act) reflects the Welsh Government's acceptance of the independent CCC recommendation¹² that Wales could achieve a net zero reduction in emissions, which had previously been considered unfeasible. The Environment (Wales) Act 2016 (as amended) requires Ministers to set a series of interim targets and five-year carbon budgets to achieve the 2050 target. For 2021-26 this stands at 37% reduction compared to the baseline and for 2026-30 this is set at an average of a 58% reduction¹³.

¹¹ The Environment (Wales) Act 2016 (Amendment of 2050 Emissions Target) Regulations 2021 changed the statutory target within the Environment Act from 80% to 100% and came into force on 12 March 2021.

¹² Climate Change Committee's (2020) The path to Net Zero and progress on reducing emissions in Wales.

¹³ The Climate Change (Carbon Budgets) (Wales) (Amendment) Regulations 2021 amended the 2021-2025 carbon budget from an average reduction of 33% to 37% lower than the baseline and came into force on 19 March 2021. The regulations set the carbon budget for the 2026-2030 period and limit to an average of 58% lower than the baseline.

UK wide strategies and plans

National Infrastructure Strategy (2020)

- 6.2.4 The National Infrastructure Strategy (HM Treasury, 2020) presents the UK Government's plans to deliver significant improvements to UK infrastructure which will enable economic growth and progress towards the net zero by 2050 ambition. At page 51 the strategy recognises the need to increase capacity from onshore wind: *"To deliver net zero, the share of generation from renewables needs to dramatically increase. While the UK leads the world in the deployment of offshore wind, greater generation capacity will need to come from onshore wind and solar as well."*

Net Zero Strategy: Build Back Greener (2021)

- 6.2.5 The Net Zero Strategy: Build Back Greener (BEIS, 2021) provides the overarching UK wide strategy to reach the UK's target for net zero emissions in 2050. The strategy sets out a delivery pathway to achieve net zero in 2050 with policies and proposals to keep the UK on track for emission reduction targets to up to the sixth carbon budget covering the period 2033-2037 (requiring a 78% reduction on 1990 baseline levels). Amongst its policies, the strategy seeks to fully decarbonise the UK power system by 2035. Key to achieving this is the commitment to *"transform [the UK's] energy system away from fossil fuels to low carbon sources of energy, such as renewable electricity generated in the UK"* (page. 39).

Welsh national strategies and plans

Energy Generation in Wales Report 2019 (2020)

- 6.2.6 The latest Energy Generation in Wales report covering 2019 sets out the latest data on energy generation from renewables. The report states that capacity had increased in Wales in recent years although increases have slowed down. It sets out that an estimated 7.5TWh of energy in Wales was generated from renewables in 2019. In comparison to the target for 70% of consumed energy to be provided by renewables, the 2019 report estimates that this figure stands at 51%. The report also notes that there is 825 MW of locally owned renewable energy capacity in Wales, which is 83% of the way towards the 1 GW target by 2030. In 2019 total onshore wind capacity stood at 1.25 GW, an increase in capacity of 12% from 2018.

Policy Statement: Local Ownership of Energy Generation in Wales – Benefitting Wales Today and for Future Generations (2020)

- 6.2.7 This places considerable importance on moving from polluting energy generating technologies to renewables. It also identifies that Wales has made considerable and impressive gains in ensuring energy generating facilities have some form of public ownership, contributing to local economies considerably more than traditional ownership methods.
- 6.2.8 The Policy Statement clarifies the definition of local ownership as "energy installations, located in Wales, which are owned by one or more individuals or organisations wholly owned and based in Wales, or organisations whose principal headquarters are located in Wales. This includes the following categories: Businesses; Farms and estates; Households and other domestic scale generation; Local Authorities; Other public sector organisations; Registered Social Landlords; Third sector organisations including social enterprises and charities, their subsidiaries, trading arms and special purpose vehicles."

Programme for Government (2021)

- 6.2.9 The Welsh Government's Programme for Government published in June 2021 sets out the actions that the Welsh Government intends to take over the lifetime of the Senedd. It seeks to ensure that tackling the climate and nature emergencies is at the heart of Welsh Government activity. One of the ten well-being objectives is *"Embed our response to the climate and nature emergency in everything we do."*

Net Zero Wales (2021)

- 6.2.10 The Environment (Wales) Act 2016 (as amended) Act requires the publication of a report setting out policies and proposals for each carbon budget period. In October 2021, the Welsh Government published Net Zero Wales: Carbon Budget 2 (2021 to 2025) which builds upon their previous plan Prosperity for All: A Low Carbon Wales (Welsh Government, 2019). This sets out a large number of policies for action in the five-year carbon budget period and proposals for action in the longer term to ensure that Wales meets the required average reduction of 37% in GHG emissions against the baseline and is on track to achieve net zero emissions in 2050.
- 6.2.11 The plan reinforces the importance of delivering energy generation from renewable sources to meet the energy needs of Wales. The plan plays an important role in meeting challenges posed by the climate emergency declared by the Welsh Government in April 2019.¹⁴

6.3 National planning policy context

- 6.3.1 Since the submission of the ES in 2019 the key national policy context set out in Section 6.3 of Chapter 6 of that document has changed substantially. Future Wales: The National Plan 2040 ('Future Wales' from here on) was published by the Welsh Government in February 2021. Alongside the publication of Future Wales, the latest Planning Policy Wales (Edition 11) was published. These are considered below.

Future Wales: The National Plan 2040 (2021)

- 6.3.2 Future Wales sets out the national development framework for Wales and has development plan status. As the highest tier of the development plan it provides the framework for the development of regional level Strategic Development Plans (SDPs) (which have yet to be produced) and Local Development Plans (LDPs). Future Wales is the Welsh Government's *"strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate resilience, developing strong eco systems and improving the health and well-being of our communities"* (page. 6).
- 6.3.3 Future Wales has been prepared to provide a clear, long term spatial direction for Government policy, action and investment in Wales. It sets out a framework for addressing key national priorities through the planning system, inclusive of decarbonisation. It states (page. 46):
- "Future Wales together with Planning Policy Wales will ensure the planning system focuses on delivering a decarbonised and resilient Wales through the places we create, the energy we generate, the natural resources and materials we use and how we live and travel."*
- 6.3.4 Future Wales recognises the role that Wales can play in supporting the use of renewable energy. It recognises that *"Wales can become a world leader in renewable energy technologies"* (page. 48) Furthermore, it recognises that *"Our wind and tidal resources, our potential for solar generation, our*

¹⁴ Welsh Government (2019) Minister for Environment, Energy and Rural Affairs Lesley Griffiths Welsh Government makes climate emergency declaration

support for both large and community scaled projects and our commitment to ensuring the planning system provides a strong lead for renewable energy development, mean we are well placed to support the renewable sector, attract new investment and reduce carbon emissions" (page. 48).

- 6.3.5 Future Wales sets out 11 outcomes to provide a vision for change to 2040. Outcome 11 seeks "A Wales where people live ... in places which are decarbonised and climate-resilient" (page. 56). Further it states, "The challenges of the climate emergency demand urgent action on carbon emissions and the planning system must help Wales lead the way in promoting and delivering a competitive, sustainable decarbonised society" (page. 56).
- 6.3.6 Future Wales reaffirms the Welsh Government's commitment to maximising renewables and the Welsh Government targets:
- For 70% of electricity consumption to be generated from renewable energy by 2030;
 - for one gigawatt of renewable energy capacity to be locally owned by 2030; and
 - for new renewable energy projects to have at least an element of local ownership from 2020.
- 6.3.7 Future Wales confirms that energy generation accounted for 29% of GHG emissions in 2018 and is clear that large scale renewable electricity generation is vital to meeting renewable energy and climate change targets and alternatives would not meet the targets (page. 97):
- "The Welsh Ministers have considered alternatives to the need for new large-scale electricity generation infrastructure, including building-mounted installations and energy efficiency measures. Although we believe that these measures have an important part to play in meeting our energy, decarbonisation and climate change targets, they will not enable us to meet these objectives on their own."*
- 6.3.8 Future Wales identifies ten Pre-Assessed Areas (PAAs) for wind within which there is a presumption in favour of large-scale wind development under Future Wales' *Policy 17 - Renewable and Low Carbon Energy and Associated Infrastructure* but subject to detailed criteria set out in *Policy 18 - Renewable and Low Carbon Energy Developments of National Significance*. Policy 17 states that "The Welsh Government strongly supports the principle of developing renewable and low carbon energy from all technologies and at all scales to meet our future energy needs" whilst decision makers are required to give "significant weight" to the need to meet international commitments and Wales' target to generate 70% of energy from renewables by 2030. Policy 18 provides a detailed decision-making framework for the renewable and low carbon energy developments. The Proposed Development site is wholly within PAA 9 for wind.

Planning Policy Wales (Edition 11) (2021)

- 6.3.9 PPW Edition 11 was adopted in February 2021 to coincide with the publication of Future Wales. PPW sets out the land use planning policies of the Welsh Government. PPW, with the supporting Technical Advice Notes (TAN), Circulars and Policy Clarification letters comprise national planning policy but do not form part of the development plan.
- 6.3.10 At para 3.30 PPW states that "In 2019 the Welsh Government declared a climate emergency in order to coordinate action nationally and locally to help combat the threats of climate change. The planning system plays a key role in tackling the climate emergency through the decarbonisation of the energy system and the sustainable management of natural resources."
- 6.3.11 Chapter 5: Productive and Enterprising Places sets out the planning policy approach to energy within Wales. Para 5.7.6 states that "The planning system should secure an appropriate mix of energy provision, which maximises benefits to our economy and communities whilst minimising potential environmental and social impacts. This forms part of the Welsh Government's aim to secure the

strongest economic development policies, to underpin growth and prosperity in Wales, recognising the importance of decarbonisation and the sustainable use of natural resources, both as an economic driver and a commitment to sustainable development."

- 6.3.12 PPW11 reaffirms the Welsh Government's targets for renewable energy generation and local ownership. Para 5.7.7 states that *"The benefits of renewable and low carbon energy, as part of the overall commitment to tackle the climate emergency and increase energy security, is of paramount importance."* PPW11 states that the planning system should (Para 5.7.7):
- *"integrate development with the provision of additional electricity grid network infrastructure;*
 - *optimise energy storage;*
 - *facilitate the integration of sustainable building design principles in new development;*
 - *optimise the location of new developments to allow for efficient use of resources;*
 - *maximise renewable and low carbon energy generation;*
 - *maximise the use of local energy sources, such as heat networks;*
 - *minimise the carbon impact of other energy generation; and*
 - *move away from the extraction of energy minerals, the burning of which is carbon intensive."*
- 6.3.13 PPW states that local planning authorities should ensure "development plan policies are supportive of renewable and low carbon energy development in all parts of Wales, direct developments to the right locations and set out clearly the local criteria against which proposals will be evaluated" (Para 5.9.10). PPW11 is also clear that local planning authorities should not seek to amend the PAAs identified in Future Wales within their LDPs.

Technical Advice Notes

- 6.3.14 On publication of Future Wales, TAN 8 Planning for Renewable Energy (2005) was superseded. It should be noted that the strategic search areas (SSA) that were identified under TAN 8 are superseded by the PAA for wind identified in Future Wales. However, SSA are still identified with the LDP policy. The Proposed Development is located within the PAA for wind and lies within a former SSA.

6.4 Local planning policy

Local Development Plan

- 6.4.1 The LDP applicable to this application comprises the Neath Port Talbot County Borough Council's (NPTCBC) LDP (2011-2026) adopted in January 2016. Therefore, the policies remain as reviewed in Section 6.4 of Chapter 6 of the 2019 ES.

Emerging Local Development Plan

- 6.4.2 NPTCBC has begun preparation of a Replacement LDP (RLDP). The Welsh Government approved the Delivery Agreement (DA) for the RLDP preparation stages in January 2022. The DA states that submission will take place in 2024 with adoption due in 2025. The RLDP is at an early stage in plan preparation and is not considered to have relevance for consideration of the Proposed Development at this stage.

Supplementary Planning Guidance

- 6.4.3 Since the submission of the 2019 ES, NPTCBC adopted a series of Supplementary Planning Guidance (SPG) on the historic environment in April 2019: the Historic Environment SPG and the supporting Schedule of Buildings of Local Importance SPG and Schedule of Designated Canal Structures SPG. The SPG were prepared in support of LDP policies SP21: Built Environment and Historic Heritage and BE2: Buildings of Local Importance and BE3: The Canal Network. They provide additional guidance to ensure that historic environment considerations, including the impacts on locally designated assets, are taken into account in decisions on planning applications.
- 6.4.4 The 2019 ES included a full assessment of the likely effects on the historic environment. The SPGs provide additional guidance to support the LDP policies that were in place at the time of the preparation of the 2019 ES. None of the SPGs adopted in April 2019 were raised as being material to the consideration of the application for the approved development in the September 2019 or November 2021 NPTCBC planning committee reports. The SPGs are therefore not considered relevant to consideration of the Proposed Development.

7. Landscape and Visual Impact Assessment

7.1 Introduction

- 7.1.1 This chapter of the ES addendum assesses changes to the likely significant effects of the Proposed Development with respect to landscape and visual amenity, taking into account the proposed amendments to the approved development. As the chapter only sets out changes of relevance it should be read in conjunction with Chapter 7: Landscape and Visual Impact Assessment of the 2019 ES. The chapter should also be read in conjunction with the development description and planning policy provided in **Chapters 1-6** of this ES addendum.

7.2 Limitations of this assessment

- 7.2.1 Field surveys to inform Landscape and Visual Impact Assessment (LVIA) were undertaken throughout 2012 – 2014 and in February 2018 in support of the approved development. No additional field surveys have been undertaken for this addendum.
- 7.2.2 The conclusions of the LVIAs included in the original ES (Amec 2014)¹⁵ (hereafter referred to as 'the 2014 LVIA') and subsequent update from 2019 (Wood 2019)¹⁶ (hereafter referred to as 'the 2019 LVIA') have been re-evaluated, taking into account the proposed changes to the layout and specification of the turbines.

7.3 Relevant legislation, planning policy, technical guidance

Legislative context

- 7.3.1 A summary of the relevant legislation is given in **Table 7.1**.

Table 7.1 Legislation relevant to the LVIA

Legislation	Legislative context
Wellbeing of Future Generations (Wales) Act 2015¹⁷	The Act puts in place seven well-being goals to help ensure that public bodies are all working towards the same vision of a sustainable Wales. In relation to landscape matters, the most relevant well-being goal is the achievement of 'a resilient Wales', which seeks to maintain and enhance a biodiverse natural environment. Planning Policy Wales Edition 11 ¹⁸ recognises that this goal can be supported by protecting sufficient scales, extent and connectivity of, and between, landscapes and habitats to enable them to withstand the pressures of change and protect and enhance biodiversity and to promote opportunities for social and economic activity based on valuing and enabling access to the natural, historic and built environment

¹⁵ Amec (2014). Foel Trawsant Wind Farm Environmental Statement: Chapter 10, Ornithology (doc ref. 24311rr073i1).

¹⁶ Wood (2019) Foel Trawsant Wind Farm Amended Scheme. Environmental Statement: Chapter 10 Ornithology. Report produced by Wood PLC for Pennant Walters (FoelT) Limited.

¹⁷ National Assembly for Wales. (2015). *Well-being of Future Generations (Wales) Act 2015*. [online]. Available at: <https://www.legislation.gov.uk/anaw/2015/2>

¹⁸ Welsh Government. (2021). *Planning Policy Wales, Edition 11*. [online]. Available at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

Legislation	Legislative context
Environment (Wales) Act 2016¹⁹	This Act requires, under Section 6 – Biodiversity and resilience of ecosystems duty, that a public authority must seek to maintain and enhance biodiversity and promote the resilience of ecosystems. This requirement could be interpreted to include landscape as part of the ecosystems approach.
National Parks and Access to the Countryside Act 1949²⁰	This Act provided the framework for the creation of National Parks and Areas of Outstanding Natural Beauty, including the Brecon Beacons National Park which lies within the LVIA Study Area. One of a National Park's statutory duties is the promotion of public understanding and enjoyment of each Park's special qualities steered by a National Park Authority as guided by each Park's statutory Management Plan.

Planning policy context

7.3.2 A summary of the relevant national and local planning policy is given in **Table 7.2**.

Table 7.2 Planning policy relevant to the LVIA

Policy	Policy context
National planning policy	
Planning Policy Wales, Edition 11¹⁸	With specific reference to large scale wind developments and the landscape, paragraph 5.9.17 recognises that Future Wales²¹ identifies Pre-Assessed Areas where the Welsh Government has already modelled the likely impact on the landscape and has found them to be capable of accommodating development in an acceptable way. There is a presumption in favour of large-scale wind energy development in these areas, subject to other criteria contained within the policy. General LVIA issues are included in Chapter 6 - Distinctive and Natural Places and more specifically within Section 6.3 Landscape. Amongst the statements of particular relevance to Project are those concerning statutory landscape designations i.e. National Parks and AONBs, including paragraph 6.3.5 that states that the duty to have regard to their purposes applies to activities affecting these areas whether those activities are located within or outside a National Park or an AONB. Paragraph 6.3.12 and 6.3.13 relate to non-statutory designations such as Special Landscape Areas that define local areas of high landscape importance, which may be unique, exceptional or distinctive to the area. Planning authorities should apply these designations where there is good reason to believe that normal planning policies cannot provide the necessary protection. Paragraphs 6.3.20 and 6.3.21 concerns the use of LANDMAP and its role in informing landscape assessments needed to inform local authorities in making local policy, guidance and decision making.
Future Wales - The National Plan 2040²²	Policy 17 – Renewable and Low Carbon Energy and Associated Infrastructure notes that there is a presumption in favour of large-scale wind energy development in Pre-Assessed

¹⁹ National Assembly for Wales. (2016). *Environment (Wales) Act 2016*. [online]. Available at: <https://www.legislation.gov.uk/anaw/2016/3/contents/enacted>

²⁰ Parliament of the United Kingdom. (1949). *National Parks and Access to the Countryside Act 1949*. [online]. Available at: <https://www.legislation.gov.uk/ukpga/Geo6/12-13-14/97/contents>

²¹ Welsh Government. (2021). *Future Wales - The National Plan 2040*. [online]. Available at: <https://gov.wales/future-wales-national-plan-2040-0>

²²

Policy	Policy context
	Areas for wind developments (which the Welsh Government has already modelled the likely impact on the landscape and has found them to be capable of accommodating development in an acceptable way), subject to the criteria in Policy 18. The Proposed Development site lies within Pre-Assessed Area 10. The policy continues by stating that all proposals should demonstrate that they will not have an unacceptable adverse impact on the environment.
Future Wales - The National Plan 2040²²	Policy 18 – Renewable and Low Carbon Energy Developments of National Significance. Proposals qualifying as Developments of National Significance will be permitted subject to Policy 17 and the criteria listed under Policy 18. Of relevance to the LVIA for the Project, item 2 requires that there are no unacceptable adverse visual impacts on nearby communities and individual dwellings. The cumulative impacts of existing and consented renewable energy schemes should also be considered.
Local planning policy	
Neath Port Talbot County Borough Council Local Development Plan (2011 – 2026). Adopted January 2016.	Strategic Policy SP14: The Countryside and the Undeveloped Coast concerns the protection of open countryside outside of settlement limits and introduces the local landscape designation: Special Landscape Areas (SLAs).
Neath Port Talbot County Borough Council Local Development Plan (2011 – 2026). Adopted January 2016.	Strategic Policy SP18: Renewable and Low Carbon Energy seeks to ensure that development will not have an unacceptable impact on the environment and amenity of local residents.
Neath Port Talbot County Borough Council Local Development Plan (2011 – 2026). Adopted January 2016.	Policy EN2: Special Landscape Areas introduces six Special Landscape Areas (SLAs) that have been defined across the Borough in order to protect areas of highest landscape quality. Renewable energy developments located within SLAs will need to demonstrate that component elements have been designed and sited to minimise visual intrusion and adverse landscape effects.
Neath Port Talbot County Borough Council Local Development Plan (2011 – 2026). Adopted January 2016.	Policy RE 1: Criteria for the Assessment of Renewable and Low Carbon Energy Development subparagraphs 4(a) and 4(b) state that all renewable energy development proposals minimise impacts on visual amenity and the natural environment, and will not result in unacceptable impacts on residential amenity.
Neath Port Talbot County Borough Council Supplementary Planning Guidance: Renewable and Low Carbon Energy. July 2017.	This document expands upon the Local Development Plan policies relating to Renewable and Low Carbon Energy including Policy RE1 and outlines how the relevant plan policies will be applied.
Neath Port Talbot County Borough Council Supplementary Planning Guidance: Landscape and Seascape. May 2018	This document expands upon Policy E2 of the Local Development Plan sets out the features and characteristics of each Special Landscape Area (SLA) defined within Neath Port Talbot.

Technical guidance

7.3.3 A summary of the technical guidance for the LVIA is given in **Table 7.3**.

Table 7.3 Technical guidance relevant to the LVIA

Technical guidance document	Context
Guidelines for Landscape and Visual Impact Assessment (Third Edition)²³	The third edition of this guidance (known as 'GLVIA3') which is produced by the Landscape Institute and Institute of Environmental Assessment is widely regarded by landscape and planning professions as the 'industry standard' together with best practice and professional experience. GLVIA3 provides the framework within which the remaining sections of the ES addendum have been undertaken with the detailed implications for the methodology by which the LVIA has been undertaken being set out in Section 5.9.
Using LANDMAP in Landscape and Visual Impact Assessments (GN46)²⁴	This guidance outlines Natural Resources Wales (NRW) advice on how LANDMAP information should be used in LVIA's. It sets out typical search and study area extents for a range of heights of tall structures and describes the filtering process that should be applied to existing LANDMAP evidence to help focus the detailed assessment of potentially sensitive landscape and visual receptors on the aspect areas most likely to be affected.
Visual Representation of Windfarms (Version 2.2)²⁵	This guidance is focussed on the production of visualisation-related materials to be included within an ES LVIA, made available to the public and to inform decision making. All wind farm applications requiring a Landscape and Visual Impact Assessment as part of an Environmental Impact Assessment should conform with the requirements set out within this document.
Visual Representation of Development Proposals²⁶	This Technical Guidance Note applies to visual representation of all forms of development. Paragraph 1.5.3 notes that the LI supports the Scottish Natural Heritage (now NatureScot) Guidance: <i>Visual Representation of Wind Farms v2.2²⁵</i> and that the <i>Visual Representation of Development Proposals</i> is broadly consistent with the guidance, particularly in respect of Type 4 Visualisation.
Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments²⁷	This guidance sets out advice on assessing cumulative landscape and visual impacts and is referenced in Chapter 7 of GLVIA3.
Technical Information Note - 2/2019. – Residential Visual Amenity Assessment²⁸	This technical information note summarises the requirement and stages of undertaking an Residential Visual Amenity Assessment (RVAA) that focuses upon private views and visual amenity in a manner that is beyond the type of visual assessment specified in GLVIA3. The approach set out facilitates the provision of an RVAA that can be used by a decision maker when weighing potential effects upon overall residential amenity in the planning balance.

²³ Landscape Institute and the Institute of Environmental Management and Assessment, (2013). *Guidelines for Landscape and Visual Impact Assessment. 3rd edition*. London. Routledge

²⁴ Natural Resources Wales. (2021). *Using LANDMAP in Landscape and Visual Impact Assessments GN46*. [online]. Available at: <https://naturalresourceswales.gov.uk/guidance-and-advice/business-sectors/planning-and-development/evidence-to-inform-development-planning/using-landmap-in-landscape-and-visual-impact-assessments-gn46/?lang=en> [Accessed 07 July 2021]

²⁵ Scottish Natural Heritage (now NatureScot). (2017). *Visual representation of wind farms: Guidance. Version 2.2*. [online]. Available at: <https://www.nature.scot/visual-representation-wind-farms-guidance> [Accessed 07 July 2021]

²⁶ Landscape Institute. (2019). *Technical Guidance Note 06/19 Visual Representation of Development Proposals*. London. Landscape Institute. [online]. Available at: <https://www.landscapeinstitute.org/visualisation/>

²⁷ Scottish Natural Heritage (now NatureScot). (2012). *Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments*. [online]. Available at: <https://www.nature.scot/doc/guidance-assessing-cumulative-impact-onshore-wind-energy-developments#Introduction+and+scope+of+this+guidance> [Accessed 07 July 2021]

²⁸ Landscape Institute (2019). *Technical Guidance Note 2/19 - Residential Visual Amenity Assessment*. [online]. Available at: <https://www.landscapeinstitute.org/technical-resource/rvaa/> [Accessed 07 July 2021]

7.4 Data gathering methodology

Definition of the Study Areas

- 7.4.1 The study areas used for the 2019 LVIA have been retained for this ES addendum. The study areas are:
- The defined study area; a site-centred 23km radius circle (2019 LVIA Figure 7.1) in accordance with Wales-specific advice provided by NRW; and
 - The detailed study area; a site-centred 15km radius circle (2019 LVIA Figure 7.1) in accordance with Wales-specific advice provided by NRW.

Desk study

- 7.4.2 Sources of information used for this addendum are the same as those listed in Table 7.2 of the 2019 LVIA.
- 7.4.3 Reference has also been made to the previous LVIA contained within the ES and associated technical appendices (24311rr073i1, Amec Environment & Infrastructure Ltd²⁹, 2014) submitted under application number P2014/0825 in 2014.

Zones of Theoretical Visibility (ZTVs)

- 7.4.4 The changes to the Proposed Development since the 2019 ES involve the reduction of the proposed number of turbines from 11 to 8, a reduction in hub height from 100m to 78.5m for Turbines 5, 6, 9, 10 and 11, and to 86.5m for Turbines 1, 2 and 8. For all turbines, there would be no change to the blade tip height of 145m. As a result, any ZTVs of the Proposed Development would show either no change or a reduction in the number of turbines visible in comparison with those produced for the 2019 ES and therefore, no new ZTVs have been produced for this addendum. The 2019 ES ZTVs are shown in 2019 LVIA Figures 7.2 – 7.10.

Survey work

- 7.4.5 A number of site visits and photographic records were undertaken throughout 2012-2014 to inform the 2014 LVIA and were supplemented by a site visit undertaken in early February 2018 for the 2019 LVIA. No additional surveys have been undertaken for this addendum.

7.5 Overall baseline

- 7.5.1 The baseline conditions within the detailed and defined LVIA study areas are described in Section 7.5 of the 2019 LVIA.

7.6 Consultation

- 7.6.1 No further consultation has been undertaken in addition to that set out in Section 7.6 of the 2019 LVIA.

²⁹ Now Wood

7.7 Scope of the assessment

- 7.7.1 The aim of this assessment is to identify if the changes to the Proposed Development would result in any new likely significant effects in addition to those identified and described in the 2019 LVIA.

Spatial scope

- 7.7.2 The spatial scope of the landscape and visual impact assessment is unchanged from the 2019 LVIA. The study areas used are:
- The defined study area; a site-centred 23km radius circle (2019 LVIA Figure 7.1); and
 - The detailed study area; a site-centred 15km radius circle (2019 LVIA Figure 7.1).

Temporal scope

- 7.7.3 The temporal scope of the assessment of landscape and visual effects covers the 25 year long operational period of the Proposed Development.
- 7.7.4 Given that the proposed amendments to the approved development would be likely to entail fewer construction activities in comparison to the proposals assessed by the 2014 and 2019 LVIA, no additional significant landscape or visual effects would arise during the construction period of the Proposed Development. Consequently, the construction period landscape and visual assessments are not repeated in this ES addendum chapter.

Potential receptors

- 7.7.5 The landscape and visual receptors relevant to this assessment are the same as those considered in the 2019 LVIA. These landscape and visual receptors are listed respectively in Appendices 7D and 7E of the 2019 LVIA.

Scoping of likely significant effects

- 7.7.6 As the area of land permanently occupied by the Proposed Development would be slightly reduced in comparison to the approved development (from 9.6ha to 6.5ha), no new significant effects would arise in relation to direct changes to the physical fabric of the landscape. Any potential new significant effects would therefore either be visual effects or effects on landscape receptors via a visual pathway.
- 7.7.7 With regard to potential receptors, consideration has been given to the potential for the proposed reduction in the number of turbines, reduction in the hub height of the turbines and increase in the rotor diameter of the turbines to give rise to increased levels of landscape or visual effect in comparison to those predicted for the approved development in the 2019 LVIA. The key consideration has been the potential for the proposed amendments to result in increased magnitudes of landscape or visual change such that some landscape or visual receptors who would not experience significant effects as a consequence of the operation of the approved development would experience significant effects as a consequence of the operation of the Proposed Development.
- 7.7.8 The landscape and visual receptors with the greatest potential to be in this situation would be:
- Landscape or visual receptors accorded high sensitivity who, in the 2019 LVIA, were assessed as experiencing a low magnitude of change and therefore a '*moderate*' level of effect that would be '*not significant*'. Any increase in the assessed magnitude of landscape or visual change

experienced by these receptors would result in a 'major' or 'moderate/major' level of effect that would be significant.

- Landscape or visual receptors accorded medium sensitivity who, in the 2019 LVIA, were assessed as experiencing a medium magnitude of change and therefore a 'moderate' level of effect that would be 'not significant'. Any increase in the assessed magnitude of landscape or visual change experienced by these receptors would result in a 'moderate/major' level of effect that would be significant.

7.8 Embedded environmental measures

- 7.8.1 The environmental measures embedded into the development proposals are unchanged to those set out in Section 7.8 of the 2019 LVIA.

7.9 Assessment methodology

- 7.9.1 The methodologies for the prediction of effects and the evaluation of significance are the same as those described in Section 7.9 of the 2019 LVIA. The matrix used to inform evaluations of significance is set out in **Table 7.4** below.

Table 7.4 Technical guidance relevant to the LVIA

	Magnitude of change			
	High	Medium	Low	Negligible
Sensitivity	High	Major (Significant)	Major (Significant)	Moderate (Not significant)
	Medium	Major (Significant)	Moderate (Not significant)	Minor (Not significant)
	Low	Moderate (Not significant)	Minor (Not significant)	Negligible (Not significant)

Note: Significant effects are those identified as 'Major'.

Table 7.4 indicates that in order for any additional likely significant effects to arise as a result of the Proposed Development, the magnitude of change sustained by High sensitivity receptors would need to increase from Low or Negligible to Medium or High, and that sustained by Medium sensitivity receptors would need to increase from Medium, Low or Negligible to High.

7.10 Assessment of effects

Baseline conditions

- 7.10.1 The baseline conditions within the detailed and defined LVIA study areas are described in Section 7.5 of the 2019 LVIA.

Predicted effects and their significance – viewpoint-based analysis

- 7.10.2 As described in paragraph 7.7.6, any potential new significant effects would either be visual effects or effects on landscape receptors via a visual pathway. In order to assess the potential for such

effects to arise, a comparative viewpoint analysis has been undertaken in relation to 15 of the 30 viewpoints included in the 2019 LVIA. These 15 viewpoints represent a selection of landscape and visual receptors, all of which are assessed as having High sensitivity to the Proposed Development and which were assessed in the 2019 LVIA as likely to sustain a Moderate or Major level of effect.

- 7.10.3 A detailed comparative analysis of each viewpoint is provided in Appendix 7A. Figures illustrating the wireframe views of the approved and Proposed Development from each of the 15 viewpoints included in the analysis are provided on Figures 7.1 to 7.15. A summary of the results of the comparative viewpoint analysis are set out in Table 7.5.

Table 7.5 Summary of comparative viewpoint analysis

Viewpoint No. and Title	Receptor	Sensitivity	2019 Assessment			Revised Assessment		
			Magnitude	Level of Effect:	Significance	Magnitude	Level of Effect:	Significance
Viewpoint 2: Afan Forest Park	Afan Woodland Walk	High	High	Major	Significant	No Change		
Viewpoint 3: Dyffryn	National Route 885 (majority of route between Maesteg and Croeserw)	High	Low/ Negligible	Moderate/ Minor	Not Significant	No Change		
	Residential Property Group G: Spelter south	High	Low	Moderate	Not Significant	No Change		
Viewpoint 4: Maes yr Awel, Eastern Edge of Caerau	Residential Property Group A: North-west Brynheulog (~14 properties to the north of the group)	High	High	Major	Significant	No Change		
Viewpoint 5: Nantyffyllon	Nantyffyllon (beyond 1.5km)	High	Low, Negligible & None	Moderate, Minor & None	Not Significant	No Change		
	Residential Property Group K: Nantyffyllon south (~42 properties on Coronation Terrace and Garnwen Terrace)	High	Low	Moderate	Not Significant	No Change		
Viewpoint 9: Abercregan	Abercregan (24 properties)	High	High	Major	Significant	No Change		
Viewpoint 10: Maesteg Golf Course	Maesteg Golf Course	High	Medium	Major	Significant	No Change		
Viewpoint 11: Blaencaerau Estate, Western Edge of Caerau	Caerau (11 properties on Blaencaerau Estate)	High	Medium	Major	Significant	No Change		
Viewpoint 12: Junction of Commercial Street and Talbot Street	Maesteg – town centre	High	Low, Negligible & None	Moderate, Minor & None	Not Significant	Negligible & None	Minor & None	Not Significant
Viewpoint 13: Maesteg Comprehensive School	Maesteg – north of Afon Llynfi	High	Low, Negligible & None	Moderate, Minor & None	Not Significant	No Change		
Viewpoint 14: Picnic Area, Bryn	Bryn (elevated properties to the south-east)	High	Low	Moderate	Not Significant	No Change		

Viewpoint No. and Title	Receptor	Sensitivity	2019 Assessment			Revised Assessment		
			Magnitude	Level of Effect:	Significance	Magnitude	Level of Effect:	Significance
Viewpoint 15: Commercial Street, Maesteg	Maesteg – south of Afon Llynfi	High	Low, Negligible & None	Moderate, Minor & None	Not Significant	No Change		
Viewpoint 16: Heol y Llwyni, Garth	Maesteg - Garth	High	Low, Negligible & None	Moderate, Minor & None	Not Significant	No Change		
Viewpoint 19: Glyncorrwg	Mynydd Corrwg Fechan	High	Low	Moderate	Not Significant	No Change		
Viewpoint 21: Ridgewood Gardens, Cimla	Cimla	High	Low, Negligible & None	Moderate, Minor & None	Not Significant	No Change		
Viewpoint 22: Prow, West of Coytrahen	Mynydd Ty-talwyn, Mynydd Baedan	High	Low	Moderate	Not Significant	No Change		

7.11 Conclusions of significance evaluation

- 7.11.1 The comparative viewpoint analysis summarised in Table 7.5 has found that the Proposed Development would result in no change to the level of effect predicted for the approved development in relation to 14 of the 15 viewpoints assessed. For one viewpoint, Viewpoint 12, the analysis has concluded that the maximum level of effect would reduce from Moderate to Minor. In relation to all viewpoints, it was considered that the amendments to the approved development would result in an improvement to the appearance of Foel Trawsnant Wind Farm, though in most instances this was not pronounced enough to alter the predicted magnitude of change.
- 7.11.2 The reasons for the improved appearance of the Proposed Development in comparison with the approved development are:
- The reduction in the number of proposed turbines from 11 to 8 consistently reduces the number of turbines visible in views, with the number of blade tips visible reducing by at least one in all views and by three in eight views.
 - The lowering of the hub height of the proposed turbines from 100m to 86.5m (three turbines) and 78.5m (five turbines) reduces the number of hubs visible. This is in addition to the reduction of hubs visible due to the removal of Turbines 3, 4 and 7. For example at Viewpoints 4, 10 and 11, where, whilst the number of visible blade tips is reduced by three due to the smaller number of proposed turbines, the number of visible hubs is reduced by five due to the hubs of two of the retained turbines dropping below the horizon.
 - The lowering of the hub height also has the effect of lowering the point of visual focus of the turbines so that, notwithstanding that the blade tip height is unchanged at 145m, the turbine hubs are closer to the horizon and the relative prominence of turbines can be reduced in comparison with the approved development.
 - The combination of lower hub height and increased rotor diameter results in the proportions of individual turbines appearing more balanced, particularly where a large proportion of the turbine tower is visible.
 - The combination of reduced numbers of turbines and the changes to their proportions often results in a less cluttered and more balanced overall composition of the visible array.
- 7.11.3 Whilst it is noted that the increased rotor diameter of the Proposed Development would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc, it is considered that this is more than compensated for by the positive factors noted above.
- 7.11.4 The increase in rotor diameter can result in a slight increase in the overall horizontal field of view occupied by the Proposed Development. This is most pronounced at Viewpoint 2, where the horizontal field of view would increase by approximately 1.7° from 26° to 27.7°. At the other viewpoints where the horizontal field of view would increase, this would be by 0.7° at Viewpoint 4 and by half a degree or less at another seven viewpoints. Conversely, the reduction in the number of turbines can result in a reduction of the horizontal field of view occupied by the Proposed Development in views where Turbines 3, 4 or 7 were previously located at the end of the visible array. This occurs at five viewpoints, with the largest reductions being 1.6° at Viewpoints 9 and 10. There is no change to the horizontal field of view at Viewpoint 19.
- 7.11.5 The factors described above explain why the amendments to the approved development would result in an improvement, however slight, to the appearance of Foel Trawsnant Wind Farm in all the viewpoints assessed. In the light of these findings, it is considered that whilst the amendments to the approved development may, in some circumstances, be sufficiently pronounced to result in a

reduction to the level of effect assessed in relation to the approved scheme (e.g. as at Viewpoint 12), it is highly unlikely that there are any circumstances in which the Proposed Development could result in an increase to the level of effect assessed in relation to the approved scheme. It is therefore concluded that the Proposed Development would not result in any receptors experiencing significant landscape or visual effects in addition to those previously identified in relation to the approved development.

7.12 Implementation of environmental measures

- 7.12.1 **Table 7.6** describes the environmental measures embedded within the Proposed Development and the means by which they will be implemented, i.e. they will be secured through planning conditions and a CEMP.

Table 7.6 Summary of environmental measures relevant to landscape and visual to be implemented

Environmental measure	Responsibility for implementation	Compliance mechanism
Design and selection of security lighting components at the construction compound	Developer/Contractor	CEMP
Turbine colour	Developer/Contractor	Planning condition

8. Historic Environment

- 8.1.1 Detailed assessment of the effects of the Proposed Development on the historic environment have been scoped out of this ES addendum following review of the proposed changes to the approved development, the historic environment baseline, the policy and statutory context.
- 8.1.2 Chapter 8 of the 2019 ES concluded that, subject to the implementation of the environmental measures set out in Section 8.8 of the chapter, the approved development would not result in any significant direct effects resulting from the disturbance to archaeological remains during the construction phase. There are a number of identified historic assets within the planning boundary, but the avoidance of known assets outside of the development footprint and provision for an archaeological watching brief will avoid any significant effects.
- 8.1.3 An assessment of effects on the settings of off-site historic assets was also completed, with a number of scheduled monuments identified as being potentially subject to significant effects. It was concluded that none of these would be subject to a significant adverse effect.
- 8.1.4 Effects on the Mynydd Margam Landscape of Special Historic Interest were assessed through the completion of an ASIDOHL (Appendix 8A of the 2019 ES). This concluded that the development would have a slight impact (using the terminology in the ASIDOHL guidance) on the character of the historic landscape as a whole. In EIA terms, this would not be significant.
- 8.1.5 The site access tracks, hardstandings, foundations and laydown areas for the Proposed Development will not extend beyond areas previously assessed. The visual effects resulting from changes in the proportion of blade to tower will not change the conclusions of likely impacts to setting which are recorded in the 2019 ES. The height to blade tip of the turbines will not change.
- 8.1.6 It is therefore concluded that the Proposed Development would not give rise to any additional effects on the historic environment as compared to the approved development and the conclusions of the 2019 ES that there would be no significant effects on the Historic Environment are therefore unchanged.

9. Non-Avian Ecology

9.1 Introduction

- 9.1.1 This chapter of the ES addendum assesses the potentially significant effects of the Proposed Development with respect to Non-Avian Ecology. The chapter should be read in conjunction with the development description provided in Chapter 5.
- 9.1.2 The results of the ecological impact assessment for the approved development are presented in Chapter 9: Non-Avian Ecology of the 2019 ES (Doc. Ref 40217rr066i1) and includes the following appendices:
- Appendix 9A: Baseline Ecological Report;
 - Appendix 9B: Baseline Bat Report; and
 - Appendix 9C: Outline Habitat Management Plan.
- 9.1.3 Chapter 12: Water Resources and Ground Conditions was a core chapter relating the non-avian ecology in the 2019 ES. The 2019 ES is an update to the 2014 ES (Amec 2014; Ref 24311rr073i) ³⁰; and 2016 Further Ecological Information (Amec Foster Wheeler 2016; Ref 24311rr120i1) ³¹, which provided supplementary environmental information and will hereafter referred to as the 'SEI Report'.
- 9.1.4 No significant effects or significant cumulative effects on any important ecological features were predicted to occur by either the 2019 ES, 2014 ES and 2016 SEI Report.
- 9.1.5 The Proposed Development seeks to vary planning condition 3 of the Decision Notice ('List of Approved Plans') to allow a change in turbine dimensions, with three turbines having a 117m rotor diameter, with a hub height of 86.5m and blade length of 58.5m (Turbines 1, 2 and 8) and five turbines having a 133m rotor diameter, with a hub height of 78.5m and blade length of 66.5m (Turbines 5, 6, 9, 10 and 11). Proposals, therefore, relate to the delivery and construction of 8 turbines.
- 9.1.6 Throughout this chapter, 'the Proposed Development site' refers to the area within the red line boundary (the planning boundary). The wider site is referred to as the 'site boundary' which refers to the area within the pink line boundary on Figures 9.1 to 9.4 encompassing land that is under the Applicant's control.

Limitations of this assessment

- 9.1.7 The following surveys undertaken as part of the 2019 ES are over two years old, having been undertaken in 2018:
- NVC and Botanical Survey;
 - GCN HSI and eDNA;

³⁰ Amec (2014). *Foel Trawsnant Wind Farm Environmental Statement Volume 1: Chapter 9, Ecology and Nature Conservation*. Report produced by Amec Environment and Infrastructure UK Limited for Pennant Walters Limited, July 2014 (Doc Ref. 24311rr073i1).

³¹ Amec Foster Wheeler (2016). *Foel Trawsnant Wind Farm, Further Ecological Information*. Report produced by Amec Foster Wheeler Environment and Infrastructure UK Limited for Pennant Walters Limited, July 2016 (Doc. Ref. 24311rr120i1).

- Otter and Water Vole surveys; and
- Bat preliminary roost assessment, activity surveys and static detector surveys.

- 9.1.8 An updated desk study was undertaken in March 2022 and an Extended Phase 1 Verification survey was undertaken on 15 February 2022 which confirmed that the site habitats remain fundamentally the same, and it is therefore considered that there is no reason to assume that the other baseline data would change significantly.
- 9.1.9 On this basis it is considered that there are no limitations relating to this Non-Avian Ecology ES addendum chapter that affect the robustness of the assessment of the potential likely significant effects of the Proposed Development.

9.2 Policy and legislative context

Planning policy

- 9.2.1 A summary of the relevant national and local planning policy is provided in **Table 9.1**. Since the 2019 ES two new National Planning Policies have been published: *Future Wales: The National Plan 2040* and *Planning Policy Wales* (11th Ed.; 2021). These have both been considered in the ES addendum.

Table 9.1 National and local planning policy considered in relation to non-avian ecology

Policy	Policy Context
National Planning Policy	
Future Wales: The National Plan 2040³²	The Welsh national development framework sets the direction for development in Wales to 2040 and includes a Habitats Regulations Assessment. Policy 9 – Resilient Ecological Networks and Green Infrastructure outlines measures to ensure the enhancement of biodiversity, the resilience of ecosystems and the provision of green infrastructure.
Planning Policy Wales – Chapter 6 Distinctive and Natural Places (11th Ed.; 2021)³³	Chapter 6 of Planning Policy Wales (PPW) sets out the Welsh Government’s objectives for Distinctive and Natural Places theme of planning policy topics covers historic environment, landscape, biodiversity and habitats, coastal characteristics, air quality, soundscape, water services, flooding and other environmental (surface and sub-surface) risks. In particular, the Biodiversity and Resilience of Ecosystems section puts emphasis on planning authorities to have regard for the State of Natural Resources Report (SoNaRR) and Area Statements published by Natural Resources Wales.

³² Future Wales; National Development Framework (February 2021) *Future Wales: The National Plan 2040*. Available at: <https://planningaidwales.org.uk/future-wales-the-national-plan-2040>. [Accessed 25/02/2021].

³³ Welsh Government (2021) *Planning Policy Wales, Edition 11, February 2021* Available at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf. [Accessed 25/02/2021]

Policy	Policy Context
Technical Advice Note (TAN) 5: Nature Conservation and Planning (2009)	TAN5 provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity conservation within Wales. It sets out the key principles of planning for nature conservation for both local development plans and when deciding planning applications that may affect nature conservation. These include: • promoting the conservation and enhancement of statutorily designated areas and undeveloped coast; • ensuring that appropriate weight is attached to designated sites of international, national and local importance; • protecting wildlife and natural features in the wider environment; • ensuring that all material considerations are taken into account and decisions are informed by adequate information about the potential effects of development on nature conservation; • ensuring that the range and population of protected species is sustained; and; • avoiding harm to nature conservation, minimising unavoidable harm by mitigation measures, offsetting residual harm by compensation measures and looking for new opportunities to enhance nature conservation.
Local planning policy	
Neath Port Talbot Local Development Plan 2011-2026 (NPT LDP)	Policy SP15 (Biodiversity & Geodiversity) sets out the approach to the protection, conservation, enhancement and management of important habitats, species and sites of geological importance. Important habitats, species and sites of geological interest will be protected, conserved, enhanced and managed through the following measures:
Policy SP15 (Biodiversity & Geodiversity)	1. The identification of the following Internationally and Nationally designated sites within the County Borough to enable their protection: (a) Special Areas of Conservation (SACs) and Ramsar Sites; (b) Sites of Special Scientific Interest (SSSIs); (c) National Nature Reserves (NNRs). 2. The identification and protection of sites of regional and local importance. 3. The protection of important natural heritage features.
NPT LDP	Policy EN 6 (Important Biodiversity and Geodiversity Sites) states that proposals that would affect Regionally Important Local Nature Reserves (LNRs), Sites of Interest for Nature Conservation (SINCs), sites meeting SINC criteria or sites supporting Local Biodiversity Action Plan (LBAP) or S7 Environment (Wales) Act 2016 habitats or species, will only be permitted where they conserve and where possible, enhance the importance of the site, or the development could not reasonably be located elsewhere. Mitigation/compensation will need to be agreed where adverse effects are unavoidable.
NPT LDP	Policy EN 7 (Important Natural Features). Development proposals that would adversely affect ecologically or visually important natural features such as trees, woodlands, hedgerows / field boundaries, watercourses or ponds will only be permitted where:
Policy EN 7 (Important Natural Features)	1. Full account has been taken of the relevant features in the design of the development, with measures put in place to ensure that they are retained and protected wherever possible; or 2. The biodiversity value and role of the relevant feature has been taken into account and where removal is unavoidable, mitigation measures are agreed.
NPT LDP	The Biodiversity and Geodiversity: Supplementary Planning Guidance (SPG) was adopted by Neath Port Talbot County Borough Council in May 2018. The SPG sets out guidance for interpretation of the biodiversity and geodiversity policies of the LDP (SP15: Biodiversity and Geodiversity; EN6: Important Biodiversity and Geodiversity Sites and EN7: Important Natural Features). The SPG sets out an approach to consider biodiversity holistically in the application process.
Supplementary Planning Guidance (SPG) – Biodiversity and geodiversity (2018)	

Legislative context

9.2.2 The following legislation has been considered in the assessment of the effects on ecological features³⁴, with the legislation remaining the same as the 2019 ES:

- The Conservation of Habitats & Species Regulations 2017 (as amended)³⁵;
- Wildlife and Countryside Act 1981 (as amended)³⁶;
- The Environment (Wales) Act 2016³⁷;
- Natural Environment and Rural Communities Act 2006 (NERC Act)³⁸;
- Protection of Badgers Act 1992³⁹;
- Hedgerows Regulations 1997⁴⁰;
- National Parks and Access to the Countryside Act 1949 (as amended)⁴¹; and
- Countryside and Rights of Way Act 2000 (CRoW Act)⁴².

Technical guidance

9.2.3 Publications that provide guidance that is relevant to the assessment of potentially significant effects on ecological features includes:

- Chartered Institute of Ecology and Environmental Management (CIEEM, 2019)⁴³. *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Version 1.1 Updated September 2019.

³⁴ The Chartered Institute for Ecology and Environmental Management (CIEEM) refer to biodiversity receptors within technical guidance as ecological features. This term is therefore used in this chapter in place of 'receptors' but for the purposes of the assessment they are the same

³⁵ Conservation of Habitats and Species Regulations 2017 ("the Habitats Regulations") has been amended by (inter alia) the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 [online]. Available at: <https://www.legislation.gov.uk/ukdsi/2019/9780111179512/contents?sort=year> [Accessed 25/02/2022].

³⁶ The Wildlife And Countryside Act 1981 (as amended) <https://www.legislation.gov.uk/ukpga/1981/69> [Accessed 25/02/2022].

³⁷ The Environment (Wales) Act 2016. Available at: <https://www.legislation.gov.uk/anaw/2016/3/contents> [Accessed 25/02/2022].

³⁸ NERC Act 2006 Available at: <https://www.legislation.gov.uk/ukpga/2006/16/contents> [Accessed 25/02/2022].

³⁹ Protection of Badgers Act 1992. Available at:

<https://www.legislation.gov.uk/ukpga/1992/51/introduction/enacted?view=plain> [Accessed 25/02/2021].

⁴⁰ The Hedgerows Regulations 1997 Available at: <https://www.legislation.gov.uk/uksi/1997/1160/contents/made> [Accessed 25/02/2022].

⁴¹ National Parks and Access to the Countryside Act 1949 (as amended). Available at: <https://www.legislation.gov.uk/ukpga/Geo6/12-13>

14/97#:~:text=An%20Act%20to%20make%20provision,and%20improvement%20of%20public%20paths [Accessed 25/02/2022].

⁴² Countryside and Rights of Way Act 2000 (<https://www.gov.uk/guidance/open-access-land-management-rights-and-responsibilities>) [Accessed 25/02/2022]

⁴³ Chartered Institute of Ecology and Environmental Management (CIEEM 2019). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Version 1.1 Updated September 2019. Available at: <https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.1Update.pdf> [Accessed 25/02/2022].

9.3 Data gathering methodology

Study area

- 9.3.1 The site boundary, planning boundary, and study areas remain the same as the 2019 ES (see 2019 ES Figures 9.1 – 9.4).
- 9.3.2 As with the 2019 ES, the search areas were defined on a precautionary basis to ensure that the Zones of Influence (Zol)⁴⁴ relevant to each ecological feature were covered during baseline data collection activities.

Desk study

- 9.3.3 A data-gathering exercise was undertaken in March 2022 which included a review of:
- European protected sites within 10km of the planning boundary (see Box 1 **Appendix 9A**);
 - SSSIs within 2km of the planning boundary (see Box 1 **Appendix 9A**);
 - Other statutory and non-statutory sites designated for their nature conservation interest within 2km of the planning boundary (see Box 1, **Appendix 9A**);
 - protected species, species of principal importance for the conservation of biodiversity (see Box 2, **Appendix 9A**), or other conservation-notable species recorded within 2km of the planning boundary;
 - habitats of principal importance for the conservation of biodiversity (see Box 2 **Appendix 9A**), or other conservation-notable habitats recorded within 2km of the planning boundary;
 - known bat roosts within 10km, reflecting current guidance;
 - landscape features that may be important for protected or conservation-notable species, such as potential migration or dispersal routes; and
 - ponds and other waterbodies within 500m of the planning boundary.
- 9.3.4 The methods and results of the desk study update are outlined in **Appendix 9A**.

Survey work

- 9.3.5 **Table 9.2** provides a list of ecological surveys carried out to inform the preparation of this ES addendum chapter. The methods and results of the February 2022 Phase 1 habitat verification survey are provided in **Appendix 9A**. The previous ecological baseline surveys are provided in the 2019 ES (Wood, 2019)⁴⁵, 2014 ES (Amec, 2014)³⁰, along with supplementary ecological information provided in the 2016 SEI Report (Amec Foster Wheeler, 2016)³¹.

⁴⁴ The Zol in this context is the area over which an individual ecological feature may be subject to a potentially significant effect as a result of the proposed development.

⁴⁵ Wood (2019) *Foel Trawsnant Wind Farm Amended Scheme. Environmental Statement: Non-Avian Ecology*. Doc Ref. 40217rr066i1. Report produced by Wood PLC for Pennant Walters (FoelT) Limited.

Table 9.2 Baseline Survey work to date

Feature / Aspect	Survey type and relevant guidelines*	Survey area	Survey period	Location of survey report
Habitats	Phase 1 habitat survey verification (JNCC, 2010) ⁴⁶	Planning boundary plus 50m	15 February 2022	Appendix 9A
Habitats	Phase 1 habitat survey (JNCC, 2010) ⁴⁶	Site boundary plus 50m**	27 – 29 Mar 2018	2019 ES: Appendix 9A
Habitats	Phase 1 habitat survey verification (JNCC, 2010) ⁴⁶	Planning boundary plus 50m	15 – 17 Aug 2018	2019 ES: Appendix 9A
Habitats	National Vegetation Classification (Rodwell, 2006) ⁴⁷	Planning boundary plus 85m at turbines, 25m on tracks	15 – 17 Aug 2018	2019 ES: Appendix 9A
Plant species	Botanical survey	Access track between the B4282 and site boundary, plus 10m.	15 – 17 Aug 2018	2019 ES: Appendix 9A
Great crested newt	Habitat Suitability Index (Oldham et al., 2000) ⁴⁸	All ponds within 500m of the planning boundary.	27 – 29 March 2018.	2019 ES: Appendix 9A
Great crested newt	Environmental DNA (Biggs et al., 2015) ⁴⁹	All ponds within 500m of the planning boundary, unless dry.	19 April 2018.	2019 ES: Appendix 9A
Otters	Searches for signs (Natural England and DEFRA, 2014) ⁵⁰	Within the site boundary.	Four visits Mar – Sep 2018	2019 ES: Appendix 9A
Water voles	Searches for signs (Strachan & Moorhouse, 2006) ⁵¹	Within the site boundary.	Three visits May – Sep 2018	2019 ES: Appendix 9A

⁴⁶Joint Nature Conservation Committee (2010). *Handbook of Phase 1 habitat survey – a technique for environmental audit*. JNCC, Peterborough.

⁴⁷Rodwell J.S. (2006). *National Vegetation Classification Users' handbook*. Joint Nature Conservation Committee, Peterborough.

⁴⁸Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). *Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus)*. Herpetological Journal 10 (4), 143-155.

⁴⁹Biggs J., Ewald N, Foster J, Valentini A, Gaboriaud C, Dejean T, Griffiths RA, Wilkinson JW, Arnell A, Brotherton P, Williams P & Dunn F (2015). *Using eDNA to develop a national citizen science-based monitoring programme for the great crested newt (Triturus cristatus)*. Biological Conservation 183, 19-28.

⁵⁰Natural England and Department for Environment Food and Rural Affairs (2014). *Guidance. Otters: surveys and mitigation for development projects. Standing advice for local planning authorities to assess the impacts of development on otters*. Available at: <https://www.gov.uk/guidance/otters-protection-surveys-and-licences>. [Accessed 15/03/2022].

⁵¹Strachan, R. and Moorhouse, T. P., (2006). *Water Vole Conservation Handbook (Second Edition)*, the Environment Agency and the Wildlife Conservation Research Unit, Oxford.

Feature / Aspect	Survey type and relevant guidelines*	Survey area	Survey period	Location of survey report
Bats	Activity surveys (static and transects) (Bat Conservation Trust 2016; Hundt 2012; Natural England 2014) ^{52,53&54} .	Within the site boundary.	April – October 2018 Preliminary roost assessment to 200m. Static detectors were placed over seven months, at 9 locations months (between April – October 2018 inclusive) recording for 5 nights at each location. Along with two transect surveys each of the seven months between April-October 2018 with a dusk activity survey each month and one dawn survey following the dusk survey in July.	2019 ES: Appendix 9B

* Surveys were based on the standard guidelines referenced (where available); the precise scope of the surveys and any deviations from guidance are set out in **2019 ES Appendices 9A – 9B**, although there were no significant deviations from guidance that might influence the characterisation of the baseline.

**Where access was permitted and possible.

9.4 Summary of Overall baseline

- 9.4.1 The overall baseline remains for the most part the same as the 2019 ES with a summary of the minor changes provided below. The 2022 desk study, Phase 1 verification survey and baseline review is provided in **Appendix 9A**, and additional baseline information provided in 2019 ES Appendix 9A and 9B.

Current baseline

- 9.4.2 A review of current baseline was undertaken in February and March 2022 and is set out below.

Planning boundary and surrounding habitats

- 9.4.3 In February 2022, aerial photography was used to review habitat changes within the planning boundary and immediate surrounding area, these remained unchanged. The February 2022 Phase 1 verification survey found the habitats to be mostly as per the 2019 ES, with the principal change being the thinning-out of the coniferous plantation woodland immediately adjacent to the access track, between target notes TN7 and TN8 (**Figure 9.3**), and associated impacts including the creation of areas of bare ground and siltation of ponds P3 and P4 from run off. The ditch along the access road has been reprofiled. No additional forestry felling was observed.

⁵² Bat Conservation Trust (2016). *Bat Surveys for Professional Ecologists. Good Practice Guidelines (3rd Edition)*. BCT, London.

⁵³ Hundt, L., (2012) *Bat Surveys Good Practice Guidelines (2nd Edition)*. BCT, London.

⁵⁴ Natural England (2014). *Bats and onshore wind turbines: interim guidance, 3rd edition*. Natural England Technical Information Note TIN051.

Designated Sites

9.4.4 **Table 9.3** provides a review of designated sites (**Figures 9.1 and 9.2**). No additional sites were considered to be relevant to this application. There are no Tree Preservation Orders on or adjacent to the planning boundary.

Table 9.3 Review of Designated Sites

	2018 Desk Study (2019 ES)	2022 Review
Designated Sites	There are three statutory designated nature conservation sites (two SACs and one LNR) and 17 non-statutory nature conservation sites (16 SINC and one Country Park) within the study area. The following sites are considered particularly relevant to this application: - Nant-y-Crywydd SINC (immediately adjacent to the planning boundary); - NPT 'Watercourses' SINC (within the planning boundary); and - Caerau West SINC (immediately adjacent to the planning boundary).	There are three statutory designated nature conservation sites (two SACs and one LNR). There is still one Country Park and the SINC have largely remained the same, with a couple of minor exceptions: - The Dyffryn Grassland SINC (which was noted in the 2018) has been removed as a SINC and this area has been incorporated in the Afan Mineral Railway SINC. - The Bryn Goytre Cycleway SINC is new and located 1.4km south-west. - NPT have designated all Ancient Semi-Natural Woodland (ASNW) as ASNW SINC, which have remained in the same location with the closest of these being 0.39km west of the site⁵⁵. There are no pathways by which the new sites could be affected by the Proposed Development. The key sites that are relevant to the application remain as per 2018.

Habitats

9.4.5 **Table 9.4** provides a summary of the S7 priority habitat areas within the planning boundary based on the February 2022 Phase 1 verification survey (**Figure 9.3**).

Table 9.4 Summary of Section 7 Habitats present within the planning boundary

Phase 1 Habitat	S.7 Priority Habitat*	Summary	~Area in planning boundary**
Improved grassland	N/A	2019 ES: improved grassland was found within the planning boundary at Turbines 1, 7 and 4. In addition, improved grassland was also present north of Turbine 2, south of Turbine 3 and north of Turbine 11. In these areas the sward was dominated by species such as perennial rye-grass (<i>Lolium perenne</i>), crested dogs-tail (<i>Cynosurus cristatus</i>) and white clover (<i>Trifolium repens</i>) which are all typical of a sward dominated by grasses. These areas correspond to the NVC community MG6b (see 2019 ES Chapter 9: Appendix 9A.3). These areas were previously classified as semi-improved acid grassland or poor semi-improved grassland but the area generally lacks forbs and has been classed as improved grassland. 2022 ES: no change in the condition or value of the habitat. Summary remains the same except for Turbines T3, T4 and T7 which no longer form part of the Proposed Development. Area within planning boundary remains the same.	18.27 ha

⁵⁵ The 2019 ES listed one ASNW SINC for all of the ASNW sites, with all ASNW sites being shown in Figure 9.2. The individual number of ASNW SINC is unknown due to undefined boundaries.

Phase 1 Habitat	S.7 Priority Habitat*	Summary	~Area in planning boundary**
Semi-improved acid grassland	N/A	2019 ES: areas of semi-improved acid grassland are present within the planning boundary, and this habitat is more extensive than previously noted as much of the 'marshy grassland' has been recategorized at turbine locations Turbines 6 and 5; and also south of T11. The semi-improved acid grassland is atypical as <i>Molinia</i> is over-represented, and so has some affinities with 'marshy grassland'; however, it is characterised as semi-improved acid grassland due to the presence of mat-grass (<i>Nardus stricta</i>) and general lack of species (other than <i>Molinia</i>) which would be associated with marshy grassland, such as soft rush (<i>Juncus effusus</i>), marsh thistle (<i>Cirsium palustre</i>) and marsh-bedstraw (<i>Galium palustre</i>). This corresponds to the NVC community U5d, based on the botanical assessment (see 2019 ES Chapter 9: Appendix 9A.3). Upland acid grasslands are not S.7 habitats, although may sometimes contribute the 'Upland heathland' S.7 habitat where they occur in mosaics with heathland habitats. 2022: no change in the condition or value of the habitat. Summary remains the same. Area within planning boundary remains the same.	8.4 ha
Wet heath	Upland heathland	2019 ES: areas of wet heath are present are present within the site boundary, and this habitat is more extensive than previously noted as much of the 'marshy grassland' east of the Nant yr Hwyaidd has been recategorized (at Turbines 10, 9 and 8). The habitat is characterised by constant but sparse heather (<i>Calluna vulgaris</i>), cross-leaved heath (<i>Erica tetralix</i>) and bilberry (<i>Vaccinium myrtillus</i>), all of which are indicative of heath vegetation. Cross-leaved heath in particular, is a strong indicator of wet heath on shallow peaty soils. This habitat was previously classified as marshy grassland due to the over representation of deer grass (<i>Trichophorum germanicum</i>) and <i>Molina</i> being more prominent than it should be within high quality or typical wet heath habitats. The habitat corresponds to the NVC community M15d, as per botanical assessment (see 2019 ES Chapter 9: Appendix 9A.3). Much of this area is under an agri-environment scheme which may possibly account for the perceived change from marshy grassland to wet heath, although the NVC communities in these areas are largely as previously recorded. 2022: no change in the condition or value of the habitat. Summary remains the same. Area within planning boundary remains the same.	10.25ha
Acid/neutral flush	Upland flushes, fens and swamps	2019 ES: generally consistent with the previous Phase 1, with minor increase in area of acid/neutral flush to north of Turbine 7. This habitat is present along the margins of a small stream extending up onto slightly higher but flushed ground. This corresponds to the NVC community M6c as per botanical assessment (see 2019 ES Chapter 9: Appendix 9B). The NVC noted that acid/neutral flushes are highly variable and are most diverse where the vegetation has been poached by livestock in very wet ground. Although soft-rush (<i>Juncus effusus</i>) is the dominant in all the acid/neutral flush habitats, the poaching at this locality maintains allows other species to thrive alongside it. 2022 ES: no change in the condition or value of the habitat. Summary remains the same, except for Turbine T7 no longer forming part of the Proposed Development. Area within planning boundary remains the same.	1.26 ha
Wet modified bog	Blanket bog	2019 ES: as per the Phase 1 within the 2014 baseline report. This habitat is present near a small stream and is often found in areas of high precipitation. These habitats are not well-developed. Common Cotton-grass (<i>Eriophorum angustifolium</i>) and purple moor grass are co-dominant and are associated with a range of species also present in the adjacent wet heath. This corresponds to the NVC community M17 as per botanical assessment (see 2019 ES Chapter 9: Appendix 9A.3). 2022: no change in the condition or value of the habitat. Summary remains the same. Area within planning boundary remains the same.	0.29 ha

Phase 1 Habitat	S.7 Priority Habitat*	Summary	~Area in planning boundary**
Marshy grassland	Upland flushes, fens and swamps	2019 ES: as per the Phase 1 within the 2014 baseline report. Marshy grassland was found within tracts of improved grassland on-site in areas of poor drainage, often, but not always in ditches and along track edges. Soft rush. The stands were often associated with soft rush and varying amounts of purple moor grass. There are small patches of marshy grassland along the access track. This corresponds to the NVC community M23b as per botanical assessment (see 2019 ES Chapter 9: Appendix 9A.3). 2022: summary remains the same. Area within planning boundary remains the same.	1.46 ha
Dry heath	Upland heathland	2019 ES: There are occasional very small localised patches of dry heath located along the access track on the edges of the coniferous woodland and upon a steep embankment where there is a rock exposure (TN7). Species included common heather (<i>Calluna vulgaris</i>); bilberry (<i>Vaccinium myrtillus</i>); and western gorse (<i>Ulex gallii</i>). 2022: no change in the condition or value of the habitat. Summary remains the same. Area within planning boundary remains the same.	0.25 ha
Ponds	Ponds	2019 ES: ponds 3, 4, 7 and 8 are located along the access track, these are likely to be outside of the vegetation clearance zone. 2022: no change in the condition or value of the habitat, other than P3 and P4 being subject to silt runoff. Area within planning boundary remains the same.	Outside vegetation clearance zone.
Watercourses	Rivers	2019 ES: stream (running water) present generally within areas of acid/neutral flushes. The 'Rivers' priority habitat does not apply to stream headwaters that are not "marked with a blue line on Ordnance Survey (OS) maps at a scale of 1:50,000" (JNCC 2011)¹⁰⁵, therefore the streams directly affected by the site infrastructure are not considered part of this classification. 2022: no change in the condition or value of the habitat. Summary remains the same. Area within planning boundary remains the same.	0.007 ha
Coniferous woodland plantation	N/A	2019 ES: located along the margins of the access track and to the south of the access track. 2022: no change in the condition or value of the habitat. Summary remains the same. Area within planning boundary remains the same.	0.83 ha
Broadleaved plantation woodland	N/A	2019 ES: two small areas of broadleaved plantation woodland consisting of sessile oak (<i>Quercus petraea</i>), silver birch (<i>Betula pendula</i>) and small leaved lime (<i>Tilia cordata</i>) located to the south of the access track planted in 2014 TN8 and TN9). 2022: no change in the condition or value of the habitat. Summary remains the same – see TN1 and TN3. Area within planning boundary remains the same.	0.82 ha
Other habitats and features	N/A	2019 ES: other habitats included along the access track included rock exposures, wet ditches, scrub and tall ruderal vegetation. Scrub and bracken were also located adjacent to the road at the base of the access track. 2022: no change in the condition or value of the habitats other than an area of bare ground between TN7 – TN8 where coniferous woodland has been thinned. Area within planning boundary remains the same.	N/A
Other features	N/A	2019 ES: comprising of boundary fences, and tracks, as per 2014 ecological baseline report. 2022: summary remains the same. Area within planning boundary remains the same.	N/A

Note Importance of proposed development in relation to ecological features defined in the 2019 ES Chapter 9, Table 9.10.

Key:

* Corresponding S.7 habitat based on the S.7 lists and the criteria within the *UK Biodiversity Action Plan: Priority Habitat Descriptions* (JNCC 2011)¹⁰⁵.

** Approximate area within planning boundary.

9.4.6 **Table 9.5** shows the Section 7 habitats and corresponding Phase 1 habitats which remained the same during the February 2022 verification survey.

Table 9.5 Section 7 habitats (and corresponding Phase 1 habitats present within the site boundary)

S.7 Habitats	Phase 1 Habitats	Approximate areas (ha.) of S.7 habitats			
		Site boundary	Planning boundary	NPT**	Wales***
Upland flushes, fens and swamps†	Acid neutral flush Marshy grassland	4.47	2.72	(1,890 – 3,257)†	Not stated‡
Upland heathland††	Wet heath Dry heath	19.93	10.25	1,053††	79,000
Blanket bog	Wet modified bog	0.28	0.28	41††	56,200
Ponds	Ponds	-	-	-	-
Rivers	Watercourses	-	-	-	-

Table notes: Table remains the same and is provided in the 2019 ES.

* Corresponding Phase 1 habitat classifications present at the site, based on the S.7 lists and the criteria within the *UK Biodiversity Action Plan: Priority Habitat Descriptions* (JNCC 2011)¹⁰⁵.

**Based on the NRW *Phase 1 terrestrial habitat survey of Wales* dataset

*** Based on JNCC data (available at <http://jncc.defra.gov.uk>).

† The NRW dataset has substantial limitations when considering the 'Upland flushes, fens and swamps' priority habitat, particularly as this is often a localised community that overlaps substantially with other habitats. The area range provided is a very coarse estimate based on an analysis of the NRW data to identify mapped land parcels in NPT where one of the Phase 1 habitats forming the 'Upland flushes, fens and swamps' S.7 habitat (i.e. 'marshy grassland' (B5); 'flush and spring' (E2); 'fen' (E3); and 'swamp' (F1), based on JNCC(2011)) is either a dominant (1890 ha.) or secondary component (1367 ha.). However, these figures must be used very cautiously: most of these land parcels are complex upland mosaics and so deriving an accurate or reasonably robust figure is not possible as the assumptions would be significant and the fundamental issues of data age and reliability would remain. However, it is clear that some of the S.7 component habitats, particularly marshy grassland, are common and widespread in Wales and frequently overlap (spatially, and in terms of species composition) with other habitats that are characteristic of current or former peatlands.

†† The approximate areas for 'Upland heathland' and 'Blanket bog' in NPT are based on an analysis of the NRW data to identify mapped land parcels in NPT where one of the Phase 1 habitats forming these S.7 habitats is either a dominant or secondary component. As with the 'Upland flushes, fens and swamps' analysis these figures must be used cautiously.

Species

9.4.7 SEWBRc identified a total of 77 species records (excluding birds and bats) during the March 2022 desk study, none of which were identified on or immediately adjacent to the planning boundary. In 2018 a total of 37 protected and notable species were identified. Generally, the 2022 desk study identified many of the same species' records as for the 2018 and 2014 baseline reports and the 2016 SEI report, although it is worth noting that there are a number of additional invertebrate species which have been identified and a small number of additional plants, ferns and mosses. Mammals such as otter, badger and hare were not identified in the 2022 records. In the 2022 desk study, as with the 2018 desk study, four species of reptile (common lizard, grass snake, slow worm and adder) were recorded. As with the 2018 records, in March 2022 there were no records for Great Crested Newts within 2km of the planning boundary. None of the additional species identified in **Appendix 9A Table 9A1.3**, were considered to warrant additional survey work, with the species either likely to be present in low numbers, or unlikely to be present.

- 9.4.8 During the February 2022 Phase 1 verification survey the habitats remained the same as those reported in the 2019 ES. It is not anticipated that the species and their distribution across the Proposed Development site will have changed significantly (Appendix 9A).
- 9.4.9 The results of the 2022 Extended Phase 1 Verification Survey in relation to species or species group are summarised in Table 9.6.

Table 9.6 Summary of 2022 Extended Phase 1 Verification Survey of the planning boundary

Species	Survey	Summary
Badger	Extended Phase 1	No evidence of badgers found; habitats remain suitable, but this species is likely to be present at low densities only if at all. These results are consistent with previous surveys.
Water vole	Extended Phase 1 / searches for evidence	No evidence of water voles found. The habitats within the development area are not suitable for water vole and this species is considered to be absent from the site. These results are consistent with previous surveys.
Otter	Extended Phase 1 / searches for evidence	No evidence of otter was found; habitats within the development area are not particularly suitable for this species although it is likely that otters periodically cross the site when moving between river catchments. These results are consistent with previous surveys.
Bats (all species)	Extended Phase 1	There were no trees within or immediately adjacent to the planning boundary which had features suitable for roosting bats. There was no change in habitat with activity likely to remain closely associated with linear features (principally treelines), with activity in the open areas of the site much lower. These results are consistent with previous surveys.
Great crested newt	Extended Phase 1 / habitat assessment	No additional ponds were identified through OS mapping. All eight ponds identified within 500m were visited, no changes in the condition or value of the habitat were noted, other than P3 and P4 being subject to silt runoff, which is unlikely to significantly affect the pond ecosystem.
Reptiles (all species)	Extended Phase 1 / habitat assessment	Habitats remained the same during the Phase 1 verification survey. Reptiles are and were previously assumed to be present in areas of the site, but in relatively low densities compared to other areas locally. Most of the site habitats (including the access track) are suitable but 'sub-optimal' for high density populations. Note, although reptiles were assumed to be present at the site, specific surveys were not considered essential to assess the likely effects of the scheme adequately and robustly on reptiles, or to design appropriate mitigation that would ensure no significant effects on these species.

Bats

Site Habitats

- 9.4.10 Habitats remained the same during the February 2022 Phase 1 verification survey of the planning boundary and the bat roost records and species obtained from SEWBRc in March 2022 have not changed significantly (**Appendix 9A**). It is not anticipated that the bat data from preliminary roost assessments, activity transects and static detector surveys undertaken in 2010 (reported in 2014 ES), 2012/13 (reported in 2014 ES) and 2018 (reported in 2019 ES) will have significantly changed.

Desk Study Data: Designated Sites and Roosts

- 9.4.11 The 2022 March desk study found no designated sites for bats within 10km of the planning boundary that were either designated primarily for bats, or which are otherwise identified as being important for local bat populations.

- 9.4.12 The March 2022 SWEBReC data for bat roosts within 10km shows a total of 170 bat roosts (or potential roosts) within 10km of the planning boundary recorded since 2012 (last 10 years). The total number of roosts per species and nearest roost per species are shown in Table 9A1.4. Four 'high collision risk' species were identified roosting within 10km: common pipistrelle (within 3.5km), noctule (within 7.6km), Nathusius' pipistrelle (~7.8km from the site) and soprano pipistrelle (within 8km). One fairly notable record was for a large soprano pipistrelle roost (450 bats recorded) approximately 8.2km away.
- 9.4.13 The 2022 desk study data is generally very similar to the 2018 desk study data, with no bat roost records recorded within the planning boundary. The only differences were that the 2018 desk study data recorded fewer roosts (150 roost records) and that the 2022 desk study data recorded additional species (natterer's, whiskered and whiskered or Brandt's roosts).

Bat Community and Activity

- 9.4.14 The bat survey work undertaken in 2018 and reported in the 2019 ES followed the most recent guidance at that time (BCT, 2016)⁵². Subsequently more recent guidelines have been issued which include *Bats and Onshore Wind Turbines* (NatureScot *et al*, 2021)⁵⁶ which identifies the potential vulnerability of Welsh bat populations to wind farms, with common pipistrelle now categorised as a high collision risk species. The potential vulnerability of Welsh bat populations to wind farms in shown in **Table 9.7**.

Table 9.7 Level of potential vulnerability of Welsh bat populations to wind farms

Wales	Collision Risk			
Relative Abundance		Low collision risk	Medium collision risk	High collision risk
	Common species			Common pipistrelle Soprano pipistrelle
	Rarer species	Brown long-eared bat Daubenton's bat Natterer's bat Lesser horseshoe bat		
	Rarest species	Alcathoe's bat Bechstein's bat Brandt's bat Greater horseshoe bat Grey long-eared bat Whiskered bat	Barbastelle Serotine	Nathusius' pipistrelle Noctule Leisler's bat

Extracted from *Bats and Onshore Wind Turbines* (NatureScot *et al*, 2021)⁵⁶ Yellow = low population vulnerability, Orange = medium population vulnerability, Red = high population vulnerability.

- 9.4.15 **Table 9.8** shows the approximate proportion of contacts by species / species group for each survey year.

⁵⁶ NatureScot (Scottish Natural Heritage), Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (BCT) with input from other key stakeholders (August, 2021) *Bats and onshore wind turbines - survey, assessment and mitigation*. Available at: <https://www.nature.scot/doc/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation>. [Accessed 25/02/2022].

Table 9.8 Approximate proportion of contacts by species / species group for each survey year

Year and dataset	~Proportion of contacts by species / species group										
	CP	SP	CP/SP	CP/NP	NP	N	Nyc	NycSe	M	LE	Bat
2010 Transects	83.6%	5.4%	3.7%	-	-	1.9%	0.3%	-	3.3%	-	1.7%
2012/13 Transects	79.3%	13.8%	2.7%	-	-	-	0.6%	-	2.1%	-	1.5%
2018 Transects	87.9%	3.2%	-	4.5%	1.5%	0.1%	-	-	2.7%	0.1%	-
2012/13 Statics	89.67%	3.62%	-	-	-	1.47%	0.39%	-	4.73%	-	0.13%
2018 Statics	89.26%	1.48%	-	-	0.02%	0.60%	0.04%	0.01%	8.09%	0.50%	-

Key

SP – soprano pipistrelle; CP – common pipistrelle; NP – Nathusius' pipistrelle; M – *Myotis* sp.; N – Noctule; Nyc – *Nyctalus* sp.; NycSe – *Nyctalus* or *Serotine*; LE – long-eared bat; Bat – unidentified bat call.

9.4.16 Based on the new bat guidance (NatureScot *et al*, 2021)⁵⁶ the following species identified in the 2019 ES (Appendix 9B: Baseline Bat Report) now fall into the 'high risk' category (with the number of contacts / proportion of contact in 2018 based on static results noted⁵⁷):

- Common pipistrelle (10,092 contacts / 89.29%);
- Soprano pipistrelle (167 contacts / 1.48%);
- Nathusius' pipistrelle (2 contacts / 0.02%);
- Noctule (68 contacts / 0.6%);
- Noctule or potentially Leisler's bat, noted as *Nyctalus* sp. in the 2019 ES, (4 contacts / 0.04%); and
- Noctule or potentially Leisler's bat, noted as *Nyctalus* sp./serotine in the 2019 ES, (1 / 0.01%).

9.4.17 These five species (common pipistrelle, soprano pipistrelle, noctule, Nathusius' pipistrelle and potentially Leisler's bat) now form the majority of the bat community at the site, with common pipistrelle being attributed to the greatest proportion of the contacts (89.26% based on the 2018 static detector data). Habitats remain the same and activity is still likely to be very strongly associated with features that are known to be attractive to bats (woodland edges and linear features such as clearly defined watercourses), with 70 – 90% of contacts in each survey being recorded on detectors at these locations during the 2018 bat activity and static detector surveys.

Summary

9.4.18 In summary, the habitats remained the same during the February 2022 Extended Phase 1 verification survey as those surveyed for the 2019 ES. There is no reason to be believed that the findings of the 2019 ES have significantly changed. The 2019 ES found that the "the bat community

⁵⁷ Based on nine static locations, each recording for five nights over seven months (April – October 2018) i.e. 305 nights of data.

and its use of the site is unexceptional, and consistent with similar upland habitats and landscapes in South Wales. There is no indication that the site habitats provide a particularly unique or valuable resource in the local area, or that significant commuting routes cross the site. No roosts were identified on or in the immediate vicinity of the site, although it is likely that bats opportunistically roost in the woodlands near the site, based on occasional atypically early contact times. The importance of the site to bats, and of the bat community, is arguably 'negligible' only, although it is recognised that lower-quality upland habitats can sometimes be important for non-breeding bats that may be displaced from higher-quality areas near roosts by nursing females, and overall therefore the site (and its population) is considered to have a 'local' importance".

Predicted future baseline

- 9.4.19 The predicted future baseline remains the same as the 2019 ES and is unlikely to be markedly different from the current baseline, in the absence of the Proposed Development. Land use/management is anticipated to remain largely unchanged in the absence of development and it is therefore considered appropriate to use the current baseline for the purpose of this assessment.

9.5 Scope of assessment

- 9.5.1 The scope of this non-avian ecology assessment broadly follows the assessment methodology set out in the 2019 ES (Chapter 9: Non-Avian Ecology) with records to methods and criteria, including the CIEEM Guidelines (CIEEM, 2016). This assessment was based on the March 2022 Desk Study, February 2022 Extended Phase 1 Habitat Verification Survey (Appendix 9A) as well as other specific survey work detailed in 2019 ES.
- 9.5.2 In the 2019 ES the following ecological features were scoped in for detailed assessment of effects comprising: Watercourses SINC, Caerau West SINC, Nant-y-Crywydd SINC, Section 7 Habitats, Peat, Bats, Reptile and Brown Hare. No significant effects on these ecological features were predicted to occur within the assessments for the approved development reported in the 2019 ES, 2014 ES or 2016 SEI. An updated desk study was undertaken in March 2022 which identified no additional ecological features that need to be scoped into this assessment. The Extended Phase 1 verification survey undertaken in February 2022 identified no changes in habitats, which would significantly affect the scope of this assessment. Therefore, no new ecological features have been identified and the scope of this assessment remains the same as the 2019 ES.
- 9.5.3 However, the assessment has been revisited to address the proposed changes to the development which includes:
- Proposals to deliver and construct 8 of the 11 turbines approved by the original permission which will lead to the reduction in temporary and permanent site infrastructure; and
 - Increases in the rotor diameter and blade tip height of all of the 8 turbines.
- 9.5.4 The revised assessment also takes into account the categorisation of common pipistrelle as a high collision risk species (NatureScot et al., 2021) 56, previously being medium collision risk species (NE, 201454) in the 2019 ES.
- 9.5.5 Two ecological features namely 'Section 7 Habitats' and 'Bats' have been revisited to address the proposed changes to the scheme design and the categorisation of common pipistrelle as a high collision risk species.
- 9.5.6 There is no material difference in the predicted effects of the scheme design on the majority of other ecological features that were scoped into the 2019 ES which included: Watercourses SINC,

Caerau West SINC, Nant-y-Crynwydd SINC, Peat, Reptiles and Brown Hare, so these have not been assessed in detail but are summarised in Table 9.11.

9.5.7 The revised scheme infrastructure is shown in **Figure 9.4**.

9.6 Embedded environmental measures

9.6.1 A range of environmental measures were identified as being embedded into the development proposals as outlined in Chapter 9 of the 2019 ES. No additional measures or changes are proposed.

9.7 Assessment of effects

Section 7 Habitats

9.7.1 **Table 9.9** shows a reduction in the total area of the temporary and permanent site infrastructure from 9.6ha in the 2019 ES to 6.53ha in the Proposed Development. Furthermore, the approximate areas of Section 7 habitats that would be directly affected by temporary and permanent site infrastructure have been reduced from:

- Upland flushes, fens and swamps: 0.82ha (2019 ES) to 0.42 ha (2022 Proposed Development);
- Upland heathland: 3.12ha (2019 ES) to 2.73ha (2022 Proposed Development); and
- Blanket bog: 0.02ha (2019 ES) to 0ha (2022 Proposed Development).

9.7.2 The outline habitat management plan which details measures for the long-term management of the site post construction will remain unchanged (2019 ES Appendix 9C). All construction/decommissioning methods and programme will remain unchanged, with the reduced infrastructure likely to have a reduced impact on the effects relating to the Watercourses SINC, Caerau West SINC, Nant-y-Crynwydd SINC, Section 7 Habitats, Peat, Reptile and Brown Hare. The effects on these ecological features reported in the 2019 ES are predicted to remain unchanged or be reduced (and not significant) in respect of the Proposed Development and this further detailed consideration is not required.

Table 9.9 Approximate areas of Section 7 habitats (and corresponding Phase 1 habitats) that are directly affected by temporary and permanent site infrastructure

Infrastructure	Upland flushes, fens and swamps						Upland heathland				Blanket bog	
	2019 ES Total area of infrastructure*	Proposed Development Total area of infrastructure	2019 ES Marshy grassland	Proposed Development Marshy grassland	2019 ES Acid Neutral Flush	Proposed Development Acid Neutral Flush	2019 ES Wet heath	Proposed Development Wet heath	2019 ES Dry Heath	Proposed Development Dry Heath	2019 ES Wet modified bog	Proposed Development Wet modified bog
Combined site tracks, tracks and turbine verges and track batters.	6.77	4.19	0.35	0.24	0.25	0.01	1.87	1.70	-	-	0.02	-
Turbine bases	0.44	0.32	0.04	0.03	0.01		0.12	0.12	-	-	-	-
Crane pads	1.07	0.71	0.11	0.04	-		0.27	0.27	-	-	-	-
Substation	0.16	0.16	-		-		0.16		-	-	-	-
Site compound†	1.15	1.14	0.10	0.10	-		0.69	0.64	-	-	-	-
Attenuation waterbody†**	0.01	0.01	-	-	-	-	0.01	-	-	-	-	-
TOTAL	9.60	6.53	0.60	0.41	0.26	0.01	3.12	2.73	-	-	0.02	-

* Table excludes main access track to site. The access track remains the same in 2022 covering ~6.4 ha. most of which is an existing forestry road except for a small ~2.4 ha. section at the junction with the B4282, which will affect an area of scrub broadleaved woodland and conifer plantation. *Infrastructure that will be re-instated or re-vegetated.** The need for an attenuation waterbody is not certain as it will depend on the precise design of the construction site drainage and the weather conditions during construction. Consequently, the precise location and dimensions (if required) cannot be defined either, although it will not exceed 10m x 10m (0.01 ha.) based on the hydrological data for the site. NPTCBC raised concerns regarding the location and precise dimensions of this waterbody, and its potential effects on the site habitats; therefore, for assessment purposes, a reasonable worst-case scenario (0.01 ha. attenuation waterbody located on wet heath) is assumed.

Bats

- 9.7.3 The 2019 ES assessed the bat activity as 'low' and the site to be of local importance. There are no designated sites for bats within the relevant search areas, and there are no substantive changes to the bat roost records in the March 2022 10km SEWBRc data (**Appendix 9A**). The Phase 1 verification walkover survey found no discernible change in habitat type or condition, and it is unlikely that the baseline status of the bat populations has change substantively. The spatial scope of the assessment covers the same area as that detailed within the 2019 ES, updating the data search in March 2022. The temporal scope is likely to remain the same with the operation period remaining the same.

High collision risk species

- 9.7.4 There are now five high collision risk species in Wales and potentially at the site: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, noctule and potentially Leisler's bat (if present). The collision risk for common pipistrelle has been increased to high, but this species in Wales is categorised as common, with a low population vulnerability (NatureScot et al, 2021) 56.
- 9.7.5 Graph 1 presents 2018 bat data for all nine static detector locations, with mean bat contacts per hour per month showing a low level of bat activity for all high collision risk species having been recorded at the site⁵⁸. It is recognised that the common pipistrelle is responsible for a high proportion of calls at the site (c. 89.29%). However, there was a low level of common pipistrelle activity overall at the site; with a mean of 33.09 common pipistrelle passes per night, across nine static detector locations⁵⁹. It is acknowledged that common pipistrelle bats are now a high collision risk species but given there is a relatively low level of common pipistrelle activity and with this species being common and widespread, the site is still considered to be of local importance. As this species is a high collision risk species which accounts for c. 89.29% of the bat population at the site there is the potential for an increased risk of bat mortality and barotrauma during the operational phase, and so the overall magnitude of change has been increased from negligible (2019 ES) to very low. This impact is not likely to affect the favourable conservation status of these species, this effect is therefore likely to be not significant.

⁵⁸ Graph 1 shows 2018 static detector data for the whole site (9 static detector locations) which recorded for 5 days at each month (45 days per month) except for May where location 2 and 8 did not record due to equipment malfunction and so 35 days per was achieved for May (based on the mean bats per hour over the 305 survey nights between April – May, over seven monitoring months). SP – soprano pipistrelle, CP – common pipistrelle, NP – Nathusius' pipistrelle, N – Noctule, Nyct – *Nyctalus* sp. (potentially Noctule or Leisler's), and *NyctSero* is included as it includes potentially noctule and Leisler's (serotine is not a high collision risk species).

⁵⁹ 2018 Data: based on a total of 10,092 common pipistrelle contacts for all 9 static monitoring locations divided by 305 survey nights.

Graph 1 Mean contacts per high collision risk species or species group per hour per month at all nine static monitoring locations combined in 2018



Standoff distances from key features

- 9.7.6 The 50m blade-tip standoff distances for all turbines has been re-calculated (**Appendix 9A**). All turbines are located to maintain a 50m blade-tip stand-off distance from key features⁶⁰ which are known to be favoured by bats (e.g. woodland edges), with the exception of Turbine 2. Static detector location 9 was located along a woodland edge ~66.5m southwest of Turbine 2 and recorded elevated levels of bat activity with 47.68% of all bat contacts across the site being recorded at this location out of a total of nine static detector locations. 51.33% of all common pipistrelle contacts recorded at the site were recorded at location 9 (5,180 contacts recorded at location 9 out 10,092 total contacts recorded across all 9 static detector locations).
- 9.7.7 Although a high percentage of contacts were recorded at location 9, there still remains relatively low bat activity at this location. **Graph 2**⁶¹ and **Table 9.10** show the mean number of contacts by high collision risk species or species group per hour in each month at static location 9, with data for all species being provided in **Appendix 9A: Table 9A2.6**.

⁶⁰ NatureScot *et al.* (2021) states "It is recommended that a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features such as wetland etc".

⁶¹ Graph 2 species SP – soprano pipistrelle, CP – common pipistrelle, NP – Nathusius' pipistrelle, N – Noctule, Nyct – *Nyctalus* sp. (potentially Noctule or Leisler's),

Graph 2 High collision risk species: mean contacts per hour at location 9 for each full night

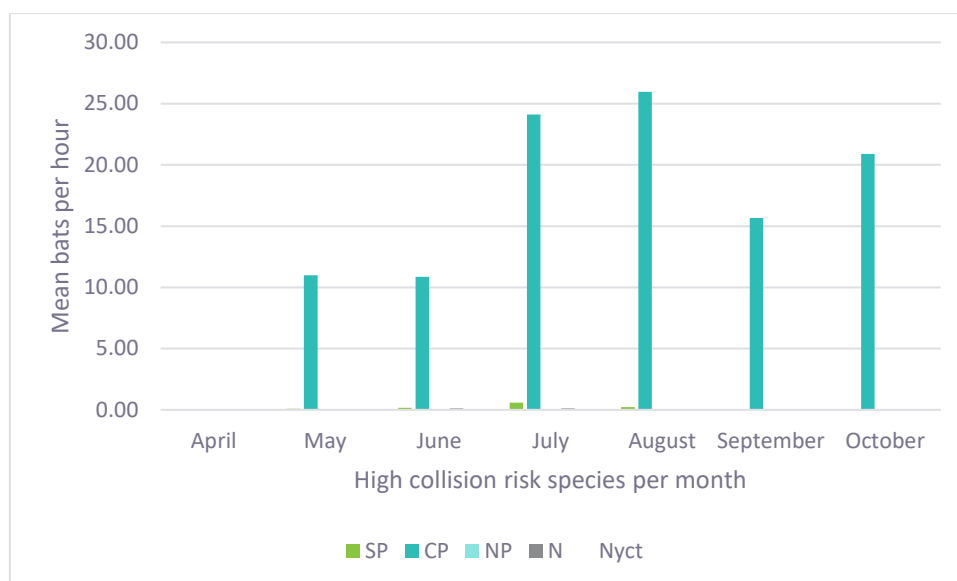


Table 9.10 High collision risk species: mean contacts per hour at location 9 for each full night

	Soprano pipistrelle	Common pipistrelle	Nathusius' pipistrelle	Noctule	Nyctalus sp.
April	0.00	0.00	0.00	0.00	0.02
May	0.09	10.98	0.00	0.02	0.00
June	0.16	10.87	0.00	0.11	0.00
July	0.58	24.11	0.03	0.11	0.00
August	0.22	25.96	0.00	0.00	0.00
September	0.06	15.67	0.00	0.00	0.00
October	0.05	20.90	0.00	0.00	0.00

9.7.8 The main impacts of not achieving the 50m standoff distance from blade tip to woodland edge at Turbine 2 on bats are:

- the potential to affect the accessibility of habitats used for foraging, commuting or roosting (albeit there has been no previous evidence of notable bat roosts);
- the potential to cause disruption to a flightline (woodland edge habitat) or cause behavioural alterations (e.g. due to presence of turbine in close proximity through noise, lighting etc); and
- the potential to cause direct mortality as a result of potential collisions with turbine blades and barotrauma during the operational phase, at this turbine location.

9.7.9 Turbine 2 is located on a site with low bat activity (including that of static detector location 9), and activity at the site has previously been assessed as low in the 2019 ES with no substantive reason

that this would change. At turbine 2 the blade will sweep within 50m⁶² of the woodland edge; with elevated levels of common pipistrelle contacts this will elevate the magnitude of effects on common pipistrelle to moderate mortality at a 'site level'. This is however likely to have a 'very low' effect on the population status of common pipistrelle in a 'local/borough' context, recognising that common pipistrelle is a very common, widespread bat species (NatureScot, *et al.*, 2021)⁵⁶. The effect of the operational wind turbines on common pipistrelle is therefore concluded to be 'Not Significant'.

Increased rotor diameters at all turbine locations

- 9.7.10 Direct bat mortality resulting from collisions with turbine blades and barotrauma during the operational period may be more likely as a result of increased rotor diameters for all turbines (Matthews *et al.* 2016)⁶³. Table 9A1.7 (Appendix 9B) provides a comparison of the total area of blades considered in the 2019 ES with the Proposed Development, with the total combined area of blades increasing by 31,739.48m² (45.36% increase).
- 9.7.11 Given the low activity at the site (based on 2018 static detector data presented in Appendix 9A, Table 9A2.6) and the fact that common pipistrelle, which are common and widespread, form the majority of contacts for high collision risk species, the increased rotor diameter at turbine locations is unlikely to affect the favourable conservation status of bat populations. As such, it is considered likely that the Proposed Development would result in non-significant adverse effect on bat species and populations, with the site remaining of local importance to bat populations, with the magnitude of risk increasing from negligible to very low and the potential risk remaining not significant.
- 9.7.12 All other potential effects on bats are considered to remain not significant as presented in the 2019 ES.

9.8 Summary of assessment

- 9.8.1 No additional ecological receptors were scoped in during this assessment. All ecological receptors remain 'Not Significant', as per the 2019 ES. **Table 9.11** summaries the effects of the Proposed Development on each of the previously scoped in ecological receptors in 2019 ES.

⁶²NatureScot *et al* (2021) recommends using a formula to estimate a 'buffer distance' to try to ensure a distance of 50m between turbine blade tip from key ecological features (in this case the nearest woodland edge) is achieved. At Turbine 2, to achieve a distance of 50m from blade to woodland edge a 'buffer distance' of 93m, is required and at this location the distance from turbine base to woodland edge is 76m and so the 'buffer distance' is short by approximately 17m.

⁶³ Matthews, F., Richardson, S., Lintott, P. and Hosken, D. (2016) *Understanding the Risk to European Protected Species (bats) at Onshore Wind Turbine Sites to inform Risk Management*. University of Exeter.

Table 9.11 Summary of significance of adverse or beneficial effects

Ecological feature	Sensitivity/ importance/ value of receptor ¹	Overall magnitude of change ²	Significance ³	Summary rationale
Watercourses SINC	County	Negligible	Not significant	2019 ES: The proposed development will have a direct effect on a minor tributary of the Nant Cynon due to the construction of an access track. A tributary of the Nant Drysiog may also be affected if an existing forestry track requires upgrading, although this watercourse is already culverted and modified in this location. These minor first-order upland streams potentially contribute to the 'Watercourses' SINC in the NPT area. The proposed development also affects the catchments of several other watercourses, which may consequently be vulnerable to site-derived pollutants or hydrological changes. The incorporated measures (see Section 12.8 of the 2019 ES) will ensure that indirect effects on local drainage systems, and hence the 'Watercourses' SINC, will be prevented or appropriately managed. The direct effects on the site watercourses (culverting beneath new access tracks) will be very small-scale and localised and will not affect any intrinsically high-value habitats; nor will the functional value of the watercourses alter as a result of the track installation. Overall, therefore, the effects on the 'Watercourses' SINC will be negligible, and the integrity or conservation status of this SINC will not be affected. 2022 ES addendum: No change, habitats remained the same during the Phase 1 habitat verification survey.
Caerau West SINC	County	Negligible	Not significant	2019 ES: There will be no direct effects on this SINC. The incorporated measures (see Section 9.8 of the 2019 ES) will ensure that indirect effects on Caerau West SINC will be prevented or appropriately managed. Overall, therefore, the proposed development will have no effect on the integrity or conservation status of the Caerau West SINC. 2022 ES addendum: No change, habitats remained the same during the Phase 1 habitat verification survey.
Nant-y-Crywydd SINC	County	Negligible	Not significant	2019 ES: There will be no direct effects on this SINC. The incorporated measures (see Section 9.8 of the 2019 ES) will ensure that indirect effects on Nant-y-Crywydd SINC will be prevented or appropriately managed. Overall, therefore, the proposed development will have no effect on the integrity or conservation status of the Nant-y-Crywydd SINC. 2022 ES addendum: No change, habitats remained the same during the Phase 1 habitat verification survey.
Section 7 habitats	Local	Low	Not significant	2019 ES: Three S.7 habitats may be directly or indirectly affected by the proposed development ('Upland flushes, fens and swamps', 'Upland heathland', and 'Blanket bog'). The condition of these habitats is variable but they are unexceptional in a local or county context being heavily influenced by historic and current agricultural practices (drainage, burning, grazing, etc.). With regard to indirect effects due to construction or hydrological changes, it is predicted that these will be avoided using normal best-practice mitigation (see Section 9.8 of the 2019 ES) or will be local and negligible in their effects, and would not on their own be considered significant. Furthermore, the S.7 habitats are modified and not notable in a national, regional or county context, and so the loss of ~4 ha. would not typically be considered significant at a county level or above. Notwithstanding this, the oHMP will

Ecological feature	Sensitivity/ importance/ value of receptor ¹	Overall magnitude of change ²	Significance ³	Summary rationale
				bring approximately 15 ha. of grassland into long-term management designed to improve its biodiversity value, and includes measures (e.g. drainage control) that will increase the extent of S.7 habitats at the site 2022 ES addendum: Habitats remained the same during the Phase 1 habitat verification survey. There has been a reduction in turbines from 11 to 8 and a reduction in the S.7 habitats directly affected (Table 9.9).
Peat	Local	Negligible	Not significant	2019 ES: 'Deep peat' (>0.5m) is very limited at the site, with the vast majority of the site being underlain by shallow (<0.3m) peaty organo-mineral soils rather than higher-value saturated active peat deposits. With regard to indirect effects due to construction or hydrological changes, it is predicted that these will be avoided using normal best-practice mitigation (see Section 9.8 of the 2019 ES) or will be local and negligible in their effects, and would not on their own be considered significant. Furthermore, the peaty soils are modified and not notable in a national, regional or county context, and so damage to ~9.6 ha. (i.e. assuming all areas of the site are underlain by peaty soils) would not be considered significant at a county level or above. 2022 ES addendum: Habitats remained the same during the Phase 1 habitat verification survey. Other than some micro-siting, turbines have remained in the same position. Area has now been reduced 9.6ha to 6.53ha.
Bats	Local	Very low	Not significant	2019 ES: It is likely that the proposed wind farm will affect the use of the site by bats, and will increase the mortality risk for bats locally, particularly common pipistrelle (this being by far the most frequently recorded bat on site). However, these changes are considered unlikely to have any significant effects on local bat populations due to the relatively low activity levels at the site; the low numbers of high collision risk species recorded (both in absolute terms and (for noctule and soprano pipistrelle) relative to their estimated local and national populations); and the incorporation of stand-off distances from those features that are known to be used by bats. No roosts have been identified within 200m of the site. 2022 ES addendum: The site's bat assemblage is categorised as being of 'low' biodiversity conservation importance in the 2019 ES. Although this is based on survey data from 2018, a habitat/walkover survey in February 2022 concluded there has been no discernible change in habitat type/condition and it is unlikely that the baseline status of bat populations/assemblage at the site has changed substantively. The increase in blade diameter increases the risk of bat mortality and (Matthews <i>et al.</i> , 2016) ⁶³ , however the majority of the turbines remain in locations where bat activity is low. The blades of turbine 2, will sweep within 50m of a small part of a woodland block, with associated elevated common pipistrelle activity (c.51.33% of recorded passes across nine static detectors in 2018). In light of uncertainty around mortality rates on wind farm sites (NatureScot, <i>et al.</i> , 2021) ⁵⁶ , on a precautionary basis it is reasonable to conclude that this will elevate the magnitude of effects on common pipistrelle to moderate mortality at a 'site level'. This is however likely to have a 'very low' effect on the population status of common pipistrelle in a 'local/borough' context, recognising that

Ecological feature	Sensitivity/ importance/ value of receptor ¹	Overall magnitude of change ²	Significance ³	Summary rationale
				common pipistrelle is a very common, widespread bat species (NatureScot <i>et al</i>, 2021) ⁵⁶. The effect of the operational wind turbines on common pipistrelle is therefore concluded to be 'Not Significant'. Although the effects on bats are likely to be 'Not Significant,' any requirement for tailored curtailment at the location of Turbine 2, on a more precautionary basis and to further limit the risk of effects on bats, is subject to agreement with NRW and where deemed specifically necessary, can be secured by planning condition.
Reptiles	Local	Negligible	Not significant	2019 ES: The site habitats are suitable for reptiles and so they are assumed to be present (given their presence in the local area) although they are unlikely to occur at high densities in the habitats affected. The proposed development will result in the loss of approximately 4 ha. Of heathland mosaic habitat that could potentially be used by these species (although the suitability and value of this is somewhat variable across the site, depending on grazing density). This loss will be offset by the habitat enhancement provided in the oHMP and the site infrastructure may incidentally improve some areas for reptiles by providing greater habitat complexity. Individual reptiles will be protected using standard best-practice measures (see Section 9.8 of the 2019 ES) that temporarily displace them from areas likely to be affected by construction; this is entirely achievable due to the discrete nature of the works and the large amounts of suitable habitat that would remain accessible. 2022 ES addendum: Habitats remained the same during the Phase 1 habitat verification survey. There has been a reduction in turbines from 11 to 8 and hence a reduction in habitats directly affected (see Table 9.9).
Brown Hare	Local	Negligible	Not significant	2019 ES: The site habitats are suitable for brown hares and so they are assumed to be present (given their presence in the local area) although it is likely that they occur at relatively low densities due to the land use and agricultural practices. The proposed development may result in the disturbance of individual animals during construction (see Section 9.8 of the 2019 ES), and will result in the loss of approximately 3.7 ha of habitat (i.e. the area of habitat directly affected, minus that which is reinstated) that could potentially be used by this species (although the suitability and value of this is somewhat variable across the site, depending on grazing density). However, any displacement will be temporary only and the loss of habitat is not considered significant based on the availability and accessibility of similar habitat elsewhere on site and locally, and the likely benefits of the habitat management plan. 2022 ES addendum: Habitats remained the same during the Phase 1 habitat verification survey. There has been a reduction in turbines from 11 to 8 hence a reduction in habitats directly affected (see Table 9.9).

1. The sensitivity/importance/value of a receptor is defined using the criteria set out in 2019 ES (Section 9.7)
2. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in 2019 ES (Section 9.7)
3. The significance of the environmental effects is based on the combination of the sensitivity/importance/value of a receptor, the magnitude of change and professional judgement and is significant, or not significant, subject to the evaluation methodology outlined 2019 ES (Section 9.9)

9.9 Conclusions of significance evaluation

- 9.9.1 The Proposed Development does not change the conclusions of the 2019 ES, with the effects on biodiversity receptors remaining 'Not Significant'.

9.10 Implementation of environmental measures

- 9.10.1 The implementation of the environmental measures as outlined in 2019 ES (Chapter 9, Table 9.23) will remain the same.

10. Ornithology

10.1 Introduction

- 10.1.1 This chapter of the ES addendum assesses the likely significant effects of the Proposed Development with respect to ornithology, taking into account the proposed amendments to the application. The chapter should be read in conjunction with the development description and planning policy provided in **Chapters 1-6**.

10.2 Limitations of this assessment

- 10.2.1 A considerable programme of baseline data collection has been carried out at the Proposed Development starting in 2008 and with more recent surveys taking place between 2018 and 2019. Due to the age of the most recent data updated verification surveys with respect to ornithology were commenced in December 2021 and are ongoing with surveys planned to continue until July 2022.
- 10.2.2 The conclusions of the original ES (Amec 2014)⁶⁴ (hereafter referred to as the '2014 ES') and subsequent update from 2019 (Wood 2019)⁶⁵ (hereafter referred to as the '2019 ES') have been re-evaluated, taking into account the proposed changes to the layout and specification of the turbines. However, full verification of the outputs will be reliant on the completion of the updated surveys being completed in 2022.

10.3 Relevant legislation, planning policy, technical guidance

Legislative context

- 10.3.1 The following legislation is relevant to the assessment of the effects on ornithology:
- Council Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended) (commonly referred to as the Birds Directive);
 - The Conservation of Habitats & Species Regulations 2017;
 - The Environment (Wales) Act 2016; and
 - Wildlife and Countryside Act 1981 (as amended).

Planning policy context

- 10.3.2 **Table 10.1** lists the issues from the relevant national and local planning policies that have been considered in assessing ornithological effects.

⁶⁴ Amec (2014). Foel Trawsant Wind Farm Environmental Statement: Chapter 10, Ornithology (doc ref. 24311rr073i1).

⁶⁵ Wood (2019) Foel Trawsant Wind Farm Amended Scheme. Environmental Statement: Chapter 10 Ornithology. Report produced by Wood PLC for Pennant Walters (FoelT) Limited.

Table 10.1 Summary of planning policy issues considered in preparing the ornithology assessment

Policy reference	Policy issues
National planning policies	
Planning Policy Wales – Chapter 6 Distinctive and Natural Places (11th Ed.; 2021)⁶⁶	Chapter 6 of Planning Policy Wales (PPW) sets out the Welsh Government's objectives for Distinctive and Natural Places theme of planning policy topics covers historic environment, landscape, biodiversity and habitats, coastal characteristics, air quality, soundscape, water services, flooding and other environmental (surface and sub-surface) risks. In particular, the Biodiversity and Resilience of Ecosystems section puts emphasis on planning authorities to have regard for the State of Natural Resources Report (SoNaRR) and Area Statements published by Natural Resources Wales.
Technical Advice Note (TAN) 5: Nature Conservation and Planning (2009)	TAN5 provides advice about how the land use planning system should contribute to protecting and enhancing biodiversity conservation within Wales. It sets out the key principles of planning for nature conservation for both local development plans and when deciding planning applications that may affect nature conservation. These include: • promoting the conservation and enhancement of statutorily designated areas and undeveloped coast; • ensuring that appropriate weight is attached to designated sites of international, national and local importance; • protecting wildlife and natural features in the wider environment; • ensuring that all material considerations are taken into account and decisions are informed by adequate information about the potential effects of development on nature conservation; • ensuring that the range and population of protected species is sustained; and • avoiding harm to nature conservation, minimising unavoidable harm by mitigation measures, offsetting residual harm by compensation measures and looking for new opportunities to enhance nature conservation.
Development plan policies	
Neath Port Talbot Local Development Plan 2011-2026 (2016)	Policy SP15 (Biodiversity & Geodiversity) sets out the approach to the protection, conservation, enhancement and management of important habitats, species and sites of geological importance. Important habitats, species and sites of geological interest will be protected, conserved, enhanced and managed through the following measures: 1. The identification of the following Internationally and Nationally designated sites within the County Borough to enable their protection: (a) Special Areas of Conservation (SACs) and Ramsar Sites; (b) Sites of Special Scientific Interest (SSSIs); (c) National Nature Reserves (NNRs). 2. The identification and protection of sites of regional and local importance. 3. The protection of important natural heritage features. Policy EN 6 (Important Biodiversity and Geodiversity Sites) states that proposals that would affect Regionally Important Local Nature Reserves (LNRs), Sites of Interest for Nature Conservation (SINC), sites meeting SINC criteria or sites supporting Local Biodiversity Action Plan (LBAP) or S7 Environment (Wales) Act 2016 habitats or species, will only be permitted where they conserve and where possible, enhance the importance of the site, or the development could not reasonably be located elsewhere. Mitigation/compensation will need to be agreed where adverse effects are unavoidable. Policy EN 7 (Important Natural Features). Development proposals that would adversely affect ecologically or visually important natural features such as trees, woodlands, hedgerows / field boundaries, watercourses or ponds will only be permitted where:

⁶⁶ Welsh Government (2021) *Planning Policy Wales, Edition 11, February 2021* Available at: https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf. [Accessed 25/02/2021]

Policy reference	Policy issues
	1. Full account has been taken of the relevant features in the design of the development, with measures put in place to ensure that they are retained and protected wherever possible; or 2. The biodiversity value and role of the relevant feature has been taken into account and where removal is unavoidable, mitigation measures are agreed.
Biodiversity and Geodiversity: Supplementary Planning Guidance (2018)	The Biodiversity and Geodiversity: Supplementary Planning Guidance (SPG) was adopted by Neath Port Talbot County Borough Council in May 2018. The SPG sets out guidance for interpretation of the biodiversity and geodiversity policies of the LDP (SP15: Biodiversity and Geodiversity; EN6: Important Biodiversity and Geodiversity Sites and EN7: Important Natural Features). The SPG sets out an approach to consider biodiversity holistically in the application process.

Technical guidance

- 10.3.3 The main issues relating to birds and wind farms to be re-considered within this ES addendum are:
- Any changes to the effects from direct habitat loss due to land take by wind turbine bases, tracks and other infrastructure.
 - Any changes to the effects of indirect habitat loss resulting from the displacement of birds from the proximity of wind turbines. Such disturbance may occur as a consequence of construction work, or due to the presence of the wind farm close to nesting or feeding sites, or on regular flight paths.
 - Any changes to the effects of collisions with turbine blades, overhead wires and guy lines (i.e. killing or injury to birds) which is of particular relevance for sites regularly used by certain species of raptor and/or large concentrations of wildfowl.
- 10.3.4 To assess the potential effects of a wind farm, both the value of the proposed development site itself to birds and the level of flight and other activity within and around the proposed development site should be determined. To date, Natural Resources Wales (NRW) has not developed specific guidance for assessing the effects of wind farms on ornithological interest. However, specific guidance has been developed by Scottish Natural Heritage (SNH) and Natural England (see below for references) which are generally accepted as the guidance to use in assessing wind farm proposals in the UK.
- 10.3.5 The following guidance was referred to throughout the 2019 ES and further considered as part of this assessment:
- Scottish Natural Heritage (2000). *Methodology for assessing the effects of wind farms on ornithological interests*. SNH Guidance Note Series.
 - Scottish Natural Heritage (2002). *Survey methods to assess wind farm impacts on upland bird communities*. SNH, Battleby.
 - Scottish Natural Heritage (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms*. <http://www.snh.gov.uk/docs/C278917.pdf>.
 - Scottish Natural Heritage (2006, updated in 2018). *Assessing significance of impacts from onshore windfarms on birds outwith designated areas*. SNH, Battleby.
 - Natural England (2010). *Assessing the effects of onshore wind farms on birds*. Technical Information Note 069.

- 10.3.6 SNH guidance on the assessment of the effects of wind farms on ornithological interests (SNH, 2000) suggests that assessment should concentrate on Target Species, for example those specially protected or those which occur at a site in regionally or nationally important numbers, as follows:
- Species protected under Schedule 1 of the *Wildlife & Countryside Act 1981* (as amended).
 - Species listed on Annex 1 of the *Council Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended)* (commonly referred to as the Birds Directive).
 - 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 wind farm.
 - Species occurring at the site in regionally or nationally important numbers.
 - Ornithological qualifying features of SPAs, Ramsar sites and SSSIs.
- 10.3.7 This target species approach is further advocated in SNH's guidance on survey methods for use in assessment of the impacts of onshore wind farms on bird communities (SNH, 2005 updated in 2017)⁶⁷. These criteria are of equal relevance to Wales as the basis for the determination of target species is UK and European wide legislation and the proportion of national and regional populations that are present on a site.

10.4 Data gathering methodology

Desk study

- 10.4.1 A detailed desk study was undertaken in support of the 2019 ES.
- 10.4.2 The presence of SPAs and Ramsar sites within 20km and SSSIs with an ornithological interest within 10km of the Proposed Development site was determined by accessing the Multi-Agency Geographical Information for the Countryside (MAGIC) website⁶⁸. Details of cited features of designated sites were obtained from the NRW website⁶⁹.
- 10.4.3 Ornithological data was requested from the South East Wales Biological Records Centre (SEWBReC) to include records of all protected species, Species of Principle Importance for the conservation of biodiversity, or other conservation-notable species recorded within 2km of the Proposed Development site. Additional ornithological records were also obtained from the Royal Society for the Protection of Birds (RSPB) to include records of protected or notable species within 5km of the Proposed Development site. Records of notable species have been summarised to include:
- Species listed under Schedule 1 of the *Wildlife & Countryside Act 1981* (as amended);
 - Species listed under the red list of Birds of Conservation Concern (BoCC) (Eaton *et al.*, 2015)⁷⁰;
 - Species listed under Section 7 of the Environment (Wales) Act 2016; and

⁶⁷ SNH (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. <http://www.snh.gov.uk/docs/C278917.pdf>.

⁶⁸ <http://magic.defra.gov.uk/>

⁶⁹ <https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/find-protected-areas-of-land-and-seas/designated-sites/?lang=en>

⁷⁰ Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R., Lock, L., Musgrove, A.J., Noble, D.G., Stroud, D. and Gregory R.D. (2015). 'Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man.' In: *British Birds* 108, pp708-746.

- Species identified within relevant Local Action Plans.

10.4.4 Sources of information used for the Ornithology assessment are listed in **Table 10.2**.

Table 10.2 Sources of desk study information

Source	Data
NRW	Cited features of designated sites from NRW website (https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/find-protected-areas-of-land-and-seas/designated-sites/?lang=en).
http://magic.defra.gov.uk/	Statutory designated sites of national and international importance within 10km and 20km of the Proposed Development site respectively
SEWBRcC	Records of protected and notable bird species within 2km of the Proposed Development site
RSPB	Records of protected and notable bird species within 5km of the Proposed Development site

Survey work

10.4.5 An extensive programme of baseline surveys was carried out in support of the 2014 ES and 2019 ES. **Table 10.3** provides a summary of the surveys completed.

Table 10.3 Summary of surveys completed between 2008-19

Survey Period	Survey Type	Summary of Effort	Key Results
2008-2009 (non-breeding)	Winter walkover	7 visits November-January Open habitats within a 1km buffer	Red kite was the only target species recorded during walkover surveys and was recorded on one occasion. Two secondary species were recorded; golden plover and snipe: a flock of 38 golden plover was flushed from open grassland from the centre of the site, whilst snipe was recorded sporadically within the site in small numbers (1-2 birds).
2008-2009 (non-breeding)	VP surveys	November 2008-January 2009 21 hours VP1 21 hours VP2	Two target species were recorded: red kite and hen harrier, though the level of activity recorded for the two species was limited (with three flights recorded for red kite and two flights for hen harrier).
2009-2010 (non-breeding)	Winter walkover	14 visits November-March Open habitats within a 1km buffer	Peregrine and goshawk were the only target species recorded during walkover surveys and were recorded on three and one occasion respectively. Two secondary species were recorded; golden plover and snipe: a flock of 50 golden plover was recorded loafing on rough grassland within the centre of the site, whilst snipe was recorded sporadically within the site in small numbers (1-2 birds).
2009-2010 (non-breeding)	VP surveys	November 2009-April 2010 36 hours VP1 39 hours VP2	Four target species were recorded: peregrine, red kite, goshawk and merlin (with three flights recorded for peregrine, eleven flights for red kite, two flights for goshawk and two flights for merlin).
2010 (breeding)	VP surveys	April-October 2010 36 hours VP1 (30 hours April-August) 36 hours VP2 (30 hours April-August)	Four target species were recorded during the vantage-point watch surveys: red kite, marsh harrier, goshawk and peregrine (with ten flights recorded for red kite, one flight for marsh harrier, five flights for goshawk and one flight for peregrine).
2010 (breeding)	Moorland bird surveys (MBS)	3 visits April-June	The site supported a sparse breeding passerine assemblage typical of the habitats present (upland pasture and rough grazing, scattered gorse scrub and flushed or boggy ground), comprising meadow pipit, skylark, linnet, wheatear, pied wagtail, reed bunting and stonechat. No wader species were recorded breeding.
2010 (breeding)	Nightjar walkover surveys	2 visits July	A single nightjar territory was recorded on 8 July 2010 and 27 July 2010 just outside the site boundary within the plantation woodland to the south.
2010 (breeding)	Breeding raptor walkover surveys	3 visits April-June	No territories or evidence of breeding by protected raptors were recorded during the raptor walkover surveys

Survey Period	Survey Type	Summary of Effort	Key Results
2010 (breeding)	Point counts	4 visits at five locations April-July	Twenty-three species were recorded during point counts. Most of the birds detected were common species associated with either coniferous woodland such as chaffinch, goldcrest, coal tit, lesser redpoll and siskin; on successive or regenerative scrubby ground such as willow warbler, whitethroat, bullfinch and wren; as well as ubiquitous species with a range of habitat preferences including wood pigeon, song thrush, mistle thrush, jay and chaffinch.
2012	VP surveys	April-August 2010 42 hours VP1 42 hours VP2	Three target species were recorded: red kite, goshawk and peregrine though the level of activity recorded for the three-raptor species was limited (with four flights recorded for red kite, three flights for goshawk and two flights for peregrine).
2012	Moorland bird surveys (MBS)	3 visits April-June	Similar to 2010, the site supported a sparse breeding passerine assemblage typical of the habitats present (upland pasture and rough grazing, scattered gorse scrub and flushed or boggy ground), comprising meadow pipit, skylark, linnet, wheatear, pied wagtail, reed bunting and stonechat. No wader species were recorded breeding.
2012	Nightjar walkover surveys	2 visits June-July	A single nightjar territory was recorded on 18 June 2012 and 16 July 2012 off-site to the south within plantation woodland and a short distance to the west of the southern access track.
2012	Honey buzzard vantage point watches	6 watches from one VP, totalling 18 hours between May-July	No honey buzzard were recorded but three other raptor species were: goshawk, peregrine and red kite.
2012	Breeding raptor walkover surveys	6 visits May-July	No territories or evidence of breeding by protected raptors were recorded during the raptor walkover surveys
2012	Point counts	3 visits at five locations April-June	Twenty-four species were recorded during point counts. Most of the birds detected were common species associated with either coniferous woodland such as chaffinch, goldcrest, coal tit, lesser redpoll and siskin; on successive or regenerative scrubby ground such as willow warbler, whitethroat, bullfinch and wren; as well as ubiquitous species with a range of habitat preferences including woodpigeon, song thrush, mistle thrush, jay and chaffinch. Notably, firecrest was recorded holding territory within Michaelston Plantation. Crossbill was recorded calling from plantation woodland adjacent to the site, whilst tree pipit and cuckoo were both recorded calling from plantation woodland off site.
2012-2013	Winter walkover	22 visits October 2012-March 2013 Open habitats within a 1km buffer	Red kite, goshawk and peregrine were the only target species recorded during walkover surveys; all three were recorded on one occasion. Two secondary species were recorded, golden plover and snipe: a flock of 25 golden plover was flushed from open grassland from the centre of the site, whilst snipe was recorded sporadically within the site in small numbers (1-2 birds).
2012-2013	VP surveys	September 2012-March 2013	Four target species were recorded: red kite, goshawk, peregrine and hen harrier (with eight flights recorded for red kite, five

Survey Period	Survey Type	Summary of Effort	Key Results
2015	Breeding honey buzzard surveys	39 hours VP1 42 hours VP2	flights for goshawk, five for peregrine and three for hen harrier).
		10 visits between May-July	No breeding locations were found within 2km of the site boundary. Only four sightings were recorded, all at least 2km from the western or northern edges of the proposed site. These were considered to relate to foraging activity from a known nest site located 4km from the site.
2017-2018	VP Surveys	November 2017-March 2018 36 hours VP1 36 hours VP2	Three target species were recorded: red kite (24 flights), goshawk (6 flights) and golden plover (6 flights of flocks between 9 and 36 individuals).
2018	VP Surveys	April 2018 – July 2018 36 hours VP1 36 hours VP2	Three target species were recorded: red kite (23 flights), goshawk (7 flights), peregrine (2 flights). No flights (based on the consented development) were recorded at potential collision height.
2018	Moorland Bird Survey and territory mapping	April 2018 – July 2018 Four visits	Target species recorded included skylark, lesser redpoll, cuckoo, reed bunting and tree pipit. The only species recorded regularly within moorland/grassland habitats were skylark and meadow pipit.
2018	Nightjar walkover surveys	June and July 2018 Two visits	Five churring males/territories were identified though two of these were located within 500m of the access track but >500m from any turbine locations.
2018	Breeding Raptor Surveys (including Honey Buzzard effort)	April 2018 – August 2018	Breeding raptor surveys recorded breeding activity/territorial behaviour for red kite and goshawk. No breeding territories of either species were recorded within 1km of the consented development with all potential nest locations in woodland off-site. Additional effort was undertaken targeting the main migratory period for honey buzzard (mid-late May) with additional, informal vantage point surveys overlooking surrounding woodland completed.
2018	VP Surveys	August 2018-October 2018 18 hours VP1 18 hours VP2	Target species recorded included: Red kite (7 flights), Goshawk (1 flight), Pintail (1 flight) Merlin (3 flights) and Hen Harrier (1 flight). No flights (based on the consented development) were recorded at potential collision height.
2018-19	Winter walkover surveys	October 2018 – March 2019	Winter walkover surveys during 2018-2019 recorded small numbers of notable non-breeding bird species. This included individual sightings of merlin and hen harrier along with records of resident species including skylark, and red kite.

10.5 Overall baseline

Current baseline

Desk study

- 10.5.1 Full results from the desk study are provided in the Appendix 10B of the 2019 ES.
- 10.5.2 There are no SPAs or Ramsar sites designated for any ornithological interest within 20km of the Proposed Development site. There are however, two SSSIs within 10km of the Proposed Development site that list ornithological interest. The details of the SSSIs are provided in Table 10.4. No new designated sites with ornithology interest features have been identified compared to the 2019 ES results.
- 10.5.3 In total 43 notable species were recorded including various species typical of the habitats found on site or within the wider area. This included:
- Species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (including red kite, common crossbill and goshawk);
 - Species listed on Section 7 of the Environment (Wales) Act 2016) (including nightjar, cuckoo, skylark and golden plover); and
 - Species listed on the red list of the Birds of Conservation Concern (including lesser redpoll, tree pipit and wood warbler).

Table 10.4 Statutory designated sites

Site name	Approximate distance and direction from Site	Reasons for designation/notification	Potential connectivity with the Site (Connectivity distances reported from SNH (2016) ⁷¹)
Eglwys Nynydd Reservoir SSSI	8.9km southwest	The largest area of fresh water in the county. The reservoir attracts large numbers of wintering waterfowl and passage migrants. Notable species include: great crested grebe, little grebe, mallard, gadwall, and coot now breed.	Unlikely, given there are no suitable habitats for the notified species within the proposed development site, and distance from the SSSI and the proposed development site.
Mynydd Ty-Isaf, Rhondda SSSI	7.9km northeast	The SSSI is primarily notified for its Arctic-alpine flora associated with the cliffs. The description for the SSSI also notes that the higher crags provide nesting sites for a Schedule 1 raptor species.	Unlikely, given the habitats within the proposed development site provide limited foraging opportunities, and the distance from the SSSI and the proposed development site.

Field Surveys

- 10.5.4 Full results from the previous surveys are provided as Appendices to the 2014 ES and the 2019 ES. A short summary of the survey results and assumed baselines for key receptors is provided in **Table 10.5**.

⁷¹ SNH (2016). Assessing connectivity with Special Protection Areas. Scottish Natural Heritage Guidance Note, Version 3, June 2016.

Table 10.5 Summary of survey results and assumed baselines for assessment in previous

Receptor	2014 ES Baseline	2019 ES Baseline
Red Kite	Red kite were recorded regularly but infrequently during vantage point surveys completed during 2008, 2009, 2010 and 2012 and 2013. Localised increases of flights were observed, associated with the presence of carrion with the viewshed, however flights were widespread and infrequent in all seasons of survey. Breeding raptor surveys did not confirm the presence of any breeding territories within 2km of the approved development.	Red kite were recorded regularly within the approved development during vantage point surveys, though greater levels of activity typically occurred offsite, over woodland to the north and west of the site. Breeding raptor surveys (including ad hoc vantage point observations) recorded a number of immature birds and evidence of breeding attempts including courtship flights and territorial behaviour. Observations suggested that there was one active red kite territory within 2km of the site and a second 2-3km of the site.
Goshawk	Goshawk were recorded infrequently with low numbers (<10) of flights recorded during vantage point surveys. Flights were typically recorded over nearby woodland plantations rather than the approved development site. Breeding raptor surveys did not confirm the presence of any breeding territories within 2km of the approved development.	Regular flights were recorded in the forestry approximately 1km north of the proposed development site with displaying birds recorded during vantage point surveys from VP2. A single bird was also recorded being mobbed by a red kite, also during a vantage point survey. Flights were also recorded to the south of the site typically between 1 and 2km from the proposed development in the area around Mynydd Bach. Observations suggest that there were two active goshawk territories within 2km and a third territory between 2km and 5km of the site.
Honey Buzzard	Dedicated vantage point surveys for honey buzzard, completed in 2012 did not record any observations of honey buzzard. Further dedicated surveys completed in 2015 identified a nest site within 4km of the approved development boundary though results suggested no breeding within 2km of the site.	Not observations of honey buzzard were made within 2km of the approved development site. Dedicated watches were undertaken during the peak migratory period in May with no observations made.
Skylark	Skylark were the most prevalent species recorded during moorland bird surveys in 2010 and 2012 with recorded 22 and 19 territories within the survey area respectively.	Skylark was the most prevalent species recorded breeding during the moorland bird survey with up to 30 territories identified. These were widespread across the moorland habitats that dominate the hilltop.

Receptor	2014 ES Baseline	2019 ES Baseline
Nightjar	Nightjar surveys in 2010 recorded a single territory within 500m of the approved development boundary, located within the woodland to the south of the proposed windfarm location. In 2012 a single territory was recorded to the west of the main access track to the south of the proposed windfarm location.	Nightjar were restricted to areas of clear fell forestry and immature plantation woodland within 500m of the approved development. Up to three churring males were recorded to the south and west of the proposed location for Turbine 6 with a further two territories located to the west of the proposed access track (>500m from any turbine locations).
Golden Plover	Golden plover were recorded infrequently during winter walkover surveys in 2008/9, 2009/10, 2012/13 with a peak counts of 38, 50 and 25 individuals respectively.	Golden plover were recorded infrequently during vantage point surveys between 2017 and 2018. A peak count of 36 birds was recorded on the 14 March 2018. Golden plover were not recorded during winter walkover surveys completed between 2018 and 2019.
Woodland assemblage (breeding)	Point counts completed in 2010 recorded species associated with woodland and plantation including crossbill, tree pipit and cuckoo. A single firecrest was also recorded within the Michaelston Plantation.	Notable species associated with the woodland present immediately to the south of the approved development boundary included cuckoo, mistle thrush, lesser redpoll and tree pipit. These occurred in low numbers (<5 territories) within the survey buffer in habitats not directly impacted but the approved development.
Moorland assemblage (breeding)	The moorland bird assemblage was relatively limited with linnet, meadow pipit, stonechat and wheatear occurring (in addition to Skylark) in 2010. In 2012, three cuckoo were recorded to the south of the site in boggy ground.	The moorland bird assemblage was relatively limited with skylark (detailed above), linnet and reed bunting (occurring around wetter areas) the only notable species recorded. Other common and widespread species included meadow pipit.
Moorland assemblage (non-breeding)	Winter walkover surveys and vantage point surveys recorded individual hen harrier and merlin infrequently within the site. Other species recorded during winter walkover surveys included fieldfare, snipe and redwing.	Winter walkover surveys during 2018-2019 recorded small numbers of notable non-breeding bird species. This included individual sightings of merlin and hen harrier along with records of resident species including skylark, and red kite.

Future baseline

- 10.5.5 In the absence of development, it is assumed that the baseline conditions on the Proposed Development site will remain as they are currently.
- 10.5.6 The future baseline is likely to alter due to the effects of climate change on bird productivity, survival rates and breeding ranges, with substantial changes in species ranges predicted during the coming decades. Survey work represents a snapshot of the bird community at the time of the survey and cannot be extrapolated to predict future population trends in the wake of agricultural or climatic changes.
- 10.5.7 The habitats present on site have not significantly altered since 2019 and no significant change to the baseline is anticipated.

10.6 Consultation

Formal consultation with NPTCBC was undertaken on 07 February 2022 to discuss the scope of any verification surveys with respect to ornithology. The following survey/desk study updates have been agreed and completed during 2021 and 2022:

- Update Non-breeding and breeding period Vantage Point Surveys – this has included 36 hours of monitoring (at each VP) completed between December 2021 and March 2022 (non-breeding period) and March 2022 with further surveys to be completed in July 2022 (breeding period);
- Moorland Bird Survey/Territory Mapping Verification – three survey visits will be undertaken between April and June to verify no changes in the breeding bird assemblage; and
- Updated desk study information relating to Honey Buzzard within Neath Port Talbot will be provided.

10.7 Scope of the assessment

- 10.7.1 The scope of the ornithology assessment for the approved development broadly followed the assessment methodology set out in the 2014 ES (Chapter 2: EIA Process) and 2019 ES (Chapter 2: Approach to Environmental Impact Assessment and Chapter 10: Ornithology), with regard to specific methods and criteria, including the CIEEM Guidelines (CIEEM, 2018)⁷². This assessment was based on the desk study and baseline data collection listed in Table 10.3.
- 10.7.2 Based on the baseline collected in support of the 2014 ES and 2019 ES, potential impacts were identified and scoped into the assessment for detailed assessment.
- 10.7.3 For this addendum the scope of the detailed assessment for the Proposed Development has been established by assessing whether the proposed differences between the approved development and the Proposed Development have the potential to result in a change to the conclusions previously made and result in new or different likely significant effects.
- 10.7.4 As the changes relate to increasing rotor diameter of all remaining turbines, with all ground level infrastructure, construction/decommissioning methods and embedded measures remaining unchanged, only those effects relating to collision risk and disturbance have the potential to change and will be subject to re-assessment.

⁷² Chartered Institute of Ecology and Environmental Management (CIEEM, 2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal. CIEEM, Winchester.

Spatial scope

- 10.7.5 The spatial scope of the assessment of ornithology covers the same area as that detailed within the 2019 ES. This includes a desk-based search area of up to 20km and survey areas of the consented development boundary and an additional buffer of 2km. An extended survey area (up to 5km) was included for Honey Buzzard only.

Temporal scope

- 10.7.6 The temporal scope of the assessment for ornithology is consistent with the period over which the development would be carried out and therefore covers the construction and operational period of up to 25 years.

Potential receptors

- 10.7.7 Table 10.6 provides a summary of the receptors identified and scoped in/out in the 2019 ES. Justification for including or excluding them from this updated assessment is provided along with verification of their "Importance".
- 10.7.8 Wherever possible, information regarding the population size, population trends and distribution of the ornithological features has been used to inform the categorisation described in Table 10.6 to determine importance at the legislative and project level. In respect of the Proposed Development at Foel Trawsant, the appropriate geographical units for identification of significance of impacts were deemed to be the UK (national), Wales (regional) and Glamorgan (county). A threshold of significance would therefore comprise those species present in county important numbers (>1% Glamorgan population). Where detailed criteria or contextual data are not available, professional judgement was used to determine importance.
- 10.7.9 All ornithological features that were determined to have an importance at local or negligible level were scoped out of the assessment at this stage, as effects on them would not constitute a significant effect in EIA terms (i.e. a significant effect could not occur).

Table 10.6 Summary of the importance level of each identified receptor

Receptor	Importance – Legislation	Importance – Project	Scoping and justification
Red Kite (Breeding)	National	County	Scoped in Estimated 1-2 breeding pairs present within 2km of the site representing a potentially significant (>1%) proportion of the county population
Goshawk (Breeding)	National	County	Scoped in Estimated 2 breeding pairs present within 1km of the site representing a potentially significant (>1%) proportion of the county population
Peregrine (breeding)	National	Negligible	Scoped out No breeding pairs identified within 2km and an absence of suitable nesting ledges.

Receptor	Importance – Legislation	Importance – Project	Scoping and justification
Golden Plover (Non-breeding)	National	County	Scoped in Up to 50 individuals were recorded on site during surveys between 2008 and 2019, representing a potentially significant proportion of the county population.
Nightjar	International	County	Scoped in Five territories identified in 2018 within 500m of the Proposed Development (including access tracks).
Other Notable Breeding Bird Species (including Dunnock, Grasshopper warbler, Skylar, Reed Bunting, Song Thrush, Tree Pipit)	National	Local – Negligible	Scoped out Numbers recorded did not represent a significant proportion of county (or regional) populations.

Scoping of Likely significant effects

- 10.7.10 The ornithology receptors that were previously taken forward for assessment are summarised as follows:
- Red Kite – Breeding.
 - Goshawk – Breeding.
 - Golden Plover – Non-Breeding.
 - Nightjar – Breeding.
- 10.7.11 **Table 10.7** provides a summary of the scoping of likely significant effects and highlights those previously scoped out and those taken forward for detailed assessment. This table also highlights where the original assessment outcome is unchanged or requires updated assessment.

Table 10.7 Summary of remaining likely significant effects, scoping outcomes from 2019 and confirmation of those effects requiring further consideration

Receptor	Likely Significant Effect	Scoping Outcome (2019 ES) and Justification	Updated Assessment Required
Red Kite	Land use change during construction resulting in the loss of foraging or nesting habitat	Scoped Out No Red Kite nest sites were identified within 500m of the Proposed Development and the wider area provides other suitable habitat for foraging.	No update required Land use change/habitat loss is reduced through reduction of number of turbines
	Visual and aural disturbance during construction resulting in displacement from foraging or nesting habitat	Scoped Out No Red Kite nest sites were identified within 500m of the Proposed Development and suitable habitat for nest sites is absent.	No update required Suitable habitat for nesting Red Kite is not present adjacent to the site. Proposed embedded measures will minimise potential disturbance impacts even if nests were identified within 500m of the construction area.
	Displacement or disturbance due to the presence of an operational windfarm	Scoped Out Red kite have been recorded foraging within operational windfarm with no significant displacement effects observed (Madders and Whitfield 2006) ⁷³	No update required Assumed no change compared to the 2019 ES
	Collision during operation resulting in mortality of individual birds	Scoped In A detailed assessment was updated and included in the 2019 ES (including Collision Risk Modelling)	Update required The changes to the potential design of the turbines requires re-assessment of Collision Risk Modelling outputs and will be informed by updated survey data collected in 2021/2022
Goshawk	Land use change during construction resulting in the loss of foraging or nesting habitat	Scoped Out No Goshawk nest sites were identified within 500m of the Proposed Development and the wider area provides other more suitable habitat for foraging.	No update required Land use change/habitat loss does not impact key habitats for this species.
	Visual and aural disturbance during construction resulting in displacement from foraging or nesting habitat	Scoped Out No goshawk nest sites were identified within 500m of the Proposed Development and suitable habitat for nest sites is absent.	No update required Suitable habitat for nesting goshawk is largely absent adjacent to the site. Proposed embedded measures will minimise potential disturbance impacts if nests were identified within 500m of the construction area.
	Displacement or disturbance due to the presence of an operational windfarm	Scoped Out Goshawk do not regularly use open/grassland habitats and are unlikely to occur	No update required Assumed no change compared to the 2019 ES

⁷³ Madders, M & Whitfield, D.P. (2006). Upland raptors and the assessment of wind farm impacts. Ibis, 148, 43–56.

Receptor	Likely Significant Effect	Scoping Outcome (2019 ES) and Justification	Updated Assessment Required
	Collision during operation resulting in mortality of individual birds	Scoped Out Very low numbers of goshawk flights were recorded within the approved development.	Potential update required The changes to the potential design of the turbines are unlikely to result in a change in significance (due to the low numbers of flight records originally recorded). However re-assessment of Collision Risk Modelling outputs will be undertaken and informed by updated survey data collected in 2021/2022
Nightjar (Breeding)	Land use change during construction resulting in the loss of foraging or nesting habitat	Scoped Out Land use change and construction did not directly impact breeding habitats (clear fell, immature plantation) for this species.	No update required Assumed no change compared to the 2019 ES
	Visual and aural disturbance during construction resulting in displacement from foraging or nesting habitat	Scoped Out Potential nest sites/habitats were within 100m of proposed working areas, however embedded measures and the distribution of this species made disturbance unlikely.	No update required Assumed no change compared to the 2019 ES
	Collision during operation resulting in mortality of individual birds	Scoped Out No Nightjar flights were recorded within the approved development and Nightjar have been recorded as breeding within/adjacent to active windfarms (BSG 2021) ⁷⁴	No update required Assumed no change compared to the 2019 ES
Golden Plover (Non-Breeding)	Land use change during construction resulting in the loss of foraging or nesting habitat	Scoped Out Low numbers recorded infrequently. Land within Zone of Influence (ZoI) provides suboptimal foraging habitat and is well outside usual wintering range for species	No update required Assumed no change compared to the 2019 ES
	Visual and aural disturbance during construction resulting in displacement from foraging or nesting habitat	Scoped Out Low numbers recorded infrequently. Land within ZoI provides suboptimal foraging habitat and is well outside usual wintering range for species	No update required Assumed no change compared to the 2019 ES
	Displacement or disturbance due to the presence of an operational windfarm	Scoped Out Low numbers recorded infrequently. Land within ZoI provides suboptimal foraging habitat and is well outside usual wintering range for species	No update required Assumed no change compared to the 2019 ES

⁷⁴ BSG (2021) Nightjar Monitoring At Pen Y Cymoedd Wind Farm: No Evidence Of Displacement Of Breeding Birds. https://www.bsg-ecology.com/portfolio_page/nightjar-monitoring-at-pen-y-cymoedd-wind-farm-no-evidence-of-displacement-of-breeding-birds/

Receptor	Likely Significant Effect	Scoping Outcome (2019 ES) and Justification	Updated Assessment Required
	Collision during operation resulting in mortality of individual birds	Scoped Out Collision Risk Modelling (CRM) predicted very low levels of collision that would not affect population at any level	Potential update required The changes to the potential design of the turbines are unlikely to result in a change in significance (due to the low numbers of flight records originally recorded). However re-assessment of Collision Risk Modelling outputs will be undertaken and informed by updated survey data collected in 2021/2022

- 10.7.12 Given the nature of the changes, the scoping of effects for all other bird species is considered to remain valid. Appendix 10C of the 2019 ES provides a summary for all species and effects scoped out from full assessment.

10.8 Embedded environmental measures

- 10.8.1 A range of environmental measures were identified as being embedded into the development proposals as outlined in Chapter 10 of the 2019 ES. No additional measures or changes are proposed.

10.9 Assessment methodology

- 10.9.1 The generic project-wide approach to the assessment methodology is set out in Chapter 4, and specifically in Sections 4.5 to 4.7 of the 2019 ES. This has informed the approach that has been used in this ecology assessment, though it is necessary to set out how this methodology has been adapted and applied to address the specific needs of this ecology assessment. In this respect, the assessment has been aligned with the standard industry guidance provided by CIEEM (2018).
- 10.9.2 The approach to assessment follows that as outlined in Chapter 10 of the 2019 ES. This provisional assessment is based upon the results of the 2019 desk study and supporting baseline information collected between 2012 and 2019. Updated survey results, collected between 2021 and 2022 will be used to verify these assessments.

10.10 Assessment of effects – Red Kite

Baseline conditions

Current baseline

- 10.10.1 Red kite is listed on Annex I of the Birds Directive and Schedule 1 of the WCA. In 2012, the UK population of red kite was estimated to be close to 2,500 pairs, including in excess of 1,000 pairs in Wales (Holling et al., 2014)⁷⁵. The species was described as becoming more frequent and breeding in West Glamorgan, with birds reported from a total of 47 locations in 2011 (Grenfell, 2012)⁷⁶. In East Glamorgan, red kite is a locally common resident and rare breeder, mainly in the north (Wilson [ed] 2017)⁷⁷. Numbers of red kite continue to increase in Wales and the UK, in the most recent update to "Birds of Conservation Concern" (Stanbury et al 2021)⁷⁸ red kite was listed as "Green" with increasing population numbers and distribution.
- 10.10.2 During the surveys completed in 2017 and 2019 red kite were seen regularly in the wider area but only infrequently directly over the Consented Development boundary. Breeding raptor surveys suggested that 1-2 pairs may breed within 2km of the Site, however no active nests were identified within 500m of the red line boundary.

⁷⁵ Holling, M. & the Rare Breeding Birds Panel (2014). Rare breeding birds in the United Kingdom in 2012. British Birds 107, pp 504-560.

⁷⁶ Grenfell, H.E. [ed] (2012). Gower Birds, the Birds of Swansea and Neath Port Talbot in 2011. Gower Ornithological Society.

⁷⁷ Wilson, J. [ed] (2017). East Glamorgan Bird Report 2016 No.55. Glamorgan Bird Club.

⁷⁸ Stanbury, A., Eaton, M., Aebischer, N., Balmer, D., Brown, A., Douse, A., Lindley, P., McCulloch, N., Noble, D., and Win I. (2021). The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain. British Birds 114: 723-747

- 10.10.3 During the VP surveys, undertaken from November 2017–October 2018 a total of 54 flights of red kite were recorded within the wider survey area (within 2km viewsheds+200m) including occasional pairs of birds. Flight activity was concentrated outside and to the east of the Proposed Development site with only 9 flights recorded at Potential Collision Height (PCH) (based on the approved development).

Predicted effects and their significance

Collision during operation resulting in mortality of individual birds

- 10.10.4 There is the potential for red kite to collide with turbine blades. Mortality from collision has the potential to lead to a decline in the local population of red kite. In view of this, Collision Risk Modelling based on red kite flight data collected from vantage point surveys undertaken from November 2017 to October 2018 inclusive was carried out. Modelling for red kite was carried out using an avoidance rate of 98%, as per the original ES (Amec, 2014)¹⁵ as well as at the recommended avoidance rate of 99% (SNH, 2017)⁶⁷.
- 10.10.5 The methods, working and results of the collision risk modelling for red kite were provided in Appendix 10D of the 2019 ES.
- 10.10.6 Due to the low number of flights recorded within the approved development, CRM was only possible for flights recorded during the non-breeding period, covering November 2017 – March 2018 inclusive. During the VP surveys undertaken from November 2017 to March 2018 inclusive, a total of 24 flights of red kite were recorded within the wider survey area (within the 2km viewsheds + 200m), including three flights involving two birds.
- 10.10.7 The flight activity was concentrated outwith and to the east of the Proposed Development site. Of these, eight flights were recorded at PCH within the Proposed Development site (+200m buffer). No flights of red kite were recorded within the Consented Development at PCH during the VP surveys undertaken during the breeding season (April–July 2018) and only a single flight of 15 seconds was recorded during late summer/autumn surveys completed between August and October 2018.
- 10.10.8 A summary of the number and length of flights for each observation period from November 2017–October 2018 is provided in Table 10.8. Provisional results from surveys completed in 2021 and 2022 are also provided but noted that surveys are ongoing.

Table 10.8 Summary of total numbers of flights and number of flights per hour of observation for red kite

Observation Period	Number of hours of monitoring	Number of flights	Total Length of Flight (seconds)	No. Flights per hour of survey
November 2017–March 2018	72 (36 hours per VP)	24	3,045	0.33
April 2018–July 2018	72 (36 hours per VP)	23	3,960	0.32
August 2018–October 2018	36 (18 hours per VP)	7	465	0.194
December 2021–February 2022	51.25 (24 hours VP1, 27.25 VP2)	30	3,180	0.58

- 10.10.9 Results from the CRM on the 2017/18 VP survey data predict that the potential rate of collisions for red kite (based on 85% operational time and 99% avoidance) would be 0.03 collisions per non-breeding season (a total of 0.86 birds over the anticipated life-span of the Proposed Development of 25 years). Based on a 98% avoidance rate, the potential red kite collisions were calculated to be 0.07 per non-breeding season (a total of 1.730 birds over 25 years). This compares to potential collision rates of 0.01 and 0.005 collisions per year (for avoidance rates of 98% and 99% respectively) based on the VP survey data for 2009/10 and 2012/13 (Appendix 10.3 in the 2014 ES, Amec 2014)¹⁵.
- 10.10.10 The updated surveys show a slight increase in the number of red kite flights with 30 flights recorded at an average of 0.58 flights recorded per hour of survey (compared to 0.33 flights per hour when compared to a similar period in 2017-18). The distribution of red kite flights recorded includes 19 intersecting the Proposed Development or passing within 200m.
- 10.10.11 For the previous assessment the CRM assumed a total of 11 turbines with an assumed rotor diameter of 90m and hub height of 100m resulting in a PCH of 55-145m.
- 10.10.12 Under the new proposals the number of turbines will be reduced to 8 with the maximum turbine height (blade tip) retained at 145m. As described in Chapter 5, the size of the rotor diameters would be increased to 133m on five of the turbines with the remaining three increased to 117m.
- 10.10.13 Taking into account the assumed hub height (78.5m and 86.6m respectively), the rotor swept area will increase such that the PCH range would increase by 12m to 145m for the 133m rotor diameter turbines and by 28m to 145m for the 117m rotor diameter turbines and subsequently increase the combined rotor swept area (i.e. the total area occupied by the turbines blades) from 69,978.96m² to 101,718.55m²
- 10.10.14 Given that the proposed changes would result in an increase in the rotor swept area and increase the number of flights included in calculations, revised estimates for the number of collisions will be estimated using both the 2017-18 data and the updated data currently being collected.
- 10.10.15 At this stage it is not possible to conclude whether the changes to the development would result in a change in the assessment outcome in relation to red kite. Following completion of the verification surveys currently being undertaken, updated CRM calculations will be undertaken and updated assessment outcomes provided.

10.11 Assessment of effects: Goshawk

Baseline conditions

- 10.11.1 Goshawk is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). The main centres of population within the UK are Wales/the Welsh Borders, the South Pennines, North-east Scotland and the English/Scottish Borders (Venables et al. 2007)⁷⁹. Within Wales, the main goshawk strongholds are in east and mid-Wales which includes Montgomeryshire. It is a fairly common, albeit very secretive species in woodlands with a preference for coniferous forests with frequent clearings and rides. The extensive plantings of the Forestry Commission across mid-Wales have provided much suitable habitat for goshawk as the trees have matured in recent years.
- 10.11.2 The Welsh population has been estimated at 200-250 pairs in 2000 (Green, 2002)⁸⁰ and more recently (in 2014), a total of 622 pairs were reported in the UK of which 163 were in Wales, 29 in East Glamorgan and 2 in Carmarthenshire and the population continues to increase in many parts

⁷⁹ Venables, W.A., Baker, A.D., Clarke, R.M., Jones, C., Lewis, J.M.S. and Tyler, S.J. (2007). The Birds of Gwent. County Avifaunas. Christopher Helm.

⁸⁰ Green, J. (2002). *Birds in Wales 1992-2000*. Welsh Ornithological Society.

of the UK including Wales (Holling et al., 2016)⁸¹. In 2015, a total of 616 pairs were reported in the UK, of which 99 pairs were in Wales (Holling et al., 2017)⁸² though this latter figure is considered to be a substantial under-estimate of the current Welsh population. Within West Glamorgan, goshawk is described as becoming more common with birds reported from six sites during the 2011 breeding season (Grenfell, 2012)⁷⁶. In East Glamorgan, the species is an increasingly reported resident breeder, with a single pair confirmed to have bred in 2016 (Wilson [ed] 2017)⁷⁷.

- 10.11.3 Results from the breeding raptor survey in 2018 indicate that the Proposed Development site is located within the core ranges of two pairs of breeding goshawk. There is therefore the potential for breeding goshawk to occur within the Proposed Development site.

Predicted effects and their significance

Collision during operation resulting in mortality of individual birds

- 10.11.4 Very low levels of flight activity were recorded across the wider site area during the 2008-15 surveys and just one flight was recorded across the Proposed Development site (below original PCH) during the 2017-18 VP surveys. Usage of the site and any potential for collision with the turbines is predicted to be a very rare event and would result in a negligible effect on the regional population of goshawk. Surveys completed between December 2021 and February 2022 have recorded four flights of goshawk with three occurring offsite over woodland in the Afan Valley. A single bird was recorded crossing the Proposed Development, flying directly north to south and into the woodland to the south of the Proposed Development.
- 10.11.5 Even considering the proposed changes to the turbine specification and reduction in number of turbines, the very low number of observed flights and low suitability of the habitat make it unlikely that a significant increase in the number of collisions would occur and it is therefore unlikely that the 2019 ES assessment would change. However, further consideration of any potential increase in risk will be considered through updated CRM analysis to be carried out on completion of the 2021 and 2022 update surveys.

10.12 Assessment of effects: Golden Plover

- 10.12.1 Golden plover is listed on Annex I of the Birds Directive and is a priority species listed in Section 7 of the Environment (Wales) Act 2016. The species is also red-listed (in Wales) due to a rapid (>50%) decline in the Welsh breeding population over the past 25 years (Johnstone & Bladwell, 2016)⁸³ with only 70–90 pairs remaining, nearly half of which are on moorland within the Cambrian Mountains⁸⁴. The wintering population of golden plover was estimated to be 400,000 birds in Britain in 2006/07 (Musgrove *et al.*, 2013)⁸⁵, and the five-year peak mean count from WeBS sites

⁸¹ Holling, M. & the Rare Breeding Birds Panel (2016). Rare breeding birds in the United Kingdom in 2014. *British Birds* 109, pp 491-545.

⁸² Holling, M. & the Rare Breeding Birds Panel (2017). Rare breeding birds in the United Kingdom in 2015. *British Birds* 110, pp 725.

⁸³ Johnstone, I. & Bladwell, S. (2016). Birds of Conservation Concern in Wales 3: the population status of birds in Wales. *Birds in Wales*, Volume 12, No.1, September 2016).

⁸⁴ RSPB Golden plover advisory sheet - http://www.rspb.org.uk/Images/Englishgoldenplover_tcm9-133252.pdf

⁸⁵ Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risely, K. and Stroud, S. (2013). Population estimates of birds in Great Britain and the United Kingdom. *British Birds*, 106, pp 88-89.

located entirely (or partly) in Wales for 2012/13-16/17 was 20,302 birds⁸⁶. This compares to co-ordinated counts across Wales totalling 18,000 birds in January 1977 (Lovegrove *et al.*, 1994)⁸⁷.

- 10.12.2 In West Glamorgan, golden plover is a former scarce breeding resident but fairly common passage visitor within Neath Port Talbot, with influxes in winter primarily to coastal areas (Grenfell, 2012)⁷⁶. In East Glamorgan, the golden plover is also described as a fairly common passage migrant and winter visitor, again, mainly along the coast, with Sker Point being the main site, supporting 250-550 birds in 2016 (Wilson [ed] 2017)⁷⁶.
- 10.12.3 During the winter walkover surveys undertaken at the Proposed Development site in 2008/09, 2009/10 and 2012/13, a total of three flocks of 50, 38 and 25 golden plover were recorded (resting and/or foraging) within the wider site area on a total of three survey dates (of 41). During this period, a total of five flights of golden plover of 28-50 birds were recorded on four VP survey dates. During winter 2017/18, a further six flights of 17-36 birds were noted on three survey dates. Ongoing surveys commenced in December 2021 have recorded ten golden plover flights with individual birds and flocks ranging between 4 and 58 individuals. Golden plover have been restricted to areas immediately to the east of the Proposed Development but are considered likely to forage or fly within this area. They have been recorded on 5 different dates between January and March
- 10.12.4 Results from the extensive programme of surveys undertaken from 2008-18 provides strong evidence to conclude that the Proposed Development site does not hold wintering or passage golden plover for any prolonged periods, and that low numbers of the birds (generally 25-50 individuals) occur sporadically in the area for short periods. This is likely due to the area providing suboptimal conditions for foraging (rough grassland), and/or is unsuitable for roosting/resting birds. In addition, much of the wintering population resides in coastal areas of South Wales, and therefore the Proposed Development site lies well outside their usual wintering range. In view of this, the effects of displacement due to the presence of the wind turbines and disturbance during construction on golden plover are considered negligible.

Predicted effects and their significance

Collision during operation resulting in mortality of individual birds

- 10.12.5 Very low levels of flight activity were recorded across the wider site area during the 2008-18 surveys with six flights recorded (features flocks of between 9 and 36 individuals). Given this low level of usage any potential for collision with the turbines is predicted to be very rare and would result in a negligible effect on the regional population of golden plover.
- 10.12.6 Results from the collision risk modelling following the 2017/18 surveys predicted that the potential rate of collisions for golden plover (based on 85% operational time and 98% avoidance) would be 0.18 collisions per non-breeding season (a total of 4.39 birds over the anticipated life-span of the proposed development of 25 years).
- 10.12.7 Even considering the proposed changes to the turbine specification and reduction in number of turbines, the very low number of observed flights and low suitability of the habitat make it unlikely that a significant increase in the number of collisions would occur and it is therefore unlikely that the 2019 ES assessment would change. However, further consideration of any potential increase in

⁸⁶ This figure is the sum of each 5-year peak mean count from each WeBS site counted in Wales obtained from the BTO website (www.bto.org). It is acknowledged that this figure could include some double recording of birds moving from one site to another, and that WeBS does not include many sites away from estuaries and wetlands that are used by golden plover.

⁸⁷ Lovegrove, R., Williams, G & Williams, I. (1994). Birds in Wales. T & AD Poyser, London

risk will be considered through updated CRM analysis to be completed on completion of the 2021 and 2022 update surveys.

10.13 Conclusions of significance evaluation

- 10.13.1 Until completion of the surveys currently being undertaken and the production of updated CRM modelling, it is not possible to conclude whether any changes to the original assessment conclusions would occur. However, based on the relatively low levels of bird activity across the site during the various surveys undertaken over the years and initial results from the 2021/2022 survey work, it is considered unlikely that any major changes would occur.

10.14 Implementation of environmental measures

- 10.14.1 **Table 10.9** describes the environmental measures embedded within the Proposed Development and the means by which they will be implemented.

Table 10.9 Summary of environmental measures to be implemented relating to ornithology

Environmental measure	Responsibility for implementation	Compliance mechanism
Avoidance of damage or destruction of nests during construction	Site management and ecological advisor independent of the contractor acting as clerk of works	Planning condition
Pre-construction surveys for breeding crossbill, and mitigation to avoid disturbance, if required	Site management and independent ecological advisor. Mitigation strategy (if required) to be submitted to NRW for agreement.	Planning condition
Avoidance measures to protect breeding nightjar from disturbance	Site management and independent ecological advisor	Planning condition
Habitat enhancement initiatives	Steering group consisting of Pennant Walters (Foelt) Ltd, their ecological consultants and NPTCBC.	Legal agreement

11. Noise

11.1 Introduction

- 11.1.1 This chapter of the ES addendum assesses changes to the likely significant effects of the Proposed Development with respect to noise, taking into account the proposed amendments to the approved development. As the chapter only sets out changes of relevance it should be read in conjunction with Chapter 11: Noise of the 2019 ES⁸⁸. The chapter should also be read in conjunction with the development description and planning policy provided in **Chapters 1-6** of this ES addendum.

11.2 Limitations of this assessment

- 11.2.1 The limitations of the assessment remain unchanged since the 2019 ES.

11.3 Policy and legislative context

- 11.3.1 The relevant planning policy, legislative context and technical guidance remains materially unchanged since the 2019 ES. TAN 8⁸⁹ and 'A Noise Action Plan for Wales 2013 – 2018'⁹⁰ have been withdrawn. The replacement document for the latter is the 'Noise and soundscape action plan 2018-2023'⁹¹, but this has no advice specifically regarding wind turbine noise. Future Wales: The National Plan 2040⁹² provides the national development framework up to 2040 and refers to the protection from noise through planning throughout, including renewables. However, none of these changes and additions has a material effect on the assessment methodology.

11.4 Data gathering methodology

Desk study

- 11.4.1 The information within this ES addendum is largely based upon data used within the 2014 ES⁹³, the exception being data for the candidate wind turbine. Sources of information used for the noise assessment are listed in **Table 11.1**.

⁸⁸Wood. Foel Trawsnant Wind Farm Amended Scheme: Environmental Statement. Doc ref 40217rr066i1. 2019.

⁸⁹Welsh Assembly Government, Technical Advice Note (TAN) 8, 'Renewable Energy'. 2008.

⁹⁰Welsh Government, A Noise Action Plan for Wales 2013 – 2018, 2013.

⁹¹Welsh Government, Noise and soundscape action plan 2018 – 2023, 2018. Available online at: <https://gov.wales/sites/default/files/publications/2019-04/noise-and-soundscape-action-plan.pdf> [Accessed 4th May 2022].

⁹²Welsh Assembly Government (2021). Future Wales. The National Plan 2040, 2020. Available online at: <https://gov.wales/sites/default/files/publications/2021-02/future-wales-the-national-plan-2040.pdf> Accessed on 28 January 2022].

⁹³Amec. Foel Trawsnant Wind Farm Environmental Statement. Doc ref. 24311rr073i1. 2014.

Table 11.1 Sources of information

Source	Data
Turbines	'Octave sound power levels, Nordex N133/4.8. Revision 1.' Nordex (2018)
Types	'Octave sound power levels, Nordex N117/3000 – Standard Mode. Revision 3.' Nordex (2015)

Survey work

- 11.4.2 The description of the survey work undertaken for the assessment remain unchanged since the 2019 ES (Chapter 11).

Turbine data

- 11.4.3 It is understood that the proposed candidate turbines for the development will be the Nordex N117 at 86.5m hub height with a rotor diameter of 117m, and the Nordex N133 at 78.5m hub height with a rotor diameter of 133m. The proposed turbines are identified in Figure 11.1.
- 11.4.4 The approach to the determination of the sound levels from nearby existing and consented turbines, to inform the assessment of cumulative wind farm noise, remains unchanged since the 2019 ES.
- 11.4.5 Noise data indicating the overall sound powers of the turbines forming part of the Proposed Development, which have been used to inform the assessment, are provided in Table 11.2.

Table 11.2 Wind turbine data

Wind Farm Site	Wind Turbine	Sound power levels (dBA L _w) per wind speed (m/s)								
		4	5	6	7	8	9	10	11	12
Foel Trawsnant	Nordex N117*	97.0	101.5	103.5	104.5	105.0	105.0	105.0	105.0	105.0
Foel Trawsnant	Nordex N133**	95.5	101	105.2	107.5	107.5	107.5	107.5	107.5	107.5

* Based on the closest available data, being a hub height of 91 m.

** Based on the closest available data, being a hub height of 78 m.

- 11.4.6 All turbine sound levels have a 2dB uncertainty correction added (on top of the above) to data provided from manufacturer sheets as the sound data provided were not warranted or guaranteed and did not include any correction for uncertainty. Spectral sound power levels of the proposed turbines at wind speeds of 7 m/s at a reference height of 10m are provided in **Table 11.3**.

Table 11.3 Wind turbine spectrum data

Wind Turbine	Sound power level, dBA L _w , per octave band, Hz, at wind speed at 10 m of 7 m/s								
	31.5	63	125	250	500	1K	2K	4K	8K
Nordex N117	73.9	83.5	90.2	95.1	96.6	99.1	98	95.9	86.1
Nordex N133	76.8	87.5	94.6	99.4	101.8	102.4	99.9	92.4	80.1

11.5 Overall baseline

- 11.5.1 The assessment of baseline conditions remains unchanged since the 2019 ES.

11.6 Consultation

- 11.6.1 Wood consulted with Neath Port Talbot County Borough Council (NPTCBC) on 10 March 2022 to agree an approach to the assessment of noise effects from the Proposed Development. From a noise perspective the proposed changes considered by this application include:
- proposals to deliver and construct 8 of the 11 turbines approved;;
 - the reduction in hub height; and
 - the expected lower noise emissions of the new candidate turbine (Nordex N133 and Nordex 117) when compared to that considered for the 2019 ES.
- 11.6.2 It was agreed that the likely outcome was a reduction in predicted noise levels from the wind farm, and hence no additional significant noise effects. This is likely to be influenced by the margin of difference in the noise levels at the worst affected receptor and will correspond with the difference between the noise emission data for the candidate turbine considered by the 2019 ES and the latest candidate turbine. Changes to the blade diameter could result in changes in the aerodynamic noise of the turbine type. However, the final design is required to meet the noise limits set out in the 2019 ES (11 turbine layout) approved as part of planning permission P2014/0825 (approved on 25 November 2021) and will be ensured through turbine selection.
- 11.6.3 It was requested that an update to the noise modelling was undertaken to confirm the above, with reporting in a chapter of the ES addendum.

11.7 Scope of the assessment

- 11.7.1 In general, the scope of the assessment remains unchanged since the 2019 ES. However, turbines T3, T4 and T7 no longer form part of the Proposed Development.

11.8 Environmental measures embedded into the Proposed Development

- 11.8.1 There has been no change to the environmental measures embedded within the Proposed Development since the 2019 ES.

11.9 Assessment methodology

- 11.9.1 There have been no changes to the assessment methodology since the 2019 ES.

11.10 Assessment of noise effects

Predicted effects and their significance

- 11.10.1 Noise levels have been predicted for the closest residential properties to the Proposed Development. The assessment tables for Foel Trawsnant Wind Farm, and for Foel Trawsnant Wind

Farm plus other nearby wind turbines, present the following information for each wind speed for each of the nine properties considered:

- Values of the background noise curve at the integer wind speeds, measured and adjusted for wind shear;
- The noise limits derived from the background noise curve, in accordance with the ETSU-R-97⁹⁴ and the Institute of Acoustics (IoA) Good Practice Guide (GPG)⁹⁵;
- The predicted turbine noise levels, based on worst-case downwind noise propagation and inclusive of any 'valley effect' penalty at receptors and assuming turbines are operating simultaneously; and
- The margin by which the predicted turbine noise, inclusive of any 'canyon effect penalty', meets the noise limits at each wind speed using the worst-case downwind noise predictions (negative values indicate the predicted noise levels are lower than the noise limits).

Foel Trawsnant Wind Farm

11.10.2 Assessments of wind turbine noise due to the operation of the Proposed Development are presented for daytime in **Table 11.4** and for night-time in **Table 11.5**.

Table 11.4 Noise Assessment – Daytime

Noise Parameter, dB LA90,10 m	Standardised 10 m wind speed quoted by manufacturer (m/s)								
	4	5	6	7	8	9	10	11	12
R1 – Tonnau Defaid									
Background Noise Curve	35.1	35.6	36.0	36.4	36.7	37.1	37.3	37.6	37.8
ETSU-R-97 Derived Noise Limit	40.1	40.6	41.0	41.4	41.7	42.1	42.3	42.6	42.8
Wind Farm Turbine Noise	26.2	30.9	34.0	35.9	36.1	36.1	36.1	36.1	36.1
Margin Under Noise Limit	-13.9	-9.7	-7.0	-5.5	-5.6	-6.0	-6.2	-6.5	-6.7
R2 – Pen y lan									
Background Noise Curve	35.1	35.6	36.0	36.4	36.7	37.1	37.3	37.6	37.8
ETSU-R-97 Derived Noise Limit	40.1	40.6	41.0	41.4	41.7	42.1	42.3	42.6	42.8
Wind Farm Turbine Noise	27.4	34.8	37.8	38.8	39.3	39.3	39.3	39.3	39.3
Margin Under Noise Limit	-12.7	-5.8	-3.2	-2.6	-2.4	-2.8	-3.0	-3.3	-3.5
R3 – Sunnyview									
Background Noise Curve	31.6	31.8	32.2	32.9	33.8	34.9	36.3	37.9	39.8
ETSU-R-97 Derived Noise Limit	36.6	36.8	37.2	37.9	38.8	39.9	41.3	42.9	44.8
Wind Farm Turbine Noise	24.5	29.4	33.0	35.1	35.2	35.2	35.2	35.2	35.2
Margin Under Noise Limit	-12.1	-7.4	-4.2	-2.8	-3.6	-4.7	-6.1	-7.7	-9.6
R4 – Teras Griffiths									
Background Noise Curve	31.6	31.8	32.2	32.9	33.8	34.9	36.3	37.9	39.8
ETSU-R-97 Derived Noise Limit	36.6	36.8	37.2	37.9	38.8	39.9	41.3	42.9	44.8
Wind Farm Turbine Noise	25.0	29.9	33.4	35.5	35.6	35.6	35.6	35.6	35.6

⁹⁴ Department of Trade and Industry (1996). ETSU-R-97 The Assessment and Rating of Noise from Wind Farms.

⁹⁵ Institute of Acoustics (2013). A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise.

Noise Parameter, dB L _{A90,10 m}	Standardised 10 m wind speed quoted by manufacturer (m/s)								
	4	5	6	7	8	9	10	11	12
Margin Under Noise Limit	-11.6	-6.9	-3.8	-2.4	-3.2	-4.3	-5.7	-7.3	-9.2
R5 – Hendre Owen Farm									
Background Noise Curve	34.3	34.6	35.1	35.7	36.4	37.2	38.2	39.3	40.5
ETSU-R-97 Derived Noise Limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.5
Wind Farm Turbine Noise	28.7	33.9	37.9	40.2	40.2	40.2	40.2	40.2	40.2
Margin Under Noise Limit	-16.3	-11.1	-7.1	-4.8	-4.8	-4.8	-4.8	-4.8	-5.3
R6 – Ty'n-y Pant Farm									
Background Noise Curve	31.5	32.0	32.6	33.6	34.8	36.2	37.9	39.9	42.1
ETSU-R-97 Derived Noise Limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	47.1
Wind Farm Turbine Noise	31.3	36.7	40.8	43.1	43.1	43.1	43.1	43.1	43.1
Margin Under Noise Limit	-13.7	-8.3	-4.2	-1.9	-1.9	-1.9	-1.9	-1.9	-4.0
R7 – Nant-yr-hwyaid Farm									
Background Noise Curve	48.7	49.3	50.0	50.9	51.7	52.6	53.4	54.1	54.7
ETSU-R-97 Derived Noise Limit	53.7	54.3	55.0	55.9	56.7	57.6	58.4	59.1	59.7
Wind Farm Turbine Noise	32.4	37.7	41.8	44.1	44.1	44.1	44.1	44.1	44.1
Margin Under Noise Limit	-21.3	-16.6	-13.2	-11.8	-12.6	-13.5	-14.3	-15.0	-15.6
R8 – Tycanol									
Background Noise Curve	31.5	32.0	32.6	33.6	34.8	36.2	37.9	39.9	42.1
ETSU-R-97 Derived Noise Limit	36.5	37.0	37.6	38.6	39.8	41.2	42.9	44.9	47.1
Wind Farm Turbine Noise	29.5	34.8	38.9	41.2	41.2	41.2	41.2	41.2	41.2
Margin Under Noise Limit	-7.0	-2.2	1.3	2.6	1.4	0.0	-1.7	-3.7	-5.9
R9 – Neuadd-wen									
Background Noise Curve	34.3	34.6	35.1	35.7	36.4	37.2	38.2	39.3	40.5
ETSU-R-97 Derived Noise Limit	39.3	39.6	40.1	40.7	41.4	42.2	43.2	44.3	45.5
Wind Farm Turbine Noise	29.6	34.9	39.0	41.2	41.2	41.2	41.2	41.2	41.2
Margin Under Noise Limit	-9.7	-4.7	-1.1	0.5	-0.2	-1.0	-2.0	-3.1	-4.3

Table 11.5 Noise Assessment – Night-time

Noise Parameter, dB L _{A90,10m}	Standardised 10 m wind speed quoted by manufacturer (m/s)								
	4	5	6	7	8	9	10	11	12
R1 – Tonnau Defaid									
Background Noise Curve	30.2	30.5	31.1	31.9	32.9	34.2	35.7	37.5	39.5
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5
Wind Farm Turbine Noise	26.2	30.9	34.0	35.9	36.1	36.1	36.1	36.1	36.1
Margin Under Noise Limit*	-16.8	-12.1	-9.0	-7.1	-6.9	-6.9	-6.9	-6.9	-8.4
R2 – Pen y lan									
Background Noise Curve	30.2	30.5	31.1	31.9	32.9	34.2	35.7	37.5	39.5
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5
Wind Farm Turbine Noise	27.4	34.8	37.8	38.8	39.3	39.3	39.3	39.3	39.3
Margin Under Noise Limit	-15.6	-8.2	-5.2	-4.2	-3.7	-3.7	-3.7	-3.7	-5.2

Noise Parameter, dB L _{A90,10m}	Standardised 10 m wind speed quoted by manufacturer (m/s)								
	4	5	6	7	8	9	10	11	12
R3 – Sunnyview									
Background Noise Curve	26.1	26.1	26.8	28.0	29.5	31.4	33.5	35.7	38.0
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
Wind Farm Turbine Noise	24.5	29.4	33.0	35.1	35.2	35.2	35.2	35.2	35.2
Margin Under Noise Limit	-18.5	-13.6	-10.0	-7.9	-7.8	-7.8	-7.8	-7.8	-7.8
R4 – Teras Griffiths									
Background Noise Curve	26.1	26.1	26.8	28.0	29.5	31.4	33.5	35.7	38.0
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
Wind Farm Turbine Noise	25.0	29.9	33.4	35.5	35.6	35.6	35.6	35.6	35.6
Margin Under Noise Limit	-18.0	-13.1	-9.6	-7.5	-7.4	-7.4	-7.4	-7.4	-7.4
R5 – Hendre Owen Farm									
Background Noise Curve	33.8	34.1	34.6	35.3	36.1	37.1	38.2	39.5	41.0
ETSU-R-97 Derived Noise Limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.0
Wind Farm Turbine Noise	28.7	33.9	37.9	40.2	40.2	40.2	40.2	40.2	40.2
Margin Under Noise Limit	-16.3	-11.1	-7.1	-4.8	-4.8	-4.8	-4.8	-4.8	-5.8
R6 – Ty'n-y Pant Farm									
Background Noise Curve	30.2	30.9	31.8	32.9	34.3	36.0	37.9	40.0	42.4
ETSU-R-97 Derived Noise Limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	47.4
Wind Farm Turbine Noise	31.3	36.7	40.8	43.1	43.1	43.1	43.1	43.1	43.1
Margin Under Noise Limit	-13.7	-8.3	-4.2	-1.9	-1.9	-1.9	-1.9	-1.9	-4.3
R7 – Nant-yr-hwyaid Farm									
Background Noise Curve	49.0	49.3	49.8	50.4	51.2	52.3	53.8	55.7	58.0
ETSU-R-97 Derived Noise Limit	54.0	54.3	54.8	55.4	56.2	57.3	58.8	60.7	63.0
Wind Farm Turbine Noise	32.4	37.7	41.8	44.1	44.1	44.1	44.1	44.1	44.1
Margin Under Noise Limit	-21.6	-16.6	-13.0	-11.3	-12.1	-13.2	-14.7	-16.6	-18.9
R8 – Tycanol									
Background Noise Curve	30.2	30.9	31.8	32.9	34.3	36.0	37.9	40.0	42.4
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	45.0	47.4
Wind Farm Turbine Noise	29.5	34.8	38.9	41.2	41.2	41.2	41.2	41.2	41.2
Margin Under Noise Limit	-13.5	-8.2	-4.1	-1.8	-1.8	-1.8	-1.8	-3.8	-6.2
R9 – Neuadd-wen									
Background Noise Curve	33.8	34.1	34.6	35.3	36.1	37.1	38.2	39.5	41.0
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.2	44.5	46.0
Wind Farm Turbine Noise	29.6	34.9	39.0	41.2	41.2	41.2	41.2	41.2	41.2
Margin Under Noise Limit	-13.4	-8.1	-4.0	-1.8	-1.8	-1.8	-2.0	-3.3	-4.8

- 11.10.3 The results in Table 11.4 show slight exceedances of the ETSU-R-97 limits at R8 - Tycanol and R9 – Neuadd-wen, to the north of the development site, when wind speeds at 10m are between 6 to 8m/s. The results in Table 11.5 indicate that no exceedance of the ETSU-R-97 limits are predicted during the night-time.

- 11.10.4 Based on the above, the assessment indicates that at receptors R8 and R9, during the daytime, noise from the wind farm would give rise to a significant effect, and that, for all other receptors and times of day, operation noise from the wind farm would give rise to effects that are not significant. Additional mitigation to reduce noise from the wind farm such that significant effects are avoided at all receptors is considered in Section 11.11.

Cumulative noise from Foel Trawsnant Wind Farm plus other nearby wind turbines

- 11.10.5 As the candidate turbine has changed since the 2019 ES, an update to the assessments of cumulative wind turbine noise due to the operation of Proposed Development and other nearby wind turbines presented in that document has been undertaken, and are presented for daytime in **Table 11.6** and for night-time in **Table 11.7**. The other nearby wind turbines include Ffynnon Oer Wind Farm, Pen y Cymoedd Wind Farm, and Llynfi Afan Renewable Energy Park⁹⁶.

Table 11.6 Cumulative Noise Assessment – Daytime

Noise Parameter, dB LA90,10m	Standardised 10 m wind speed quoted by manufacturer (m/s)								
	4	5	6	7	8	9	10	11	12
R1 – Tonnau Defaid									
Background Noise Curve	35.1	35.6	36.0	36.4	36.7	37.1	37.3	37.6	37.8
ETSU-R-97 Derived Noise Limit	40.1	40.6	41.0	41.4	41.7	42.1	42.3	42.6	42.8
Wind Farm Turbine Noise	29.9	32.6	35.1	36.7	37.0	37.3	37.7	37.7	37.7
Margin Under Noise Limit	-10.2	-8.0	-5.9	-4.7	-4.7	-4.8	-4.6	-4.9	-5.1
R2 – Pen y lan									
Background Noise Curve	35.1	35.6	36.0	36.4	36.7	37.1	37.3	37.6	37.8
ETSU-R-97 Derived Noise Limit	40.1	40.6	41.0	41.4	41.7	42.1	42.3	42.6	42.8
Wind Farm Turbine Noise	29.7	33.1	35.4	37.1	37.4	37.7	38.1	38.1	38.1
Margin Under Noise Limit	-10.4	-7.5	-5.6	-4.3	-4.3	-4.4	-4.2	-4.5	-4.7
R3 – Sunnyview									
Background Noise Curve	31.6	31.8	32.2	32.9	33.8	34.9	36.3	37.9	39.8
ETSU-R-97 Derived Noise Limit	36.6	36.8	37.2	37.9	38.8	39.9	41.3	42.9	44.8
Wind Farm Turbine Noise	31.0	32.8	35.0	36.5	36.8	37.5	38.2	38.2	38.2
Margin Under Noise Limit	-5.6	-4.0	-2.2	-1.4	-2.0	-2.4	-3.1	-4.7	-6.6
R4 – Teras Griffiths									
Background Noise Curve	31.6	31.8	32.2	32.9	33.8	34.9	36.3	37.9	39.8
ETSU-R-97 Derived Noise Limit	36.6	36.8	37.2	37.9	38.8	39.9	41.3	42.9	44.8
Wind Farm Turbine Noise	31.1	33.2	35.2	36.9	37.2	37.7	38.5	38.5	38.5
Margin Under Noise Limit	-5.5	-3.6	-2.0	-1.0	-1.6	-2.2	-2.8	-4.4	-6.3
R5 – Hendre Owen Farm									
Background Noise Curve	34.3	34.6	35.1	35.7	36.4	37.2	38.2	39.3	40.5
ETSU-R-97 Derived Noise Limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.5
Wind Farm Turbine Noise	36.6	38.0	40.0	41.6	41.9	42.7	43.6	43.6	43.6
Margin Under Noise Limit	-8.4	-7.0	-5.0	-3.4	-3.1	-2.3	-1.4	-1.4	-1.9
R6 – Ty'n-y Pant Farm									

⁹⁶ Further details on the general approach to inter-project cumulative effects are discussed in **Chapter 17**

Noise Parameter, dB L _{A90,10m}	Standardised 10 m wind speed quoted by manufacturer (m/s)								
	4	5	6	7	8	9	10	11	12
Background Noise Curve	31.5	32.0	32.6	33.6	34.8	36.2	37.9	39.9	42.1
ETSU-R-97 Derived Noise Limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	47.1
Wind Farm Turbine Noise	34.8	38.0	41.4	43.5	43.6	43.8	44.1	44.1	44.1
Margin Under Noise Limit	-10.2	-7.0	-3.6	-1.5	-1.4	-1.2	-0.9	-0.9	-3.0
R7 – Nant-yr-hwyaid Farm									
Background Noise Curve	48.7	49.3	50.0	50.9	51.7	52.6	53.4	54.1	54.7
ETSU-R-97 Derived Noise Limit	53.7	54.3	55.0	55.9	56.7	57.6	58.4	59.1	59.7
Wind Farm Turbine Noise	35.5	38.9	42.4	44.5	44.5	44.7	45.1	45.1	45.1
Margin Under Noise Limit	-18.2	-15.4	-12.6	-11.4	-12.2	-12.9	-13.3	-14.0	-14.6
R8 – Tycanol									
Background Noise Curve	31.5	32.0	32.6	33.6	34.8	36.2	37.9	39.9	42.1
ETSU-R-97 Derived Noise Limit	36.5	37.0	37.6	38.6	39.8	41.2	42.9	44.9	47.1
Wind Farm Turbine Noise	33.7	36.6	39.7	41.7	41.9	42.1	42.5	42.5	42.5
Margin Under Noise Limit	-2.8	-0.4	2.1	3.1	2.1	0.9	-0.4	-2.4	-4.6
R9 – Neuadd-wen									
Background Noise Curve	34.3	34.6	35.1	35.7	36.4	37.2	38.2	39.3	40.5
ETSU-R-97 Derived Noise Limit	39.3	39.6	40.1	40.7	41.4	42.2	43.2	44.3	45.5
Wind Farm Turbine Noise	35.9	37.9	40.4	42.1	42.4	42.9	43.6	43.6	43.6
Margin Under Noise Limit	-3.4	-1.7	0.3	1.4	1.0	0.7	0.4	-0.7	-1.9

Table 11.7 Cumulative Noise Assessment – Night-time

Noise Parameter, dB L _{A90,10m}	Standardised 10 m wind speed quoted by manufacturer (m/s)								
	4	5	6	7	8	9	10	11	12
R1 – Tonnau Defaid									
Background Noise Curve	30.2	30.5	31.1	31.9	32.9	34.2	35.7	37.5	39.5
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5
Wind Farm Turbine Noise	29.9	32.6	35.1	36.7	37.0	37.3	37.7	37.7	37.7
Margin Under Noise Limit	-13.1	-10.4	-7.9	-6.3	-6.0	-5.7	-5.3	-5.3	-6.8
R2 – Pen y lan									
Background Noise Curve	30.2	30.5	31.1	31.9	32.9	34.2	35.7	37.5	39.5
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.5
Wind Farm Turbine Noise	29.7	33.1	35.4	37.1	37.4	37.7	38.1	38.1	38.1
Margin Under Noise Limit	-13.3	-9.9	-7.6	-5.9	-5.6	-5.3	-4.9	-4.9	-6.4
R3 – Sunnyview									
Background Noise Curve	26.1	26.1	26.8	28.0	29.5	31.4	33.5	35.7	38.0
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
Wind Farm Turbine Noise	31.0	32.8	35.0	36.5	36.8	37.5	38.2	38.2	38.2
Margin Under Noise Limit	-12.0	-10.2	-8.0	-6.5	-6.2	-5.5	-4.8	-4.8	-4.8
R4 – Teras Griffiths									
Background Noise Curve	26.1	26.1	26.8	28.0	29.5	31.4	33.5	35.7	38.0

Noise Parameter, dB L _{A90,10m}	Standardised 10 m wind speed quoted by manufacturer (m/s)								
	4	5	6	7	8	9	10	11	12
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
Wind Farm Turbine Noise	31.1	33.2	35.2	36.9	37.2	37.7	38.5	38.5	38.5
Margin Under Noise Limit	-11.9	-9.8	-7.8	-6.1	-5.8	-5.3	-4.5	-4.5	-4.5
R5 – Hendre Owen Farm									
Background Noise Curve	33.8	34.1	34.6	35.3	36.1	37.1	38.2	39.5	41.0
ETSU-R-97 Derived Noise Limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	46.0
Wind Farm Turbine Noise	36.6	38.0	40.0	41.6	41.9	42.7	43.6	43.6	43.6
Margin Under Noise Limit	-8.4	-7.0	-5.0	-3.4	-3.1	-2.3	-1.4	-1.4	-2.4
R6 – Ty'n-y Pant Farm									
Background Noise Curve	30.2	30.9	31.8	32.9	34.3	36.0	37.9	40.0	42.4
ETSU-R-97 Derived Noise Limit	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	47.4
Wind Farm Turbine Noise	34.8	38.0	41.4	43.5	43.6	43.8	44.1	44.1	44.1
Margin Under Noise Limit	-10.2	-7.0	-3.6	-1.5	-1.4	-1.2	-0.9	-0.9	-3.3
R7 – Nant-yr-hwyaid Farm									
Background Noise Curve	49.0	49.3	49.8	50.4	51.2	52.3	53.8	55.7	58.0
ETSU-R-97 Derived Noise Limit	54.0	54.3	54.8	55.4	56.2	57.3	58.8	60.7	63.0
Wind Farm Turbine Noise	35.5	38.9	42.4	44.5	44.5	44.7	45.1	45.1	45.1
Margin Under Noise Limit	-18.5	-15.4	-12.4	-10.9	-11.7	-12.6	-13.7	-15.6	-17.9
R8 – Tycanol									
Background Noise Curve	30.2	30.9	31.8	32.9	34.3	36.0	37.9	40.0	42.4
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	45.0	47.4
Wind Farm Turbine Noise	33.7	36.6	39.7	41.7	41.9	42.1	42.5	42.5	42.5
Margin Under Noise Limit	-9.3	-6.4	-3.3	-1.3	-1.1	-0.9	-0.5	-2.5	-4.9
R9 – Neuadd-wen									
Background Noise Curve	33.8	34.1	34.6	35.3	36.1	37.1	38.2	39.5	41.0
ETSU-R-97 Derived Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.2	44.5	46.0
Wind Farm Turbine Noise	35.9	37.9	40.4	42.1	42.4	42.9	43.6	43.6	43.6
Margin Under Noise Limit	-7.1	-5.1	-2.6	-0.9	-0.6	-0.1	0.4	-0.9	-2.4

- 11.10.6 The results in Table 11.6 show slight exceedances of the ETSU-R-97 limits at R8 - Tycanol and R9 – Neuadd-wen, to the north of the development site, when wind speeds at 10 m are between 6 to 10 m/s, with the greatest exceedance at R8 of 3.1 dB when wind speeds are 7 m/s. The results in Table 11.7 indicate a slight exceedance of the ETSU-R-97 limits at R9 – Neuadd-wen, during the night-time, of 0.4 dB when wind speeds are 10 m/s.
- 11.10.7 Based on the above, the assessment indicates that at receptors R8 and R9, during the daytime, and at R9 during the night-time, cumulative noise from the Proposed Development and other nearby wind turbines would give rise to a significant effect, and that, for all other receptors and times of day, cumulative noise from wind turbines would give rise to effects that are not significant. Additional mitigation to reduce noise from the wind farm such that significant effects are avoided at all receptors is considered in Section 11.11.

11.11 Consideration of additional mitigation or compensation

- 11.11.1 An analysis of potential mitigation options to avoid the significant effects identified was undertaken based on manufacturer's data indicating the reduction in total sound power of the N133 wind turbines with different operating modes. The analysis was undertaken with reference to the results of the assessment of cumulative wind turbine noise, and then cross checked with the results of the assessment of the Proposed Development only. A summary of the results of the analysis are provided in **Table 11.8** below.

Table 11.8 Summary of results of mitigation investigation

Scenario	Turbine operating mode, per turbine			Max. exceedance, dB	Max. attenuation achieved, dB
	T5	T6	T11		
Daytime (6 m/s)	Mode 8	Mode 9	Mode 8	2.1	2.4
Daytime (7 m/s)	Mode 5	Mode 10	Mode 8	3.1	3.6
Daytime (8 m/s)	Mode 3	Mode 9	Mode 1	2.1	2.5
Daytime (9 m/s)	Mode 0	Mode 4	Mode 4	0.9	1.1
Daytime (10 m/s)	Mode 0	Mode 2	Mode 3	0.4	0.6
Night-time (10 m/s)	Mode 0	Mode 2	Mode 3	0.4	0.6

- 11.11.2 The results **Table 11.8** indicate that, with the reduced power operating modes provided to turbines T5, T6 and T11, significant effects will be avoided when combining the sound from the operational Proposed Development and that of other nearby turbines.

11.12 Conclusions of significance evaluation

- 11.12.1 Exceedances of limits have been identified through modelling and assessment of the Proposed Development assuming a worst case scenario that all receptors are downwind of all turbines. The results of the assessment indicate that, in consideration of Proposed Development only, significant effects are anticipated at receptors R8 and R9 during the daytime, and effects are not significant at all other receptors and times of day. Regarding the results of the assessment of the cumulative scenario, the assessment indicates that, significant effects are anticipated at receptors R8 and R9 during the daytime and at R9 during the night-time, and effects are not significant at all other receptors and times of day.
- 11.12.2 Analysis of the attenuation that may be achieved by the implementation of lower operational power modes for the turbines with the greater sound power, the N133 turbines, indicates that the significant effects identified in the assessment may be avoided and reduced such that they are not significant. The mitigation package achieving the necessary attenuation is detailed in Table 11.8.

11.13 Implementation of environmental measures

- 11.13.1 Whilst the candidate turbine may change, the assessment indicates that residential amenity of surrounding areas would be protected by an appropriately worded planning condition based on ETSU-R-97 limits as stipulated within **Section 11.10**. Compliance of these limits can be proven with measurements taken at residential receptor locations once the wind farm is operational.

12. Water Resources and Ground Conditions

- 12.1.1 Detailed assessment of the effects of the Proposed Development on Water Resources and Ground Conditions have been scoped out of this ES addendum following review of the proposed changes to the approved development, the baseline, the policy and statutory context.
- 12.1.2 Chapter 12 of the 2019 ES considered potential effects on surface water, groundwater, flood risk and private water supplies. The chapter concluded that the construction, operation and decommissioning of the approved development would not lead to any significant effects on the water environment, provided that all recommended environmental measures outlined in Section 12.8 of the chapter were put in place.
- 12.1.3 The position of tracks, hardstandings, foundations and laydown areas would not change outside of the micrositied allowance previously assessed. The reduction from 11 to 8 turbines would result in fewer impermeable and semi-permeable areas.
- 12.1.4 It is therefore concluded that the Proposed Development would not give rise to any additional effects on Water Resources and Ground Conditions as compared to the approved development and the conclusions of the 2019 ES that there would be no significant effects on the water environment are therefore unchanged.
- 12.1.5 A Coal Authority report, provided as Appendix 12B to the 2019 ES, confirmed that the development area is within the likely zone of influence from workings in 11 seams of coal at shallow to 780m depth. The planning boundary is not in the likely zone of influence of any present underground coal workings and is not in an extent that is likely to be affected at the surface from any planned future workings. The Coal Authority report, provided as Appendix 12A of this ES addendum for completeness, provides approximate positions of three mine entries within the planning boundary.
- 12.1.6 According to the report, the Coal Authority "is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining".
- 12.1.7 Although it is anticipated that they will not have any cause for concern, given the Proposed Development overlies areas of coal, the Coal Authority should be consulted with regards final engineering design.
- 12.1.8 A Coal Stability Risk Assessment, undertaken by James Associates, was provided as Appendix 12B of the 2019 ES. It identified six proposed turbines which lie within zones of potential impact associated with abandoned mining. The assessment recommends a programme of site investigation works be undertaken around the following turbines: T1, T2, T3, T4, T8 and T9. As stated in Chapter 5 however, the Applicant no longer proposed to install turbines T3 or T4 (and T7). The Coal Stability Risk Assessment report is provided as part of Appendix 12A of this ES addendum.

13. Traffic and Transport

- 13.1.1 The Proposed Development seeks permission for a revised development which differs from the approved development by increasing the rotor diameter of eight turbines, as described in Chapter 5. All other infrastructure elements (and therefore construction traffic movements) remain unchanged, albeit the proposed removal of three turbines would reduce transport movements compared to those reported in the 2019 ES due to less material quantities (stone, concrete, sand) being required, and hence environmental traffic effects would be less than those reported in Chapter 13 of the 2019 ES, which were reported as not significant.
- 13.1.2 As such, apart from updating Swept Paths Analysis (SPA) and the Construction Traffic Management Plan (see Appendix 13A) based on the worst-case longest blade length (67m) of the turbines under consideration, all other traffic and transport related environmental effects remain unchanged from those considered in the 2019 ES.
- 13.1.3 To account for the potential additional impacts of delivering the larger 67m blades to the site, a revised abnormal load route and delivery methodology (using a blade lifter vehicle arrangement) has been proposed for the Proposed Development, as detailed in Appendix 13A. The proposed route is as follows:
- M4 junction 36;
 - A4063 via Tondy, Coytrahen, Llangwynydd and Maesteg (into town centre);
 - B4282 Neath Road; and
 - B4282 to Site Access.
- 13.1.4 Due to the nature of the route and the constraints which exist through Maesteg town centre, two vehicle arrangements are proposed to be used to deliver blade components:
- a standard extendable trailer arrangement with manual rear steering override; and
 - a blade lifter arrangement which will carry the blade at an elevated angle through the constraints of Maesteg town centre.
- 13.1.5 The blade components will be carried on a standard extendable trailer configuration between the port and a layby on the A4063 west of Betws. At this layby the blade component will be transhipped from the extendable trailer configuration to the blade lifter arrangement. The blade lifter arrangement is required for transportation through the more constrained section of route through Maesteg. Further details of the route assessment using a blade lifter arrangement through Maesteg are summarised in Section 4.2 of the CTMP provided in Appendix 13A.
- 13.1.6 A preliminary assessment of the delivery routes has been undertaken to understand if there are any improvements to the highway which will need to be made to accommodate the delivery of abnormal loads. The assessment identified improvements were required at a number of junctions; the individual junctions are discussed in more detail in Section 4.2 of the CTMP provided in Appendix 13A. All relevant permits for abnormal load transportation, including DfT Special Types General Order (STGO) will be arranged prior to commencement of deliveries.
- 13.1.7 SPA has been undertaken at five 'pinch points' (areas of potential constraint) on the proposed abnormal load delivery route. The results of this updated SPA are provided in Appendix 13A and demonstrate that, subject to some adjustments to existing highway infrastructure including the temporary removal of street furniture and some trimming of trees/hedgerows, abnormal loads can be accommodated on the proposed route.

- 13.1.8 Should the Proposed Development be consented, a 'dry run' will be undertaken to confirm the extent of overrun / overhang areas identified by the SPA and any mitigation required, as per planning condition 6 of the current planning permission.
- 13.1.9 It is considered that there would be no significant effects in relation to traffic and transport as a result of the Proposed Development.

14. Socio-economics including recreation and tourism

- 14.1.1 The Proposed Development primarily relates to an increased rotor diameter of eight of the consented turbines (from a maximum of 90m to a maximum 133m). The Applicant also intends to not construct three of the approved turbines (T3, T4 and T7). All ground level infrastructure, construction and decommissioning methods/programme will remain unchanged, albeit site tracks and other infrastructure related to T3, T4 and T7 would no longer be required.
- 14.1.2 The 2019 ES concluded the following effects:
- Climate change and energy security: Minor (not significant) positive effect on the achievement of Welsh Government's legal and policy commitment to increasing renewable energy production within Wales, and towards its commitments to have a positive and lasting effect on climate change.
 - Economy and community: Moderate (significant) effect on the regional economy from the positive contribution during the construction phase. Negligible (not significant) effects during operation.
 - Tourism and recreation: Negligible (not significant) effects. Effects on users of public rights of way (PRoW) minimised in the construction phase through the implementation of environmental measures including diversions and adoption of permissive paths.
- 14.1.3 Effects in relation to Climate change and energy security, and Economy and community, are expected to remain unchanged from the 2019 ES.
- 14.1.4 With respect effects on users of PRoW, Condition 13 of planning permission ref. P2014/0825 relates to the diversion of PRoW within the site. The applicant no longer proposes to divert the bridleway (ProW 39) or footpath (PRoW 40) referred to in the condition. Both will remain in place and available to users with alternative routes also provided for use, if desired, during both the construction and operation phases. Effects will therefore remain negligible and not significant.
- 14.1.5 In conclusion, Socio-economic effects from the Proposed Development would remain unchanged from those reported in the 2019 ES for the approved development.

15. Shadow Flicker

15.1 Introduction

- 15.1.1 This chapter of the ES addendum assesses the likely significant effects of the Proposed Development with respect to shadow flicker. It should be read in conjunction with the development description provided in Chapter 5 of this ES addendum and Chapter 5 of the 2019 ES.
- 15.1.2 This is an update to the assessment presented in the 2019 ES⁹⁷, which examined the potential effects relating to shadow flicker in the defined study area of 10 rotor diameters plus 50m micro-siting to reflect a worst-case scenario for potential effects⁹⁸. This assessment has therefore been updated taking into consideration the proposed change to turbine dimensions and reduction in number of turbines as described in Chapter 5.

15.2 Limitations of this assessment

- 15.2.1 There are no limitations relating to shadow flicker that affect the robustness of the assessment of the potential likely significant effects of the Proposed Development.
- 15.2.2 However, it was not possible to visit the private residential properties and take accurate measurements of window locations, sizes and orientation, so an estimate of the number, orientation and location of windows has been made, based on available information such as OS maps, aerial photographs and Google Streetview.

15.3 Policy and legislative context

Planning policy

- 15.3.1 **Table 15.1** lists the issues from the relevant planning policies that have been considered in assessing shadow flicker effects.

Table 15.1 Policy issues considered in preparing the Shadow Flicker assessment

Policy reference	Policy context
Technical Advice Note (TAN) 8: Planning for Renewable Energy (2005) – Para 2.32 (revoked however used as a guide for this assessment)	Under particular circumstances the sun may pass behind the rotors of a wind turbine and cast a shadow over neighbouring properties. The shadow flicks on and off as the blades rotate. This can be disturbing for the affected residents or even have the potential of being a health problem for people who are photo-sensitive epileptics. The problem is only seasonal and lasts for a few hours per day but needs to be investigated where any potential exists. Developers should provide an analysis of the potential shadow flicker impacting upon nearby properties".
Future Wales (the National Development Framework)	This states: "Policy 18 – Renewable and Low Carbon Energy Developments of National Significance

⁹⁷ Wood (2019). Foel Trawsant Wind Farm Amended Scheme: Environmental Statement. Doc ref 40217rr066i1

⁹⁸ Despite the Applicant not seeking to micro-site any turbines (see **Chapter 5**, para 5.2.13), this approach retains consistency with the approach adopted in the 2019 ES

Policy reference	Policy context
	<i>... 7. there are no unacceptable adverse impacts by way of shadow flicker, noise, reflected light, air quality or electromagnetic disturbance;</i> "
Local planning policy	
Neath Port Talbot County Borough Council Local Development Plan 2011 -2026 Renewable and Low Carbon Energy Supplementary Planning Guidance (July 2017) Policy RE1	Matters that will need to be taken into consideration in relation to all types of renewable/low carbon energy include visual amenity, cultural and residential impacts on local communities, effects on the natural environment, highway safety implications, effects on communications, and site restoration. Particular attention will need to be given to potential impacts on the landscape, townscape or seascape, nature conservation, wildlife interests, areas of historical and cultural importance and the potential for pollution, noise, dust, vibration, reflected light and shadow flicker.

Technical guidance

15.3.2 A summary of the technical guidance for Shadow Flicker is given in **Table 15.2**.

Table 15.2 Technical guidance relevant to the Shadow Flicker assessment

Technical guidance document	Context
Best Practice Guidance to Planning Policy Statement 18 (PPS 18) Renewable Energy (Northern Ireland Department of the Environment, 2009)	Whilst not strictly applicable in a Welsh context, the guidance in Northern Ireland provided in the draft Best Practice Guidance to Planning Policy Statement 18 (PPS 18) Renewable Energy (Northern Ireland Department of the Environment, 2009) is noteworthy. The draft guidance reaffirms the advice provided by DECC (2011) and the Welsh Government, but further recommends that "shadow flicker at neighbouring offices and dwellings within 500m should not exceed 30 hours per year or 30 minutes per day." The recommendation is based on a European Union sponsored study undertaken by Predac (2004), an organisation that promotes best practice in energy use and supply.
Department of Energy and Climate Change, Update of UK Shadow Flicker Evidence Base, 2011,	Provides evidence and guidance to support shadow flicker assessments.

15.4 Data gathering methodology

- 15.4.1 The shadow flicker assessment comprises numerical modelling of the proposed turbines and receptors within the defined study area. It is noted that whilst there are a number of computer models available, the DECC study (2011)⁹⁹ confirms that there are limited differences between outputs of the various packages. For Shadow Flicker assessments, Wood use one of the industry standard software packages, ReSoft Wind Farm software (version 4.2.5.2).
- 15.4.2 The calculations from this assessment process assume a worst-case scenario based on the sun shining during all daylight hours over the course of a year, no obscuring features (such as trees, hedges, other buildings) being present, the face of the rotor always being aligned towards the dwelling, and that the rotor is always turning (i.e. the wind is always blowing between 4m/s and 25m/s, and no account is taken of shut down periods for maintenance). This methodology yields a

⁹⁹ Department of Energy and Climate Change, Update of UK Shadow Flicker Evidence Base, 2011, <http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/ORED/1416-update-uk-shadow-flicker-evidence-base.pdf>

theoretical maximum indication of potential shadow flicker incidence, together with the times of day, and dates during the year when potential incidence may occur.

- 15.4.3 The software performs calculations to determine the position of the sun throughout the year, and thus during what times of day it will theoretically cast a shadow across the windows of nearby houses within 10 rotor diameters (plus 50m micro-siting). Data input into the model where shadow flicker assessment is required is as follows:
- The locations of all properties within ten times the rotor diameter (including an allowance of 50m for micro-siting) and 130 degrees either side of north of any turbine;
 - The dimensions and orientations of windows facing the Proposed Development;
 - The surrounding topography (Ordnance Survey Digital Terrain Model); and
 - The locations and dimensions of the turbines.
- 15.4.4 The following sources of information outlined in **Table 15.3** were used to inform this assessment.

Table 15.3 Sources of Information

Topic	Source of information
Residential properties: location in relation to the proposed development and identification of windows	Ordnance Survey (OS) 1:25,000 Mapping Google Earth Street View Bing Maps Birds Eye View
Topography Height data	OS 5m DTM data

15.5 Overall baseline

- 15.5.1 As outlined in Section 15.3 and 15.4 it is considered that shadow flicker does not have a significant effect at properties located at a distance greater than ten rotor diameters from the wind turbines. The turbines under consideration for development at this site have rotor diameters of up to 133m, meaning a study area of 1,330m. We have also allowed 50m for micro-siting, giving a total study area of 1,380m.
- 15.5.2 Properties falling within this baseline will be assessed with regards to the potential to experience shadow flicker. The study area is shown in Figure 15.1. None of the properties considered currently experience shadow flicker from other wind farm developments.

Predicted future baseline

- 15.5.3 On the basis of the information currently available, no changes to the baseline conditions are anticipated in the event that the Proposed Development does not proceed.

15.6 Scope of the assessment

- 15.6.1 The approach to shadow flicker assessment as set out in Section 9.4 reflects that undertaken for the 2019 ES.

Spatial scope

- 15.6.2 The spatial scope of the assessment of shadow flicker assessment covers the area of the site contained within the application boundary, together with the Zones of Influence that has formed the basis of the study area described in **Section 15.5**.

Temporal scope

- 15.6.3 Shadow flicker is an operational effect of the wind farm and is not present during construction or decommissioning. Therefore, the temporal scope of the assessment of shadow flicker is consistent with the period over which the development would be carried out and therefore covers the operational period of the wind farm.

Potential receptors

- 15.6.4 There are 33 properties within the study area (1380m) and 130° either side of north relative to the turbines, as noted in **Table 15.4**. The locations of the receptors are shown on **Figure 15.1**, with the majority located to the north of the site in the settlements of Cynonville and Duffryn along the A4107.

Table 15.4 Shadow Flicker Receptors within Study Area

ID	House Name/address	Distance to nearest turbine (m)	Easting	Northing
1	Hendre-owen	878	283608	195571
2	50 Afan Road	908	283263	195572
3	51 Afan Road	883	283228	195535
4	Afan Lodge Hotel	919	283187	195559
5	52 Afan Road	855	283219	195502
6	53 Afan Road	815	283164	195436
7	Nant-yr-hwyaid Farm	508	282736	195082
8	Hafodwen	647	282603	195182
9	Ty'n-y-pant Farm	572	282501	195031
10	1 – 2 Percy Road	709	282494	195195
11	3 – 4 Percy Road	704	282510	195198
12	5 – 6 Percy Road	699	282529	195203
13	7 – 8 Percy Road	693	282548	195207
14	9 -10 Percy Road	690	282565	195212
15	11 – 12 Percy Road	686	282582	195215
16	13 – 14 Percy Road	681	282600	195218
17	15 – 16 Percy Road	688	282620	195234

ID	House Name/address	Distance to nearest turbine (m)	Easting	Northing
18	17 – 18 Percy Road	682	282639	195234
19	19 – 20 Percy Road	677	282661	195236
20	21 – 22 Percy Road	673	282680	195238
21	1 – 2 Pentwyn Road	721	282588	195256
22	3 – 4 Pentwyn Road	724	282569	195251
23	5 – 6 Pentwyn Road	729	282553	195249
24	7 – 8 Pentwyn Road	734	282535	195246
25	9 – 10 Pentwyn Road	738	282517	195241
26	11 – 12 Pentwyn Road	743	282499	195237
27	13 – 14 Pentwyn Road	747	282482	195232
28	Travancore	748	282631	195301
29	Tycanol	688	282313	194999
30	Tonnau Dafydd	1054	285031	193593
31	Green View/Glan yr Afrom	759	282597	195301
32	Timberhops	795	282433	195258
33	Bryn Argoed	766	282400	195199

Potentially significant effects

- 15.6.5 Shadow flicker is a potential operational effect of the Proposed Development (with no effects during construction or decommissioning).

Photo Sensitive Epilepsy

- 15.6.6 Research has been carried out to determine whether shadow flicker from wind turbines can cause seizures in photo-sensitive epilepsy sufferers¹⁰⁰. Sufferers are usually sensitive to flickering light at frequencies from 3Hz–60Hz. For a typical 3-blade, 45m rotor diameter wind turbine the maximum rotational speed will be less than 20 revolutions per minute so the blade passing frequency is 60rpm, or 1Hz; this is well below the 3Hz–60Hz sensitivity range.
- 15.6.7 The proposed turbines will operate at varying speeds, up to 15 RPM. As the turbine rotors will have three blades, each blade will pass a particular point no more than 45 times a minute, which equates to a maximum frequency of 0.75 Hertz. This is much lower than the 3-30 Hertz frequency range generally thought to risk triggering photo-sensitive epilepsy. It is also noted in the DECC Report

¹⁰⁰ Harding G, Harding P, and Wilkins A, [2008]: Wind turbine, flicker, and photosensitive epilepsy: Characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them.

(2011)¹⁰¹ that "on health effects and nuisance of the shadow flicker effect, it is considered that the frequency of the flickering caused by the wind turbine rotation is such that it should not cause a significant risk to health".

- 15.6.8 Therefore photo-sensitive epilepsy is not considered further in this assessment.

15.7 Embedded environmental measures

- 15.7.1 There are no UK guidelines which quantify what exposure levels to shadow flicker would be acceptable. Therefore, where particular combinations of circumstances arise that have the potential for nuisance (particularly where rooms affected are in regular occupancy and the effect proves to be a frequent occurrence in reality), measures may be required to reduce the level of exposure to acceptable levels.
- 15.7.2 If shadow flicker effects occur in practice at a particular occupied building, it does not immediately follow that additional mitigation is required. Such effects would need to occur in a room that was occupied at the times of occurrence and for a duration that caused a nuisance. For example, if an effect was predicted to occur for a three-week period in the early hours of the morning in a room unlikely to be occupied at that time, with each occurrence lasting just a few minutes, then it is unlikely that mitigation measures would be needed.
- 15.7.3 However, until the turbine locations and technical parameters are precisely defined (following micro-siting and turbine selection through competitive tender activities), and the wind turbines are operating, neither the requirement for, nor the exact details of mitigation can be finalised.
- 15.7.4 The Applicant is committed to installing a shadow flicker impact control module prior to operation to turbines which have the potential to cause shadow flicker on nearby properties. Therefore if, following a complaint and appropriate investigation, shadow flicker is confirmed to result in a loss of residential amenity at any location, the technical mitigation measures built into these turbines would be activated. This covers all properties that could experience shadow flicker.
- 15.7.5 The shadow flicker control module consists of bespoke software, a clock, a timer, a switch, a wind direction sensor and a light sensor. The module can control a specific turbine (or turbines) which would be programmed to shut down on specific dates at specific times when the sun is bright enough, there is sufficient wind to rotate the blades and the wind direction is such that nuisance shadow flicker could occur. There is no specific UK guidance regarding what level of light is sufficient to cause a shadow flicker event. However, the actual light level that would trigger a turbine shut down can be manually configured onsite, following installation, to reflect local conditions.
- 15.7.6 Planning conditions 24 and 25 of the planning permission for the approved development state:
- "24. The shadow flicker control system, as set out within the mitigation measures, section 15.13 of the ES shall be fully implemented prior to the first beneficial use of the wind farm and retained in perpetuity.*
- 25. None of the wind turbines hereby permitted shall be operated until a written scheme has been submitted to and approved in writing by the Local Planning Authority, setting out a protocol for the assessment of shadow flicker in the event of any complaint to the local planning authority from the owner or occupier of any dwelling (defined for the purposes of this condition as a building within Use Class C3 of the Use Classes Order) which lawfully exists or*

¹⁰¹ Department of Energy and Climate Change, Update of UK Shadow Flicker Evidence Base, 2011, <http://www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/ORED/1416-update-uk-shadow-flicker-evidence-base.pdf>

had planning permission at the date of this permission. The written scheme shall be implemented in accordance with the approved details."

- 15.7.7 No changes are proposed to these conditions as a result of this current application and, as such, they will be retained for the Proposed Development to ensure that any complaints would be investigated within a reasonable timescale and that the rectification of any shadow flicker problem that is substantiated would be implemented promptly and effectively. As noted previously, the DECC guidance (2011) states that "Mitigation measures which have been employed to operational wind farms such as turbine shut down strategies, have proved very successful, to the extent that shadow flicker cannot be considered to be a major issue in the UK".
- 15.7.8 Table 15.5 describes the environmental measures embedded within the Proposed Development and how these embedded measures will influence the Shadow Flicker assessment.

Table 15.5 Summary of the embedded environmental measures and how these influence the Shadow Flicker assessment

Receptor	Potential changes and effects	Embedded measures and influence on assessment
Residential and/or occupied buildings within the study area	Experiencing shadow flicker effects	Implementation of a shadow flicker control module will reduce effects to an acceptable level

15.8 Assessment methodology

- 15.8.1 The assessment approach recommended within both national and local planning guidance is for the assessment of shadow flicker effects to be carried out at properties within 130 degrees either side of north and 10 rotor diameter distance from the nearest property. A study area of 1,380m from each turbine has therefore been adopted for the shadow flicker assessment in order to include land within 10 times the maximum rotor diameter (based on a maximum 133m rotor diameter in line with the worst-case access study scenario¹⁰²) plus a 50m micro-siting allowance.

Methodology for prediction of effects

- 15.8.2 The generic project-wide approach to the assessment methodology was described in Chapter 2 of the 2019 ES. However, whilst this has informed the approach that has been used in this shadow flicker assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this shadow flicker assessment.

Significance evaluation methodology

- 15.8.3 Whilst the time and duration of shadow flicker events can be predicted accurately, the level of the effect is difficult to quantify as this would depend on the location of windows within a property, the use of the rooms affected, the level of shading surrounding the property and how susceptible the receptor is to light flicker.
- 15.8.4 As confirmed by the DECC study (2011), there is no standard UK or Welsh guidance relating to a limit for shadow flicker. The only guidance providing additional recommendations is the aforementioned Northern Irish PPS 18 (2009) guidance which recommends that for properties

¹⁰² Turbines 1, 2 and 8 have a proposed rotor diameter of 117m, the remaining turbines have a proposed rotor diameter of 133m, which were applied to the shadow flicker model.

within 500m of the turbines, shadow flicker should not exceed 30 hours per year or 30 minutes per day.

- 15.8.5 For the purpose of this assessment, once the effect of theoretical shadow flicker has been modelled, the approach to establishing the magnitude of change is based on professional judgement.
- 15.8.6 Significance is typically defined as a function of the sensitivity of a receptor with the magnitude of change. In this case the sensitivity of the receptor (an occupied building) is considered to be high and as such significance will be defined largely as a function of the magnitude of change. A methodology for the establishment of the magnitude of change has therefore been derived based on professional experience and is presented in Table 15.6. This is based on the distance of the property from the turbine location along with the number of predicted hours of shadow flicker effect.

Table 15.6 Scoring Methodology for Magnitude of Change

Magnitude of Change	Distance from Turbine	And/ Or	Predicted Shadow Flicker Effect Duration
High	<500m		>30 minutes a day or >30 hours per year.
Medium	500 – 700m		>30 minutes a day or >30 hours per year.
Low	700m – 1380m		<30 minutes a day or <30 hours per year.
No Change	>1380m		No shadow flicker effect predicted.

- 15.8.7 The EIA Regulations require that a final judgement is made about whether or not each effect is likely to be significant. In this assessment, effects are considered to be significant or not significant according to the matrix in **Table 15.7**. Effects are rated as being either major or moderate (significant) where the magnitude of change is high or medium, or minor or negligible (not significant) where magnitude of change is low, or no change.

Table 15.7 Matrix of EIA Significance

Sensitivity	Magnitude of change			
	High	Medium	Low	No change
High	Major (Significant)	Moderate (Significant)	Minor (Not Significant)	Negligible (Not significant)

Factors limiting the occurrence of shadow flicker

- 15.8.8 There are several additional factors that can influence the amount of shadow flicker actually experienced and these cannot be readily included in a computer-based assessment.
- 15.8.9 Climatic conditions dictate that the sun is not always shining. The closest Met Office location providing long term climate summaries is Mumbles Head, located some 20km from the development site. However, this station does not record sunshine hours and so St Athan Met Station, located some 30km from the site has been used instead.

- 15.8.10 Historic Met Office data (over the period 1981–2010) gives actual sunshine hours for the St Athan Met Station to be 38% of total daylight hours¹⁰³. Cloud cover during other times may obscure the sun and prevent shadow flicker occurrence. While some shadows may be cast under slightly overcast conditions, no shadow at all would be cast when heavy cloud cover prevails. During calm periods, or very high winds, the wind turbine blades would not rotate and shadow flicker would not occur. Turbines would also be periodically shut-down for maintenance or repair work.
- 15.8.11 Wind turbines automatically orientate themselves to face the prevailing wind direction. This means that the turbine rotors would not always face directly towards the occupied buildings. Under some wind conditions, the proposed turbines would face 'side-on' to properties, and in these conditions only a very small area of blade movement would be visible.

15.9 Assessment of Shadow Flicker effects

Baseline conditions

- 15.9.1 Baseline conditions are discussed in Section 15.5.

Predicted effects: operation

- 15.9.2 Figure 15.2 shows a contour map representing the annual number of hours of potential shadow flicker effects on the occupied buildings included in the assessment.
- 15.9.3 Table 15.8 below shows the number of days per year that each occupied building could be affected by shadow flicker. It also shows the maximum number of hours per day, the mean number of hours per day and the total number of hours per year that shadow flicker could occur. The likely number of hours per year when shadow flicker could occur has been calculated using Met Office records of the number of annual sunshine hours per year at St Athan. Individual results for each receptor are provided in Appendix 15A.

Table 15.8 Shadow Flicker Model Results

ID	Days/Year	Turbine(s) causing shadow flicker	Distance to nearest turbine (m)	Mean no. of minutes/day	Theoretical max hours/ year	Likely hours/ year ¹
1	51	11	878	31.2	26.6	10.1
2	77	6, 10, 11	908	67.2	86	32.7
3	87	6, 10, 11	883	52.2	75.5	28.7
4	91	5, 6, 10, 11	919	48.6	73.9	28.1
5	93	5, 6, 10, 11	855	47.4	73.7	28.0
6	107	5, 6, 11	815	40.8	73	27.7
7	175	5, 6, 10, 11	508	59.4	173.3	65.9
8	141	5, 6, 11	647	45	105.1	39.9
9	123	5, 6, 11	572	40.2	82	31.2

¹⁰³ <http://www.metoffice.gov.uk/public/weather/climate/st-athan-vale-of-glamorgan#?tab=climateTables>

Average sunshine hours of 1673 / Total number of daylight hours 4380 = 38% (last accessed 16/02/2022)

ID	Days/Year	Turbine(s) causing shadow flicker	Distance to nearest turbine (m)	Mean no. of minutes/day	Theoretical max hours/ year	Likely hours/ year ¹
10	92	5, 6, 11	709	35.4	54.5	20.7
11	91	5, 6, 11	704	33.6	50.7	19.3
12	96	5, 6, 11	699	33.6	54.2	20.6
13	102	5, 6, 11	693	34.2	58.4	22.2
14	111	5, 6, 11	690	36.6	67.9	25.8
15	127	5, 6, 11	686	39.6	84.1	32.0
16	143	5, 6, 11	681	43.2	103.3	39.3
17	157	5, 6, 11	688	43.2	113.8	43.2
18	156	5, 6, 11	682	47.4	123.2	46.8
19	156	5, 6, 11	677	50.4	130.4	49.6
20	161	5, 6, 10, 11	673	54	144.2	54.8
21	134	5, 6, 11	721	42	93.8	35.6
22	127	5, 6, 11	724	38.4	81.2	30.9
23	112	5, 6, 11	729	36.6	68.5	26.0
24	108	5, 6, 11	734	34.8	62.8	23.9
25	105	5, 6, 11	738	33.6	59.3	22.5
26	104	5, 6, 11	743	34.2	58.8	22.3
27	105	5, 6, 11	747	33.6	59	22.4
28	148	5, 6, 11	748	46.8	115.4	43.9
29	97	5, 6, 11	688	35.4	56.8	21.6
30	0	-	1054	0	0	0.0
31	145	5, 6, 11	759	39.6	95.1	36.1
32	104	5, 6, 11	795	32.4	56.2	21.4
33	105	5, 6, 11	766	31.2	54.5	20.7

¹ Based on average sunshine hours at the site, 38% of daylight hours.

- 15.9.4 The approach taken to the modelling assessment is theoretical and based on the worst-case scenario in that it assumes each property is occupied, that there are windows or doors facing the wind turbines, that there are no intervening obstructions, that the sun shines throughout daylight hours, that the wind blows constantly within the operating parameters of the wind turbines and that the rotor is always orientated towards the receptor.
- 15.9.5 The results show that turbines 5, 6, 10 and 11 have the potential to cause shadow flicker effects. The assessment shows that the remaining turbines of the Proposed Development, turbines 1, 2, 8

and 9, do not have the potential to cause any shadow flicker within the study area. However, they have been included in the model for completeness.

- 15.9.6 Examination of the detailed results of the model found in Appendix 15A shows that receptor 30 would not experience any shadow flicker as a result of the development. The remaining 32 receptors could experience between 26.6 and 173.3 hours of shadow flicker per year, based on the worst-case model.
- 15.9.7 If average annual sunshine hours are applied to the model, then all currently occupied buildings are likely to experience shadow flicker for no more than 65.9 hours per annum.
- 15.9.8 Due to the number of properties in the study area, a selection of properties have been chosen to illustrate the potential effects of shadow flicker. As many of the properties are grouped close together and experience similar levels of potential effect, a sample property has been chosen from each group. The representative property has the highest predicted levels of effect within the group. The groupings are shown below in Table 15.9.

Table 15.9 Shadow Flicker Model Results Groups

Grouping	Description of Group	Properties included (ID)	Representative property ID
1	Hendre-owen Farm	1	1
2	Properties in Duffryn on Afan Road	2 - 6	2
3	Nany-yr-hwyaid farm	7	7
4	Ty'n-y-pant Farm	9	9
5	Properties on southern edge of Cynonville	8, 10 – 27	20
6	Properties on northern side of Cynonville	28, 31 - 33	28
7	Tycanol	29	29
8	Properties to east of site	30	30

Receptor group 1

- 15.9.9 The model shows that receptor 1 could experience shadow flicker effects from turbine 11 for an average duration of 31.2 minutes from late November until mid-January between the hours of 11.41 and 12.28.
- 15.9.10 In total the property could experience up to 26.6 hours per year of potential shadow flicker. Based on the significance criteria presented in Section 9.8, the effect on this property would be low and therefore not significant according to Table 15.6.

Receptor group 2

- 15.9.11 The model shows that receptor 2 could experience shadow flicker effects from turbine 6 for an average duration of 28.2 minutes from late-November until mid-January between the hours of 12.51 and 13.36.
- 15.9.12 The model shows that receptor 2 could also experience shadow flicker effects from turbine 10 for an average duration of 26.5 minutes from late-November until mid-January between the hours of 09.41 and 10.26.

- 15.9.13 The model shows that receptor 2 could experience shadow flicker effects from turbine 11 for an average duration of 35 minutes from mid-November until late-January between the hours of 10.01 and 11.02.
- 15.9.14 In total the property could experience up to 86 hours per year of potential shadow flicker. Based on the significance criteria presented in Section 9.8, the effect on this property would be medium and therefore significant according to Table 15.6. However, as stated in Section 9.7, the Applicant is committed to installing a shadow flicker control module where required. This module can control a specific turbine (or turbines) which would be programmed to shut down on specific dates at specific times when the sun is bright enough, there is sufficient wind to rotate the blades and the wind direction is such that nuisance shadow flicker could occur. The effects are therefore concluded as not significant.

Receptor group 3

- 15.9.15 The model shows that receptor 7 could experience shadow flicker effects from turbine 5 for an average duration of 29.2 minutes from early-November until early-February between the hours of 09.19 and 10.29.
- 15.9.16 The model shows that receptor 7 could also experience shadow flicker effects from turbine 6 for an average duration of 46 minutes from late December until late-February between the hours of 10.25 and 11.29, and between mid-October and early-December between 09.55 and 10.59.
- 15.9.17 The model shows that receptor 7 could also experience shadow flicker effects from turbine 10 for an average duration of 23.1 minutes from mid-February until early March between the hours of 07.54 and 08.24 and between mid-October and late October between 07.26 and 07.56.
- 15.9.18 The model shows that receptor 7 could also experience shadow flicker effects from turbine 11 for an average duration of 30.2 minutes from late February until late March between the hours of 07.29 and 08.08 and between late September and mid-October between 07.09 and 07.48.
- 15.9.19 In total the property could experience up to 173.3 hours per year of potential shadow flicker. Based on the significance criteria presented in Section 9.8, the effect on this property would be medium and therefore significant according to Table 15.6. However, as stated in Section 9.7, the Applicant is committed to installing a shadow flicker control module where required. This module can control a specific turbine (or turbines) which would be programmed to shut down on specific dates at specific times when the sun is bright enough, there is sufficient wind to rotate the blades and the wind direction is such that nuisance shadow flicker could occur. The effects are therefore concluded as not significant.

Receptor group 4

- 15.9.20 The model shows that receptor 9 could experience shadow flicker effects from turbine 5 for an average duration of 28.1 minutes from late-January until mid-February between the hours of 08.53 and 09.30, and between late-October and mid-November between 08.23 and 09.00.
- 15.9.21 The model shows that receptor 9 could also experience shadow flicker effects from turbine 6 for an average duration of 42.3 minutes from late January to mid-March between the hours of 08.55 and 09.51, and between early October and mid-November between 08.26 and 09.22.
- 15.9.22 The model shows that receptor 9 could also experience shadow flicker effects from turbine 11 for an average duration of 25.3 minutes from early March to late March between the hours of 06.59 and 07.32, and between mid-September and early October between 06.42 and 07.15.
- 15.9.23 In total the property could experience up to 82 hours per year of potential shadow flicker. Based on the significance criteria presented in Section 9.8, the effect on this property would be medium and

therefore significant according to Table 15.6. However, as stated in Section 9.7, the Applicant is committed to installing a shadow flicker control module where required. This module can control a specific turbine (or turbines) which would be programmed to shut down on specific dates at specific times when the sun is bright enough, there is sufficient wind to rotate the blades and the wind direction is such that nuisance shadow flicker could occur. The effects are therefore concluded as not significant.

Receptor group 5

- 15.9.24 The model shows that receptor 20 could experience shadow flicker effects from turbine 5 for an average duration of 30.3 minutes from early January and early February between the hours of 09.46 and 10.27, and between mid-November and late December between 09.25 and 10.15.
- 15.9.25 The model shows that receptor 20 could experience shadow flicker effects from turbine 6 for an average duration of 39.3 minutes from early January and mid-February between the hours of 10.22 and 11.14, and between late-October and late December between 09.54 and 10.55.
- 15.9.26 The model shows that receptor 20 could experience shadow flicker effects from turbine 10 for an average duration of 20.3 minutes from early February and late February between the hours of 08.11 and 08.38, and between mid-October and early November between 07.41 and 08.08.
- 15.9.27 The model shows that receptor 20 could experience shadow flicker effects from turbine 11 for an average duration of 27.3 minutes from mid-February and mid-March between the hours of 07.54 and 08.29, and between early October and late October between 07.29 and 08.04.
- 15.9.28 In total the property could experience up to 144.2 hours per year of potential shadow flicker. Based on the significance criteria presented in Section 9.8, the effect on this property would be medium and therefore significant according to Table 15.6. However, as stated in Section 9.7, the Applicant is committed to installing a shadow flicker control module where required. This module can control a specific turbine (or turbines) which would be programmed to shut down on specific dates at specific times when the sun is bright enough, there is sufficient wind to rotate the blades and the wind direction is such that nuisance shadow flicker could occur. The effects are therefore concluded as not significant.

Receptor group 6

- 15.9.29 The model shows that receptor 28 could experience shadow flicker effects from turbine 5 for an average duration of 26.5 minutes from early January and early February between the hours of 09.43 and 10.21, and between mid-November and late December between 09.22 and 10.09.
- 15.9.30 The model shows that receptor 28 could experience shadow flicker effects from turbine 6 for an average duration of 35.2 minutes from early January and mid-February between the hours of 10.14 and 11.02, and between late-October and late December between 09.47 and 10.42.
- 15.9.31 The model shows that receptor 28 could experience shadow flicker effects from turbine 11 for an average duration of 25.2 minutes from mid-February and mid-March between the hours of 08.00 and 08.32, and between early October and late October between 07.33 and 08.06.
- 15.9.32 In total the property could experience up to 115.4 hours per year of potential shadow flicker. Based on the significance criteria presented in Section 15.8, the effect on this property would be medium and therefore significant according to Table 15.6. However, as stated in section 9.7, the Applicant is committed to installing a shadow flicker control module where required. This module can control a specific turbine (or turbines) which would be programmed to shut down on specific dates at specific times when the sun is bright enough, there is sufficient wind to rotate the blades and the

wind direction is such that nuisance shadow flicker could occur. The effects are therefore concluded as not significant.

Receptor group 7

- 15.9.33 The model shows that receptor 29 could also experience shadow flicker effects from turbine 5 for an average duration of 24.3 minutes from mid-February to late February between the hours of 08.21 and 08.54, and between mid-October and late October between 07.51 and 08.24.
- 15.9.34 The model shows that receptor 29 could also experience shadow flicker effects from turbine 6 for an average duration of 36.5 minutes from mid-February to mid-March between the hours of 08.05 and 08.53, and between late September and late October between 07.41 and 08.29.
- 15.9.35 The model shows that receptor 29 could also experience shadow flicker effects from turbine 11 for an average duration of 23.3 minutes from mid-March to late March between the hours of 06.44 and 07.13, and between mid-September and late September between 06.30 and 06.59.
- 15.9.36 In total the property could experience up to 56.9 hours per year of potential shadow flicker. Based on the significance criteria presented in Section 15.8, the effect on this property would be medium and therefore significant according to Table 15.6. However, as stated in Section 9.7, the Applicant is committed to installing a shadow flicker control module where required. This module can control a specific turbine (or turbines) which would be programmed to shut down on specific dates at specific times when the sun is bright enough, there is sufficient wind to rotate the blades and the wind direction is such that nuisance shadow flicker could occur. The effects are therefore concluded as not significant.

Receptor group 8

- 15.9.37 The model shows that receptor 30 would not experience any shadow flicker effects from the turbines.

Predicted effects and their significance

- 15.9.38 A summary of the results of the assessment of shadow flicker is provided in **Table 15.10**.

Table 15.10 Summary of significance of adverse effects

Receptor and summary of predicted effects	Sensitivity of receptor ¹	Magnitude of change ²	Significance ³	Summary rationale
Shadow flicker effects on residential property: 31 occupied buildings	High	Medium	Moderate (Not significant)	Although, according to Table 9.7 , moderate effects are deemed significant, any shadow flicker effects would be investigated and fully mitigated through a shadow flicker control module in turbines. No significant effects would therefore arise.
Shadow flicker effects on residential property: 2 occupied buildings	High	Low	Minor (Not significant)	Modelling has shown that significant effects are considered unlikely. Any shadow flicker effects would be fully mitigated through a shadow flicker control module in turbines.

4. The sensitivity of a receptor is defined using the criteria set out in section 9.8 above and is defined as high

5. The magnitude of change on a receptor resulting from activities relating to the development is defined using the criteria set out in section 9.8 above and is defined as no change, low, medium and high

6. The significance of the environmental effects is based on the combination of the sensitivity/importance/value of a receptor and the magnitude of change and is expressed as major (significant), moderate (significant) or minor/negligible (not significant), subject to the evaluation methodology outlined in section 9.8.

15.10 Conclusions of significance evaluation

- 15.10.1 The assessment has identified the potential for significant shadow flicker effects at 31 occupied buildings, and non-significant effects at two occupied buildings. Mitigation has been identified in the form of a control system which automatically shuts down the wind turbine causing the effect to restrict effects to less than 30 minutes per day and/or 30 hours per year at any property.
- 15.10.2 With this measure in place no shadow flicker significant effects would arise from the Proposed Development.
- 15.10.3 A programme of monitoring would ensure the effectiveness of the proposed mitigation.

15.11 Implementation of environmental measures

- 15.11.1 **Table 15.11** describes the environmental measures embedded within the Proposed Development and the means by which they will be implemented.

Table 15.11 Summary of environmental measures relevant to Shadow Flicker to be implemented

Environmental measure	Responsibility for implementation	Compliance mechanism	Section Reference
Shadow Flicker Control Module	Applicant	Planning Condition	15.7

16. Aviation and Telecommunications

- 16.1.1 Detailed assessment of the effects of the Proposed Development on the aviation radar and telecommunications systems have been scoped out of this ES addendum following review of the proposed changes to the approved development, the baseline, the policy and statutory context.
- 16.1.2 Chapter 16 of the 2019 ES concluded that the degradation of microwave and other electromagnetic signals as a result of the approved development was considered unlikely due to the technical mitigation solutions identified as a result of consultations with stakeholders, in particular the Joint Radio Company (JRC). The Applicant is committed to adopt measures proposed by JRC, and Western Power Distribution, to resolve any potential signal interference problems should they arise as a result of construction and operation of the wind farm, and therefore there should be no resulting impact on these signals. This is in accordance with planning condition 15:
- “No development shall commence until a scheme has been submitted to and approved in writing by the local planning authority (in consultation with Western Power Distribution (WPD) and the Joint Radio Company) providing for the mitigation of the impact of the development on any telecommunications links operated by WPD. The scheme shall be implemented as approved in writing by WPD.”*
- 16.1.3 There will be no changes to the previous conclusions given that the Proposed Development does not propose an increase to overall tip height, or movement outside agreed micro-siting allowances for the approved development (as per planning condition 27).
- 16.1.4 It is therefore concluded that the Proposed Development would not give rise to any additional effects on the Aviation and Telecommunications as compared to the approved development and the conclusions of the 2019 ES that there would be no significant effects are therefore unchanged.

17. Cumulative effects

17.1 Introduction

- 17.1.1 The EIA process includes consideration as to whether any of the individual effects of the Proposed Development would combine to create a cumulative effect greater than the sum of the individual effects. There are two types of cumulative effects to be considered:
- Inter-project effects: effects that arise as a result of the Proposed Development in combination with other large-scale developments or projects; and
 - Intra-project/Inter-related effects: effects that occur as a result of two or more environmental topic effects acting together (i.e. combined), to result in a new or changed effects on a single receptor.
- 17.1.2 In the 2019 ES inter-project cumulative effects were considered within the individual topic chapters as appropriate, with inter-related cumulative effects considered in Chapter 17 of the document. For this ES addendum, the approach to inter-project cumulative effects is summarised in **Section 17.2**. An update to the assessment of inter-related cumulative effects is presented in **Section 17.3**.

17.2 Inter-project cumulative effects

- 17.2.1 To reflect the time which has passed since the 2019 ES, an exercise has been undertaken to identify any new developments or planning applications for major developments within the Zone of Influence (Zoi) for the cumulative assessment, set at 23km based on the maximum Zoi of all technical topics (for the Landscape and Visual assessment). This identified that the following major developments have come forward since the 2019 ES:
- Y Bryn Wind Farm (Proposed; Scoping Direction received February 2021).
 - Mynydd Fforch Dwm Wind Farm (Proposed; Scoping Report submitted April 2022).
 - Upper Ogmere Wind Farm (Proposed; Scoping Submitted October 2021).
 - Ty'n Y Waun / Heol y Cyw Solar (Proposed; Pre-Application Advice submitted in December 2021).
 - Craig Y Perchyll Solar – (Proposed; Non-EIA Decision made in September 2021).
- 17.2.2 Other wind farm developments¹⁰⁴ considered in the 2019 ES were identified in Chapter 7, Table 7.3 and Figure 7.57 of that submission. This figure has been updated to include the additional major developments listed above and is provided as **Figure 17.1**.
- 17.2.3

¹⁰⁴ No developments other than wind farms were scoped into the inter-project cumulative effects assessments for the 2019 ES

- 17.2.4 Table 17.1 lists the other developments within the 23km ZOI and their current status, as well as their status at the time of the 2019 ES.

Table 17.1 Other developments considered in the 23km ZoI

Other developments in the 23km	Status in 2019	Status in 2022
Maesgwyn Extension	Operational	Operational
Pant-y-Wal Extension	Operational	Operational
Mynydd y Gwair	Operational	Operational
Mynydd y Gwrhyd	Operational	Operational
Mynydd Betws	Operational	Operational
Newton Down	Operational	Operational
Taff Ely and Mynydd Portref	Operational	Operational
Fforch Nest and Pant-y-wal	Operational	Operational
Ferndale	Operational	Operational
Maerdy	Operational	Operational
Maerdy T9	Operational	Operational
Mynydd Bwlfa	Operational	Operational
Measgwyn	Operational	Operational
Ffynnon Oer	Operational	Operational
Mynydd Brombil	Operational	Operational
Llynfi Afan	Operational	Operational
Mynydd Portref Extensions	Operational	Operational
Bwlfa Farm	Operational	Operational
Swansea Bay Wind Turbine	Operational	Operational
Newlands Farm Wind Turbine	Operational	Operational
Land at Parc Stormy	Operational	Operational
Pen y Cymoedd	Operational	Operational
Abergorki	Operational	Operational
Former Nant y Gwyddon Landfill Site	Consented	Operational
Llwyncelyn Wind Project	Consented	Operational
Mynachdy Farm, Ynysbwl, Pontypridd	Consented	Operational
West of Rhiwfelin Fach Farm	Consented	Operational
Headwind Taff Ely	Consented	Operational
Land at Pen-y-waun Farm	Proposed	Operational

Other developments in the 23km	Status in 2019	Status in 2022
East of Melin Court	Proposed	Operational
Road to Craig Fatha Farm, Brynna	Proposed	Operational
Y Bryn Wind Farm	-	Proposed (Scoping Direction received February 2021)
Mynydd Fforch Dwm Wind Farm	-	Proposed (Scoping Report submitted April 2022)
Upper Ogmore Wind Farm	-	Proposed (Scoping Submitted October 2021)
Ty'n Y Waun / Heol y Cyw Solar	-	Proposed (Pre-Application Advice submitted in December 2021)
Craig Y Perchyll Solar	-	Proposed (Non-EIA Decision made in September 2021)

17.2.5 Although it is noted that a S73 TCPA application represents a new planning application, the proposed variation to the approved development, as discussed in detail in **Chapter 5**, represents a proposed change to rotor diameter and hub height only, with maximum height to blade tip maintained at 145m and no changes to turbine locations outside agreed micro-siting limits proposed. The fundamental nature of the development sought via the S73 application is therefore in essence unchanged from that already approved.

17.2.6

- 17.2.7 Table 17.1 demonstrates that all of the other developments considered in the 2019 ES are now operational. The table also notes that none of the additional major developments which have come forward since the 2019 ES have been consented. They are all at the pre-application stage and are not at an advanced enough stage for sufficient publicly available information to be available to undertake a robust assessment of inter-project cumulative effects. Furthermore, given that the Foel Trawsnant Wind Farm is further along in the planning process, it is considered that the other major developments which have come forward since the 2019 ES should be taking the approved development into account in their assessments on inter-project cumulative effects. As is demonstrated by the assessments within the technical chapters (7-16), the conclusions of the 2019 ES remain valid, or in some cases are improved due to the proposed reduction in turbine numbers from 8 to 11. Should the approved development be considered in the inter-project cumulative effects assessments of the other major developments discussed, this would therefore represent a worst-case scenario in terms of likely effects.

17.3 Inter-related (intra-project) cumulative effects

- 17.3.1 Chapter 17 of the 2019 ES considered whether any of the individual environmental topic effects resulting from the approved development, which are not significant in their own right, could combine to create effects that are significant, on common receptors between technical topics. The assessment focused on those receptors where significant effects have been predicted in respect of at least two or more topics and/or where the technical assessments have shown that potential individual effects are nearing the thresholds of established national criteria. It concluded that no significant inter-related cumulative effects would occur.
- 17.3.2 The Proposed Development does not introduce any new receptors when compared to the 2019 ES, and the conclusions of the individual topic chapters (7-16) are either consistent with the 2019 ES or, as stated in Section 17.2, are improved due to the proposed reduction in turbine numbers from 8 to 11.
- 17.3.3 It is therefore concluded that the Proposed Development would not give rise to any additional intra-project (inter-related) cumulative effects as compared to the approved development and the conclusions of the 2019 ES that there would be no significant effects are therefore unchanged.

Appendix 1A

2019 Environmental Statement

Appendix 1B

2019 Further Environmental Information

Appendix 7A

Landscape and Visual Impact Assessment

Table 7A.2 Viewpoint 2: Afan Forest Park

Figure 7.1 (2019 ES Figures 7.34a – 7.34c)		Assessed in relation to the Afan Woodland Walk Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T6 @ 0.9km	T6 @ 0.9km
Visible hubs		5	4
Visible blade tips		6	5
Horizontal field of view		26°	27.7°
Magnitude of change		High	High
Level of effect		Major	Major
Significance		Significant	Significant
2019 Rationale (figure references are to the 2019 LVIA)	Afan Woodland Walk The Afan Woodland Walk is a 2.4km long circular walk on the northern slopes of Cefn yr Argoed to the south of the South Wales Miners’ Museum. The Walk is intended to be undertaken in an anti-clockwise direction. Figure 7.29 indicates that the whole of this Walk would fall within the blade tip ZTV of the Foel Trawsnant Wind Farm amended scheme and, as a result of recent felling of substantial tracts of forestry, it is likely that views of the turbines would actually be available from the majority of its length. Exceptions would be where views are subject to screening by deciduous trees near Argoed Farm and around the Miners’ Museum. The photomontage from Viewpoint 2 shown on Figures 7.34 (a-c) illustrates the view from a location on the Walk near the Miner’s Museum. The clearest views would be available from the south-eastern section of the Walk, from where five turbines would be partly visible, with closest (Turbine 6) being prominent at a distance of approximately 400m. Recreational visual receptors undertaking the Walk in the intended anti-clockwise direction would initially have no views of the wind farm in the vicinity of the Miners’ Museum and would experience Low magnitudes of visual change to the glimpsed views available as far as Argoed Farm. To the south of Argoed Farm, the magnitude of visual change would increase through Medium to High before walkers would turn their backs on the turbines to return northward.		
Revised Assessment	Figure 7.1 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from this location. At Viewpoint 2, the number of visible turbines would reduce from 6 to 5 as a result of the removal of Turbine 4 and the number of visible hubs would reduce from 5 to 4 as a result of the lower hub height. Figure 7.1 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine’s rotor arc and a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 1.7°). The reduction in turbine numbers gives rise to a less cluttered and more regular composition. Where the majority of a turbine tower is visible (e.g. Turbine 6), the amended turbine dimensions result in more balanced proportions and, notwithstanding that the blade tip height is unchanged, the reduced hub height lowers the visual focus of the turbines and may give the appearance of a reduced overall height. Turbine 6 will remain prominent and the magnitude of change will remain High.		
Conclusion	No Change		

Table 7A.3 Viewpoint 3: Dyffryn

Figure 7.2 (2019 ES Figures 7.35a – 7.35c)		Assessed in relation to National Cycle Route 885 and Residential Property Group G: Spelter south Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T7 @ 1.4km	T1 @ 1.5km
Visible hubs		2	1
Visible blade tips		4	3
Horizontal field of view		22.3°	22.5°
Magnitude of change		Low/Negligible (NCR885) Low (Residential Group G)	Low/Negligible (NCR885) Low (Residential Group G)
Level of effect		Moderate/Minor (NCR885) Moderate (Residential Group G)	Moderate/Minor (NCR885) Moderate (Residential Group G)
Significance		Not significant (all)	Not significant (all)
2019 Rationale (figure references are to the 2019 LVIA)		National Cycle Route 885 Approximately 6km of NCR885 falls within the ZTV of the proposed wind farm. Notwithstanding intermittent screening from adjacent houses along some central parts of this section, the Foel Trawsnant Wind Farm amended scheme would be visible to northbound cyclists from parts of the Route to the south of Spelter and to southbound cyclists between Croeserw and Spelter. The photomontage from Viewpoint 3, shown on Figures 7.35 (a-c) is taken from the Route to the east of Spelter and illustrates the likely appearance of Foel Trawsnant Wind Farm from the majority of locations along this section of the Route. Residential Property Group G: Spelter south The photomontage from Viewpoint 3 shown on Figures 7.35 (a-c) illustrates the likely appearance of the Foel Trawsnant Wind Farm amended scheme from a slightly more elevated location to the east of the northern end of this group. Views similar to those shown in the photomontage may be available from west-north-west facing upper storey windows of properties on Heol Tywith, properties on the western edge of Duffryn Place and properties forming the central terrace on Coegnant Road. Views from other properties on Coegnant Road are likely to be screened by intervening buildings or garden trees. The magnitude of visual change experienced by residents of the properties forming this group would not exceed Low.	
Revised Assessment		Figure 7.2 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 4 to 3 as a result of the removal of Turbine 7 and the number of visible hubs would reduce from 2 to 1. The remaining visible hub (Turbine 1) would be considerably closer to the horizon as a result of the lower hub height. Figure 7.2 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc and a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.2°). The removal of Turbine 7 considerably reduces the proportion of the wind farm that would be visible in this view, though also gives rise to a less regular composition. Notwithstanding that the blade tip height is unchanged, the relative prominence of Turbine 1 is lessened as a result of the reduced hub height. The magnitude of visual change would not exceed Low.	
Conclusion		No Change	

Table 7A.4 Viewpoint 4: Maes yr Awel, Eastern Edge of Caerau

Figure 7.3 (2019 ES Figures 7.36a – 7.36c)		Assessed in relation to Residential Property Group A: North-west Brynheulog (north of the group) Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T8 @ 1.5km	T8 @ 1.5km
Visible hubs		9	4
Visible blade tips		11	8
Horizontal field of view		44°	44.7°
Magnitude of change		High	High
Level of effect		Major	Major
Significance		Significant	Significant
2019 Rationale (figure references are to the 2019 LVIA)		Residential Property Group A: North-west Brynheulog (north of the group) A review of the photomontage view from Viewpoint 4 on Maes-yr-Awel in the extreme north of this area shown on Figures 7.36 (a-c) together with the wireframe images from Attlee Terrace in the centre of this area and from Hartshorn Terrace to the immediate south in Appendix 7G indicates that theoretical visibility of the Foel Trawsnant Wind Farm amended scheme would reduce with elevation from north to south across this group of properties. Whilst nine turbines would be visible at hub height together with a further two visible at blade height from the northernmost part of this area, this would reduce to seven hubs and four blade tips in the centre of the area and to five hubs and five blade tips near its southern boundary. The angle of view occupied by the turbines would be between 40° and 45°. Views from south-south-west facing windows on the front elevations of these properties would be highly oblique, with only the left-hand (southern) half of the array encroaching upon the centre of the view. Views from upper storey windows on these elevations are not likely to be subject to any screening from intervening elements, whilst views from lower storey windows are likely to be partially screened by houses to the south, with typically only the upper parts of the most prominent turbines visible. Views from rear gardens will more commonly be subject to screening from boundary vegetation and adjacent houses. Given the length of the visible array and the ready availability of relatively unobstructed, albeit oblique, views, it is considered that the operation of the Foel Trawsnant Wind Farm amended scheme is likely to give rise to significant effects on the views available to residents in this area. Effects will be greatest in the north of the area, where a High magnitude of visual change is predicted which will reduce to a Medium magnitude of visual change in the south of the area.	
Revised Assessment		Figure 7.3 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 11 to 8 as a result of the removal of Turbines 3, 4 and 7 and that the number of visible hubs would reduce from 9 to 4 due to a combination of the reduced number of turbines and the lower hub height. The remaining visible hubs (Turbines 8, 9, 10 and 11) would be considerably closer to the horizon as a result of the lower hub height. Figure 7.3 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc and a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.7°). The removal of three turbines and the even greater reduction of the number of visible hubs results in a considerably less cluttered and more regular composition. Notwithstanding that the blade tip height is unchanged, the relative prominence of the visible array is lessened as a result of the reduced hub height. Whilst the composition of the visible array is improved and its relative prominence slightly reduced, the magnitude of visual change would remain High.	
Conclusion		No Change	

Table 7A.5 Viewpoint 5: Nantffyllon

Figure 7.4 (2019 ES Figures 7.37a – 7.37c)		Assessed in relation to Nantffyllon (beyond 1.5km) and Residential Property Group K: Nantffyllon south (Coronation Terrace and Garnwen Terrace) Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T1 @ 1.5km	T1 @ 1.5km
Visible hubs		2	1
Visible blade tips		5	4
Horizontal field of view		16°	16.2°
Magnitude of change		Low, Negligible & None (Nantffyllon beyond 1.5km) Low (Residential Group K)	Low, Negligible & None (Nantffyllon beyond 1.5km) Low (Residential Group K)
Level of effect		Moderate, Minor & None (Nantffyllon beyond 1.5km) Moderate (Residential Group K)	Moderate, Minor & None (Nantffyllon beyond 1.5km) Moderate (Residential Group K)
Significance		Not significant (all)	Not significant (all)
2019 Rationale (figure references are to the 2019 LVIA)		Nantffyllon (beyond 1.5km) This group includes properties in Nantffyllon that are beyond 1.5km from the Foel Trawsnant Wind Farm amended scheme site and extends to include all properties to the north of the rugby ground which are within the blade tip ZTV. The area is on the edge of the ZTV and the photomontage from Viewpoint 5 shown on Figures 7.37 (a-c) illustrates the maximum visibility of the Foel Trawsnant Wind Farm amended scheme in this area. Low magnitudes of visual change may affect views available to residents of some properties to the east of the A4063 as illustrated in the photomontage. Theoretically available views of blade tips from properties to the west of the road are likely to be screened by intervening buildings and vegetation. Residential Property Group K: Nantffyllon south (Coronation Terrace and Garnwen Terrace) The wireframe images from Garnwen Road and Picton Street in Appendix 7G indicate that theoretical visibility of the Foel Trawsnant Wind Farm amended scheme would increase from west to east across this group, with the greatest theoretical visibility being of two turbines at hub height from the eastern edge of this group. The photomontage from Viewpoint 5 on Heol Tywith shown on Figures 7.37 (a-c) illustrates the slightly increased visibility of the turbines available from a location to the east of this group. However, clear views of this nature are unlikely to be generally available due to intervening buildings and the rising topography of this area. Some views of one or two blade tips and possibly one hub may be available from the upper storey rear windows of some properties on Coronation Terrace and Garnwen Terrace. In the clearest views the magnitude of visual change would not exceed Low. The majority of residents in this group would experience Negligible or no levels of visual effect.	
Revised Assessment		Figure 7.4 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 5 to 4 as a result of the removal of Turbine 7 and that the number of visible hubs would reduce from 2 to 1 for the same reason. The remaining visible hub (Turbine 8) would be considerably closer to the horizon as a result of the lower hub height. Figure 7.4 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc and a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.2°). The removal of Turbine 7, which was previously the most prominent turbine in the visible array, in combination with the lowering of the hub height in relation to Turbine 8, reduces the relative prominence of the wind farm. The composition of the visible array benefits from the removal of Turbine 7. Whilst the composition of the wind farm is slightly improved and its relative prominence reduced, the magnitude of visual change at this location would remain Low.	
Conclusion		No Change	

Table 7A.6 Viewpoint 9: Abercregan

Figure 7.5 (2019 ES Figures 7.41a – 7.41c)		Assessed in relation to Abercregan (24 properties) Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T11 @ 2.4km	T11 @ 2.4km
Visible hubs		10	7
Visible blade tips		11	8
Horizontal field of view		31.4°	29.8°
Magnitude of change		High	High
Level of effect		Major	Major
Significance		Significant	Significant
2019 Rationale (figure references are to the 2019 LVIA)		Abercregan (24 properties) The village of Abercregan is located in the Afan Valley at its junction with Cwm Cregan between Duffryn Rhondda and Cymer, approximately 2km to the north-east of the nearest proposed turbine at Foel Trawsnant Wind Farm amended scheme. The village comprises a core of 26 houses on Alban Terrace, Abercregan Road and Prosser's Terrace, with a further 11 houses arranged in two short terraces on Prosser's Terrace to the east. All houses except the southernmost three properties on Abercregan Road have front elevations facing south-east or south-south-east. The photomontage from Viewpoint 9 shown on Figures 7.41 (a-c) illustrates the appearance of the wind farm from the junction of Prosser's Terrace and Abercregan Road. The photomontage illustrates that Foel Trawsnant Wind Farm would occupy a prominent position on the horizon of the framed views down the Afan Valley from locations near the core of the settlement. These views or similar ones are likely to be available from the 11 westernmost houses on Prosser's Terrace, the eight easternmost houses on Alban Terrace and the two northernmost houses on Abercregan Road. The wind farm would be prominent in the primary views available from windows on the front elevations of these properties and would result in a High magnitude of visual change to these residents' views. The wind farm would not be visible from rear windows or rear gardens of these properties. Similar views are likely to be available from secondary windows and gardens of the more southerly houses on Abercregan Road. Whilst the framed nature of the views available from the centre of the settlement magnify the visual impact of the turbines, the presence of the steep sided hills to either side of the valley would result in a reduced proportion of the wind farm being visible from properties further to the east and west. The magnitude of change to the primary views of the seven westernmost properties on Alban Terrace would be Medium, whilst that to those from the six easternmost houses on Prosser's Terrace would be no greater than Low.	
Revised Assessment		Figure 7.5 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 11 to 8 as a result of the removal of Turbines 3, 4 and 7 and that the number of visible hubs would reduce from 10 to 7 for the same reason. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.5 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc. However, the removal of Turbine 7 from the left hand side of the visible array would result in a slight decrease in the overall horizontal field of view occupied by the Proposed Development (approximately 1.6°). Due to the framed nature of this view, the lowering of the hub height does not reduce the relative prominence of the wind farm from this location. Despite individual turbines appearing better proportioned, the composition of the visible array is not substantively improved from that of the previous scheme. The magnitude of visual change at this location would remain High.	
Conclusion		No Change	

Table 7A.7 Viewpoint 10: Maesteg Golf Course

Figure 7.6 (2019 ES Figures 7.42a – 7.42c)		Assessed in relation to Maesteg Golf Course Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T1 @ 2.2km	T1 @ 2.2km
Visible hubs		11	6
Visible blade tips		11	8
Horizontal field of view		28.1°	26.5°
Magnitude of change		Medium	Medium
Level of effect		Major	Major
Significance		Significant	Significant
2019 Rationale (figure references are to the 2019 LVIA)		Maesteg Golf Course Maesteg Golf Course is situated to the south of the B4282 to the west of Maesteg, approximately 1.6km to the south of the nearest proposed turbine location at its closest point. The whole of the golf course falls within the blade tip ZTV of the Foel Trawsnant Wind Farm, with the number of turbines theoretically visible generally increasing with elevation from the north-east to the south-west. The photomontage from Viewpoint 10 shown on Figures 7.42 (a-c) illustrates the appearance of the wind farm from an elevated location near the south-western boundary of the Golf Course from which the proposed turbines would be visible in the same field of view as turbines within the Llynfi Afan Wind Farm and distant turbines at Pen-y-Cymoedd Wind Farm. This viewpoint represents by far the clearest views of the Foel Trawsnant Wind Farm that would be available, in which the magnitude of visual change would be Medium. From many less elevated areas within the Golf Course, theoretical visibility would be limited to turbine blade tips only and some views would be subject to screening by the scattered blocks of woodland and trees present at lower levels. Whilst the Foel Trawsnant Wind Farm would not be a dominant element in any views from the golf course, it would be prominent from several parts and overall, the magnitude of visual change is considered to be Medium and would be significant.	
Revised Assessment		Figure 7.6 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 11 to 8 as a result of the removal of Turbines 3, 4 and 7 and that the number of visible hubs would reduce from 11 to 6 due to the removal of the turbines and the reduction in hub height. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.6 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc. However, the removal of Turbine 7 from the right hand side of the visible array would result in a slight decrease in the overall horizontal field of view occupied by the Proposed Development (approximately 1.6°). The reduced number of turbines and the lower hub height results in the wind farm being relatively less prominent than the previous scheme. Individual turbines appear better proportioned and the overall composition of the visible array benefits from the removal of the clustering and ghosting previously associated with Turbines 3, 9 and 10. Whilst the appearance of the wind farm benefits from the reduced number of turbines, the lower hub height and the slight reduction to the width of the visible array, the magnitude of visual change at this location would remain Medium.	
Conclusion		No Change	

Table 7A.8 Viewpoint 11: Blaencaerau Estate, Western Edge of Caerau

Figure 7.7 (2019 ES Figures 7.43a – 7.43c)		Assessed in relation to Caerau (beyond 1.5km) Sensitivity: High
	2019 Assessment	Revised Assessment
Distance to nearest turbine	T7 @ 2.4km	T8 @ 2.4km
Visible hubs	11	6
Visible blade tips	11	8
Horizontal field of view	28.5°	29.2°
Magnitude of change	High	High
Level of effect	Major	Major
Significance	Significant	Significant
2019 Rationale (figure references are to the 2019 LVIA)	Caerau (beyond 1.5km) The western part of the settlement falls within 1.5km of the proposed wind farm. The photomontage from Viewpoint 11 shown on Figures 7.43 (a-c) illustrates the appearance of Foel Trawsnant Wind Farm from a location on the north-eastern corner of the settlement and represents the clearest view of the turbines that would be available to any residents. Theoretical visibility of the wind farm would reduce from north-east to south-west across this area as the settlement descends into the Llynfi Valley and the turbines are screened by the intervening high ground to the west. Actual visibility of the turbines would be strongly influenced by the pronounced south-west to north-east axis of the settlement, which results in only a minority of houses having front or rear elevations that face the Foel Trawsnant Wind Farm site. Views similar to those illustrated from Viewpoint 11 would be available to residents of six properties toward the north-eastern end of the Blaencaerau Estate whose houses have south-west facing front elevations with relatively unobstructed long-distance views. Similar views may be available from the just upper storey windows of a further five houses in this vicinity. The magnitude of visual change experienced in these views would be High. The proportion of the turbines visible would be much reduced from the other houses with windows facing toward the wind farm. Residents of houses on the northern half of North Street may experience a Medium magnitude of visual change to views from upper storey rear windows only and overall, the magnitude of visual change experienced by these residents would be Low. The magnitude of visual change experienced by other residents within this settlement would not exceed Low, with the vast majority experiencing Negligible or no magnitude of visual change.	
Revised Assessment	Figure 7.7 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 11 to 8 as a result of the removal of Turbines 3, 4 and 7 and that the number of visible hubs would reduce from 11 to 6 due to the removal of the turbines and the reduction in hub height. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.7 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine’s rotor arc and that there would be a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.7°). The reduced number of turbines and the lower hub height results in a slight reduction in the relative prominence of the wind farm. Individual turbines appear better proportioned and the overall composition of the visible array is less cluttered and more regular than that of the previous scheme. Whilst the appearance of the wind farm benefits from the reduced number of turbines and lower hub height, the magnitude of visual change at this location would remain High.	
Conclusion	No Change	

Table 7A.9 Viewpoint 12: Junction of Commercial Street and Talbot Street, Maesteg

Figure 7.8 (2019 ES Figures 7.44a – 7.44c)		Assessed in relation to Maesteg town centre Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T1 @ 2.5km	T1 @ 2.5km
Visible hubs		2	0
Visible blade tips		4	3
Horizontal field of view		8.5°	7.4°
Magnitude of change		Low, Negligible and None	Negligible and None
Level of effect		Moderate, Minor and N/A	Minor and N/A
Significance		Not significant	Not significant
2019 Rationale (figure references are to the 2019 LVIA)	Maesteg town centre This area includes the core retail areas of Talbot Street and Commercial Street and extends to include the supermarkets off Llynfi Road and Castle Street. The photomontage from Viewpoint 12 shown on Figures 7.44 (a-c) illustrates the appearance of the wind farm from junction of Commercial Street, Talbot Street, Neath Road and Llynfi Road. The photomontage is representative of the clearest views of the wind farm that would be available from publicly accessible locations in this area. Other than from the location illustrated, such views would be largely restricted to the car park to the east of Llynfi Road. At most, the presence of the hubs of three turbines and the blade tips of a further single turbine would result in a Low magnitude of visual change, but it is likely that these would not be seen or noticed by many visitors to the town centre.		
Revised Assessment	Figure 7.8 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 4 to 3 as a result of the removal of Turbine 7 and that the number of visible hubs would reduce from 3 to 0 due to the removal of the Turbine 7 and the reduction in hub height in relation to Turbine 8. Figure 7.8 also indicates that the increased rotor diameter of the amended proposal would be unlikely to result in a slight increase in the apparent extent of each turbine's rotor arc and that there would be a slight decrease in the overall horizontal field of view occupied by the Proposed Development (approximately 1.1°). The reduced number of turbines and the removal of all turbine hubs results in a reduction in the relative prominence of the wind farm, which would now only be visible as blade tips break the horizon. As a result of these changes, the magnitude of visual change at this location would reduce from Low to Negligible.		
Conclusion	Reduction in level of effect from Moderate to Minor		

Table 7A.10 Viewpoint 13: Maesteg Comprehensive School

Figure 7.9 (2019 ES Figures 7.45a – 7.45c)		Assessed in relation to Maesteg north of Afon Llynfi Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T1 @ 2.5km	T1 @ 2.5km
Visible hubs		6	4
Visible blade tips		8	6
Horizontal field of view		9°	9.3°
Magnitude of change		Low, Negligible and None	Low, Negligible and None
Level of effect		Moderate, Minor and N/A	Moderate, Minor and N/A
Significance		Not significant	Not significant
2019 Rationale (figure references are to the 2019 LVIA)		Maesteg north of Afon Llynfi This area consists of the residential areas to the east of the town centre and to the north of Afon Llynfi. It extends from Church Street and Queen Street in the west to Greenfield Terrace and Crown Rise in the east and is bisected by Bridgend Road. The photomontages from Viewpoints 13 and 15 shown on Figures 7.45 (a-c) and 7.47 (a-c) illustrate the appearance of Foel Trawsant Wind Farm amended scheme from locations to the immediate north and south of this area. Theoretical visibility of the wind farm would increase from west to east across the area. Theoretically, views similar to those illustrated from Viewpoint 13 would be available in the north-east of the area, in the vicinity of Crown Rise and Brodawel. However, the general alignment of properties and the presence of nearby screening elements in the form of vegetation and buildings would result in such views actually only being available from the six bungalows on Belmont Close, which have front elevations facing north-west. In these views it is likely that parts of up to six turbines would be apparent at a minimum separation distance of approximately 3km, although some or all may be screened by the structure of Maesteg Comprehensive School to the north-west. The clearest views would be available from the single north-west facing dormer window on each of these properties, in which the magnitude of visual change would be Low. Elsewhere within the area, magnitudes of visual change are unlikely to exceed Negligible and the majority of residents would experience no change to their views.	
Revised Assessment		Figure 7.9 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 8 to 6 as a result of the removal of Turbines 3 and 7 and that the number of visible hubs would reduce from 6 to 4 for the same reason. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.9 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc and that there would be a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.3°). In this instance, the reduced number of turbines and the lower hub height does not result in reduction in the relative prominence of the wind farm as the removed turbines were previously partially obscured by Turbines 2 and 8. Individual turbines appear better proportioned and the overall composition of the visible array benefits from the removal of the previous ghosting of Turbines 2/3 and 7/8, albeit that due to micro-siting the visible blade of Turbine 10 is now much closer to the tower of Turbine 8. The highest magnitude of visual change likely to be experienced by residents would be unchanged and would remain Low.	
Conclusion		No Change	

Table 7A.11 Viewpoint 14: Picnic Area, Bryn

Figure 7.10 (2019 ES Figures 7.49a – 7.49c)		Assessed in relation to Bryn (elevated properties to the south-east) Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T1 @ 2.5km	T1 @ 2.5km
Visible hubs		3	2
Visible blade tips		6	4
Horizontal field of view		14.9°	15.4°
Magnitude of change		Low	
Level of effect		Moderate	
Significance		Not significant	
2019 Rationale (figure references are to the 2019 LVIA)		Bryn (elevated properties to the south-east) This village is located approximately 3km to the south-west of the Foel Trawsant Wind Farm on the lower ground at the head of Cwm Dyffryn to the south of Mynydd Penhydd and Pen Disgwylfa. The photomontage from Viewpoint 14 shown on Figures 7.49 (a-c) illustrates the appearance of the wind farm from the east of the village and is representative of the clearest views that would be available, which would include views from the more elevated locations in the east of the settlement, in the vicinity of Station Terrace. The photomontage illustrates the appearance of the wind farm in the context of the existing forestry. In this context the magnitude of visual change sustained in the clearest views would be Negligible. However, should this forestry be felled, the number of turbines visible could increase from one to three turbines visible at hub height and a further three at blade tip. In this scenario, the magnitude of visual change would increase to Low. Elsewhere in the settlement, the magnitude of visual change would increase from None to Negligible were the existing forestry to be removed.	
Revised Assessment		Figure 7.10 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 6 to 4 as a result of the removal of Turbines 3 and 7 and that the number of visible hubs would reduce from 3 to 2 due to the removal of Turbine 7. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.10 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc and that there would be a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.5°). The reduced number of turbines and the lower hub height results in a slight reduction in the relative prominence of the wind farm. The overall balance of the composition of the visible array would not be altered. Whilst the appearance of the wind farm benefits from the reduced number of turbines and lower hub height, the magnitude of visual change at this location would remain Low.	
Conclusion		No Change	

Table 7A.12 Viewpoint 15: Commercial Street, Maesteg

Figure 7.11 (2019 ES Figures 7.47a – 7.47c)		Assessed in relation to Maesteg south of Afon Llynfi Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T1 @ 2.9km	T1 @ 2.9km
Visible hubs		5	2
Visible blade tips		7	5
Horizontal field of view		7.6°	7.3°
Magnitude of change		Low, Negligible and None	Low, Negligible and None
Level of effect		Moderate, Minor and N/A	Moderate, Minor and N/A
Significance		Not significant	Not significant
2019 Rationale (figure references are to the 2019 LVIA)		Maesteg south of Afon Llynfi This area includes the residential areas to the south and east of the town centre and Afon Llynfi. It extends from Neath Road and Priory Terrace in the west to Garn road in the north-east and Alma Road in the south-east, but does not include Y Parc. The photomontages from Viewpoints 12 and 15 shown on Figures 7.44 (a-c) and 7.47 (a-c) illustrate the appearance of Foel Trawsnant Wind Farm from locations to the immediate north of this area and from the east of the area. Theoretical visibility of the wind farm would increase from west to east across the area. The clearest views of the Foel Trawsnant Wind Farm would be available from the southern half of Alma Road, where the mixture of two-storey houses and bungalows have either front or rear elevations facing north-west and the relatively steep hill on which they are built reduces the scope for the turbines to be obscured by adjacent buildings, particularly from upper storey windows. In these views, the upper parts of four to six hubs and seven to nine blades of the turbines are likely to be discernible on the north-western horizon at a distance of approximately 3.5km. Foel Trawsnant Wind Farm would appear as a discrete, compact element in expansive views and would give rise to a Low magnitude of visual change. Elsewhere within this area, the high density of housing and reduced theoretical visibility of the turbines would ensure that the magnitude of visual change experienced by residents would not exceed Negligible and most residents would once again experience no change to their existing views.	
Revised Assessment		Figure 7.11 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 7 to 5 as a result of the removal of Turbines 3 and 7 and that the number of visible hubs would reduce from 5 to 3 for the same reason. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.11 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc, but that there would be a slight decrease in the overall horizontal field of view occupied by the Proposed Development (approximately 0.3°) due to the removal of Turbine 3. In this instance, the reduced number of turbines and the lower hub height does not result in reduction in the relative prominence of the wind farm as the removed turbines were previously partially obscured by Turbines 1/2 and 8. Individual turbines appear better proportioned and the overall composition of the visible array benefits from the removal of the previous ghosting of Turbines 1/2/3 and 7/8, albeit that the ghosting of Turbines 1/2 remains. The highest magnitude of visual change likely to be experienced by residents would be unchanged and would remain Low.	
Conclusion		No Change	

Table 7A.13 Viewpoint 16: Heol y Llwyni, Garth

Figure 7.12 (2019 ES Figures 7.48a – 7.48c)		Assessed in relation to Maesteg, Garth Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T1 @ 3.4km	T1 @ 3.4km
Visible hubs		8	5
Visible blade tips		9	6
Horizontal field of view		7.6°	8.1°
Magnitude of change		Low, Negligible and None	Low, Negligible and None
Level of effect		Moderate, Minor and N/A	Moderate, Minor and N/A
Significance		Not significant	Not significant
2019 Rationale (figure references are to the 2019 LVIA)		Maesteg, Garth This area includes all parts of Maesteg and Garth to the east of Afon Llynfi and extends northward to Chestnut Grove and southward to Mill View. Ground elevation generally increases from west to east across the area and separation distances range from approximately 3km in the north to 5km in the south. Theoretical visibility of the Foel Trawsnant Wind Farm would increase from parts of seven to nine turbines in the west to parts of 10 to 11 turbines in the east. The photomontage from Viewpoint 16 shown on Figures 7.48 (a-c) illustrates the appearance of the wind farm from a relatively elevated location in the north of this area and represents the clearest views of the turbines that would be available. Views similar to the one shown from the northern end of Heol-y-Llwyni are likely to be available from a limited number of other locations in the area where houses with north-west facing elevations have areas of open space to their immediate north-west. This would include a small number of properties on Bron-y-Waun and Heol Faen in the centre of the area. In these views the turbines would be discernible as a minor element on the north-western horizon and would result in a Low magnitude of visual change. Other views toward Foel Trawsnant Wind Farm would either be highly oblique or subject to screening by nearby buildings or trees and would give rise to no more than a Negligible magnitude of visual change. As with other areas within the Maesteg urban area, the views available to most of residents would be unaffected.	
Revised Assessment		Figure 7.12 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 9 to 6 as a result of the removal of Turbines 3, 4 and 7 and that the number of visible hubs would reduce from 8 to 5 for the same reason. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.12 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc and that there would be a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.5°). The reduced number of turbines and the lower hub height results in a reduction in the relative prominence of the wind farm in comparison to the previous scheme. Individual turbines appear better proportioned and the overall composition of the visible array is considerably less cluttered. The highest magnitude of visual change likely to be experienced by residents would be unchanged and would remain Low.	
Conclusion		No Change	

Table 7A.14 Viewpoint 19: Glyncorrwg

Figure 7.13 (2019 ES Figures 7.51a – 7.51c)		Assessed in relation to Mynydd Corrwg Fechan Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T11 @ 5.9km	T11 @ 5.9km
Visible hubs		5	3
Visible blade tips		9	6
Horizontal field of view		10.6°	10.6°
Magnitude of change		Low	Low
Level of effect		Moderate	Moderate
Significance		Not significant	Not significant
2019 Rationale (figure references are to the 2019 LVIA)		Mynydd Corrwg Fechan Located to the immediate north of the village of Glyncorrwg, public access to this area is limited to the eastern and lower southern flanks. The nature of the available views toward Foel Trawsnant Wind Farm from this area would be similar to that illustrated in the photomontage from Viewpoint 19, located in the village, shown on Figures 7.51 (a-c) , but a greater proportion of the turbines would be visible due to the increase in their height. The magnitude of visual change would be Low.	
Revised Assessment		Figure 7.13 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 9 to 6 as a result of the removal of Turbines 3, 4 and 7 and that the number of visible hubs would reduce from 5 to 3 due to the removal of Turbine 3 and the reduction of hub height in relation to Turbine 10. The remaining visible hubs would be closer to the horizon as a result of the lower hub height. Figure 7.13 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc, but that there would be no change in the overall horizontal field of view occupied by the Proposed Development. Due to the framed nature of the view, the reduced number of turbines and the lower hub height would not result in a reduction in the relative prominence of the wind farm in comparison to the previous scheme. Individual turbines appear better proportioned, but the balance of the overall composition of the visible array is not greatly altered. The highest magnitude of visual change would remain Low.	
Conclusion		No Change	

Table 7A.15 Viewpoint 21: Ridgewood Gardens, Cimla

Figure 7.14 (2019 ES Figures 7.53a – 7.53c)		Assessed in relation to Cimla Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T6 @ 6.1km	T6 @ 6.1km
Visible hubs		11	7
Visible blade tips		11	8
Horizontal field of view		9.1°	9.4°
Magnitude of change		Low, Negligible and None	Low, Negligible and None
Level of effect		Moderate, Minor and N/A	Moderate, Minor and N/A
Significance		Not significant	Not significant
2019 Rationale (figure references are to the 2019 LVIA)	Cimla Cimla is a residential suburb to the south-east of Neath. The proposed wind farm would only be theoretically visible from a small area close to Ridgewood Gardens near the south-eastern edge of the suburb. The photomontage from Viewpoint 21 shown on Figures 7.53 (a-c) illustrates the view from Ridgewood Gardens and represents the clearest views of the Foel Trawsnant Wind Farm that may be available. From here, the hubs and blades of the 11 proposed turbines at Foel Trawsnant Wind Farm would be visible in the same field of view as the more distant turbines at the Llynfi Afan Wind Farm and a small number of turbines on the south-western edge of Pen-y-Cymoedd Wind Farm. The availability of these views would be restricted to a small number of properties on the edge of the suburb, from which they would often be highly oblique. The magnitude of visual change to the clearest views would not exceed Low and would be Negligible with regard to the majority of views available to residents even from the edge of the suburb. The vast majority of residents would have no view of the proposed wind farm.		
Revised Assessment	Figure 7.14 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 11 to 8 as a result of the removal of Turbines 3, 4 and 7 and that the number of visible hubs would reduce from 11 to 7 due to the removal of turbines and the reduction of hub height in relation to Turbine 1. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.14 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc and that there would be a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.3°). The reduced number of turbines and the lower hub height results in a slight reduction in the relative prominence of the wind farm in comparison to the previous scheme. The overall composition of the visible array is less cluttered, though no more balance than that of the previous scheme. The highest magnitude of visual change likely to be experienced by residents would be unchanged and would remain Low.		
Conclusion	No Change		

Table 7A.16 Viewpoint 22: Ridgeway Walk on Mynydd Baedan

Figure 7.15 (2019 ES Figures 7.54a – 7.54c)		Assessed in relation to Mynydd Ty-talwyn, Mynydd Baedan Sensitivity: High	
		2019 Assessment	Revised Assessment
Distance to nearest turbine		T1 @ 8.3km	T1 @ 8.3km
Visible hubs		11	8
Visible blade tips		11	8
Horizontal field of view		6.3°	6°
Magnitude of change		Low	
Level of effect		Moderate	
Significance		Not significant	
2019 Rationale (figure references are to the 2019 LVIA)		Mynydd Ty-talwyn, Mynydd Baedan These two relatively low hills form the south-eastern tip of the massif to the south-west and south of Maesteg. Whilst there is no public access to Moel Ty-talwyn, the Glamorgan Ridgeway Walk passes close to the summit of Mynydd Baedan. In the expansive views available from this location, Foel Trawsnant Wind Farm would appear as a minor element on the northern horizon at a distance of approximately 8.5km. The appearance of the wind farm is illustrated by the photomontage from Viewpoint 22 shown on Figures 7.54 (a-c) which shows the Foel Trawsnant turbines in the same field of view as the turbines at the more distant Pen-y-Cymoedd and Ffynnon Oer Wind Farms and the turbines within the Llynfi Afan Wind Farm with the latter appearing at a similar scale to those proposed at the Foel Trawsnant Wind Farm. The introduction of the proposed turbines into this baseline would slightly increase the horizontal field of view in which turbines are present. The incremental change would lead to a Low magnitude of visual change.	
Revised Assessment		Figure 7.15 indicates that the amendments to the proposed development would result in a reduction of the number of turbines visible from 11 to 8 as a result of the removal of Turbines 3, 4 and 7 and that the number of visible hubs would reduce from 11 to 7 due to the removal of turbines and the reduction of hub height in relation to Turbine 1. The remaining visible hubs would be considerably closer to the horizon as a result of the lower hub height. Figure 7.15 also indicates that the increased rotor diameter of the amended proposal would (when turbines are facing directly toward the viewer) result in a slight increase in the apparent extent of each turbine's rotor arc and that there would be a slight increase in the overall horizontal field of view occupied by the Proposed Development (approximately 0.3°). The reduced number of turbines and the lower hub height results in a slight reduction in the relative prominence of the wind farm in comparison to the previous scheme. The overall composition of the visible array is less cluttered, though no more balance than that of the previous scheme. The highest magnitude of visual change likely to be experienced by residents would be unchanged and would remain Low.	
Conclusion		No Change	

Appendix 9A

Desk Study, Extended Phase 1 Verification Survey and Baseline Review

9A1.1 Desk Study undertaken March 2022

Methods

A data-gathering exercise was undertaken in March 2022 which included a review of:

- European protected sites within 10km of the planning boundary (see **Box 1**); and
- SSSIs within 2km of the planning boundary (see **Box 1**);
- Other statutory and non-statutory sites designated for their nature conservation interest within 2km of the planning boundary (see **Box 1**);
- protected species, species of principal importance for the conservation of biodiversity (see **Box 2**), or other conservation-notable species recorded within 2km of the planning boundary;
- habitats of principal importance for the conservation of biodiversity (see **Box 2**), or other conservation-notable habitats recorded within 2km of the planning boundary;
- known bat roosts within 10km, reflecting current guidance;
- landscape features that may be important for protected or conservation-notable species, such as potential migration or dispersal routes;
- ponds and other waterbodies within 500m of the planning boundary.

The sources of desk study data is shown in **Table 9A1.1**.

Box 1 – Designated Biodiversity Sites, and Priority Habitats and Species

Statutory Biodiversity Sites

- **European sites:** Important biodiversity sites designated under international law or treaties. European sites are any **Special Area of Conservation** (SAC) from the point at which the European Commission and the UK Government agree the site as a '**Site of Community Importance**' (SCI); any classified **Special Protection Area** (SPA); any **candidate SAC** (cSAC); and (exceptionally) any other site or area that the Commission believes should be considered as an SAC but which has not been identified by the Government. The term 'European site' is term is also commonly used when referring to **potential SPAs** (pSPAs), to which the provisions of Article 4(4) of Directive 2009/147/EC (the 'new wild birds directive') apply; and to **possible SACs** (pSACs) and listed **Ramsar sites**, to which the provisions of the Habitats Regulations are applied a matter of Government policy (TAN 5 para. 5.1.3) when considering development proposals that may affect them.
- **Sites of Special Scientific Interest (SSSIs):** Nationally important sites notified under the Wildlife and Countryside Act 1981 (as amended) that provide the best examples of the UK's flora, fauna, or geological or physiographical features (note, this assessment focuses on those sites notified for their biodiversity interest).
- **National Nature Reserves (NNRs):** Nationally important sites notified under the National Parks and Access to the Countryside Act 1949 and the Wildlife and Countryside Act 1981 (as amended); in practice most NNRs are SSSIs also.

Local Nature Reserves (LNRs): Locally important sites that are designated under the National Parks and Access to the Countryside Act 1949 with the objective of encouraging their use for the study, research or enjoyment of nature.

Non-statutory Biodiversity Sites

Non-statutory biodiversity sites in Neath Port Talbot (NPT) area are known as Sites of Importance for Nature Conservation (SINCs). The search buffer also extends into the administrative area of Bridgend County Borough Council (BCBC) which also refer to non-statutory biodiversity sites as SINCs.

Other important habitats or species

Species (or habitats) of "principal importance for the conservation of biodiversity" are those listed by Welsh Government pursuant to Section 7 of the Environment (Wales) Act 2016. These include most of those UK BAP priority habitats and species that occur in Wales. They are referred to as 'S.7' habitats or species.

Other conservation-notable habitats and species would include:

- Ancient Woodland Inventory Sites (AWIS; areas that have been under continuous woodland cover since at least 1600) (within the planning boundary);
- 'Nationally Rare' and 'Nationally Scarce' species in the UK, which are species recorded from, respectively, 1-15 and 16-100 hectares (10x10km squares of the UK national grid);
- habitats and species listed within the NPT or BCBC Local Biodiversity Action Plan (LBAP);
- other species that NRW have identified to SEWBREC due to concerns regarding their status;
- other species or assemblages such as large populations of animals considered uncommon or threatened in a wider context;
- 'Important Hedgerows' as defined using the habitat criteria in The Hedgerows Regulations 1997.

Box 2 – Legally Protected and Controlled Species

Legal Protection

Many species of animal and plant receive some degree of legal protection. For the purposes of this report, legal protection refers to:

- Species included on Schedules 5 and 8 of the Wildlife and Countryside Act 1981 (as amended), excluding species that are only protected in relation to their sale (see section 9[5] and 13[2]);
- Species included on Schedules 2 and 5 of the Conservation of Habitats and Species Regulations 2017 (England and Wales); and
- Badgers, which are protected under the Protection of Badgers Act 1992.

Legal Control

Schedule 9 of the *Wildlife and Countryside Act 1981* (as amended) lists species of animal that it is an offence to release or allow to escape into the wild (for example grey squirrel) and species of plant that it is an offence to plant or otherwise cause to grow in the wild (for example, Japanese knotweed)

Table 9A1.1 Sources of desk study information

Aspect	Data	Sources
Statutory sites (March 2022)	Boundary data. Citations. Other site information (e.g. Conservation Objectives; Site Improvement Plans; Condition Assessments; Views about Management; etc.).	Magic: www.defra.magic.gov.uk JNCC: http://jncc.defra.gov.uk NRW: http://lle.gov.wales/home
Non-statutory sites (March 2022)	Boundary data Citations	South East Wales Biodiversity Records Centre (SEWBrEC).
Other sites and habitats (March 2022)	Boundary data	Magic: www.magic.gov.uk
Tree preservation orders (March 2022)	Location data	Neath Port Talbot County Council and Bridgend County Borough Council
Species records (March 2022)	Location data	South East Wales Biodiversity Records Centre (SEWBrEC).

JNCC Joint Nature Conservancy Council
 Magic Web-based Government GIS for environmental information
 NRW Natural Resources Wales
 SEWBrEC South-East Wales Biodiversity Records Centre

Results

Designated Sites

There are three statutory designated nature conservation sites (two SACs and one Local Nature Reserve) and a number of non-statutory nature conservation sites (SINCs and one Country Park) are located within the study area. The designated sites have largely remained the same, with a couple of minor exceptions those being that the 2018 desk study noted the Dyffryn Grassland SINC has now been incorporated into the Afan Mineral Railway SINC. Along with new SINCs which include the Bryn Goytre Cycleway SINC. NPT has designated all ASNW sites as SINCs, the locations for these remain the same as in 2019 ES (2019 ES **Figure**

9.2). The designated sites within the study area shown in **Table 9A1.2**, **Figure 9.1** and **Figure 9.2**. There are no Tree Preservation Orders present on or adjacent to the planning boundary.

As with the 2018 desk study, in March 2022 all the designated sites have been reviewed, and the same designated sites are considered relevant to this application. These include:

- Nant-y-Crywydd SINC (immediately adjacent to the planning boundary);
- NPT Watercourse SINC (within the planning boundary); and
- Caerau West SINC (within the planning boundary).

Table 9A1.2 Designated Nature Conservation Sites within the Relevant Search areas in relation to the planning boundary

Site	Location	Summary of interest features
Glaswelltiroedd Cefn Cribwr/ Cefn Cribwr Grasslands SAC	8.7km S	The site is one of four sites representing purple moor grass (<i>Molinia</i>) meadows in south and central Wales and is one of the major UK strongholds for this habitat type. There are extensive stands of M24 <i>Molinia</i> – meadow thistle (<i>Cirsium dissectum</i>) fen-meadow, including the heathy sub-type with cross-leaved heath (<i>Erica tetralix</i>), as well as other forms with a stronger representation of grasses, rushes and small sedges.
Kenfig SAC	9.7km SW	This site is a largely intact dune system situated in south Wales. <u>Annex I features:</u> Fixed coastal dunes with herbaceous vegetation ("grey dunes") Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>) Humid dune slacks Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp. Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) (Q) <u>Annex II features:</u> Petalwort (<i>Petalophyllum ralfsii</i>) Fen orchid (<i>Liparis loeselii</i>)
Bryn Tip Local Nature Reserve	1km	This site is located to the northern end of the village of Bryn. The former coal spoil tip and supports <i>Molinia</i> grassland, acid grassland, heathland, bare areas with lichen, gorse scrub and sedge rich flushes.
Afan Mineral Railway SINC	0.49km NW	A linear site running along the middle section of the Afan Valley between Cymmer and Pontrhydyfen. The principal habitat is riparian woodland, a large proportion of which is included on the Ancient Woodland Inventory. Additional habitats include a mosaic of grassland, heath, Bracken slopes and spoil elements in a valley which also holds considerable industrial heritage. In 2017 an intensive invertebrate study was done by the Colliery Spoil Biodiversity Initiative finding 169 invertebrate species with at least 7 species of conservation importance. The presence of habitat specialists indicate that colliery spoil habitats of Cwm Blaenpelenna are mimicking more natural habitats. Recorded taxa include 260 vascular plants, 132 bryophytes, 169 invertebrates, 32 birds, 19 lichens, 8 fungi, 2 mammals, plus 1 each of amphibian and reptile.
Bryn Tip SINC	1km W	This site is located to the northern end of the village of Bryn. The site is on former coal spoil tip and supports diverse vegetation including <i>Molinia</i> grassland, acid grassland, heathland, bare areas with lichen, Gorse Scrub, sedge rich rushes. There are a number of canalised and underground water courses as well as a more natural open stream in the east of the site. The site also supports good numbers of invertebrates notably Dark Green Fritillary (<i>Argynnis aglaja</i>), together with birds including Linnet (<i>Carduelis cannabina</i>) and Skylark (<i>Alauda arvensis</i>).

Site	Location	Summary of interest features
Bryn Goytre Cycleway SINC	1.4km SW	A 2.5 mile linear section of disused railway line and currently a designated cycle track which follows the Cwm Dyffryn Valley between Bryn and Goytre. Near Bryn and Goytre there are verges of low diversity mesotrophic grassland (largely MG1), but much of the track is flanked by ancient Sessile-oak/Birch woodland with abundant ferns plus a suite of Ancient Woodland Indicators including Hairy wood-rush, Bluebell, Wood sorrel and Opposite-leaved golden-saxifrage. Other features include an area of Sessile-oak/Birch woodland with a field layer dominated by Purple moor-grass (a community variant uncommon in NPT), a Sweet hestnut copse which has some large, mature trees and Small-leaved limes. INNS include Indian balsam, Japanese knotweed and Rhododendron.
Meadow Row, Bryn SINC**	1.67km W	A colliery spoil site with remnants of semi-natural grasslands situated in a small south-facing cwm immediately east of the small village of Bryn. The habitats primarily comprise a mosaic of colliery spoil vegetation, with dry acid grassland scrub and rush-pasture. Recorded taxa include 101 vascular plants, 31 bryophytes, 9 birds, 6 lichens, 1 invertebrate and 1 fungus.
NPT Watercourses SINC	Coincides with site	Designated as it is a watercourse. No citation details are available. The 'Rivers' priority habitat does not apply to stream headwaters that are not " <i>marked with a blue line on Ordnance Survey (OS) maps at a scale of 1:50,000</i> " (JNCC 2011) ¹⁰⁵ , therefore the streams directly affected by the site infrastructure are not considered part of this classification.
Caerau North SINC	0.94km E	Marsh/Marshy grassland, fen, dry modified bog, wet modified bog, sphagnum blanket bog, semi-improved acid grassland, wet dwarf shrub heath, broad-leaved semi-natural woodland, acid dry dwarf shrub heath
Caerau West SINC	Coincides with site	Marsh/marshy grassland, flush spring and acid/neutral flush, sphagnum blanket bog, sphagnum wet modified bog, wet dwarf shrub heath, dry heath acid mosaic, dry dwarf shrub heath, semi-improved acid grassland, scattered bracken.
Craig Tal-y-Fan SINC	1.9km E	Broad-leaved semi-natural woodland, dense continuous scrub, dense continuous bracken.
Cwm Cerwyn SINC	1km SE	Broad-leaved semi-natural woodland, unimproved neutral grassland, dense continuous scrub, coniferous plantation.
Cwm Sychbant SINC	1.6km S	Semi-improved neutral grassland, broad-leaved semi-natural woodland, marsh/marshy grassland, dense continuous bracken, coniferous plantation.
Nant-y-Crynwydd SINC	~5m E	Marsh/marshy grassland, semi-improved neutral and acid grassland, sphagnum blanket bog, broad-leaved semi-natural woodland, dense continuous scrub.
Sychbant Fields SINC	1.8km S	Dry dwarf shrub heath (acid).
Tudor West SINC	0.6km E	Marsh/marshy grassland, neutral grassland unimproved, broad-leaved semi-natural woodland, semi-improved acid grassland and acid/neutral flush.
Y Parc (North) SINC	0.45km SE	Broad-leaved semi-natural woodland, wet and dry dwarf heath with scattered bracken, semi-improved acid grassland, unimproved neutral grassland, wet modified sphagnum bog, marsh/marshy grassland and dense continuous scrub.
Y Parc (South) SINC	1.47km SE	Broad-leaved semi-natural woodland, marsh/marshy grassland, semi-improved neutral grassland, dense continuous scrub, wet dwarf shrub heath, blanket bog and unimproved neutral grassland.
ASNW SINC s	0.39km W (closest)	There are several ASNW SINC. Site boundaries are not clearly defined in some areas and so the exact number has not been presented. The location of the ASNW SINC remain the same as Figure 9.2 in the 2019 ES.

Site	Location	Summary of interest features
Afan Argoed Country Park	0.55km NW	Set in the Afan Valley in Neath Port Talbot. This 48 square mile forest park has miles of cycling trails, walking trains and several mountain bike trails.

Key

* Location relative to site boundary

(Q) Interest features (habitats or species) that are qualifying features; all other habitats and species are primary reason for designation.

Annex I/II Habitats or species listed on Annex I or II (respectively) of Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive')

Note: information based on SEWBRc data search of non-designated sites within 2km of the planning boundary.

Species Records

Table 9A1.3 provides a summary of the key species records provided by SEWBRc (excluding birds and bats) that are dated within the last 10 years, principally:

- protected species;
- Section 7 species;
- LBAP species; and
- NRW species.

A total of 77 species records (excluding birds and bats) were identified in the March 2022 desk study, none of which were identified on or immediately adjacent to the planning boundary. In 2018 a total of 37 protected and notable species were identified. Generally, the 2022 desk study identified many of the same species' records as for the 2018, 2014 baseline reports and 2016 SEI report, although it is worth noting that there are a number of additional invertebrate species which have been identified and a small number of additional plants, ferns and mosses. Mammals such as otter, badger and hare were not identified in the 2022 records, albeit this does not suggest an absence. Similarly, to the 2018 desk study four species of reptile were noted. None of the additional species identified in **Table 9A1.3** were considered to warrant additional survey work, with the species either likely to be present in low numbers, or unlikely to be present.

Table 9A1.3 Protected and notable species within 2km of the planning boundary since 2012 (from SEWBRc)

Common name	Scientific Name	Number of records	Nearest Records	Key Protections / Policy Status
Eurasian Common Shrew	<i>Sorex araneus</i>	2	0.7km	LBAP (BNG)
Stoat	<i>Mustela erminea</i>	1	0.32km	NRW and LBAP (BRG)
Weasel	<i>Mustela nivalis</i>	1	1.9km	NRW and LBAP (BRG)
West European Hedgehog	<i>Erinaceus europaeus</i>	2	1.7km	S7 and LBAP (BRG)
Adder	<i>Vipera berus</i>	1	1.9km	WCA and S7
Common Lizard	<i>Zootoca vivipara</i>	5	1.5km	WCA and S7
Grass Snake	<i>Natrix helvetica</i>	1	1.5km	WCA and S7
Slow-worm	<i>Anguis fragilis</i>	1	1.9km	WCA and S7
Brown/Sea Trout	<i>Salmo trutta</i>	1	1.8km	S7 and LBAP (BGW)

Common name	Scientific Name	Number of records	Nearest Records	Key Protections / Policy Status
Anomalous	<i>Stilbia anomala</i>	4	1.7km	S7
Autumnal Rustic	<i>Eugnorisma glareosa</i>	4	1.7km	S7
Barred Chestnut	<i>Diarsia dahlia</i>	1	1.8km	LBAP(BRG)
Black Arches	<i>Lymantria monacha</i>	2	1.4km	LBAP(BRG)
Blood-vein	<i>Timandra comae</i>	4	1.5km	S7
Bright Neb	<i>Argolamprotes micella</i>	3	1.7km	RD2(UK)N
Brindled Beauty	<i>Lycia hirtaria</i>	5	1.4km	S7
Broom Moth	<i>Ceramica pisi</i>	5	1.4km	S7
Buff Ermine	<i>Spilosoma lutea</i>	3	1.5km	S7
Centre-barred Sallow	<i>Atethmia centrago</i>	5	1.4km	S7
Chocolate-tip	<i>Clostera curtula</i>	2	1.7km	LBAP(BRG)
Cinnabar	<i>Tyria jacobaeae</i>	8	656m	S7
Cloaked Carpet	<i>Euphyia biangulata</i>	1	1.8km	LBAP(BRG)
Coronet	<i>Craniophora ligustri</i>	5	1.4km	LBAP(BRG)
Dark Brocade	<i>Mniotype adusta</i>	1	1.9km	S7
Dark-barred Twin-spot Carpet	<i>Xanthorhoe ferrugata</i>	2	1.7km	S7
Devon Carpet	<i>Lampropteryx otregiata</i>	2	1.5km	LBAP(BRG)
Dot Moth	<i>Melanchra persicariae</i>	5	1.7km	S7
Dusky Brocade	<i>Apamea remissa</i>	4	1.5km	S7
Dusky Thorn	<i>Ennomos fuscantaria</i>	1	1.9km	S7
Feathered Gothic	<i>Tholera decimalis</i>	2	1.7km	S7
Garden Tiger	<i>Arctia caja</i>	1	1.7km	S7
Green-brindled Crescent	<i>Allophyas oxyacanthae</i>	1	1.8km	S7
Hedge Rustic	<i>Tholera cespitis</i>	2	1.7km	S7
Knot Grass	<i>Acronicta rumicis</i>	6	1.7km	S7
Large Ranunculus	<i>Polymixis flavicincta</i>	2	1.7km	LBAP(BRG)
Latticed Heath	<i>Chiasmia clathrata</i>	3	1.4km	S7
Marsh Oblique-barred	<i>Hypenodes humidalis</i>	1	1.7km	LBAP(NPT)
Mottled Rustic	<i>Caradrina morpheus</i>	2	1.9km	S7

Common name	Scientific Name	Number of records	Nearest Records	Key Protections / Policy Status
Neglected Rustic	<i>Xestia castanea</i>	1	1.9km	S7
Oblique Carpet	<i>Orthonama vittata</i>	1	1.9km	S7
Ochreous Pug	<i>Eupithecia indigata</i>	1	1.1km	LBAP(BRG)
Powdered Quaker	<i>Orthosia gracilis</i>	3	1.7km	S7
Red-necked Footman	<i>Atolmis rubricollis</i>	4	1.4km	LBAP(NPT)
Rosy Minor	<i>Litoligia literosa</i>	2	1.7km	S7
Rosy Rustic	<i>Hydraecia micacea</i>	2	1.7km	S7
Rustic	<i>Hoplodrina blanda</i>	2	1.4km	S7
Sallow	<i>Cirrhia icteritia</i>	5	1.7km	S7
Scarce Grass-veneer	<i>Crambus pratella</i>	1	1.7km	RD2(UK)NB
Shoulder-striped Wainscot	<i>Leucania comma</i>	3	1.7km	S7
Small Phoenix	<i>Ecliptopera silaceata</i>	5	1.5km	S7
Small Seraphim	<i>Pterapherapteryx sexalata</i>	8	1.4km	LBAP(BRG)
Small Square-spot	<i>Diarsia rubi</i>	1	1.7km	S7
Southern Midget	<i>Phyllonorycter dubitella</i>	1	1.9km	LBAP(BRG)
Spectacle	<i>Abrostola tripartita</i>	4	1.4km	LBAP(BRG)
White Ermine	<i>Spilosoma lubricipeda</i>	4	1.4km	S7
Woundwort Pearl	<i>Anania stachydalis</i>	2	1.7km	LBAP(BRG)
Dark Green Fritillary	<i>Speyeria aglaja</i>	6	1.5km	LBAP(BRG)
Dingy Skipper	<i>Erynnis tages</i>	3	1km	RD1(UK)VU, S7, LBAP(BRG)
Grayling	<i>Hipparchia semele</i>	2	1.8km	RD1(UK)VU, S7, LBAP(BRG)
Small Blue	<i>Cupido minimus</i>	1	1.5km	RD1(UK)NT, S7, WCA5,
Small Heath	<i>Coenonympha pamphilus</i>	10	1.5km	RD1(UK)NT, S7
Small Pearl-bordered Fritillary	<i>Boloria selene</i>	2	1.6km	RD1(UK)NT, S7, LBAP(BRG)
Wall	<i>Lasiommata megera</i>	1	1.6km	RD1(UK)NT, S7
Keeled Orthetrum	<i>Orthetrum coerulescens</i>	2	1.9km	LBAP(BRG)
Scarce Blue-tailed Damselfly	<i>Ischnura pumilio</i>	1	1.9km	RD1(UK)NT, LBAP(BRG)

Common name	Scientific Name	Number of records	Nearest Records	Key Protections / Policy Status
Short-winged Cone-head	<i>Conocephalus dorsalis</i>	1	1km	LBAP(BRG)
Cheilosia chrysocoma	<i>Cheilosia chrysocoma</i>	1	1.1km	RD2(UK)S
Violet Oil-beetle	<i>Meloe violaceus</i>	1	1.2km	RD2(UK)NB, S7
Chamomile	<i>Chamaemelum nobile</i>	1	1.7km	RD1(UK)VU, RD1(Wales)EN, S7,
Spiked Sedge	<i>Carex spicata</i>	1	1.9km	LBAP(BRG)
Narrow Buckler-fern	<i>Dryopteris carthusiana</i>	2	403m	LBAP(BRG)
Common Feather-moss	<i>Kindbergia praelonga</i>	2	1.3km	RD1(Wales)LC
Marsh Forklet-moss	<i>Dichodontium palustre</i>	2	1.1km	RD1(Wales)LC
Portuguese Feather-moss	<i>Platyhypnidium lusitanicum</i>	1	1.3km	RD1(Wales)LC
Smaller White-moss	<i>Leucobryum juniperoideum</i>	1	1.3km	RD1(Wales)LC

Key:

*Closest record to main planning boundary; note, distances are approximate.

EPS – Species protected under the *Conservation of Habitats and Species Regulations 2010* (as amended)

WCA – Species protected under the *Wildlife and Countryside Act 1981* (as amended) (excluding in relation to sale)

S7 – Environment (Wales) Act 2016 (Section 7)

LBAP (BRG) – Bridgend County Borough Council Local Biodiversity Action Plan Species (now superseded by S7).

LBAP (NPT) – Neath Porth Talbot Council Borough Council Local Biodiversity Action Plan Species (now superseded by S7).

PBA – Protection of Badgers Act 1992

NRW – Natural Resource Wales Priority Species.

RD1(UK) – Red Data Book listing for the UK based on IUCN guidelines

RD1(Wales) – Red Data Book listing for Wales based on IUCN guidelines

RD2(UK) – Red Data Book listing for the UK based on IUCN guidelines

Bat Roost Records

Designated sites

No designated sites were recorded within 10km of the planning boundary that were either designated primarily for bats, or which are otherwise identified as being important for local bat populations.

Bat Roost Records within 10km

The March 2022 SWEBrEC data shows a total of 170 bat roosts (or potential roosts) within 10km of the planning boundary recorded since 2012 (last 10 years). The total number of roosts per species and nearest roost per species are shown in **Table 9A1.4**. Four 'high collision risk' species were identified roosting within 10km: common pipistrelle (within 3.5km), noctule (within 7.6km), Nathusius' pipistrelle (~7.8km from the site) and soprano pipistrelle (within 8km). One notable record was for a large soprano pipistrelle roost (450 bats recorded) approximately 8.2km away.

The 2022 desk study data is generally very similar to the 2018 desk study data, with no bat roost records recorded within the planning boundary. The only differences were that the 2018 desk study data recorded fewer roosts (150 roost records), and that the 2022 desk study data recorded additional species being natterer's, whiskered and whiskered or Brandt's roosts.

Table 9A1.4 Summary of Bat Roost Records within 10km of the planning boundary since 2012 (from SEWBRcC)

Common Name	Scientific Name	No. roost records	No. bats recorded in nearest roost	Distance in km to nearest roost
Bats	<i>Chiroptera</i>	9	1	4.9km
Brown Long-eared Bat	<i>Plecotus auritus</i>	5	Undisclosed	7.8km
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	17	1	3.5km
Daubenton's Bat	<i>Myotis daubentonii</i>	9	14	7.7km
Greater Horseshoe Bat	<i>Rhinolophus ferrumequinum</i>	3	2	7.8km
Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	4	2	7.8km
Long-eared Bat species	<i>Plecotus</i>	1	1	9.1km
Myotis sp.	<i>Myotis</i>	3	1	8.9km
Nathusius's Pipistrelle	<i>Pipistrellus nathusii</i>	5	1	8.2km
Natterer's Bat	<i>Myotis nattereri</i>	1	28	8.3km
Noctule Bat	<i>Nyctalus noctula</i>	24	1	7.6km
Pipistrelle	<i>Pipistrellus</i>	37	1	2.2km
Serotine	<i>Eptesicus serotinus</i>	1	1	9.5km
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	48	10	8km
Whiskered Bat	<i>Myotis mystacinus</i>	3	1	8.2km
Whiskered or Brandt's Bat (Myotis sp.)	<i>Myotis mystacinus/brandtii</i>	1	1	8.2km

Note: SEWBRcC March 2022 data provided bat records and not bat roost records, with roosts and or potential roost being interpreted through comments, potentially leaving a minor margin of error where comments are not clear. In addition, the number of bats recorded in the SEWBRcC records is identified as 1, when there may in some instances be a greater number).

Additional information and receptors

Site Surroundings

A March 2022 review of freely available web-based aerial photography found site habitats to remain the same as the 2018 desk study, with the site is located in a rural landscape with habitat features typical of an exposed upland rural location in south Wales. These habitats include:

- improved grassland;
- woodlands;

- various semi-natural upland grazed habitats, probably including wet heath, semi-improved acid grassland, marshy grassland, and flushes;
- watercourses;
- ponds; and
- scrub.

These features provide habitat linkages to and around the site for a range of species. The site appears to be unexceptional at the landscape scale, supporting a similar range of habitats and features.

Waterbodies

Analysis of the Ordnance Survey 1:10k map tile and Phase 1 Extended Habitat Survey data indicated that there are eight ponds or similar waterbodies within 500m of the planning boundary.

9A2.1 Extended Phase 1 Habitat Verification Survey

Methods

A Phase 1 Habitat Verification Survey (JNCC, 2010)⁴⁶ of the planning boundary and a 50m surrounding area (where access was permitted, safe and possible) was undertaken by a Wood ecologist on 15 February 2022 to verify and update the previous 2018 Extended Phase 1 survey, which was verified by additional botanical assessments undertaken from 15-17 August 2018 and included in the 2019 ES Baseline Report. Distinct habitats were identified and any conservation-notable habitats or interest features that were too small to map (e.g. patches of dry heath along the access track) were subject to a more detailed description in a Target Note (TN). As the standard Phase 1 Habitat survey methodology is largely concerned with vegetation communities only, the survey was 'extended' in accordance with the *Guidelines for Baseline Ecological Assessment* (IEA, 1995) to include:

- preliminary searches for evidence of protected or conservation-notable species / species-groups (including bats; great crested newts; badger; water voles; reptiles; and otters), and for habitats or features likely to support them if direct evidence is absent; and
- the identification of other constraints (e.g. non-native invasive plant species) or opportunities (e.g. opportunities for micro-siting or enhancement) that may be present at the site.

The Phase 1 habitat verification survey focused on the habitats within the planning boundary (as these may be directly affected) but included habitats within the site boundary also. The preliminary searches for fauna were extended to the site boundary for species-groups (including badger; reptiles; water voles; and otters). The search and assessment methods used for key species and species groups within the site boundary remained the same as the 2019 ES and are summarised in **Table 9A2.1**; it must be noted that the use of these search methods alongside a Phase 1 survey will not generally confirm that a species is absent, unless otherwise stated, and will not necessarily remove the need for additional species-specific surveys to determine the baseline or mitigation requirements.

The location of key interest features (e.g. potential bat roosts, badger sett entrances, water vole burrows, mature trees, etc.) were recorded using a GPS unit. A review of 1:10,000 Ordnance Survey maps and freely-available aerial photographs to identify the location and connectivity of ponds and other waterbodies within 500m of the planning boundary was undertaken to identify any new ponds.

Table 9A2.1 Summary of incidental survey methods used during the Extended Phase 1 habitat survey verification

Species	Methods
Badger	The site boundary and surrounding land within 50m was searched for evidence of badger activity including setts, badger paths, foraging marks, dung pits and hair, where access was permitted and possible.
Water voles	The suitability of site boundary habitats for water voles was assessed. Where possible (taking account of health and safety considerations regards working near watercourses) the assessment was supported by a survey for water vole field signs, including burrows, feeding remains, latrines or footprints. Note that water voles can occur some distance away from watercourses, particularly in upland areas (although water features often remain a focal point for their activity).
Otters	The likelihood of otters using the site boundary was assessed. Where possible (taking account of health and safety considerations regards working within watercourses) the assessment was supported by a survey for otter field signs including holts, laying up areas, spraints (particularly around prominent features such as tree stumps, boulders, culvert exits/entrances, or grass tussocks near waterbodies) or feeding remains.
Reptiles	The site boundary potential to support reptiles was assessed. Suitability for reptiles was assessed, in particular woodland, embankments, slopes, potential natural and artificial refugia, interface or edge habitats, and shade free areas near dense vegetation; possible refugia such as boards or logs were also examined.
GCN	Ponds identified within 500m were visited to see if they were still present.
Other Species	The site boundaries potential to support other species of nature conservation importance, particularly those identified by the desk study, was also assessed.

Constraints

There were no constraints to the verification survey that are likely to affect the robustness of the conclusions. The Phase 1 verification survey was carried out on 15 February 2022 which is outside the guideline period for such surveys (April – October), however, these are not considered to affect the robustness of the survey.

Results

Habitats

The habitats within the site boundary are illustrated on **Figure 9.3**, with the habitats within the planning boundary and ponds within 500m of the planning boundary identified. Targets Notes are presented in **Table 9A2.2**.

Table 9A2.2 Target Notes

Target Note (TN)	Description of interest feature
TN1	Area of broadleaved plantation woodland consisting of sessile oak (<i>Quercus petraea</i>), silver birch (<i>Betula pendula</i>) and small leaved lime (<i>Tilia cordata</i>) located to the south of the access track planted in 2014, which has been overplanted on a mosaic of habitats such as bracken, brambles, SI acid grassland and localised patches of wet heath and bog.
TN2	Area of mature coniferous plantation woodland. Understorey comprises of a mosaic of habitats such as bracken, brambles, SI acid grassland and localised patches of wet heath.

Target Note (TN)	Description of interest feature
TN3	Area of broadleaved plantation woodland consisting of sessile oak (<i>Quercus petraea</i>), silver birch (<i>Betula pendula</i>) and small leaved lime (<i>Tilia cordata</i>) located to the south of the access track planted in 2014. Understorey comprises of a mosaic of habitats with patches of bracken, brambles, marshy grassland and bog.
TN4	Large stand of Japanese Knotweed.
TN5	Large stand of Japanese Knotweed.
TN6	Localised patches of dry heath upon a steep embankment where there is a rock exposure. Along with SI acid grassland and regenerating trees. Area has been burnt. Brambles present.
TN7 and TN8	Between TN7 and TN8 the coniferous woodland to the west of the access track has been thinned, leaving a strip of bare ground adjacent to the access. Bare ground is also present to the east of the access track, with the reprofiling of a ditch running adjacent.
TN9	Nuttall's waterweed (<i>Elodea nuttallii</i>) present in Pond 3.
TN10	Colony of Montbretia 'Star of the East' (<i>Crocasmia x crocosmiiflora</i>) on verge between track and fence.
TN11	Colony of Montbretia 'Star of the East' (<i>Crocasmia x crocosmiiflora</i>) at edge of woodland.
TN12	SI acid grassland – although not typical SI grassland, as Molina is overrepresented. However, matgrass (<i>Nardus stricta</i>) and other species indicative of well drained ground indicated as degraded form of dryish acid grassland rather than true acid grassland.
TN13	Improved grassland, dominated by grasses and lacking forbs.
TN14	Wet heath, with vegetation characterised by more or less constant but sparse <i>Calluna</i> , <i>Erica tetralix</i> and <i>Vaccinium myrtillus</i> , all of which are indicative of heath vegetation. <i>Erica tetralix</i> , in particular, is a strong indicator of wet heath on shallow peaty soils.

Table 9A2.3 shows the habitats within the site boundary and the approximate area of these within the planning boundary. The habitats within the site and planning boundary remain the same as the 2019 ES Baseline Report. The only noticeable change was the area of bare ground between TN7 and TN8 due to the thinning of the coniferous plantation woodland and reprofiling of the ditch along the access road (**Figure 9.3**). A review of 1:10,000 Ordnance Survey maps and freely-available aerial photographs in February 2022 found identified no new ponds. The eight ponds identified within 500m of the planning boundary in the 2019 ES Baseline Report were all visited in February 2022 and remained present, although P3 and P4 were cloudy due to silt run-off entering the ponds.

Table 9A2.3 Habitats within the site boundary and the approximate area of these within the planning boundary

Phase 1 Habitat	S.7 Priority Habitat*	Summary	~Area in planning boundary**
Improved grassland	N/A	2019 ES: improved grassland was found within the planning boundary at Turbines 1, 7 and 4. In addition, improved grassland was also present north of Turbine 2, south of Turbine 3 and north of Turbine 11. In these areas the sward was dominated by species such as perennial rye-grass (<i>Lolium perenne</i>), crested dogs-tail (<i>Cynosurus cristatus</i>) and white clover (<i>Trifolium repens</i>) which are all typical of a sward dominated by grasses. These areas correspond to the NVC community MG6b (see Appendix 9A.3). These areas were previously classified as semi-improved acid grassland or poor semi-improved grassland but the area generally lacks forbs and has been classed as improved grassland. 2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same except for Turbines T3, T4 and T7 no longer forming part of the Proposed Development.	18.27 ha
Semi-improved acid grassland	N/A	2019 ES: areas of semi-improved acid grassland are present within the planning boundary, and this habitat is more extensive than previously noted as much of the 'marshy grassland' has been recategorized at turbine locations Turbines 6 and 5; and also south of T11. The semi-improved acid grassland is atypical as <i>Molinia</i> is over-represented, and so has some affinities with 'marshy grassland'; however, it is characterised as semi-improved acid grassland due to the presence of mat-grass (<i>Nardus stricta</i>) and general lack of species (other than <i>Molinia</i>) which would be associated with marshy grassland, such as soft rush (<i>Juncus effusus</i>), marsh thistle (<i>Cirsium palustre</i>) and marsh-bedstraw (<i>Galium palustre</i>). This corresponds to the NVC community U5d, based on the botanical assessment (see Appendix 9A.3). Upland acid grasslands are not S.7 habitats, although may sometimes contribute the 'Upland heathland' S.7 habitat where they occur in mosaics with heathland habitats. 2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same.	8.4 ha
Wet heath	Upland heathland	2019 ES: areas of wet heath are present are present within the site boundary, and this habitat is more extensive than previously noted as much of the 'marshy grassland' east of the Nant yr Hwyaidd has been recategorized (at Turbines 10, 9 and 8). The habitat is characterised by constant but sparse heather (<i>Calluna vulgaris</i>), cross-leaved heath (<i>Erica tetralix</i>) and bilberry (<i>Vaccinium myrtillus</i>), all of which are indicative of heath vegetation. Cross-leaved heath in particular, is a strong indicator of wet heath on shallow peaty soils. This habitat was previously classified as marshy grassland due to the over representation of deer grass (<i>Trichophorum germanicum</i>) and <i>Molina</i> being more prominent than it should be within high quality or typical wet heath habitats. The habitat corresponds to the NVC community M15d, as per botanical assessment (see Appendix 9A.3). Much of this area is under an agri-environment scheme which may possibly account for the perceived change from marshy grassland to wet heath, although the NVC communities in these areas are largely as previously recorded. 2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same.	10.25 ha
Acid/neutral flush	Upland flushes, fens and swamps	2019 ES: generally consistent with the previous Phase 1, with minor increase in area of acid/neutral flush to north of Turbine 7. This habitat is present along the margins of a small stream extending up onto slightly higher but flushed ground. This corresponds to the NVC community M6c as per botanical assessment (see Appendix 9B). The NVC noted that acid/neutral flushes are highly variable and are most diverse where the vegetation has been poached by livestock in very wet ground. Although soft-rush (<i>Juncus effusus</i>) is the dominant in all the acid/neutral flush habitats, the poaching at this locality maintains allows other species to thrive alongside it.	1.26 ha

Phase 1 Habitat	S.7 Priority Habitat*	Summary	~Area in planning boundary**
		2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same, except for Turbine T7 no longer forming part of the Proposed Development.	
Wet modified bog	Blanket bog	2019 ES: as per the Phase 1 within the 2014 baseline report. This habitat is present near a small stream and is often found in areas of high precipitation. These habitats are not well-developed. Common Cotton-grass (<i>Eriophorum angustifolium</i>) and purple moor grass are co-dominant and are associated with a range of species also present in the adjacent wet heath. This corresponds to the NVC community M17 as per botanical assessment (see Appendix 9A.3). 2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same.	0.29 ha
Marshy grassland	Upland flushes, fens and swamps	2019 ES: as per the Phase 1 within the 2014 baseline report. Marshy grassland was found within tracts of improved grassland on-site in areas of poor drainage, often, but not always in ditches and along track edges. Soft rush. The stands were often associated with soft rush and varying amounts of purple moor grass. There are small patches of marshy grassland along the access track. This corresponds to the NVC community M23b as per botanical assessment (see Appendix 9A.3). 2022 ES addendum: summary remains the same.	1.46 ha
Dry heath	Upland heathland	2019 ES: There are occasional very small localised patches of dry heath located along the access track on the edges of the coniferous woodland and upon a steep embankment where there is a rock exposure (TN7). Species included common heather (<i>Calluna vulgaris</i>); bilberry (<i>Vaccinium myrtillus</i>); and western gorse (<i>Ulex gallii</i>). 2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same.	0.25 ha
Ponds	Ponds	2019 ES: ponds 3, 4, 7 and 8 are located along the access track, these are likely to be outside of the vegetation clearance zone. 2022 ES addendum: no change in the condition or value of the habitat, other than P3 and P4 being subject to silt runoff.	Outside vegetation clearance zone.
Watercourses	Rivers	2019 ES: stream (running water) present generally within areas of acid/neutral flushes. The 'Rivers' priority habitat does not apply to stream headwaters that are not "marked with a blue line on Ordnance Survey (OS) maps at a scale of 1:50,000" (JNCC, 2011) ¹⁰⁵ , therefore the streams directly affected by the site infrastructure are not considered part of this classification. 2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same.	0.007 ha
Coniferous woodland plantation	N/A	2019 ES: located along the margins of the access track and to the south of the access track. 2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same.	0.83 ha
Broadleaved plantation woodland	N/A	2019 ES: two small areas of broadleaved plantation woodland consisting of sessile oak (<i>Quercus petraea</i>), silver birch (<i>Betula pendula</i>) and small leaved lime (<i>Tilia cordata</i>) located to the south of the access track planted in 2014 (TN8 and TN9). 2022 ES addendum: no change in the condition or value of the habitat. Summary remains the same - see TN1 and TN3.	0.82 ha

¹⁰⁵ JNCC (2011) *UK Biodiversity Action Plan Priority Habitat Descriptions*. Available at: <https://data.jncc.gov.uk/data/2728792c-c8c6-4b8c-9ccd-a908cb0f1432/UKBAP-PriorityHabitatDescriptions-Rev-2011.pdf> [Accessed: 15/03/2022].

Phase 1 Habitat	S.7 Priority Habitat*	Summary	~Area in planning boundary**
Other habitats and features	N/A	2019 ES: other habitats included along the access track included rock exposures, wet ditches, scrub and tall ruderal vegetation. Scrub and bracken were also located adjacent to the road at the base of the access track. 2022 ES addendum: no change in the condition or value of the habitats other than an area of bare ground between TN7 – TN8 where coniferous woodland has been thinned.	N/A
Other features	N/A	2019 ES: comprising of boundary fences, and tracks, as per 2014 ecological baseline report. 2022 ES addendum: summary remains the same.	N/A

Key:

* Corresponding S.7 habitat based on the S.7 lists and the criteria within the *UK Biodiversity Action Plan: Priority Habitat Descriptions* (JNCC, 2011)¹⁰⁵.

** Approximate area within the planning boundary.

Note: 2019 refers to text taken from the 2019 ES which was issued, with the Phase 1 review and botanical assessment having been undertaken in in 2018. 2022 refers to the Phase 1 verification survey and this report.

Six Section 7 priority habitats are present within the planning boundary (including the access track):

- ponds (six within the planning boundary along the access track and two within the site boundary);
- rivers (watercourses);
- upland heathland (wet heath and dry heath);
- upland flushes, fens and swamps (marshy grassland and acid/neutral flush within the wind farm site and small localised patches along the access track);
- blanket bog (wet modified bog); and
- dry heath (very small areas along the access route within the planning boundary).

Other habitats associated with the access route margins are varied and too small scale to map but included:

- ballast (limestone) track;
- rock exposures;
- wet ditches;
- streams;
- scrub (dominated by brambles);
- tall ruderal vegetation;
- broadleaved plantation woodland; and
- coniferous plantation woodland.

Non-native invasive plant species

The following species listed as invasive plants on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) were identified on or near to the planning boundary during the 2018 Phase 1 review and remained present during the 2022 Phase 1 verification survey:

- Two populations of Montbretia (*Crocasmia x crocosmiiflora*) were located to of the north of the access track, one adjacent to the fence line (TN10) and the second adjacent to the coniferous woodland (TN11).
- Pond 3 supports a population of Nuttall's waterweed (*Elodea nuttallii*) (TN9).
- Two stands of Japanese knotweed (*Fallopia japonica*) were located outside of the site boundary to south-east of the access track along the forestry road (TN4 and TN5).

The results of the 2022 Extended Phase 1 Verification Survey in relation to species or species group are summarised in **Table 9A2.4**.

Table 9A2.4 Summary of 2022 Extended Phase 1 Verification Survey of the planning boundary

Species	Survey	Summary
Badger	Extended Phase 1	No evidence of badgers found; habitats arguably suitable but species is likely to be present at low densities only if at all. These results are consistent with previous surveys.
Water vole	Extended Phase 1 / searches for evidence	No evidence of water voles found; habitats within the development area are not suitable for this species and it is considered to be absent from the site. These results are consistent with previous surveys.
Otter	Extended Phase 1 / searches for evidence	No evidence of otter was found; habitats within the development area are not particular suitable for this species although it is likely that otters periodically cross the site when moving between river catchments. These results are consistent with previous surveys.
Bats (all species)	Extended Phase 1	There were no trees within or adjacent to the site boundary which had features suitable for roosting bats. There was change in habitat with activity likely to remain closely associated with linear features (principally treelines), with activity in the open areas of the site much lower. These results are consistent with previous surveys.
Great crested newt	Extended Phase 1 / habitat assessment	No additional ponds were identified through OS mapping. All eight ponds identified within 500m were visited, no change in the condition or value of the habitat, other than P3 and P4 being subject to silt runoff, which is unlikely to significantly affect the pond ecosystem.
Reptiles (all species)	Extended Phase 1 / habitat assessment	Habitats remained the same during the Phase 1 verification survey as reported in the 2019 ES. A common lizard was recorded incidentally along an embankment adjacent to a track near Turbine 5 during a site visit in May 2018; this was recorded near an area of semi-improved acid grassland and wet heath outside the planning boundary. Reptiles are and were previously assumed to be present in areas of the site, but in relatively low densities compared to other areas locally. Most of the site habitats (including the access track) are suitable but 'sub-optimal' for high density populations. Note, although reptiles were assumed to be present at the site, specific surveys were not considered essential to adequately and robustly assess the likely effects of the scheme on reptiles, or to design appropriate mitigation that would ensure no significant effects on these species.

9A3.1 Additional Surveys Undertaken in 2018 as part of the 2019 ES

Bats

2019 ES: The 2019 ES (Appendix 9B) Baseline Bat Report found:

"There are no substantive differences between the data used to support the 2014 ES and the 2018 survey data. In summary:

- The bat community appears unexceptional, both in terms of numbers of contacts with bats and the species recorded, with the vast majority of contacts being with common pipistrelles (>89%).
- Bats have been recorded at all locations across the site, and so will clearly use or cross the open areas of the site where turbines will be sited. However, activity was very strongly associated with features that are known to be attractive to bats (woodland edges and linear features such as streams), with 70 – 90% of contacts in each survey being recorded on detectors at these locations.
- Four species/species groups that fall into the 'high risk' species category have been recorded (noctule, *Nyctalus* sp., *Nyctalus/Serotine* and *Nathusius* pipistrelle), although less than 2% of contacts (1.86% in 2012/2013; 0.67% in 2018) were with these species. These species do not therefore form a potentially significant component of the bat community at the site."

Table 9A2.6 is extracted from the 2019 ES, **Appendix 9B: Baseline Bat Report Table 3.8** and summarises the mean number of contacts per hour with each species / species group at each static detector location in 2018¹⁰⁶.

Table 9A2.6 Extracted from 2019 ES Appendix 9B 'Table 3.8: Mean contacts per survey hour at each location for each full night in 2018'

Survey month and location	Mean no. of contacts by species/species group / hour							Total
	SP	CP	NP	N	Nyct	NyctSero	M	LE
April								
L1								0.00
L2	0.02		0.02					0.04
L3	0.08							0.08
L4						0.02		0.02
L5								0.00
L6								0.00
L7					0.02		0.02	0.04
L8		0.02				0.02	0.10	0.02
L9					0.02		0.02	0.04
May								
L1		0.24					0.04	0.29
L2								0.00
L3	0.09	7.47					0.76	0.02
L4		0.29		0.02				
L5		0.07						

¹⁰⁶ This is based on the total number of hours each detector operated (approximately the time between sunrise and sunset, plus one hour, on each full night of operation for each detector, plus one hour). Note, zero values are not shown for clarity.

Survey month and location	Mean no. of contacts by species/species group / hour							Total
	SP	CP	NP	N	Nyct	NyctSero	M	LE
L6		0.07					0.02	0.09
L7		0.73					0.07	0.80
L8								0.00
L9	0.09	10.98		0.02			1.11	12.20
June								
L1	0.05	0.76		0.08			0.84	1.74
L2	0.08	5.18		0.08			2.11	7.45
L3	0.08	14.61		0.92			1.11	16.71
L4		0.32					0.05	0.37
L5		0.21					0.03	0.24
L6		5.18						5.18
L7		1.53					0.16	1.68
L8	0.42	6.55	0.03	0.05			0.50	7.55
L9	0.16	10.87		0.11			0.95	12.08
July								
L1	0.03	1.32					0.79	2.13
L2	0.03	1.42					1.45	2.89
L3	0.13	6.03					0.37	6.53
L4	0.03	1.50		0.11			0.26	1.89
L5	0.05	0.53		0.03			0.03	0.63
L6	1.03	1.58					0.05	2.66
L7	0.05	3.37		0.03			0.32	3.76
L8	0.24	13.55		0.03			4.32	18.13
L9	0.58	24.11	0.03	0.11			0.50	25.32
August								
L1		0.04					0.13	0.17
L2		0.04		0.07			0.26	0.43
L3	0.07	4.20					2.87	7.13
L4							0.07	0.07

Survey month and location	Mean no. of contacts by species/species group / hour								Total
	SP	CP	NP	N	Nyct	NyctSero	M	LE	
L5							0.02		0.02
L6		0.07							0.07
L7		2.07					0.07		2.13
L8	0.02	0.54					0.24	0.02	0.83
L9	0.22	25.96					0.20	0.09	26.46
September									
L1		1.74		0.02			0.17	0.04	1.96
L2	0.06	0.35		0.02				0.04	0.46
L3	0.07	7.57					0.06	0.37	8.07
L4	0.11	2.02					0.13		2.26
L5	0.02	0.13		0.04			0.02	0.04	0.24
L6		0.19					0.02		0.20
L7		2.13					0.07	0.09	2.30
L8	0.09	5.41					0.31		5.81
L9	0.06	15.67					0.26	0.22	16.20
October									
L1		0.17					0.22		0.40
L2	0.02	0.11					0.10	0.03	0.25
L3	0.11	8.60					0.08	0.03	8.83
L4		0.11					0.03		0.14
L5		0.05					0.02		0.06
L6		0.05					0.02		0.06
L7		0.57					0.05		0.62
L8		1.67			0.03		0.32		2.02
L9	0.05	20.90					0.11		21.06

SP – soprano pipistrelle; CP – common pipistrelle; NP – Nathusius' pipistrelle; M – *Myotis* sp.; N – Noctule; *Nyct* – *Nyctalus* sp.; *NyctSero* – *Nyctalus* sp. / Serotine; LE – long-eared bat.

2022 ES addendum: Habitats within the planning boundary and 50m from the planning boundary remained the same during the Phase 1 verification survey.

In terms of the bat survey work undertaken in 2018 and 2019 survey methodology followed the extant guidance (BCT, 2016⁵²). Subsequently more recent guidelines have been issued which include *Bats and*

Onshore Wind Turbines (NatureScot *et al*, 2021)⁵⁶ which identifies the potential vulnerability of Welsh bat population to wind farms and now includes common pipistrelle.

Based on the new bat guidance (NatureScot *et al*, 2021)⁵⁶ the following species identified in the 2019 ES (**Appendix 9B: Baseline Bat Report**) now fall into the 'high risk' category (with their 2018 no. of contacts / proportion of contact based on static results noted¹⁰⁷):

- Common pipistrelle (10,092 contacts / 89.29%);
- Soprano pipistrelle (167 contacts / 1.48%);
- Nathusius' pipistrelle (2 contacts / 0.02%);
- Noctule (68 contacts / 0.6%);
- Noctule or potentially Leisler's bat, noted as *Nyctalus sp.* in the 2019 ES, (4 contacts / 0.04%); and
- Noctule or potentially Leisler's bat, noted as *Nyctalus sp./serotine* in the 2019 ES, (1 / 0.01%).

Great Crested Newt

2019 ES: The 2018 desk study found no records for GCN within 2km of the site. Eight ponds were identified and subject to HSI and eDNA sample where they retained a suitable amount of water (i.e. were not dry). The GCN eDNA results were negative and GCN were considered absent from the site.

2022 ES addendum: No additional ponds were identified during a review of OS mapping, all eight ponds were visited and present. There were no noticeable changes to the habitat of the ponds, with the minor exception of P3 and P4 which had silt run-off; however, this is unlikely to significantly affect the integrity of the pond with frog spawn having been present on 15 February 2022.

Otter

2019 ES: Field surveys were conducted on four occasions between March and September 2018. The baseline report found *"No evidence of otters was found within the site boundary. However, it is recognised that otters are present in rivers on either side of the Foel Trawsnant watershed and so are likely to periodically cross the site, although any such use will inevitably be intermittent and unlikely to be detected without an enhanced level of survey and monitoring effort that is not commensurate with the level of risk to this species"*.

2022 ES addendum: Habitats within the planning boundary and 50m from the planning boundary remained the same during the Phase 1 verification survey. No evidence of otter was found during the walkover.

Water Vole

2019 ES: Field surveys were conducted on four occasions between March and September 2018 in association with the otter survey. The baseline report found *"No evidence of water vole activity was found during the surveys. Based on its characteristics the site is thought unlikely to be used by this species and the lack of evidence supports this, particularly as water voles tend to be very localised in their habits. There are no areas of the site which meet the 'typical' habitat criteria for water voles (e.g. water features which are adjacent to areas of dense grassy and herbaceous vegetation within which they can hide and feed; water features which have a depth of at least a metre). Water voles in upland areas of Scotland are sometimes fossorial (not specifically associated with watercourses); however, there is no evidence of water voles using the Foel Trawsnant site in this manner. Water voles are therefore considered to be absent from the site"*.

¹⁰⁷ Based on nine static locations, each recording for five nights over seven months (April – October 2018) i.e. 315 nights of data.

2022 ES addendum: Habitats within the planning boundary and 50m from the planning boundary remained the same during the Phase 1 verification survey. No evidence of water vole was found during the walkover.

NVC/Botanical Surveys

2019 ES: The 2018 NVC survey in summary found:

- *“Three of the vegetation communities are recognised as Section 7 priority habitats of principal importance for biodiversity conservation in Wales. These are the Carex echinate -Sphagnum mire (M6c) – Acid/neutral flush, Trichophorum-Erica wet heath (M15d) – Wet Heath; and the Trichophorum-Eriophorum mire (M17) – Wet modified bog. As such this means that impacts on vegetation of conservation importance will result from the construction of Turbines 8, 9 and 10 and their associated tracks, which lie within large tracts of such vegetation. Other small areas of vegetation of conservation importance may be lost in the vicinity of proposed Turbines 3, 5 and 7, depending on the land-take area and associated works that may have a physical impact nearby. None of the vegetation near proposed Turbines 1, 2, 4 and 6 is considered to have any conservation importance.*
- *Access Travel Inventory Survey: The botanical assessment confirmed that the existing and proposed access track sections leading to the Foel Trawsnant plateau do not support populations of any plant species of either national or regional conservation importance. It noted the presence of Schedule 8 invasive plants namely Montbretia (Crocsmia x crocosmiiflora) Nuttall’s waterweed (Elodea nuttallii) and Japanese knotweed (Fallopia japonica) in trackside habitats”.*

2022 ES addendum: Habitats within the planning boundary and 50m from the planning boundary remained the same during the Phase 1 verification survey. Note Turbines 3, 4 and 7, no longer form part of the scheme.

Peat Survey Review

2019 ES: The peat survey review in baseline report found: *“The 2014 ES the peat-depth studies (Walters UK Ltd, 2014) demonstrated that the vast majority of the site is underlain by ‘peaty’ deposits less than 0.3m deep (generally black organic-rich soils (e.g. podzols) representative of agriculturally-improved former peatlands, underlain by either the weathered parent material or clay layers) (see **Figure 6.1** and **Figure 6.2**). True blanket mire (i.e. mire that is predominantly or entirely ombrotrophic) is almost entirely absent at Foel Trawsnant, with the localised areas of deeper ‘peat’ (>0.5m) being minerotrophic soligenous valley mires and acid flush associated with streams and areas of impeded drainage. Most of the deeper peat at the site is associated with acid / neutral flush (M6 Carex-Sphagnum mire) which is the most widespread soligenous mire in the British uplands, usually occurring in wet hollows, at seepage lines, on flushed slopes, in shallow gullies and along stream margins, all places with slowly moving acid groundwater. It is a sub-montane community, found in Wales up to 500m altitude or more. It nearly always lies over acid and moderately nutrient-rich deep, wet and peaty soils.*

Of 772 depth probes or samples taken, only 20 were deeper than 0.5m, and only six individual cores recorded peat depths of between 0.7 and 0.8m. In all cases these areas of peat between 0.7 and 0.8m deep were found to be very localised, and none of these occur at any of the proposed locations for infrastructure. The peat resource at the site is therefore considered to be of ‘local’ value only.

The existing survey data appropriately characterises the peat resource at the site. No further surveys are therefore proposed as the reduced number of turbines will be located in the same positions as those previously assessed”.

2022 ES addendum: Habitats within the planning boundary and 50m from the planning boundary remained the same during the Phase 1 verification survey.

Appendix 9B

Calculation of Stand-off Distances for Turbines

*NatureScot et al (2021)*⁵⁶ recommends a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features such as wetlands). The tables below calculate the standoff distances required from the central point of the turbine base to woodland edges and watercourses. This is to allow for a 50m buffer from blade tip to woodland edge or watercourse. It has been assumed that trees with reach a maximum height of 30m when fully mature. Watercourses have been assumed to be at ground level 0m. Watercourses are based on those with a clear topography associated with them and exclude drainage ditches or watercourses which periodically dry.

133m Rotor Re-Calculation of Stand-Off Distances for Turbines

Five turbines are to use a 133m rotor which are to include: Turbines 5, 6, 9, 10 and 11.

Table 9B1.1 Calculation of Stand Off Distances Required for a 133m Rotor Turbine

	Woodland (up to 30m)	Watercourses
Turbine Hub Height (m)	78.5m	78.5m
Blade Length (m)	66.5m	66.5m
Feature height (m)	30m	0m
Blade Tip Standoff (m)	50m	50m
Distance to base (m)	105.92m	86.08m
Buffer distance	106m	87m

Note: Woodland has been assumed to reach a maximum maturity of 30m. Watercourses are based those which have a clear topography associated with them.

Table 9B1.2 Calculation of Stand Off Distances for 133m Rotor Turbines from Woodland Edge

Turbines with 133m Rotor	Distance from turbine base to nearest woodland edge	Buffer Required to achieve 50m from blade to woodland edge	50m from blade tip to woodland edge (Y/N)
T5	124m	106m	Y
T6	267m	106m	Y
T9	193m	106m	Y
T10	370m	106m	Y
T11	465m	106m	Y

Table 9B1.3 Calculation of Stand Off Distances for 133m Rotor Turbines from Watercourses

Turbines with 133m Rotor	Distance from turbine base to nearest woodland edge	Buffer Required to achieve 50m from blade to woodland edge	50m from blade tip to woodland edge (Y/N)
T5	307m	87m	Y
T6	240m	87m	Y
T9	186	87m	Y
T10	142	87m	Y
T11	113	87m	Y

117m Rotor Re-Calculation of Stand-Off Distances for Turbines

Three turbines are to use a 117m rotor which are to include: Turbines 1, 2 and 8.

Table 9B1.4 Calculation of Stand Off Distances Required for a 117m Rotor Turbine

	Woodland	Watercourses
Turbine Hub Height (m)	86.5m	86.5m
Blade Length (m)	58.5m	58.5m
Feature height (m)	30m	0m
Blade Tip Standoff (m)	50m	50m
Distance to base (m)	92.63m	65.50m
Buffer distance	93m	66m

Note: Woodland has been assumed to reach a maximum maturity of 30m. Watercourses are based those which have a clear topography associated with them.

Table 9B1.5 Calculation of Stand Off Distances for 117m Rotor Turbines from Woodland Edge

Turbines with 117m Rotor	Distance from turbine base to nearest woodland edge	Buffer Required to achieve 50m from blade to woodland edge	50m from blade tip to woodland edge (Y/N)
T1	94m	93m	Y
T2	76m	93m	N
T8	418m	93m	Y

Table 9B1.6 Calculation of Stand Off Distances for 117m Rotor Turbines from Watercourses

Turbines with 117m Rotor	Distance from turbine base to nearest woodland edge	Buffer Required to achieve 50m from blade to woodland edge	50m from blade tip to woodland edge (Y/N)
T1	583m	66m	Y
T2	362m	66m	Y
T8	400m	66m	Y

Calculation of the total area of blades in the 2019 ES and the 2022 ES addendum

Table 9B1.7 provides a comparison of the total area of blades in the 2019 ES and 2022 ES addendum.

Table 9B1.7 Comparison of total area of blades in 2019 ES and the 2022 ES addendum

	2019 ES (90m rotor diameter)	2022 ES addendum (117m rotor diameter)	2022 ES addendum (133m rotor diameter)
Radius: blade length	45m	58.5m	66.5m
Diameter: rotor diameter	90m	117m	133m
Total area of blades (circle)	6,361.73m ²	10,751.32 m ²	13,892.91 m ²
Number of turbines	11	3	5
Total combined area (circle) per turbine rotor diameter	69,979.03 m ²	32,253.96 m ²	69,464.55 m ²
Total combined area (circle)	2019 ES (90m): 69,979.03 m ²		2022 ES addendum (117m and 133m): 101,718.51m ²

Appendix 13A

Revised Construction Traffic Management Plan

Appendix 15A

Detailed Shadow Flicker Results

Table 15A.17 Detailed Shadow Flicker Results

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
1	1	283602	195576	1	1	2	275	0	51	0.58	0.47	23.8
1	2	283601	195571	1	1	2	275	0	51	0.58	0.47	24
1	3	283600	195566	1	1	2	275	0	51	0.58	0.48	24.2
1	4	283608	195564	1	1	2	180	0	51	0.59	0.49	24.8
2	1	283268	195568	2	1	2	115	0	77	1.43	0.99	76.1
2	2	283268	195568	2	1	4	115	0	76	1.43	1.01	77.1
2	3	283271	195575	2	1	2	115	0	75	1.42	1.02	76.6
2	4	283271	195575	2	1	4	115	0	74	1.44	1.04	77.2
2	5	283258	195570	2	1	4	206	0	77	1.41	0.98	75.2
3	1	283229	195530	2	1	2	120	0	87	1.28	0.77	66.9
3	2	283231	195536	2	1	2	120	0	86	1.31	0.8	69
3	3	283234	195541	2	1	2	120	0	85	1.33	0.84	71.2

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
4	1	283189	195552	1	1	2	105	0	71	0.88	0.46	32.6
4	2	283189	195552	1	1	4	105	0	68	0.89	0.5	34.3
4	3	283191	195558	1	1	2	105	0	65	0.88	0.51	33.2
4	4	283191	195558	1	1	4	105	0	70	0.89	0.51	35.7
4	5	283194	195566	1	1	2	105	0	69	0.89	0.51	35.2
4	6	283194	195566	1	1	4	105	0	78	0.9	0.49	38.1
4	7	283179	195549	1	1	2	200	0	91	0.99	0.64	58.6
4	8	283179	195549	1	1	4	200	0	90	1	0.66	59.4
5	1	283220	195494	2	1	2	125	0	93	1.11	0.69	63.9
5	2	283220	195494	2	1	4	125	0	92	1.18	0.71	65.1
5	3	283225	195504	2	1	2	125	0	91	1.2	0.71	64.8
5	4	283225	195504	2	1	4	125	0	90	1.25	0.73	66
6	1	283173	195436	2	1	2	145	0	105	0.94	0.6	63.4
6	2	283173	195436	2	1	4	145	0	105	0.93	0.61	64.2
6	3	283168	195431	2	1	2	145	0	107	0.96	0.6	63.7
6	4	283168	195431	2	1	4	145	0	106	0.94	0.61	64.4

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
6	5	283163	195427	2	1	2	145	0	106	0.97	0.6	64.1
6	6	283163	195427	2	1	4	145	0	107	0.95	0.61	64.8
7	1	282741	195083	2	1	2	122	0	165	1.6	0.96	158.6
7	2	282741	195083	2	1	4	122	0	173	1.61	0.94	162.6
7	3	282737	195077	2	1	2	122	0	164	1.6	0.97	158.4
7	4	282737	195077	2	1	4	122	0	169	1.6	0.96	161.8
7	5	282732	195088	1	1	2	212	0	129	1.57	1.04	133.6
8	1	282598	195176	1	1	2	160	0	133	1.14	0.7	92.5
8	2	282603	195177	1	1	2	160	0	137	1.16	0.71	96.8
8	3	282608	195179	1	1	2	160	0	139	1.17	0.72	99.5
9	1	282501	195041	1	1	2	64	0	120	0.88	0.61	73.7
9	2	282501	195041	1	1	4	64	0	121	0.88	0.61	74
9	3	282503	195036	1	1	2	64	0	119	0.89	0.62	74.2
9	4	282503	195036	1	1	4	64	0	121	0.89	0.62	74.7
9	5	282506	195031	1	1	2	64	0	121	0.9	0.62	75.3
9	6	282506	195031	1	1	4	64	0	120	0.9	0.63	75.5

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
9	7	282506	195025	1	1	2	64	0	119	0.9	0.63	75.5
9	8	282509	195026	1	1	2	120	0	121	0.91	0.63	76.5
10	1	282492	195189	2	1	2	169	0	77	0.9	0.55	42.4
10	2	282492	195189	2	1	4	169	0	91	0.91	0.56	50.5
10	3	282500	195191	2	1	2	169	0	71	0.87	0.51	36.4
10	4	282500	195191	2	1	4	169	0	88	0.92	0.56	48.8
11	1	282510	195192	2	1	2	169	0	68	0.83	0.5	33.7
11	2	282510	195204	2	1	4	169	0	86	0.92	0.53	45.3
11	3	282518	195202	2	1	2	169	0	64	0.76	0.48	30.5
11	4	282518	195202	2	1	4	169	0	83	0.91	0.51	42.7
12	1	282527	195198	2	1	2	169	0	62	0.76	0.48	29.5
12	2	282527	195198	2	1	4	169	0	83	0.94	0.52	43.1
12	3	282533	195207	2	1	2	169	0	72	0.89	0.51	36.6
12	4	282533	195207	2	1	4	169	0	92	0.98	0.54	49.6
13	1	282544	195202	2	1	2	168	0	72	0.9	0.5	36.3
13	2	282544	195202	2	1	4	168	0	94	1	0.54	51

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
13	3	282552	195203	2	1	2	168	0	79	0.94	0.51	40
13	4	282552	195203	2	1	4	168	0	99	1.02	0.56	55
14	1	282564	195205	2	1	2	168	0	89	1	0.53	47
14	2	282564	195205	2	1	4	168	0	106	1.06	0.57	60
14	3	282571	195207	2	1	2	168	0	94	1.04	0.54	51.2
14	4	282571	195207	2	1	4	168	0	108	1.08	0.59	64.1
15	1	282580	195211	2	1	2	169	0	104	1.09	0.58	60.7
15	2	282580	195211	2	1	4	169	0	119	1.1	0.62	74
15	3	282587	195210	2	1	2	169	0	110	1.11	0.6	66.4
15	4	282587	195210	2	1	4	169	0	125	1.11	0.65	81
16	1	282597	195215	2	1	2	168	0	123	1.13	0.64	78.4
16	2	282597	195215	2	1	4	168	0	132	1.13	0.69	90.7
16	3	282606	195216	2	1	2	168	0	132	1.15	0.66	87.5
16	4	282606	195216	2	1	4	168	0	139	1.15	0.7	98
17	1	282616	195230	2	1	2	167	0	137	1.17	0.69	94.3
17	2	282616	195230	2	1	4	167	0	147	1.17	0.7	102.2

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
17	3	282625	195232	2	1	2	167	0	141	1.19	0.71	100.6
17	4	282625	195232	2	1	4	167	0	154	1.19	0.7	107.5
17	5	282612	195231	1	1	2	251	0	0	0	0	0
18	1	282636	195232	2	1	2	179	0	155	1.21	0.71	110.7
18	2	282636	195232	2	1	4	179	0	155	1.21	0.74	114.1
18	3	282643	195233	2	1	2	179	0	155	1.23	0.74	114.9
18	4	282643	195233	2	1	4	179	0	154	1.23	0.76	117
19	1	282657	195230	2	1	2	180	0	155	1.26	0.78	120.2
19	2	282657	195230	2	1	4	180	0	155	1.26	0.79	122
19	3	282664	195230	2	1	2	180	0	156	1.27	0.78	122.3
19	4	282664	195230	2	1	4	180	0	153	1.28	0.81	123.8
20	1	282677	195235	2	1	2	179	0	161	1.3	0.83	133.6
20	2	282677	195235	2	1	4	179	0	161	1.3	0.84	135.1
20	3	282683	195240	2	1	2	179	0	161	1.31	0.83	134.2
20	4	282683	195240	2	1	4	179	0	161	1.31	0.84	135.2
21	1	282592	195252	2	1	2	159	0	129	1.11	0.64	82.6

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
21	2	282592	195252	2	1	4	159	0	132	1.11	0.68	89.2
21	3	282582	195253	2	1	2	159	0	122	1.09	0.62	75.9
21	4	282582	195253	2	1	4	159	0	128	1.09	0.65	83.5
22	1	282574	195246	2	1	2	171	0	113	1.07	0.6	68.3
22	2	282574	195246	2	1	4	171	0	123	1.07	0.63	77.3
22	3	282567	195244	2	1	2	171	0	109	1.06	0.58	63.4
22	4	282567	195244	2	1	4	171	0	117	1.06	0.62	72.1
23	1	282556	195244	2	1	2	168	0	102	1.04	0.56	57.2
23	2	282556	195244	2	1	4	168	0	111	1.04	0.59	65.2
23	3	282550	195242	2	1	2	168	0	98	1.02	0.55	54.2
23	4	282550	195242	2	1	4	168	0	109	1.03	0.57	62.2
24	1	282538	195240	2	1	2	168	0	96	0.99	0.54	52
24	2	282538	195240	2	1	4	168	0	106	1	0.56	59.6
24	3	282531	195239	2	1	2	168	0	96	0.98	0.53	51
24	4	282531	195239	2	1	4	168	0	105	0.99	0.56	58.4
25	1	282521	195236	2	1	2	169	0	94	0.96	0.52	49.1

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
25	2	282521	195236	2	1	4	169	0	103	0.97	0.55	56.4
25	3	282514	195236	2	1	2	169	0	93	0.95	0.52	48.4
25	4	282514	195236	2	1	4	169	0	103	0.95	0.54	55.4
26	1	282503	195233	2	1	2	167	0	89	0.92	0.51	45.8
26	2	282503	195233	2	1	4	167	0	100	0.93	0.53	53.3
26	3	282493	195234	2	1	2	167	0	93	0.91	0.52	48.3
26	4	282493	195234	2	1	4	167	0	102	0.91	0.53	54.5
27	1	282485	195229	2	1	2	170	0	94	0.9	0.52	49.1
27	2	282485	195229	2	1	4	170	0	102	0.9	0.54	54.8
27	3	282478	195227	2	1	2	170	0	94	0.89	0.53	49.7
27	4	282478	195227	2	1	4	170	0	103	0.89	0.53	54.7
28	1	282627	195296	3	2	2	186	0	148	1.16	0.73	107.3
28	2	282627	195296	2	1	4	186	0	146	1.16	0.74	107.8
28	3	282632	195294	2	1	2	186	0	147	1.17	0.73	107.3
28	4	282632	195294	2	1	4	186	0	146	1.17	0.75	109.4
28	5	282635	195299	1	1	2	100	0	146	1.16	0.73	107.2

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
29	1	282318	194999	2	1	2	53	0	91	0.75	0.53	48.1
29	2	282318	194999	2	1	4	53	0	97	0.75	0.54	52.6
29	3	282318	194991	2	1	2	139	0	89	0.76	0.54	48
29	4	282318	194991	2	1	4	139	0	95	0.77	0.56	53.2
30	1	285029	193595	1	1	2	0	0	0	0	0	0
30	2	285029	193595	1	1	4	0	0	0	0	0	0
30	3	285033	193595	1	1	2	0	0	0	0	0	0
30	4	285033	193595	1	1	4	0	0	0	0	0	0
30	5	285027	193593	1	1	2	270	0	0	0	0	0
31	1	282595	195296	1	1	2	160	0	136	1.09	0.66	89.9
31	2	282599	195297	1	1	2	160	0	145	1.1	0.64	93
32	1	282437	195257	1	1	2	165	0	101	0.81	0.51	51.1
32	2	282437	195257	1	1	4	165	0	101	0.81	0.52	52.6
32	3	282433	195256	1	1	4	165	0	102	0.81	0.51	52.2
32	4	282429	195254	1	1	2	165	0	98	0.8	0.51	49.9
32	5	282429	195254	1	1	4	165	0	100	0.8	0.52	51.8

House	Window	Easting	Northing	Width (m)	Depth (m)	Height (m)	Degrees from North	Tilt angle	Days per year	Max hours per day	Mean hours per day	Total hours
33	1	282404	195199	1	1	2	130	0	98	0.74	0.5	49.3
33	2	282404	195199	1	1	4	130	0	103	0.74	0.5	51.7
33	3	282400	195196	1	1	2	130	0	99	0.74	0.51	50
33	4	282400	195196	1	1	4	130	0	103	0.74	0.5	51.5

