

Table 12.7: Significance of Visual Effects

Significance	Description
Major	The proposed development would affect existing views to the extent that defining visual elements would become subservient within the view . When viewed within the context of the landscape, the proposed development is likely to be seen to conflict with existing visual amenity. Receptors are likely to be categorised as being of high sensitivity.
Major - Moderate	The proposed development would be visually prominent , which may lead to the loss of some essential landscape features which contribute to the visual character or quality of the view. Receptors are more likely to be categorised as being of medium or high sensitivity.
Moderate	The proposed development would result in some alteration to landscape features which contribute to the existing visual character or quality, but the overall integrity of the landscape and its visual qualities are maintained. The proposed development may be suitably absorbed or accommodated within the view alongside existing visual elements. Receptors are likely to be categorised as being of medium sensitivity.
Moderate - Minor	The proposed development would be visually integrated within the existing landscape without the loss of essential landscape features which contribute to the visual character or quality of the view. Receptors are more likely to be categorised as being of medium or low sensitivity, although not exclusively so.
Minor	The development would be integrated into the existing landscape without having a material effect upon the distinctive and valued characteristics of the view. Receptors are likely to be categorised as being of low sensitivity.

12.4.6. Viewpoint locations from where effects are determined to have **major** or **major - moderate** visual significance will be considered to be **significant**. Conversely any locations where it is determined that visual effects are **minor** or **moderate - minor**, visual effects will be considered not significant.

12.4.7. Where effects are determined to be of moderate significance, whether these effects are significant or not significant will depend on the individual and specific mitigating circumstances relating to each viewpoint and the professional opinion of the landscape specialist will determine this. For example, effects from a particular viewpoint may be considered to be of moderate visual significance. However, the broad nature of the view in which the proposed development would be seen may reduce these effects to an extent where effects would still be considered to be moderate though not considered to be significant.

Cumulative

12.4.8. In addition to assessing the individual effects of the proposed wind farm on landscape character and visual amenity the LVIA will also assess the cumulative effects of existing, consented, and those wind farms submitted for planning.

12.4.9. Given the large number of wind farm developments within the 45 km study area, the criteria outlined below is proposed to be applied in order that the assessment be focussed on only the wind farm developments that are likely to contribute to significant cumulative effects on landscape character and visual amenity:

- All existing, consented and submitted turbines within a 5 km radius of the outer most Y Bryn turbine.

- All existing, consented and submitted turbines with a blade tip height of 30 m or more within a 5 – 15 km radius of the outer most Y Bryn turbine.
- All existing, consented and submitted turbines with a blade tip height of 60 m or more within a 15 – 25 km radius of the outer most Y Bryn turbine.
- All existing, consented and submitted turbines with a blade tip height of 90 m or more within a 25 – 35 km radius of the outer most Y Bryn turbine.
- All existing, consented and submitted turbines with a blade tip height of 120 m or more within a 35 – 45 km radius of the outer most Y Bryn turbine.

12.4.10. It is proposed that the same viewpoints used to assess the individual effects on visual amenity as listed in Table 12.1 above, will be used to illustrate cumulative effects. Cumulative wind farms to be included within the LVIA, based on the methodology described above and on current information are listed in Table 12.8:

Table 12.8: Cumulative Wind Farms

Name	Distance to nearest Y Bryn turbine (km)	No. of Turbines	Hub Height	Tip Height
Operational				
Taff Ely	14.97	20	35	53.5
Maesgwyn	13.48	13	70/80	110-125
Maesgwyn Ext	14.16	1	80	125
Maerdy	12.84	8	80	125
Ferndale	14.95	8	51	76
Mynydd Bwlfa	13.81	12	70/80	115/125
Mynydd Brombil	1.63	4	60	100
Pant-y-Wal	11.89	10	70	115
Pant-y-Wal Ext	10.90	8	80	125
Llynfi Afan Renewable Energy Park	4.37	12	78	118
Pen-y-Cymoedd	2.92	76	89.5	143.5
Ffynnon Oer	4.12	16	58	93
Fforch Nest1/2	12.41	11	70	115
Mynydd Portref	16.06	11	49/60	75/86
Mynydd Portref Extension	16.8	6	70	110
Mynydd-y-Gwair (resubmission)	20.51	16	80	127
G24 Innovations Turbine	41.59	1	95	140
Mynydd y Gwrhyd (resubmission)	19.51	2	59	100
Oakdale Business Park	3.6	2	80	130
Pen Bryn Oer	32.54	3	71.5	110

Name	Distance to nearest Y Bryn turbine (km)	No. of Turbines	Hub Height	Tip Height
West of Rhiwfelin Fach Farm	20.77	1	61.5	77
Consented				
Graig Fatha	18.58	1	75	125
Llwyncelyn	19.84	2	75	125
Llwyncelyn (resubmission)	19.84	2	80	138.5
Maesgwyn Extension (Phase 2)	13.15	4	80	125
Taff Ely (Repowering)	15.09	7	69	110
In Planning				
Foel Trawsnant	0.20	11	100	145
Upper Ogmere	6.96	7	77.5	130

Source: Soltys Brewster/Natural Power Consultants

*If any of the cells are left blank it's because we were unable to source the data.

Question 17: Do consultees agree with the methodology used to determine which wind farms are to be included within the cumulative assessment and also agree with the list provided in Table 12.8?

12.4.11. The significance of cumulative effects on landscape character will be determined by combining the sensitivity of the Landscape Character Area with the magnitude of cumulative change that would occur. Note that sensitivity in respect of cumulative effects would be the same as identified for individual effects and therefore the same criteria as identified in Table 12.2 would be applied. The criteria for informing the magnitude and the significance of cumulative effects on landscape character are demonstrated in the following tables:

Table 12.9: Magnitude of Cumulative Landscape Effects

Magnitude	Description
High	The combined effects of the proposed development and other cumulative wind farm developments would result in major loss of, or major alteration to key elements of the landscape, to the extent that there would be a fundamental and permanent, or long-term, change to its character. The change may occur over an extensive area.
High - medium	The combined effects of the proposed development and other cumulative wind farm developments would result in significant loss of, or major alteration to key elements of the landscape, to the extent that there would be a significant and permanent, or long-term, change to its character. The change may occur over a large area.
Medium	The combined effects of the proposed development and other cumulative wind farm developments would result in the loss of or alteration to key elements of the landscape, to the extent that there would be a partial long-term change to its character. The change may occur over a limited area.

Magnitude	Description
Medium - Low	The combined effects of the proposed development and other cumulative wind farm developments would result in a loss, or alteration to key elements of the landscape, to the extent that there may be some slight perception of change to its character. The change may be temporary and occur over a limited area.
Low	The combined effects of the proposed development and other cumulative wind farm developments would result in such a minor loss of or alteration to key elements of the landscape that there would be no fundamental change to its character.

Source: Soltys Brewster

Table 12.10: Significance of Cumulative Landscape Effects

Significance	Description
Major	Effects that would occur when the majority of landscape attributes are deemed to be highly sensitive and the combined cumulative effects of the proposed development and other cumulative developments would alter the landscape character to the extent that it would become defined or considerably influenced by the presence of wind farm developments, taking account of cumulative baseline conditions.
Major - Moderate	Effects that would occur when the a number of landscape attributes are deemed to be highly sensitive and the combined cumulative effects of the proposed development and other cumulative developments would partially alter the landscape character to the extent that it would become influenced by the presence of wind farm developments, taking account of cumulative baseline conditions.
Moderate	The significance of cumulative effects would decrease as the number of sensitive landscape attributes also decreases. The proposed development and other cumulative developments may still be easily noticeable , but their combined effects would not cause the landscape character to become more defined by wind farm developments than by other landscape attributes.
Moderate - Minor	Effects that would occur when the majority of landscape attributes are not deemed to be highly sensitive and where the proposed development and other cumulative development can be integrated into the existing cumulative baseline , without the loss of key underlying landscape attributes.
Minor	Effects that would occur when the landscape attributes are not deemed to be highly sensitive and where the combined effects of the proposed development and other cumulative developments would have no effect on the existing landscape attributes .

Source: Soltys Brewster

12.4.12. The significance of cumulative effects on visual amenity will be determined by combining the sensitivity of the visual receptors with the magnitude of cumulative change that would occur. Note that sensitivity in respect of visual receptors would be the same as identified for individual effects and therefore the same criteria as identified in Table 12.5 would be applied. The criteria for informing the magnitude and the significance of cumulative effects on visual amenity are demonstrated in the following tables:

Table 12.11 Magnitude of Cumulative Visual Effects

Magnitude	Description
High	Cumulative development including the proposed development would increase the scale of wind farm development in the landscape to a level which would dominate views.

Magnitude	Description
High - medium	The proposed development when viewed in combination with other cumulative developments would be an apparent feature that is likely to occupy a significant proportion of the overall view. The development and other cumulative developments may contrast with existing features of the landscape. Wind farm development is likely to be visually prominent to the extent that it would affect and change the appearance of a number of key existing elements within the view. Views are likely to be medium to long distance and long in duration.
Medium	Cumulative development including the proposed development would result in a noticeable increase in wind farms within the view. However, this increase would not result in the wind farms being the dominant feature of the view.
Medium - Low	Cumulative development including the proposed development would be visible but would form components of the view that might be easily missed by the casual observer. They would not contribute to the overall prominence of wind farms within the view.
Low	Cumulative development including the proposed development would be barely perceptible, or imperceptible, and would have no effect on the perception of wind farms within the view.

Source: Soltyś Brewster

Table 12.7: Significance of Cumulative Visual Effects

Significance	Description
Major	Effects that would occur when the majority of visual receptors are deemed to be highly sensitive and the combined effects of the proposed development and other cumulative developments would result in the view becoming defined , or considerably influenced by wind farm development.
Major - Moderate	The proposed development when viewed in combination with other cumulative developments would be visually prominent, which may lead to the loss of some essential landscape features which contribute to the visual character or quality of the view. Receptors are more likely to be categorised as being of medium or high sensitivity.
Moderate	The significance of effects would decrease as the number and sensitivity of visual receptors also decreases. The proposed development and other cumulative wind farms may still be a noticeable addition to views. However, their combined effects would not cause the overall visual character of the view to become defined by wind farm development rather than by other elements of the existing view.
Moderate - Minor	Effects that would occur when the majority of visual receptors are not deemed to be highly sensitive and where the combined effects of the proposed development and other cumulative wind farms would have little or no incremental effect on existing views. They are likely to constitute a barely perceptible, or imperceptible, component of the wider view, which might be missed by the casual observer. Awareness of the proposed development and other cumulative wind farms would not have a marked effect on the overall quality of the view.
Minor	Effects that would occur when the visual receptors are not deemed to be highly sensitive and where the combined effects of the proposed development and other cumulative wind farms would have no incremental effect on existing views.

Source: Soltyś Brewster

LVIA Outputs

12.4.13. The following figures will be produced to assist in assessing and illustrating any changes in the effects on landscape character and visual amenity.

- Statutory and Non-Statutory Landscape Designations.
- Access and movement, including key transport routes, cycle routes, national/scenic routes and long-distance trails.
- LANDMAP plans for each of the five Aspect Areas, (LANDMAP Guidance note 3 (2017)).
- Character Areas.
- Viewpoint Location Plan (1 to 22).
- ZTV to blade tip height to illustrate any changes in theoretical visibility within the 45 km study area, presented at A1 size format.
- ZTV to hub height to illustrate any changes in theoretical visibility within the 45 km study area, presented at A1 size format.
- Viewpoint visualisations, to be produced following published guidance, from each of the 22 viewpoints to include:
 - baseline photograph and matching wireline (including cumulative developments),
 - photomontages, (from 10no. viewpoints – locations to be agreed with statutory consultees).
- Cumulative wind farm location plan.
- Cumulative ZTV (Blade Tip only) at A1 size format. Separate plans will be prepared to show the relationship of the Proposed Y Bryn Wind Farm, in combination with operational wind farms, consented wind farms, and wind farms in planning.
- Aviation lighting ZTV and associated figures.
- Key aviation lighting night-time visualisations.
- Residential Impact Assessment (RVAA).

12.4.14. Note that the photomontages will illustrate removal of forestry associated within the wind farm (if visible) only. Forestry removal as shown on NRW's Forestry Design Plan or not directly associated with Y Bryn Wind Farm that lie outside of the site boundary will not be shown on the photomontages. However, any potential effects of this removal on landscape character and visual amenity will be described within the assessment text.

12.4.15. The LVIA will include the following sections:

- Introduction
- Methodology
- Consultation
- Baseline conditions, including landscape related planning policy.
- Assessment of Potential Effects; including direct effects and, indirect effects upon the landscape character and visual effects, for both individual and cumulative effects. This will cover the constructional, operational and decommissioning phases of the development.
- Cumulative Effects.
- Conclusion.

Question 18: Do the consultees agree with the proposed approach to assess the effects on landscape character and visual amenity?

Question 19: Do consultees see value to any particular enhancement measures?

13. Hydrology, Geology and Hydrogeology

13.1. Introduction

- 13.1.1. This section of the scoping report has been prepared by Natural Power and outlines the information which currently exists, as well as presenting the baseline conditions applicable to the hydrological, hydrogeological and geological environment in the surrounding region of the proposed Y Bryn Wind Farm.
- 13.1.2. As noted in Section 1 and 9, the intention of this scoping report is to introduce the proposed development and provide the PINS and consultees with sufficient information (where it currently exists) on the likely impacts of the proposed Y Bryn Wind Farm development on individual receptors and important features at this stage. The intended approach will allow for an EIA that focusses on only those aspects of the proposed wind farm development that are likely to have a significant effect on known hydrological, hydrogeological and groundwater receptors, as well as those receptors that are currently unknown.
- 13.1.3. A hydrological baseline desktop review was undertaken in October 2020. The information gained from the desktop review has been presented in the following sections.
- 13.1.4. Where the impacts on important hydrological, hydrogeological and geological features (whether it be direct or indirect) from the proposed Y Bryn Wind Farm are not likely to cause a significant effect, it is proposed that these receptors are 'scoped out' and thus not included within the EIA.
- 13.1.5. Table 13.8 summarises the results of the desk top review and highlights whether or not the receptor will be included within the EIA.
- 13.1.6. As part of the EIA, a Hydrological, Geological and Hydrogeological Impact Assessment will be undertaken on those receptors that have potential to experience a **significant effect** from the construction, operation and decommissioning of the proposed development.

13.2. Legislation, Guidance and Consultation

International Legislation and Policy

- 13.2.1. The assessment takes into account the requirements of the Water Framework Directive (2000/60/EC) (WFD). The WFD aims to protect and enhance the quality of surface freshwater (including lakes, rivers and streams), groundwater, groundwater dependent ecosystems, estuaries and coastal waters. The key objectives of the WFD relevant to this assessment are:
- To prevent deterioration and enhance aquatic ecosystems; and
 - To establish a framework of protection of surface freshwater and groundwater.

National Legislation and Regulations

- 13.2.2. This assessment takes into account the following legislation and policy:
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
 - Land Drainage Act 1994;
 - Flood and Water Management Act 2010;
 - Water Act 2014;
 - The Pollution Prevention and Control (England and Wales) Regulations 2000;
 - The Water Supply (Water Quality) Regulations 2018;
 - The Private Water Supplies (Wales) Regulations 2017;
 - The Waste (England and Wales) (Amendment) Regulations 2012;

- Part IIa of the Environment Protection Act 1990; and
- The Town and Country Planning (EIA) Regulations 2017.

Policy & Guidance

- 13.2.3. The following regional policies are also taken into account during the assessment:
- Planning Policy Wales (Edition 10) – November 2018;
 - Technical Advice Note 8: Renewable Energy (2005);
 - Technical Advice Note 15: Development and Flood Risk (2004);
 - Neath Port Talbot County Borough Council Local Development Plan (2016);
 - Bridgend County Borough Council Local Development Plan (2013) and replacement LDP (2018-2033).
- 13.2.4. Table 13.1 lists other guidance and best practice documentation which has been considered as part of this assessment.

Table 13.1: Guidance and Best Practice

Topic	Source of Information
Natural Resource Wales (NRW)	PPG 1 Understanding your environmental responsibilities - good environmental practices
Pollution Prevention Guidelines (PPG's)*	GPP 2: Above ground oil storage tanks
	GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer
	GPP 5: Works and maintenance in or near water
	PPG 6: Working at construction and demolition sites
	GPP 8: Safe storage and disposal of used oil
	GPP 13: Vehicle washing and cleaning
	GPP 21: Polluting incident response planning
Construction Industry Research and Information Association (CIRIA)	CIRIA C692 Environmental Good Practice on site (third edition)
	CIRIA C697 The SuDS Manual
	CIRIA C532 Control of Water Pollution from Construction sites
	CIRIA C624 Development and Flood Risk – guidance for the construction industry
	CIRIA C648 Control of Water Pollution from Linear Construction Projects
	CIRIA C689 Culvert Design and Operation Guide
Other Guidelines	Scottish Renewables Joint Publication, (2015) Good Practice During Wind Farm Construction Version 3
	FCE, SNH, (2010), Floating Roads on Peat
	Scottish Renewables, Joint Publication (2012), Development of Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste

*A review plan for the PPGs is currently underway. The review will result in a replacement guidance series, Guidance for Pollution Prevention (GPPs). It is intended that the new series will provide environmental

Topic	Source of Information
	good practice guidance for the whole UK, and environmental regulatory guidance directly to Northern Ireland, Scotland and Wales ⁴⁶

Consultation

- 13.2.5. Throughout the EIA stage on-going consultation will be undertaken with relevant stakeholders, including NRW (statutory consultee function), to ensure that they consider that the layout and the approach to the EIA is considered acceptable.

13.3. Survey Work Undertaken

- 13.3.1. The following sub-sections summarise the desktop survey work that has been undertaken to inform the hydrological, hydrogeological and geological details which are subsequently presented in this scoping report.

Desk Based Study

- 13.3.2. A desk based study has been undertaken in order to establish the hydrology, hydrogeological and geological conditions underlying the area of the proposed development. A detailed review of documentation and data sources has been undertaken, as detailed in Table 13.2.

Table Error! No text of specified style in document..2:Baseline Information Sources

Topic	Sources of Information
Topography	1:25,000 Ordnance Survey Mapping 1:50,000 Ordnance Survey Mapping OS Landform Panorama digital terrain model (DTM) data OS Terrain 5 DTM
Designated Nature and Conservation sites	NRW Designated Sites (http://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/find-protected-areas-of-land-and-seas/designated-sites/?lang=en) [Accessed 06/10/2020]
Solid and Superficial Geology	1:50,000 Solid and Superficial Geology data provided by the British Geological Survey (BGS)
Soils and Peat	UK Soil Observatory Map Viewer (http://www.ukso.org/mapViewer.html) [Accessed 06/10/2020] Shapefiles supplied by NRW-EDT
Surface Water Hydrology	1:25,000 OS Raster Data 1:50,000 OS Raster Data OS VectorMap Local data
Flooding	NRW Long Term Flood Risk Map (https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en) [Accessed 07/10/2020]

⁴⁶ Net Regs (2020). *Guidance for Pollution Prevention (GPPs) - Full List*. [Online]. Available from: <http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/> [Accessed: 08/10/2020]

Topic	Sources of Information
Water Quality	NRW Water Watch Wales Map Gallery (http://waterwatchwales.naturalresourceswales.gov.uk/en/) [accessed 07/10/2020] NRW River Basin Management Plans (https://naturalresources.wales/evidence-and-data/research-and-reports/water-reports/river-basin-management-plans-published/?lang=en) [Accessed 07/10/2020]
Water Resources	1:50,000 OS Raster Data Neath Port Talbot County Borough Council and Bridgend County Borough Council PWS Data Request
Hydrogeology	1:625,000 Hydrogeology data provided by the British Geological Survey (http://mapapps2.bgs.ac.uk/geoindex/home.html) [Accessed 07/10/2020]

13.4. Baseline Results

- 13.4.1. Through the desk study the existing site conditions have been established and are outlined below.

Topography

- 13.4.2. The landscape of the proposed development is characterised by extensive coniferous forestry plantation. The proposed development is divided into two areas which are centred around the Bryn (northern) and Penhydd (southern) forest blocks.
- 13.4.3. The general topography of the northern proposed development area slopes to the north-west and south forming a plateau which runs roughly through the centre of the area with a topographic high point of 363 m Above Ordnance Datum (AOC). The slopes steepen in the northern area of the forestry block around Cwm yr Argoed. Elevations range between ~100 m AOD and 363 m AOD.
- 13.4.4. The topography in the southern proposed development area is more complex with a number of notable hill tops and gentle slopes. There are some steep incised valleys towards the site boundary, generally sloping to the south and west. A topographic high of 349 m AOD is reached at the southern site boundary. Elevations range from ~140 m AOD to 349 m AOD.

Designated Sites

- 13.4.5. Within a 3 km radius of the proposed development site boundary there are four designated areas. Three are designated as a Site of Special Scientific Interest (SSSI) and one as a Local Nature Reserve (LNR). The Bryn Tip LNR is located between the Bryn and Penhydd forestry blocks directly south of the northern proposed development area. Bryn Tip is designated as a nature reserve to protect its historic colliery spoil status and enhance the natural habitat which is home to a number of rare and protected species including deer.
- 13.4.6. Eglwys Nunydd Reservoir SSSI is located approximately 1.8 km to the south of the proposed site boundary and is designated for its large number of wintering waterfowl and passage migrants. Margam Moors SSSI is located approximately 3 km to the south- west of the proposed site boundary and is designated for Fen and marshy grassland mosaic with standing water and associated aquatic invertebrate assemblage. Cwm du Woodlands SSSI is located approximately 2.8 km to east of the site boundary and is designated for semi natural broadleaved woodland.

13.4.7. The three sites which are designated SSSI are either not hydrologically linked to the proposed development or their designations are not due to hydrological, hydrogeological and geological features. Margam Moors SSSI and Cwm du Woodlands SSSI are situated in different hydrological catchments to the proposed development and it is unlikely that there will be any direct impacts from a hydrological perspective as a result of construction or operation. It is possible that Eglwys Nunydd Reservoir SSSI is hydrologically linked to the proposed development, however, because the designation is for wintering wildfowl and passage migrants this will be assessed in the Ecology Section of the ES. The assessment on SSSI are therefore proposed to be scoped out of the hydrology, geology and hydrogeology EIA section. Bryn Tip LNR will also be included as part of the Ecology Section of the EIA and is therefore suggested it is also scoped out given the designation is not for hydrology.

Site Hydrology

- 13.4.8. The main hydrology feature within the immediate vicinity of the proposed development is the River Avan/Afon Afan which is just north of the proposed site boundary. A number of mapped watercourses are identified within the site boundary flowing into the River Avan/Afon Afan. The Ffrwd Wylt rises in an un-forested area between the Bryn and Penhydd forest blocks and flows east south-west, roughly following the site boundary of the southern forestry block. A number of mapped watercourses flow from both forestry blocks into the Ffrwd Wylt.
- 13.4.9. Some mapped watercourses flow due east and discharge to the Llynfi River to the east of the proposed site boundary. A number of mapped watercourses are incised into short steep valleys within the forestry and flow south-west into Afon Cynffig.
- 13.4.10. The Cwm Wernderi Reservoir is a small reservoir within the Bryn forestry block. It is outside of the site boundary but within the catchment of the proposed development. This reservoir is within the catchment of the Ffrwd Wylt.
- 13.4.11. The Eglwys Nunydd Reservoir approximately 1.8 km west of the site boundary could also be hydrologically connected, however more site investigation would be undertaken to confirm this.
- 13.4.12. A review of aerial photography shows extensive forestry works within the proposed site boundary and some evidence of the associated increased functional drainage of the land through the cutting of artificial drainage ditches and furrows, which ultimately feed into the watercourses named. Appropriate consideration of these features would be outlined within the EIA, including buffer distances.
- 13.4.13. Due to the proximity of proposed infrastructure to mapped watercourses and water bodies, further assessment will be required to determine the level of impact on water quality, flooding and potential pollution.

Flood Risk

- 13.4.14. A qualitative flood risk assessment has been undertaken where the risks of flooding have considered from all potential sources which are listed below and with reference to NRW's Flood Map⁴⁷. The assessment has considered the risk to the proposed development as well as the potential to increase flooding downstream that could be caused by the proposed development.
- 13.4.15. NRW is progressing a Natural Flood Management (NFM) pilot project in the Ffrwd Wylt catchment (northern part of Bryn forest block and southern part of Penhydd forest block) to take a holistic approach to catchment management, comprising interventions in the headwaters to slow the flow of water and

⁴⁷ NRW. (2018) *Long term flood risk*. [Online]. Available from <https://naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en> [Accessed 06/10/2020].

reduce flooding. The applicant would seek to complement the objectives of the pilot project through the infrastructure design of the wind farm.

Fluvial and Pluvial Flooding

- 13.4.16. A review of NRW's Flood Map indicates that the river Cwm Wernderi, within the proposed site boundary, has a medium (between 1 in 100 year event to a 1 in 30 year event) risk of flooding. This appears to be confined to the riparian zone of the channel. Within the proposed site boundary there is mainly a low (between 1 in a 1000 year event to 1 in a 100 year event) to medium risk of flooding from surface waters, but again, this is primarily confined to the riparian zones of watercourses and scattered across the site in topographic hollows.

Flooding from Reservoir Extents

- 13.4.17. The Cwm Wernderi watercourse within the site boundary and the Cwm Dyffryn watercourse which the Cwm Wernderi feeds into, are at risk of flooding from reservoirs. This does not extend beyond the functional flood plain.

Tidal Flood Sources

- 13.4.18. The proposed site boundary is approximately 3 km away from the nearest coast. However, given the topographical position of the proposed development it will not be affected by tidal flooding which will therefore be scoped out of the assessment.

Groundwater Flood Sources

- 13.4.19. Flooding can also result from high groundwater levels if the water table rises above the surface level. Groundwater flooding happens in response to a combination of already high groundwater levels (usually during mid- or late-winter) and intense or unusually lengthy storm events. Groundwater flooding is difficult to predict as it rarely follows a consistent pattern. The response time between rainfall and groundwater flooding is also relatively long.
- 13.4.20. Groundwater flooding is often associated with the shallow unconsolidated sedimentary aquifers that over lie non-aquifers. Such aquifers are susceptible to flooding as the storage capacity within these deposits is often limited and direct rainfall recharge can be relatively high, subsequently increasing the water levels within the groundwater. Further information on the superficial geology is provided in paragraph 13.4.29. This will be discussed and assessed as part of the ES.

Flooding from Artificial Drainage

- 13.4.21. There is evidence of artificial drainage associated with forestry works within the proposed site boundary. There is the potential that this could cause some localised flooding by increasing runoff rates to the watercourses that they drain to within the surrounding area.
- 13.4.22. Due to proximity of proposed infrastructure to mapped watercourses which have been determined as being at risk from fluvial and reservoir flooding, further assessment on the potential impacts will be required. As part of the site design infrastructure will be located as far as possible but a minimum of 50 m from mapped watercourses and waterbodies whilst taking into account other constraints.

Soils

- 13.4.23. The distribution of soils across the site boundary is dependent upon land use, geology, topography and hydrological regime of the area. Information on the site soils has been provided by the UKSO⁴⁸ and is presented below in Table 13.3 and a screenshot of the soils is presented in Figure 13.1.

⁴⁸ UKSO (2018). *UK Soil Observatory map viewer*. [Online]. Available from <http://www.ukso.org/mapViewer.html> [Accessed 08/10/2020]

Table 13.3: Summary of Soil Types

Generalised Soil Type	Parent material
Very acid loamy upland soils with a wet peaty surface (light pink)	Glacial Till
Freely draining acid loamy soils over rock (salmon pink)	Mudstone and Sandstone
Slowly permeable wet very acid upland soil, with a peaty surface (light green)	Glacial Till

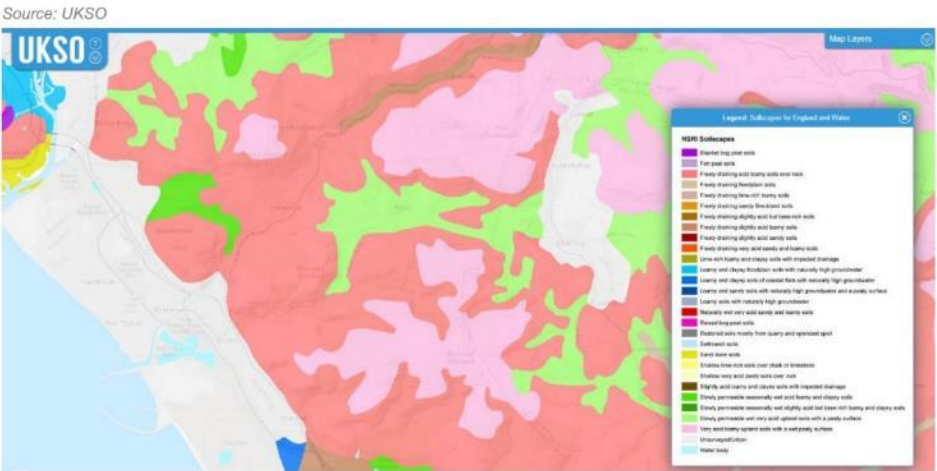


Figure 13.1: Screenshot of UKSO mapper showing soils underlying the site

- 13.4.24. The high-level information indicates that the dominate soil types are very acid/loamy soils with a wet peaty surface, freely draining acid loamy soils and slowly permeable wet very acid soils with a peaty surface. It is expected that the quality of the soils will be affected by the existing land use, including plantation forestry and artificial drainage ditches to dry the soils.
- 13.4.25. A phase 1 peat survey will be undertaken to inform potential site constraints. The phase 1 peat survey information will be used to inform the requirements for a more detailed phase 2 peat survey, together with Peat Management Plan and Peat Slide Risk Assessment.
- 13.4.26. Subject to forestry conditions and compliance with health and safety, a phase 1 peat survey shall consist of a 100 m gridded pass over all proposed infrastructure areas suggested to be underlain by peat or peaty soils. Following refinement/finalisation of the scheme layout and subject to outcomes of phase 1, detailed phase 2 probing over all proposed infrastructure areas underlain by peat or peaty soils would be proposed consisting of the following:
- 50 m gridded points for borrow pits and compounds/substations;
 - 50 m spacing along centreline, with 10 m offsets along all new track sections;
 - Determination of specific widening sections of the existing access track, with the same method applied; and
 - 10 m spacing transects north-south and east-west out to 100 m for all turbine and met mast locations.

- 13.4.27. A peat core would be taken at turbine and infrastructure locations where peat exceeds 0.5 m depth. The core would be analysed for its physical properties - degree of decomposition using the Von Post scale⁴⁹.

Geology

- 13.4.28. According to the 1:50,000 scale British Geological Society (BGS) dataset, the proposed development is underlain by the geological units presented in Table 13.4.

Table 13.4: Solid and Superficial Geology

Element	Type	Comments
Rhondda Member: Sandstone.	Sedimentary	These sedimentary rocks are fluvial in origin. They are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the channels, floodplains and levees of a river or estuary (if in a coastal setting).
South Wales Middle Coal Measures Formation: Mudstone, Siltstone And Sandstone.	Sedimentary	These sedimentary rocks are fluvial, palustrine and shallow-marine in origin. They are detrital, forming deposits reflecting the channels, floodplains and deltas of a river in a coastal setting (with periodic inundation from the sea).
South Wales Middle Coal Measures Formation - Sandstone	Sedimentary	These sedimentary rocks are fluvial, palustrine and shallow-marine in origin. They are detrital, forming deposits reflecting the channels, floodplains and deltas of a river in a coastal setting (with periodic inundation from the sea).
Llynfi Member - Mudstone, Siltstone And Sandstone	Sedimentary	These sedimentary rocks are fluvial in origin. They are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the channels, floodplains and levees of a river or estuary (if in a coastal setting).
Brithdir Member - Sandstone.	Sedimentary	These sedimentary rocks are fluvial in origin. They are detrital, ranging from coarse- to fine-grained and form beds and lenses of deposits reflecting the channels, floodplains and levees of a river or estuary (if in a coastal setting).
Till	Superficial deposit	These sedimentary deposits are glacial in origin. They are detrital, created by the action of ice and meltwater, they can form a wide range of deposits and geomorphologies associated with glacial and inter-glacial periods during the Quaternary.
Peat	Superficial deposit	These sedimentary deposits are lacustrine and palustrine in origin. They comprise accumulated (and detrital) organic material, forming beds and lenses within lagoons, bogs and swamps. See Figure 13.2.

⁴⁹ The **von Post** humification test (**von Post classification** system) involves squeezing the **peat** and the material that is extruded between the fingers, examining the material, and classifying the soil as belonging to one of ten (H1–H10) humification or decomposition categories.

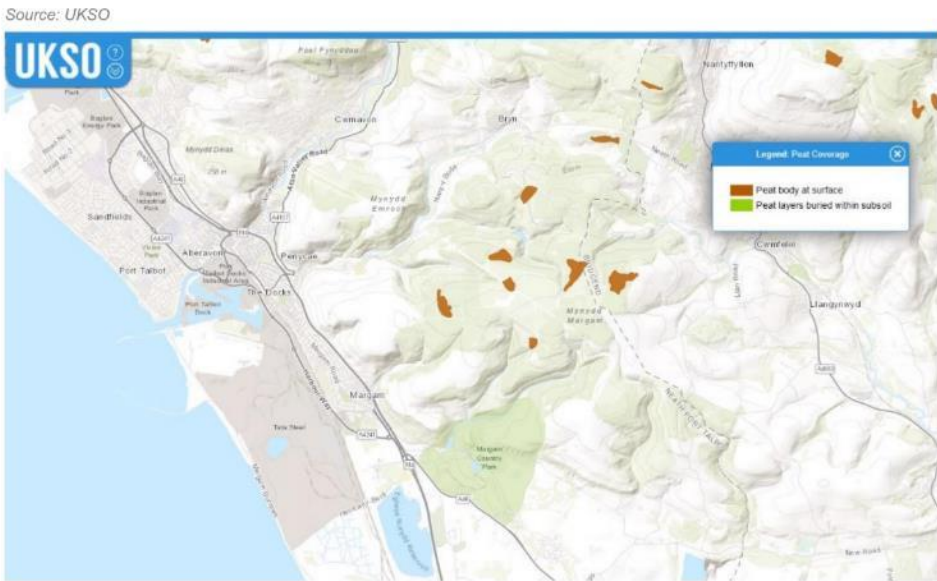


Figure 13.2: Screenshot of mapped peat deposits (UKSO)

- 13.4.29. The underlying solid geology comprises Brithdir Member - Sandstone Formation that covers the majority of the proposed site boundary, and both the South Wales Middle Coal Measures Formation and Llynfi Member Formation which underlays a section in the north. Superficial deposits of peat are well spread across the proposed site boundary but are not great in number, however till can be found on the edges of the Bryn forest block in the valley of Nant Cynon and Nant Drysiog watercourses, and the northern edge of the Penhydd Nant forest block in the valley of the Cwnfarteg watercourse.
- 13.4.30. It is noted that no specific geological feature of interest has been identified within the site boundary (excluding peat and soils which are discussed separately), as such, this can be scoped out of the assessment. Although having an understanding of the underlying bedrock and superficial geology is pivotal for the effectiveness of the construction design of the proposed development, specific mitigation to protect the geodiversity during construction, operation and decommissioning is not required. Knowledge of the local geology will be utilised in the assessment of groundwater dependent terrestrial ecosystems (GWDTEs).

Hydrogeology

- 13.4.31. Following review of the 1:625,000 scale BGS Hydrogeological Map⁵⁰ the majority of the site boundary is underlain by a moderately productive aquifer associated with the South Wales Upper Coal Measure Formation. The aquifer is a regional, cyclic multi-layered aquifer with moderate yields from sandstones and many springs, however mine water quality is poor. In the north, the site boundary is also underlain by a moderately productive aquifer but of the Pennine middle coal measures formation and South Wales Coal Measures Formation (undifferentiated) which exhibits the same characteristics as the South Wales Upper Coal Measure Formation.

⁵⁰ BGS (2018). *BGS hydrogeology 625K*. [Online]. Available from <http://www.bgs.ac.uk/products/hydrogeology/maps.html> (Last accessed: 08/10/2020)

- 13.4.32. At this stage, no assessment has been made on the groundwater dependency of the identified habitats located within the site boundary. A thorough review and inclusion of appropriate assessments will be included in the ES to determine the characteristics of the hydrogeological environment and its suitability to support GWDTEs. The ES will be prepared with cognisance of the habitats and NVC assessment completed as part of the Ecology assessment.

Water Resources

- 13.4.33. A data request was issued to the local authorities in September 2020 to determine the presence of any water abstractions for private water supply use using a 3 km buffer around the site boundary. Bridgend County Borough Council provided the coordinates for Private Water Supply (PWS) sources within 5 km of the Proposed Development. There is one PWS (ID 10) within the site boundary (emboldened in Table 13.5 below) and a further 20 PWS within 5 km of the site boundary.

Table 13.5 Private Water Sources

ID	Easting	Northing	Source Type	Activity Type
1	285116	189434	Borehole Water	Commercial
2	287800	192000	Spring Water	Shared Domestic
3	284500	188000	Spring Water	Shared Domestic
4	283789	190860	Spring Water	Shared Domestic
5	285200	189400	Borehole Water	Shared Domestic
6	284567	189251	Spring Water	Shared Domestic
7	284567	189239	Borehole Water	Domestic
8	283384	190166	Borehole Water	Domestic
9	283398	190198	Spring Water	Domestic
10	283168	190264	Spring Water	Domestic
11	284200	189000	Spring Water	Domestic
12	286600	191800	Spring Water	Domestic
13	285900	193500	Spring Water	Domestic
14	287500	191700	Spring Water	Domestic
15	284700	192500	Spring Water	Domestic
16	284700	192500	Borehole Water	Domestic
17	284600	188700	Spring Water	Domestic
18	285240	187659	Spring Water	Domestic
19	284799	189499	Spring Water / Borehole Water	Domestic
20	284600	188700	Spring Water / Borehole Water	Domestic
21	286543	188441	Spring Water /Borehole Water	Domestic

- 13.4.34. All identified PWS will be assessed for hydrological connectivity to the Proposed Development as part of the EIA.

13.4.35. At the time of writing a response has not yet been received from Neath Port Talbot County Borough Council therefore these PWS will also be assessed as part of the EIA.

Carbon Balance Assessment

13.4.36. A carbon balance assessment will be produced to give an indication of the proposed development's impact on the existing peat on site and to assess the potential effects in terms of carbon dioxide (CO₂) emissions against the total potential carbon savings attributed to the proposed development. The assessment will quantify the gains over the life of the proposed development against the release of CO₂ during construction, including loss of peat bog and construction of wind farm infrastructure. The latest version of the Scottish Government carbon calculator that is available will be used, which is currently 1.6.1.

13.5. Impact Assessment

Methodology

13.5.1. The greatest risk of affecting the hydrological, geological and hydrogeological environment will occur during the construction phase, with effects reduced during the operational and decommissioning phase. Taking this into account the EIA will address the following issues for all phases of development:

- Changes to existing drainage patterns.
- Effects on baseflow.
- Effects on run-off rates.
- Effects on erosion and sedimentation.
- Effects on groundwater levels.
- Effects on water resources.
- Effects on impediments to flow.
- Flood risk.
- Pollution risk.
- Effects on integrity of peat bodies.
- Effects on groundwater and surface water quality.

13.5.2. The EIA would involve the following

- Further detailed desk studies and further site visits to establish baseline conditions of the area and carry out detailed site investigations.
- Evaluation of the likely significant environmental effects of the Proposed Development and the impacts that these could have on the current site conditions.
- Demonstrating how the embedded good practice measures help to avoid and mitigate against any identified adverse effects resulting from the Proposed Development.
- Evaluation of the likely significant environmental effects with consideration of the potential embedded mitigation measures, taking account of the sensitivity of the baseline features, the potential magnitude of these effects and the probability of these effects occurring.
- The residual significance of the environmental effects following the consideration of additional mitigation measures, as well as further potential enhancement measures.

Effects Evaluation

13.5.3. The likely significant environmental effects will be defined by taking account of two main factors: the sensitivity of the receptor and the potential magnitude should that effect occur. The sensitivity of the

receptor i.e. its baseline quality as well as its ability to absorb the effect without perceptible change is defined in Table 13.6.

Table 13.6: Definition of sensitivity of the receptor

Sensitivity	Definition
High	National importance. Receptor with a high quality and rarity, local scale and limited potential for substitution/replacement or receptor with a medium quality and rarity, regional or national scale and limited potential for substitution / replacement.
Medium	Regional importance. Receptor with a medium quality and rarity, local scale and limited potential for substitution/replacement or receptor with a low quality and rarity, regional or national scale and limited potential for substitution / replacement.
Low	Local importance. Receptor with a low quality and rarity, local scale. Environmental equilibrium is stable and is resilient to changes that are greater than natural fluctuations, without detriment to its present character.

13.5.4. The magnitude of impact includes the timing, scale, size and duration of the likely significant environmental effects. For the EIA the assessment the magnitude of impact criteria would be defined in Table 13.7 below.

Table 13.7: Magnitude of impact

Magnitude	Criteria	Definition
High	Total loss of or major/substantial alteration to key elements/features of the baseline (pre-development) conditions such that the post development character/composition/attributes will be fundamentally changed.	Fundamental (long term or permanent) changes to geology, hydrology, water quality and hydrogeology.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of the baseline will be materially changed.	Material but non-fundamental and short to medium term changes to the geology, hydrology, water quality and hydrogeology.
Low	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.	Detectable but non-material and transitory changes to the geology, hydrology, water quality and hydrogeology.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.	No perceptible changes to the geology, hydrology, water quality and hydrogeology.

13.5.5. The sensitivity of the receiving environment together with the magnitude of the effect (assuming the successful implementation of industry good practice and design mitigation measures) is then combined to define the significance of the effect, as per Table 5.2. Those residual adverse effects indicated as **Major and Major/Moderate** will be regarded as being **significant** effects. However, other factors may have to be considered including the duration and the reversibility of the effect. It should also be noted, that in most cases the assessment considers only the adverse effects, where positive effects are identified these will be also be discussed.

Good Practice Mitigation

- 13.5.6. The design of the Y Bryn Wind Farm development will avoid known impacts on hydrological receptors as far as possible (embedded mitigation). Mitigation will be developed in line with the Good Practice During Wind Farm Construction Guide⁵¹.
- 13.5.7. Throughout the EIA process and following survey work and feedback from the consultation process it may be that the layout presented here in the Scoping Report further develops.
- 13.5.8. Refer to Section 8 for further general information about embedded mitigation.

Mitigation by Design

- 13.5.9. A series of buffer distances will be adopted to help reduce effects of the Y Bryn Wind Farm on the hydrological environment. A 50 m buffer will be implemented for all identified mapped hydrological features. Infrastructure will be located outside this buffer except where access necessitates.
- 13.5.10. Watercourse crossings associated with any new access track will be minimised as far as practicable.
- 13.5.11. As part of the EIA site investigations will take place and if required a peat slide risk assessment (PSRA) will be produced to make sure the wind farm is designed to avoid areas of high risk. Alongside the PSRA, a peat management plan (PMP) will be also be produced if required, demonstrating how impact on peat will be minimised and means of reusing peat through reinstatement and restoration methods.
- 13.5.12. Mitigation will follow the well-established principles of industry good practice so as to prevent or minimise effects on the surface and groundwater environment. The following good practice principles will be included as part of the embedded mitigation:
- Drainage – all runoff derived from works associated with the proposed development will not be allowed to directly enter the identified natural drainage network. All runoff will be adequately treated via a suitably designed drainage scheme with appropriate sediment and pollution management measures. The proposed development is situated in an area of commercial forestry and it is imperative that the drainage infrastructure is designed to maintain the existing hydrological regime and meet the required design standards.
 - Storage – all soil/peat stockpiles as well as equipment, materials and chemicals will be stored well away from any watercourses. Chemical, fuel and oil stores will be sited on impervious bases with a secured bund.
 - Vehicles and Refuelling – standing machinery will have drip trays placed underneath to prevent oil and fuel leaks causing pollution. Where practicable, refuelling of vehicles and machinery will be carried out in designated areas, on an impermeable surface, and well away from any watercourses identified from the 1:10k OS mapping.
 - Maintenance – only emergency maintenance to construction plant will be carried out in designated areas, on an impermeable surface well away from any watercourse or drainage feature, unless vehicles have broken down necessitating maintenance at the point of breakdown, where special precautions will be taken.
 - Welfare Facilities – on-site welfare facilities will be adequately designed and maintained to ensure all sewage is disposed of appropriately. This may take the form of a soakaway or tankering with off-site disposal depending on the suitability of the site for a soakaway and only with prior agreement with NRW/Local Planning Authority.

⁵¹ SNH and Scottish Renewables Joint Publication, (2019) Good Practice During Wind Farm Construction Version 4;

- Cement and Concrete – fresh concrete and cement are very alkaline and corrosive and can be lethal to aquatic life. The use of wet concrete in and around watercourses will be preferentially avoided however if necessary it will be carefully controlled.
 - Monitoring Plan – all activities undertaken as part of the proposed development will be monitored throughout the construction phase. Such monitoring will be to ensure environmental compliance.
 - Contingency Plans – plans will ensure that emergency equipment is available on site i.e. spill kits and absorbent materials, advice on action to be taken and who should be informed in the event of a pollution incident.
 - Training – All relevant staff personnel will be trained in both normal operating and emergency procedures, and will be made aware of any highly sensitive areas on site.
- 13.5.13. Further details on specific mitigation requirements will be provided within the ES chapter, technical appendices and a site specific outline Construction Environmental Management Plan (CEMP). It should be acknowledged that some mitigation measures included in the chapter or CEMP would be outline in certain elements of detail, due to the requirement of detailed engineering design which will not be available at the stage of the application, but nonetheless, will be guided by good practice and legislation.
- 13.5.14. Based on the findings of the baseline study and whether the significance of any impact on receptors can be quantified Table 13.8 identifies what is proposed to be scoped in and out of the assessment.

Table 13.8: Proposed Scoping Topics

Baseline	Scope In or out	Reason
Designated Sites	Scope Out	The designated sites (SSSI/LNR) are either located so it is unlikely that there will be any direct impacts from a hydrological perspective as a result of construction or operation or their designation is not related to hydrology and will therefore be assessed as part of the Ecology Section of the EIA.
Site Hydrology	Scope In	There are a number of watercourses and water features hydrologically connected to the proposed development including the Cwnwmerderi Reservoir and potentially the Eglwys Nunydd Reservoir An appropriate level of assessment will need to be considered to understand the potential impacts of the development on water quality, flood risk and potential pollution.
Flood Risk	Scope In	Whilst a desk based assessment has been provided above, further assessment will be required due to the mapped water features in the proximity to proposed infrastructure.
Peat and Soils	Scope In	The initial desktop study identifies areas of peat soils which is to be supported by a phase 1 peat survey. Further assessment may be required to inform a carbon balance assessment, peat management plan and peat slide risk assessment, if required. Information on peat and soils will also be utilised for production of a GWDTE assessment.
Geology	Scope Out	No specific mitigations to protect geodiversity are required. Review of the local geology information will be considered for the GWDTE assessment.
Hydrogeology	Scope In	Assessment will be required to confirm the presence of GWTDE on site based habitat, soils and hydrogeological information for the moderately productive aquifer.
Water Resource	Scope In	PWS are identified within the surrounding area and further assessment will be required to confirm supply details and mitigation requirements

Baseline	Scope in or out	Reason
Carbon Balance	Scope In	Initial desk top study and site visits indicate the presence of peat on site, and although careful siting of infrastructure will minimise the impact on peat, the use of the NatureScot carbon calculator tool will assess the carbon impact of the proposed development.

Question 20: Are consultees in agreement with the methodologies proposed and the topics to be scoped out?

Question 21: Do consultees see value to any particular mitigation and/or enhancement measures for any local or regional receptors, whether referred to above or otherwise?

14. Cultural Heritage

14.1. Introduction

- 14.1.1. This section presents the proposed scope of work for the Cultural Heritage Assessment for Y Bryn Wind Farm and has been prepared by Headland Archaeology (UK) Ltd. The purpose of the assessment is to identify the potential effects of the proposed development on the historic environment and cultural significance of the area in which the development is located. The heritage impact assessment will follow policy and best practice guidance in order to establish a robust and transparent analysis of the issues. The approach adopted will follow a standard staged process consisting of baseline survey to identify known and potential historic assets, design iteration to minimise likely impacts on the historic environment, comparative analysis to determine which historic assets might be affected by the proposed development, field survey and analysis to establish the heritage significance of important affected assets, characterising the nature and magnitude of impacts, design of mitigation measures, and an assessment of the residual effect on the historic environment.
- 14.1.2. It is important to note that, although any effects on the significance of historic assets due to change in their setting are likely to be visual in nature, the assessment of these visual effects is distinct from the assessment of visual change in the LVIA. The assessment of effects on setting may be informed by visualisations prepared as part of the LVIA but the conclusions reached regarding visual change in the setting of a heritage asset are distinct.

14.2. Environmental Baseline and Potential Sources of Impact

Baseline Conditions

- 14.2.1. The baseline used for this scoping section has been compiled using existing data on the historic environment available online from Royal Commission on Ancient and Historic Monuments Wales (RCAHMW) via the Coflein website⁵², and data obtained from the Gwynedd Archaeological Trust (GAT) Historic Environment Record (HER), and designations data available as GIS datasets from the Lle Geo-Portal for Wales⁵³ with the exception of records for Historic Parks and Gardens which were supplied directly by Cadw in a dataset dated July 2017. This dataset was due to be transferred to a Statutory Register of Historic Parks and Gardens in Wales in late 2020.

⁵² Available online from: <https://coflein.gov.uk/> (last accessed 12.11.2020)

⁵³ Available online from: <http://lle.gov.wales/home> (last accessed 12.11.2020)

- 14.2.2. The proposed wind farm site is within the Registered Landscape of Special Historic Interest known as Margam Mountain. There are six Scheduled Monuments within the wind farm site boundary (Figure 14.1) – one post-medieval industrial site (Caer Mynydd Ventilation Furnace and Mine), two prehistoric religious, ritual and funerary sites, and three prehistoric defensive enclosures, in addition the prehistoric enclosure known as “Roman Camp” (GM058) and Y Bwlwarcu hillfort (GM059) border the wind farm site. There are also 89 non-designated historic assets recorded by the HER within the site boundary (Figure 14.1). The HER also includes six duplications of designated assets (Scheduled Monuments) within the site boundary. A study of the Coflein website has identified at least 21 undesignated heritage assets recorded within the site boundary. The majority of these non-designated assets are post-medieval features identified from historic mapping or as upstanding features, but they also include two Bronze Age barrows, a Bronze Age cairn, an Iron Age enclosure and five medieval sites which survive as earthworks. A similar mix of monument types is recorded within 1km of the site boundary (Figure 14.3).
- 14.2.3. There are a further 50 Scheduled Monuments and another Landscape of Special Historic Interest within 5 km of the site boundary. There are also eight Grade I Listed Buildings, 25 Grade II* Listed Buildings, 168 Grade II Listed Buildings, three Conservation Areas and two Registered Parks and Gardens within 5 km of the site boundary (Figure 14.4). Between 5 and 10 km from the site boundary there are 52 Scheduled Monuments, and four Grade I and 30 Grade II* Listed Buildings (Figure 14.5).

Potential Sources of Impact

- 14.2.4. Effects on the historic environment can arise through direct physical impacts, impacts on setting or indirect impacts:
- Direct physical impacts describe those development activities that directly cause damage to the fabric of a heritage asset. Typically, these activities are related to construction works and will only occur within the site of the asset.
 - An impact on the setting of a heritage asset occurs when the presence of a development changes the surroundings of a heritage asset in such a way that it affects (positively or negatively) the heritage significance of that asset. Visual impacts are most commonly encountered but other environmental factors such as noise, light or air quality can be relevant in some cases. Impacts may be encountered at all stages in the life cycle of a development from construction to decommissioning but they are only likely to lead to significant effects during the prolonged period which is the operational life of the development.
 - Indirect impacts describe secondary processes, triggered by the development, that lead to the degradation or preservation of heritage assets. For example, changes to hydrology may affect archaeological preservation; or changes to the setting of a building may affect the viability of its current use and thus lead to dereliction.
- 14.2.5. Decommissioning should not result in further damage to historic assets as the ground disturbance would already have occurred during the construction phase, and therefore is scoped out of the assessment.
- 14.2.6. Cultural heritage constraint areas will, where necessary, be defined to include an appropriate buffer around known historic assets. Constraint areas can be treated as a ‘trigger’ for the identification of potential direct effects: they represent areas within which works may lead to direct effects of more than negligible significance on known historic assets.
- 14.2.7. Potential effects on unknown historic assets will be discussed in terms of the risk that a significant effect could occur. The level of risk depends on the level of archaeological potential combined with the nature and scale of disturbance associated with construction activities and may vary between high and negligible for different elements or activities associated with a development, or for the development as a whole.

- 14.2.8. Potential effects on the settings of historic assets will be identified from an initial desk-based appraisal of data from Cadw, RCHAMW and the HER and consideration of current maps and aerial images available. Where this initial appraisal identifies the potential for a significant effect, the asset will be visited to define baseline conditions and identify key viewpoints. Visualisations will be prepared (by the LVIA consultants) to illustrate changes to key views, where potentially significant effects are identified.
- 14.2.9. Where potentially significant effects are identified, mitigation measures will be proposed. The preferred mitigation option is always to avoid or reduce effects through design, or through precautionary measures such as fencing off heritage assets during construction works. Effects which cannot be eliminated in these ways would lead to residual effects.
- 14.2.10. Adverse effects resulting from physical harm to historic assets may be mitigated by an appropriate level of survey, excavation, recording, analysis and publication of the results, in accordance with a written scheme of investigation agreed with Gwent Glamorgan Archaeological Trust (GGAT). Archaeological investigation can have a beneficial effect of increasing knowledge and understanding of an asset, thereby enhancing its archaeological and historical interest and offsetting adverse effects. Adverse effects resulting from visual change within the setting of historic assets can generally only be mitigated through changes to the design and layout of the proposed development, but can be off-set through more general enhancement measures (though this will not reduce the overall level of impact).

14.3. Methodology

- 14.3.1. The assessment will be carried out with reference to the following legislation, policy and guidance:
- The Historic Environment (Wales) Act 2016 as the primary statutory tool for protecting historic assets and sustainable management of the historic environment in Wales⁵⁴
 - Planning Policy Wales Edition 10, December 2018 (PPW)⁵⁵,
 - Technical Advice Note 24: The Historic Environment (May 2017)⁵⁶,
 - Cadw guidance documents: Heritage Impact Assessment in Wales (May 2017)⁵⁷ and the Setting of Historic Assets in Wales (2017)⁵⁸,
 - Cadw's Conservation Principles (March 2011)⁵⁹,
 - Natural Resources Wales (NRW) Guide to using the Register of Landscapes of Historic Interest⁶⁰

⁵⁴ Available online from: <https://www.legislation.gov.uk/anaw/2016/4/contents> (last accessed 12.11.2020)

⁵⁵ Available online from: <https://gov.wales/planning-policy-wales> (last accessed 12.11.2020)

⁵⁶ Available online from: <https://gov.wales/technical-advice-note-tan-24-historic-environment> (last accessed 12.11.2020)

⁵⁷ Available online from: <https://cadw.gov.wales/sites/default/files/2019-05/20170531Heritage%20Impact%20Assessment%20in%20Wales%2026917%20EN.pdf> (last accessed 12.11.2020)

⁵⁸ Available online from: <https://cadw.gov.wales/sites/default/files/2019-05/Setting%20of%20Historic%20Assets%20in%20Wales%20EN.pdf> (last accessed 12.11.2020)

⁵⁹ Available online from: https://cadw.gov.wales/sites/default/files/2019-05/Conservation_Principles%20for%20the%20sustainable%20managment%20of%20the%20historic%20environment%20of%20Wales.pdf (last accessed 12.11.2020)

⁶⁰ Available online from: https://cadw.gov.wales/sites/default/files/2019-05/LandscapesRegisterGoodPractice_EN_0.pdf (last accessed 12.11.2020)

- Standard and Guidance for Historic Environment Desk-Based Assessment (Chartered Institute for Archaeologists (CIfA 2020)⁶¹,
 - Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment (CIfA 2020)⁶²,
 - Gwent Glamorgan Archaeological Trust (GGAT) standards and guidance for archaeological work⁶³.
- 14.3.2. The consultees below will be approached for information to inform the EIA. These consultees may also be contacted by PINS regarding the scope of the EIA:
- Cadw,
 - GGAT,
 - Neath Port Talbot County Borough Council's Conservation Officer,
 - Bridgend County Borough Council's Conservation Officer; and
 - Local archaeological interest groups (as appropriate).

Baseline Desk Study

- 14.3.3. It is proposed that the cultural heritage assessment will employ two overlapping study areas. The Inner Study Area (ISA) will comprise the proposed site boundary and a 2 km buffer from the outer edge of the site boundary. The ISA will allow the development of the local historic environment to be understood in detail, to enable an assessment of the significance of known assets, and to identify the potential for currently unknown assets to occur, within the boundary of the proposed development. The Outer Study Area (OSA) will extend to at least 20 km from the site boundary, which is taken as the maximum extent of potentially significant effects on the settings of heritage assets. Within the OSA, assets will be included in the assessment based on the level of importance assigned to the asset (defined in the EIA Methodology), to ensure that all significant effects are recognised:
- Up to 2 km from site: minimum Grade II Listed Buildings, and any undesignated asset of local importance which has a wider landscape setting that contributes substantially to its cultural significance,
 - Up to 5 km from site: minimum Grade II Listed Buildings, Conservation Areas, Historic Landscapes, Historic Parks and Gardens and undesignated assets of recognised regional importance,
 - Up to 10 km from site: World Heritage Sites, Grade I and II* Listed Buildings, Scheduled Monuments and undesignated assets of national importance,
 - Up to at least 20 km from site: any asset which is considered exceptionally important, and where long-distance views from or towards the asset are thought to be particularly sensitive, in the opinion of the assessor or consultees. Beyond 10 km, the baseline will be screened (and agreed with consultees) in order to identify any assets of particular sensitivity or importance.
- 14.3.4. The distribution of known archaeology in the surrounding area indicates that previously unidentified archaeological remains are most likely to be found on gentle slopes, sheltered fertile land and/or close to

⁶¹ Available online from: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf (last accessed 12.11.2020)

⁶² Available online from: https://www.archaeologists.net/sites/default/files/CIfAS%26GCommissioning_2.pdf (last accessed 12.11.2020))

⁶³ Available online from: www.ggat.org.uk (last accessed 12.11.2020)

the principal watercourses. At present, the entire ISA is considered to be of Low to Medium archaeological potential, although this may change during the assessment process.

- 14.3.5. The baseline of the assessment will be informed by a full desk-based assessment. The following sources will be consulted in preparing this assessment:
- Listed building data from Cadw;
 - Descriptions of designated historic assets and assets recorded in the Glamorgan Gwent Archaeological Trust Historic Environment Record (GGATHER) and the National Monuments Record Wales (NMRW), viewed on the Historic Wales website (<http://historicwales.gov.uk>);
 - Archaeological records held by GGAT HER;
 - Conservation area details from Neath Port Talbot County Borough Council and Bridgend County Borough Council;
 - Natural Resources Wales (NRW) Lidar data;
 - LANDMAP datasets;
 - Maps and plans held in the Glamorgan Gwent Archives (subject to any access restrictions posed by Covid-19);
 - Relevant internet sources including National Library of Wales,
 - Aerial photos held by the Central Register for Aerial Photography Wales (CRAPW) and the RCAHMMW;
 - Readily available published sources and unpublished archaeological reports.
- 14.3.6. A walkover survey will be undertaken to confirm the presence and condition of known features within the ISA once the layout has progressed and likely infrastructure locations have been identified.
- 14.3.7. A stage 1 setting assessment following Cadw guidance will be carried out for all historic assets within the ISA, and on Designated Historic Assets (DHAs) within the OSA. This will identify those assets for which the proposed wind farm may result in potentially harmful changes within their setting and will inform the scope of the detailed assessment of setting which will be included within the EIA.
- 14.3.8. Intangible cultural heritage for the combined study areas would also be considered at this stage, to include for example potential artistic or literary associations, sacred space, or local traditions and customs.

Baseline Field Study and Virtual Modelling

- 14.3.9. A site inspection will be carried out of those areas of the wind farm that are not under forestry, targeting the proposed turbine locations and internal access and cabling routes with a 100 m buffer to allow for micrositeing to establish the condition of historic assets and identify the potential for the existence of additional assets not currently identified. It will also identify the contemporary existing environment (including historic and modern developments, and land-use including operational wind farms and single turbines, commercial forestry, as well as other infrastructure and major developments such as the motorway, steelworks and high-voltage overhead powerlines) to help understand the setting of historic assets and the degree of change that the proposed development might introduce.
- 14.3.10. To assist with the impact assessment a staged approach will be undertaken. Field inspections will be made after a filtering exercise to identify those historic assets that would not experience visual change, and that can therefore be scoped out. This would be achieved by comparison of mapped historic assets against the Zone of Theoretical Visibility (ZTV) data and aerial imagery. For those assets which show a potential change to their setting by the development being visible, further analysis would be undertaken to assess the level of impact. The ZTV mapping uses a bare earth model and even when it suggests

potential visibility of the proposed development from historic assets, intervening vegetation and structures might screen views, which will be confirmed through field inspections.

- 14.3.11. A fully navigable 3D model, incorporating terrain data; aerial and OS imagery; tree location and height data; building location, shape and height data; and wind turbine (including cumulative) location and dimension information has been procured by the applicant and will be utilised to assist in the design and assessment of the proposed wind farm development.

Assessment of Heritage Significance

- 14.3.12. Analysis of the historic assets and historic mapping will allow synthesis and interpretation of the historic development of the site and enable the heritage significance to be established in accordance with Cadw's Heritage Impact Assessment in Wales (section 4.2) and Conservation Principles for the sustainable management of the historic environment in Wales. This analysis will also establish what comprises the setting for the historic assets, and what elements of that setting contribute to how the asset is experienced, understood and appreciated. Assessment of the heritage significance (sensitivity) of the asset would use the criteria in the following table (the Registered Landscape of Special Historic Interest (HLW) is not included as this has a specific assessment methodology and scoring mechanism that needs to be applied (Assessment of the Significance of Development on Historic Landscape (ASIDOHL2)), so is itemised separately below).

Table 14.1: Levels of heritage significance

Importance of the asset	Criteria
Very high	World Heritage Sites and other assets of equal international importance
High	Grade I and II* Registered Parks and Gardens, Scheduled Monuments, Protected Wreck Sites, Registered Battlefields, Grade I and II* Listed Buildings, and undesignated historic assets of equal importance
Medium	Conservation Areas, Grade II Registered Parks and Gardens, Grade II Listed Buildings, historic assets on local lists and undesignated assets of equal importance
Low	Undesignated historic assets of lesser importance
Negligible	Negligible or no heritage significance
Unknown	Further information is required to assess the potential of these sites

Source: Headland Archaeology

Initial Input to Design Iteration and Mitigation

- 14.3.13. Analysis of Geographic Information System (GIS) layered data about the historic environment (DHAs, non-designated historic assets in GAT and RCHAMW datasets) will be used to identify historic assets that may be affected by the proposed development. This information will be provided to the design team to assist with avoiding or minimising both direct and indirect effects on historic assets. Where potential adverse impacts on cultural heritage are identified, measures to prevent, reduce and/or where possible offset these impacts will be proposed.

Assessment of Potential Impacts

- 14.3.14. The proposed development would result in a change to the existing baseline, and change might be considered as impacts according to the degree of change in relation to heritage significance. In accordance with EIA regulations, the assessment would identify impacts and effects as direct or indirect, adverse or beneficial, and short-term, long-term or permanent. Direct impacts are those which physically

alter an asset and therefore its heritage significance; indirect impacts are those which affect the heritage significance of an asset by causing change within its setting. Application of Cadw's Managing: Setting of Historic Assets in Wales will require a four stage process in assessment of impacts:

- Stage 1: Identify the Historic Assets
- Stage 2: Define and Analyse the Setting
- Stage 3: Evaluate the Potential Impact of Change or Development
- Stage 4: Consider Options to Mitigate the Impact of a Proposed Change or Development

14.3.15. Magnitude of impact will be assessed with reference to the criteria set out in Table 14.2.

Table 14.2: Magnitude of impact

Magnitude of Impact	Guideline Criteria
High beneficial	Elements of the asset's physical fabric which would otherwise be lost, severely compromising its heritage significance, are preserved in situ; or Elements of the asset's setting, which were previously lost or unintelligible, are restored, greatly enhancing its heritage significance.
Medium beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to an appreciable but partial loss of heritage significance, are preserved in situ; or Elements of the asset's setting are considerably improved, appreciably enhancing its heritage significance; or Research and recording leads to a considerable enhancement to the archaeological or historical interest of the asset.
Low beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to a slight loss of heritage significance, are preserved in situ; or Elements of the asset's setting are improved, slightly enhancing its heritage significance; or Research and recording leads to a slight enhancement to the archaeological or historical interest of the asset.
Negligible	The asset's fabric and/or setting is changed in ways which do not beneficially or adversely affect its heritage significance.
Low adverse	Elements of the asset's fabric and/or setting which are of very limited relevance to its significance are lost or changed, resulting in a very slight loss of heritage significance; or Elements of the asset's fabric and/or setting which contribute to its heritage significance are minimally affected, resulting in a very slight loss of heritage significance.
Medium adverse	Elements of the asset's fabric and/or setting which contribute to its significance are affected, but to a limited extent, resulting in an appreciable but partial loss of the asset's heritage significance.
High adverse	Key elements of the asset's fabric and/or setting are lost or fundamentally altered, such that the asset's heritage significance is lost or severely compromised.

Source: Headland Archaeology

Assessment of Potential Effects

- 14.3.16. Following a design freeze the EIA will assess the potential direct effects for heritage assets from construction activities. Within the Outer Study Area assessment would be focussed on DHAs of the highest heritage significance (Table 14.1) that, following the filtering process, are considered to have potential for more than minimal visual change.
- 14.3.17. The assessment of effects will combine analysis of the data gathered during the DBA and site visit, photographs and wireframe visualisations of the topography and proposed development (produced by the LVIA consultants). Consideration will be given to assessing effects resulting from night time illumination following a review of the aviation lighting assessment and current baseline.
- 14.3.18. These assessments will be carried out using professional judgement, taking into account designations and heritage significance as assessed against national standards. Significance of effect will be based on a combination of heritage significance (in other disciplines sometimes referred to as sensitivity of the receptor) and magnitude of impact. The significance of effect matrix is presented in Table 14.3 and relates the heritage significance to the magnitude of impact (incorporating contribution from setting where relevant) to establish the likely significance of effect.
- 14.3.19. Effects of Major or Moderate significance are considered to be "significant effects"; those of Minor or Negligible significance are considered not to be significant, but will be described in the assessment. Where Table 14.3 provides two possible options for the significance of effect this will be a matter of professional judgement, taking into account the relative heritage significance of the asset, the magnitude of impact and the reversibility or otherwise of the impact.

Table 14.3: Significance of Effect

Magnitude of Impact	Heritage Significance				
	Very High	High	Medium	Low	
High beneficial	Major	Major	Major or Moderate	Moderate or Minor	Enhancement
Medium beneficial	Major	Major or Moderate	Moderate or minor	Minor	
Low beneficial	Major or moderate	Moderate or minor	Minor	Negligible	
Neutral/None	Neutral/nil	Neutral/nil	Neutral/nil	Neutral/nil	Neutral/nil
Low adverse	Major or moderate	Moderate or minor	Minor	Negligible	Harm
Medium adverse	Major	Major or moderate	Moderate or minor	Minor	
High adverse	Major	Major	Major or Moderate	Moderate or Minor	

Source: Headland Archaeology

ASIDOHL 2

- 14.3.20. The introduction of the wind farm within the Registered Landscape of Special Historic Interest (HLW) would have direct and indirect impacts on the historic landscape. Development within an HLW is not restricted, however the classification presents a further aspect of interest that would need to be assessed. A full Assessment of the Significance of the Development on the Historic Landscape (ASIDOHL2) would be required to complement any EIA and related planning submission, and ultimately the benefit that might

derive from the proposed development would be an essential element in determining whether the development would receive permission.

- 14.3.21. An ASIDOHL2 assessment will be completed following the design freeze. The process set out in Natural Resources Wales (NRW)'s "Guide to Good Practice on Using the Register of Landscapes of Historic Interest in the Planning and Development Process" (2007⁶⁴) will be followed.

Cumulative Effects

- 14.3.22. Cumulative effects on the significance of historic assets may occur where the wind farm results in an effect on the significance of a historic asset and other developments also have an effect on the same asset.
- 14.3.23. It is proposed that:
- turbines below 20 m in height be excluded from the assessment of cumulative effects;
 - single turbines between 20 m and 50 m in height within 5 km of Y Bryn Wind Farm are included;
 - single turbines over 50 m in height and all wind farms within 20 km be considered for cumulative effects; and
 - wind farms or single turbines beyond 20 km be excluded.
- 14.3.24. This is in order to focus the assessment on potentially significant cumulative interactions. It is not considered that domestic scale turbines (less than 50 m height to tip) beyond 5 km from the proposed development will have the potential to result in significant cumulative interactions.

14.4. Scope

- 14.4.1. It is not proposed that cultural heritage issues in general would be scoped out, but where for example the "bare earth" ZTV indicates no visibility of the development from a historic asset or from areas where the asset's significance can be appreciated, this would allow the asset to be scoped out early in the assessment process. All such instances where a historic asset is scoped out of further assessment will be clearly explained within the ES.
- 14.4.2. As noted above, decommissioning should not result in further damage as the ground disturbance would already have occurred during the construction phase, and therefore is scoped out of the assessment.
- 14.4.3. The EIA may include a high level overview of the proposed grid connection. At this stage, the proposed grid connection route and method of connection is unknown. However, it is proposed that operational phase effects on historic assets will be scoped out for the grid connection route if the proposal taken forward is for underground cable.

Question 22: Do consultees agree with the approach and scope of the Heritage assessment?

Question 23: Do consultees see value to any particular mitigation and/or enhancement measures for any local or regional heritage features, whether referred to above or otherwise?

⁶⁴Available online from: https://cadw.gov.wales/sites/default/files/2019-05/LandscapesRegisterGoodPractice_EN_0.pdf (last accessed 12.11.2020)

15. Traffic and Transport

15.1. Introduction

- 15.1.1. The objective of the Traffic and Transport Assessment is to assess the impact of the development of Y Bryn Wind Farm on the public road network, through an assessment of impact on existing traffic levels by means of a Traffic Impact Assessment (TIA). The assessment will be undertaken by Natural Power Consultants and Pell Frischmann.
- 15.1.2. At this stage, turbine component deliveries are anticipated to come from Swansea docks and along the M4 towards the site, however a number of options are currently being investigated for final site access.

15.2. Methodology and Scope

EIA - Traffic Impact Assessment Scope

- 15.2.1. An assessment of the traffic impact will be undertaken for the proposed development using the relevant project specific information. The methodology for the assessment would comply with all latest guidance, as relevant, including the Guidelines for the Environmental Assessment of Road Traffic (IEMA 1993) and Department for Transport (DfT) Guidance on Transport Assessment.
- 15.2.2. The methodology used for the assessment will be as follows:
- The geographic extent of the study will be confirmed in consultation with the relevant roads and highways authorities and will generally consist of the local road network where sensitive receptors are evident.
 - Baseline traffic data will be used to measure the impact on existing traffic levels, considering the increase in heavy goods vehicles (HGV's) and light goods vehicles (LGV's) during construction and operation for the proposed development which will be derived from detailed project information and professional judgement. Acquisition of traffic count data will be done either by use of the Department for Transport Traffic Count Database, consultation with the local roads authority or commissioning of traffic counts, depending on the level of existing information available.
 - The assessment of traffic against baseline data will determine the likely impact of project traffic against the criteria set out in Institute of Environmental Assessment (IEA) Guidance Notes No.1 and Department for Transport (DfT) guidance, as relevant. The guidance suggests that two rules can be used as a screening process to delimit the scale and extent of the assessment:
 - Rule 1 – Include highway links where traffic flows would increase by more than 30% (or the number of HGVs would increase by more than 30%)
 - Rule 2 – Include any other specifically sensitive areas where traffic flows would increase by 10% or more. (IEA Guidelines Paragraph 3.20 defines sensitive area as including "accident blackspots, conservation areas, hospitals, links with pedestrian flows etc.")

Where the predicted increase in traffic flow is lower than these thresholds, the significance of the effects can be stated to be low or insignificant, and further detailed assessments are not warranted. Where the predicted increase in traffic flow results in a high significance then further mitigation is required in order to minimise the potential impact.

It should be noted that these guidelines are intended for the environmental impact assessment of long-term impacts of road traffic associated with major new developments such as industrial estates and supermarkets. In terms of a wind farm development, this would be equivalent to the operational phase rather than the construction phase. The volume of traffic generated during the operational phase of a wind farm is considered negligible as during normal operation the wind farm would generally be unattended but with regular site visits to carry out routine inspections and preventative

maintenance. However, in the absence of other guidance, the IEA guidelines are used to assess the temporary transport flow during construction.

If any traffic impact criteria is exceeded, the assessment will recommend suitable mitigation measures. The assessment would consider:

- Delay effects on other road users (by consideration of percentage changes in traffic composition and volume),
 - Road Infrastructure (dilapidation)
 - Safety effects on other road users and adjacent properties, and
 - Safety effects on pedestrians and cyclists (e.g. on routes passing through towns).
- The study would consider effects during construction, operation and decommissioning.

AIL Route Survey Report

- 15.2.3. An assessment of potential delivery routes for Abnormal Indivisible Loads (AILs) will be carried out, including the production of swept path drawings for key points of interest, on OS base mapping or topographical survey data as deemed appropriate. The swept path assessments will identify areas of over-sail and over-run, street furniture modifications and indicative mitigation works, for both turbine blade and tower section components.
- 15.2.4. A full Electronic Service Delivery for Abnormal Loads (ESDAL) consultation with the trunk and local roads officers relating to structure issues with the proposed access routes would also be undertaken to identify any structural issues that may arise. Consideration will also be given to any site access junctions to ensure adequate design including visibility splays.
- 15.2.5. A Road User Safety Audit will be undertaken, if necessary.

Preliminary Traffic Management Plan

- 15.2.6. As part of the Traffic and Transport assessment, and in line with any pre-application requirements, a Preliminary Construction Traffic Management Plan will be produced for transport associated with site traffic (HGV's, LGV's etc), as well as a separate Preliminary Abnormal Indivisible Load (AIL) Traffic Management Plan for transport associated with wind turbine component deliveries. Both documents will be included as part of the planning submission. The Traffic Management Plans will generally outline the detail of the works and the associated traffic. It will include aspects such as the standard industry mitigation measures considered for impacts associated with the works, and typical traffic management measures employed for control of traffic on the public road to ensure there are no safety issues or impediments on the public highway.

EIA - Traffic and Transport Chapter

- 15.2.7. A Traffic and Transport EIA chapter will be produced as part of the EIA and include the following information:
- Traffic Impact Assessment;
 - AIL Route Survey Report(appended);
 - Preliminary AIL Traffic Management Plan (appended);
 - Preliminary Construction Traffic Management Plan (appended).

16. Noise

16.1. Introduction

- 16.1.1. This section of the scoping report summarises the proposed scope for the noise assessment for Y Bryn Wind Farm, undertaken by specialist noise consultants Hayes McKenzie Partnership Ltd.
- 16.1.2. Noise from an operating wind farm generally exhibits itself in two forms: aerodynamic and mechanical. The aerodynamic noise is broadband in nature and originates from the incoming air interacting with the moving blades. Given the rotational nature of the source, there can be a certain rhythmical nature, or modulation, to the broadband noise under certain circumstances. Whether the wind farm noise is audible, or distinguishable, to a nearby resident depends upon many factors, including: the receptor distance, the wind speed, the wind direction, and the nature of local background noise sources (e.g. noise from nearby trees blowing in the wind, noise from a nearby stream, or noise from local traffic flows) that may or may not help to mask the wind turbine noise. It is possible that mechanical noise from internal machinery can also be audible, depending upon the design of said machinery. Mechanical noise if present is generally tonal in nature, where discrete frequencies may be identified, but this depends upon the machine design in the first instance, and upon the nature of any background noise that may provide masking in particular frequency ranges.
- 16.1.3. Noise related to the construction phase of a wind farm may exhibit itself in many forms, depending upon the nature of the particular construction activity and plant. Typically there would be various stages (that may overlap) to the construction phase, e.g. works on borrow pits, construction and renovation of access tracks, hard standing area construction, turbine foundation excavation and concrete pouring, etc. Each of these operations may involve different machinery and so cause different levels of noise, but is generally, relatively speaking, short-term in nature, and likely to be limited to daytime working hours. Additional noise may also be generated from construction related traffic, for instance if there is a requirement for delivery of road stone or concrete.
- 16.1.4. It is proposed to assess operational noise from the proposed development using ETSU-R-97, and noise from the construction phase using BS 5228:2019.

16.2. Methodology

Operational Noise - General Approach

- 16.2.1. Operational noise from the proposed development will be assessed according to the noise criteria suggested by ETSU-R-97⁶⁵. The use of ETSU-R-97 to assess the potential noise impact of wind energy developments is recommended by TAN 8^{66, 67}, which is referred to by Planning Policy Wales⁶⁸ in regards

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

66 Technical Advice Note (TAN) 8: *Planning for Renewable Energy*, Welsh Assembly Government (July 2005).

67 TAN 8 states at Paragraph 2.16 of Annex C: “The report ‘The Assessment and Rating of Noise from Wind Farms’ (ETSU-R-97) describes a framework for the measurement of wind farm noise and gives indicative noise levels calculated to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding unduly to the costs and administrative burdens on wind farm developers of planning authorities. The report presents the findings of a cross-interest Noise Working Group and makes a series of recommendations that can be regarded as relevant guidance on good practice”.

68 *Planning Policy Wales*. Edition 10, December 2018. Welsh Government (2018).

large scale wind energy development. The methods outlined in the Institute of Acoustics Good Practice Guide⁶⁹ (GPG) will also be followed, as this gives further good practice guidance to the application of ETSU-R-97.

- 16.2.2. Y Bryn Wind Farm currently is proposed to have turbines with a tip height of up to 250 m. In terms of predicting potential noise from the development, source noise levels will be based upon a range of candidate turbine models that are currently available in the market of maximum tip height considered. A combined sound power level curve that encompasses the maximum noise levels of the various candidate turbine models will be modelled.

Cumulative Assessment and Daytime Noise Criterion

- 16.2.3. It is required for cumulative noise levels, from all wind farm developments combined, to meet the ETSU-R-97 noise criteria. The cumulative noise assessment will consider all other existing, proposed, or consented wind farm developments that are close enough to be relevant to the noise sensitive receptors neighbouring this proposal. When modelling the other wind farm developments, consideration will be given to the 'controlling property' and 'significant presented headroom' approaches outlined in the GPG. If it is possible and realistic, it will be assumed that the other wind farm developments are at their respective noise limits.
- 16.2.4. Table 16.1 below summarises other wind farm developments in the immediate area, detailing their approximate distance and generating capacity.

Table 16.1: Other wind farm developments

Wind Farm	Distance to nearest Y Bryn turbine (km)	County*	Status	Generating Capacity (MW)
Foel Trawsnant	0.2	NPT	Proposed ⁷⁰	33 MW
Mynydd Brombil	1.6	NPT	Operating	8 MW
Pen y Cymoedd	2.9	RCT/NPT	Operating	228 MW
Ffynnon Oer	4.1	NPT	Operating	32 MW
Llynfi Afan	4.4	NPT/BCC	Operating	24 MW
Melin Court	6.5	NPT	Approved	18 MW
Upper Ogmores	7.0	BCC	Proposed	25 MW
Newton Down	8.5	BCC	Operational	5 MW
Pant y Wal	11.9	BCC	Operational	25 MW
Pant y Wal Extension	10.9	BCC	Operational	20 MW
Pant y Wal Extension (Phase 2)	11.9	BCC	Proposed	5 MW
Fforch Nest 1/2	12.4	RCT/BCC	Operational	17.5/10 MW

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

70 Consent has been granted to a 13 turbine scheme at Foel Trawsnant, subject to a Section 106 agreement. A revised 11 turbine scheme (with greater tip height) has subsequently been proposed, for which it is understood the local authority have resolved to grant permission, subject to a Section 106 agreement.

Wind Farm	Distance to nearest Y Bryn turbine (km)	County*	Status	Generating Capacity (MW)
Maerdy	12.8	RCT	Operational	24 MW
Maesgwyn	13.5	NPT	Operational	26 MW
Maesgwyn Extension	13.2	NPT	Operational	10 MW

*Where: NPT: Neath Port Talbot County Borough Council, BCC: Bridgend County Borough Council, RCT: Rhondda Cynon Taf County Borough Council.

- 16.2.5. It is understood that there are no single wind turbine developments within 4 km of the site, that are either existing, or proposed/consented within the planning system, that would need consideration within the cumulative noise assessment.
- 16.2.6. It is proposed to include the following wind farms in the cumulative noise assessment:
- Foel Trawsnant;
 - Mynydd Brombil;
 - Pen y Cymoedd;
 - Ffynnon Oer;
 - Llynfi Afan;

Question 24: Do consultees agree with the proposed approach to cumulative noise and the list of other wind developments that are planned to be included in the cumulative noise assessment?

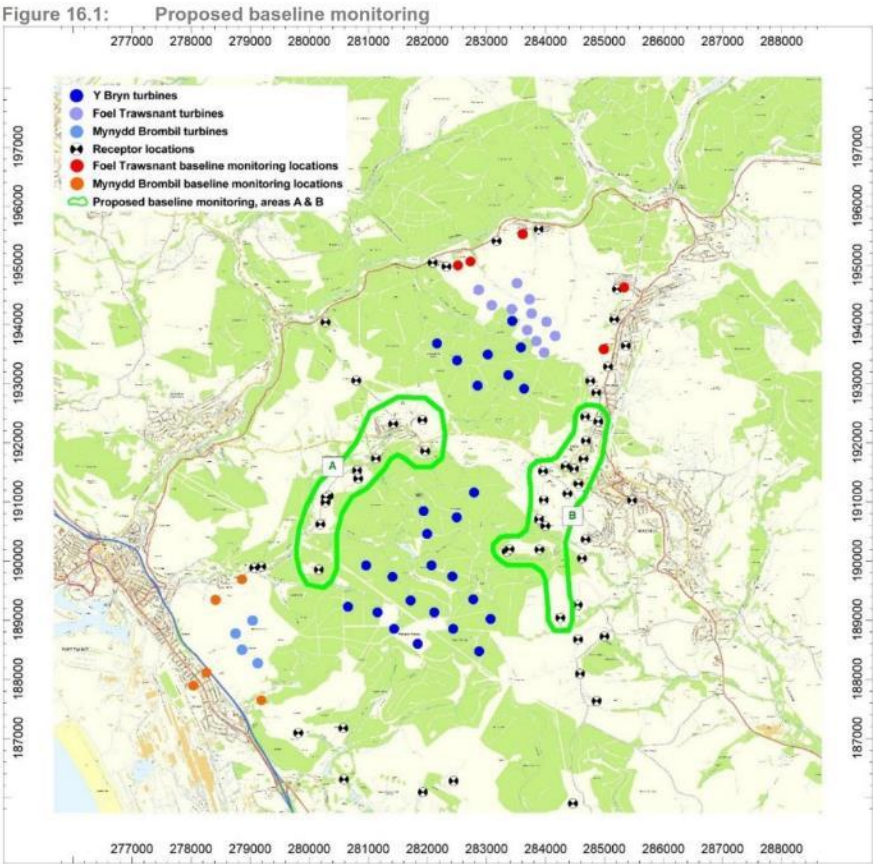
- 16.2.7. ETSU-R-97 suggests that daytime noise limits within the range of 35 – 40 dB LA90 offer a reasonable degree of protection to wind farm neighbours without placing unreasonable restrictions on wind farm development. The actual value chosen for the daytime limit should depend upon a number of factors, namely:
- The number of dwellings in the neighbourhood of the wind farm;
 - The effect of noise limits on the number of kilowatt/hour (kWh) generated; and
 - The duration and level of exposure.
- 16.2.8. Due consideration should be given to all three mentioned factors. Nevertheless, if just the second aspect is considered, the potential wind energy generating capacity of the Y Bryn development is estimated to be up to 171.6 MW. ETSU-R-97 suggests that the larger the development, the stronger the planning merit for a higher noise limit, e.g. "a single wind turbine causing noise levels of 40 dB at several nearby residences would have less planning merit than thirty wind turbines causing the same amount of noise at several nearby residences" (noting that in 1997 the largest machines considered by the Noise Working Group were only 450 kW). That is, the greater the generating capacity, the greater the positive aspects of the development to justify a higher noise limit, in a planning balance sense. For large significant wind farm developments (i.e. >50 MW), an overall noise condition daytime limit of 40 dB is usually imposed, for example as at Pen y Cymoedd, Clocaenog and Brechfa Forest West. Given the proposed Y Bryn development is estimated to be up to 171.6 MW and the additional planning merit inferred from the weight of more recent climate change and renewable energy related law and policy, including the Net Zero target, Hayes McKenzie consider a daytime noise limit at the upper value of 40 dB LA90 (or background + 5 dB) to be appropriate for non-financially involved properties. Any financially involved properties would be apt to receive a higher 45 dB LA90 limit.
- 16.2.9. Potential wind farm noise levels during night-time periods will be assessed against the ETSU-R-97 night-time criterion of 43 dB LA90 (or background + 5 dB). For dwellings where residents have a financial

involvement with the development, potential wind farm noise levels will be assessed against the ETSU-R-97 suggested criterion of 45 dB L_{A90} (or background + 5 dB).

Question 25: Do consultees agree it is appropriate to assess noise from the development, individually and cumulatively, against a daytime limit of 40 dB L_{A90} / Background + 5 dB and 45 dB L_{A90} for financially involved properties?

Baseline Monitoring Locations

- 16.2.10. Following the ETSU-R-97 approach, baseline background noise levels will be monitored at several potentially sensitive noise receptors neighbouring the proposed development.
- 16.2.11. Figure 16.1 details the areas of proposed baseline noise monitoring. Also highlighted on the figure are the background noise monitoring locations to the north, which were previously used for the Foel Trawsnant application. For the assessment of receptors to the north and north-east, it is intended to refer to these background noise measurements collected for Foel Trawsnant.
- 16.2.12. In a similar fashion, the background noise monitoring locations used for the Mynydd Brombil application are also highlighted. It is intended to use these background noise levels for the assessment of receptors to the south-west of the development.
- 16.2.13. It is intended, if possible, to undertake new background noise monitoring at several locations within areas A and B as highlighted on Figure 16.1. These are areas where preliminary noise predictions suggest cumulative wind farm noise levels may be approaching the ETSU-R-97 daytime limit range of 35-40 dB L_{A90}, and where background noise monitoring has not previously been undertaken.



Source: Hayes McKenzie

- 16.2.14. The methodology and final locations of background noise monitoring will be discussed and agreed with the local environmental health officers of NPT and BCC.

Question 26: Do consultees agree with the areas proposed for background noise monitoring?

Construction Noise

- 16.2.15. Noise associated with the construction and decommissioning stages of the proposed development will be undertaken according to the methods outlined by BS 5228⁷¹. This will be based upon noise levels of typical or intended construction plant, that would be considered likely for the anticipated various construction phases of the development. It is intended to assess noise from construction related traffic on nearby access routes according to the method outlined in Calculation of Road Traffic Noise⁷².

71 BS 5228-1:2009+A1:2014: Code of practice for noise and vibration control on construction and open sites, Part 1: Noise. (December 2008).

72 Department of Transport: Calculation of Road Traffic Noise. (1988).

Question 27 Do consultees agree with the proposed approach to assessing construction related noise from the proposed development?

Scope

- 16.2.16. The scope of the noise assessment will include an assessment of:
- Operational noise from the proposed development, including cumulative noise impacts from neighbouring wind farm developments;
 - Construction related noise from the construction and decommissioning phases of the proposed development, including noise from associated construction traffic.

17. Forestry

17.1. Introduction

- 17.1.1. This section has been prepared by ARC Woodlands Ltd and sets out the approach which would be used to integrate the proposed Y Bryn Wind Farm into the existing woodland structure.
- 17.1.2. The proposed development is within the afforested areas that lie between Port Talbot and Maesteg. These areas of forest are managed by NRW on behalf of the Welsh Ministers and the site boundary lies within the two NRW Forest Resource Plan areas of Margam and Afan⁷³. The forest areas can be characterised as upland dominated by conifer tree species, the most common of which is Sitka spruce (*Picea sitchensis*) (Figure 17.1). Other areas of broadleaved woodland exist within the site boundary as either plantation, Semi-natural or Ancient semi-natural type woodland. In addition, there are areas of permanent open ground around water courses and other features and open ground created through the felling programme of NRW.
- 17.1.3. The current Bryn site boundary includes only the freehold land belonging to NRW. In addition to the freehold land, there are areas within the existing NRW Forestry Resource Plans which are leased to Welsh Government and managed by NRW alongside the freehold land. As a result, the study area for the forestry assessment for Y Bryn will be extended to include these leasehold areas as shown in Figure 17.2.
- 17.1.4. The planted forests were established from the 1920's onwards⁷⁴ and many parts have been harvested and restocked. This has given rise to a range of ages of trees with open areas, young trees and mature trees all present. The forests are now in a production phase and felling and replanting is ongoing.
- 17.1.5. The forest area is actively managed on either a clear felling or a continuous cover system, with some areas being subject to minimum intervention practices. The management objectives of NRW include restructuring the forests to break up even aged crops, diversifying species, restoring open habitat and ancient woodland sites and providing recreation and community benefits including footpaths, cycle paths.
- 17.1.6. In the UK there is a strong presumption against permanent deforestation⁷⁵, unless it addresses other environmental concerns. The integration of the proposed development into the Forest Design Plan will be a key part of the development process. A wind farm felling plan would be prepared setting out the forestry felling and management requirements, including replanting associated with the construction and operation of the proposed development.

⁷³ <https://naturalresources.wales/about-us/what-we-do/welsh-government-woodland-estate/forest-resource-plans> [Accessed:22/09/2020]

⁷⁴ UK. Forestry Commission (1961) *Glamorgan Forests, Forestry Commission Guide*. London: Her Majesty's Stationery Office

⁷⁵ Available online from: <http://gov.wales/woodlands-wales-strategy> (last accessed 12.11.20)

17.2. Consultation

- 17.2.1. The main forestry consultee is NRW who manage and control the forest land within the site boundary. They are also the body that regulates tree felling and planting in Wales in both the Welsh Government woodland and private woodlands.
- 17.2.2. To integrate the tree felling needed by the proposed wind farm, the developer will consult with NRW throughout the development of the proposal so that the felling can meet the requirements of the Welsh Government's Woodland for Wales strategy⁷⁶, individual NRW Forest Resource Plans and NRW's long term objectives.
- 17.2.3. There may be comments raised by other consultees, including Neath Port Talbot and Bridgend County Borough Councils, regarding forestry and these will be detailed in the ES.

17.3. Legislation and Guidance

- 17.3.1. The forestry proposal will be prepared in accordance with the current industry best practice and guidance.
- 17.3.2. The United Kingdom Forestry Standard (Forestry Commission 2017)⁷⁷ is the standard used by all UK governments as a reference for sustainable forest management. The standard is supported by seven guidelines which can be used to demonstrate the appropriate management of forests and woodland in the UK to international and European criteria. National forestry policy in Wales is set out by the Welsh Government's Woodlands for Wales (Welsh Government, 2018) strategy. The strategy is supported by the Woodlands for Wales: action plan (Welsh Government, 2018⁷⁸) and the 7 main themed supporting documents-
- Biodiversity
 - Economic development and enterprise benefits
 - Education, learning and skills benefits
 - Extent nature and character
 - Health and well being
 - Landscape heritage and culture
 - Water and soils
 - Tree health strategy⁷⁹
- 17.3.3. NRW managed woodlands are certified through both the Forest Stewardship Council (FSC)⁸⁰ and the Programme for the Endorsement of Forest Certification (PEFC)⁸¹ sustainable forest management schemes. Any forest operations required by the development will adhere to the commitments made through these schemes to the UK Woodland Assurance Standard 4.0 (2018)⁸².
- Forestry Commission (2017). The UK Forestry Standard: The Government's Approach to Sustainable Forestry, Forestry Commission, Edinburgh.

⁷⁶ Available online from: <http://gov.wales/woodlands-wales-strategy> (last accessed 12.11.20)

⁷⁷ Available online from: <http://www.gov.uk/government/publications/the-uk-forestry-standard> (last accessed 12.11.20)

⁷⁸ Available online from: <https://gov.wales/woodlands-wales-action-plan> (last accessed 12.11.20)

⁷⁹ Available online from: <http://gov.wales/forestry> [Accessed: 10/09/2020 (last accessed 12.11.20)

⁸⁰ Available online from: <https://fsc-uk.org> (last accessed 12.11.20)

⁸¹ Available online from: <https://www.pefc.co.uk> (last accessed 12.11.20)

⁸² Available online from: <http://ukwas.org.uk> (last accessed 12.11.20)

- UKWAS (2012). The UK Woodland Assurance Standard Third Edition, UKWAS, Edinburgh.
- Woodlands for Wales – The Strategy for Woodlands and Trees. Welsh Government (2018). Welsh Woodland Strategy

17.3.4. In addition, the proposals will be developed in line with industry best practice and will refer to other guidance produced by NRW, along with relevant material from Forest Research, Forestry Scotland and Forestry England.

Question 28: Are consultees in agreement that this provides sufficient guidance for the forestry elements of this wind farm proposal?

17.4. Methodology

- 17.4.1. The forestry baseline will be prepared from site visits, aerial photography and the GIS datasets held by NRW at the time of the ES preparation. The GIS datasets used by NRW to produce the Forest Resource Plans are live datasets and up to date versions will be used up to design freeze stage. The baseline produced for the ES will include current species, age and the existing felling and restocking plans. The baseline used for this scoping section was sourced as a GIS datasets from the Lle Geo-Portal for Wales⁸³.
- 17.4.2. The ES will reflect on how the forests can rapidly change either through regular forest management activity dictated by landowner activities and market forces or through natural events like storm damage, pests and disease outbreaks. Forestry is therefore not considered likely to result in a significant effect. The ES chapter will describe the changes needed to incorporate the wind farm proposal into the forest areas rather than ascertaining levels of EIA significance. This will include changes to forest cover where felling is needed to incorporate roads or other infrastructure including turbine locations, and will describe the felling method (which is dependent on age of crop) and product (e.g. timber, brash etc.). The Forestry Chapter of the ES will also identify where replanting is possible once the development is completed. The effects of the forest felling and restocking will be assessed in other chapters of the ES including Ecology, Landscape, Hydrology, and Traffic and Transport.
- 17.4.3. The main source of potential change within the forest will be from the preparation of the site prior to the construction of turbines and infrastructure. This will be in the form of tree felling/clearance to create the space required for the development. Tree felling and clearance will be needed for turbine foundations and crane hardstandings, the upgrading and construction of new access tracks/roads, excavation of borrow pits, cable routes, drainage ditches, batters and the construction of control buildings/substation, met masts, compounds and laydown areas etc.
- 17.4.4. Further impact in the operational phase may arise from maintenance works to tree cover around infrastructure. Examples may include removing or cutting trees to maintain tree heights. During decommissioning it may be necessary to remove trees, which have regrown since construction, in order to access the infrastructure.

17.5. Cumulative Assessment

- 17.5.1. The changes to the forest resulting from the development are regarded as specific to the site boundary and it is proposed that there are no cumulative forestry issues to be addressed.

17.6. Mitigation

- 17.6.1. Mitigation of potential impacts will be embedded, where possible, in the design of the proposed wind farm; for example, by using existing forest infrastructure and avoiding sensitive areas such as Plantations on

⁸³ <http://lle.gov.wales/home> [Accessed:03/05/2020]

Ancient Woodland Sites (PAWS) within the study area. A keyholing approach will be used around the individual wind farm elements which will seek to limit the amount of felling required for each wind farm component. Assessment of the crops surrounding the component by age, existing felling data and wind firmness will indicate whether keyholing will be used or whether felling out to larger areas will be needed.

- 17.6.2. Some of the area felled will be available post construction for replanting which may be with alternative species or the areas may be retained for other purposes that benefit the overall aims of the Forest Resource Plan, for example an alternative open habitat or a change of woodland type. The Forest Resource Plans may need to be redesigned by NRW to incorporate these changes.
- 17.6.3. The "Woodlands for Wales" document presents the role that the Welsh Government expects new and existing woodlands to provide. The strategy highlights the "strong presumption" against permanent removal of woodlands except for the restoration of priority open habitats. The strategy goes on to explain that where forest or woodland area is lost to development it is assumed that the loss is offset by new compensatory planting.

Question 29: Are consultees in agreement with the proposed methodology and approach for forestry?

18. Socio-Economics

18.1. Introduction

- 18.1.1. The demonstration of socio-economic and community impacts has become a more prominent issue for the onshore wind sector in recent years. We therefore consider it an essential that this ES includes a socio-economic assessment to determine the benefits for the Welsh economy and benefits for local communities.
- 18.1.2. In terms of tourism effects, the review of literature evidence suggests that overall the research tends to support the premise that wind farm development has not resulted in a serious negative economic impact on tourism and could even have wider positive impacts. The most relevant and recent research on the economic impact of wind farms on tourism was published by the Welsh Government in February 2014⁸⁴. The research outlines a number of key findings which suggests that there is little evidence to suggest wind farms have had/or as having, a detrimental impacts on tourism across Wales. Furthermore, a more recent national tracker survey⁸⁵ outlined that support for renewable energy has been consistently high during the tracker with 79% expressing support for the use of renewables, whilst opposition to renewables was very low at 4%, with only 1% strongly opposed. It is intended therefore to **scope out** assessment of **tourism** from the EIA.

18.2. Methodology

- 18.2.1. We propose that the socio-economic assessment would be based upon 3 economic boundaries (local, regional and national economy) and will include the following:

⁸⁴ Welsh Government (2014) *Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector*, Available online from: https://gov.wales/sites/default/files/publications/2019-06/potential-economic-impact-of-wind-farms-on-welsh-tourism_0.pdf (last accessed 12.11.20)

⁸⁵ Energy and Climate Change Public Attitude Tracker, Wave 24, January 2018: Available online from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/678077/BEIS_Public_Attitudes_Tracker_-_Wave_24_Summary_Report.pdf (Last accessed 12.11.20)

- assess the existing economic environment (baseline) using official data on population, industrial structure, unemployment and economic activity levels, income and earnings;
- assess the potential economic effects during the development and construction phase of the proposed development including direct employment, supplier effects and income effects;
- assess the potential economic effects during the operation of the wind farm including direct employment, supplier effects and income effects;
- assess the economic affects arising from infrastructure improvements and potential community benefits and shared ownership; and
- consider and report on mitigation and management measures which could be employed to minimise any negative impacts and maximise potential positive impacts.

18.2.2. Given the evidence from numerous large scale wind farm applications in the UK that there is little likelihood of significant effects in EIA terms, the socio-economic chapter will not aim to derive EIA significance for effects.

Question 30: Are consultees in agreement with the proposed methodology for socio-economic and that tourism is scoped out?

19. Health and Public Safety

19.1. Shadow Flicker

- 19.1.1. Department of Energy and Climate Change (DECC) studies⁸⁶ have shown that shadow flicker occurs in the UK within ten rotor diameters of the turbine and within 130 degrees either side of north relative to the turbines. Beyond these limits it is considered that potential impacts associated with shadow flicker will not be significant.
- 19.1.2. Should the final turbine layout mean that there are no residential properties identified within potential shadow flicker zones of proposed turbines, we propose to scope out the need for a shadow flicker assessment from the ES. Otherwise, shadow flicker assessment will be undertaken to analyse the potential impact and assess its significance. This would consist of determining the maximum number of shadow flicker hours per year at any receptor within the vicinity of the wind farm that theoretically has the potential to experience some form of shadow flicker effects, using software such as WindFarmer (which would show 'worst case scenario', i.e. with no account taken of actual window locations, local average climatic conditions, intervening screening features (buildings, trees etc.)). Depending on the outcomes of this initial 'worst case' assessment further 'real-world' conditions would be reviewed further.
- 19.1.3. There is limited guidance on a defined number of hours of shadow flicker that is considered acceptable and considered insignificant. Predac, which are a European Union sponsored organisation that promotes best practice in energy use and supply, recommends that shadow flicker does not exceed 30 hours per year or 30 minutes per day (Predac, 2003)⁸⁷. Less than 30 hours per year of theoretical shadow flicker is the most commonly quoted figure within the industry as an acceptable limit in the UK. Mitigation is however possible through use of light sensors and individual turbine control during potential flicker producing times and conditions.

⁸⁶ An update of the UK Shadow Flicker Evidence Base as reported for DECC by Parsons Brinckerhoff, March 2011: Available online from Update of UK Shadow Flicker evidence base - GOV.UK (www.gov.uk) (Last accessed 25.11.20)

⁸⁷ Predac (2003) *Spatial Planning of Wind Turbines Report*.

19.2. Ice Throw

- 19.2.1. Blade icing is a rare occurrence that will only happen when the blades of the turbine are stationary and under near freezing temperatures and relatively high humidity, with either freezing rain or sleet. If these certain climatic conditions cause icing to occur, once operation recommences, the operational motion of the turbine blades and the forces of gravity can cause the ice to break off and fall vertically to the ground.
- 19.2.2. The risk of ice throw⁸⁸ is dependent on the local climate and weather conditions in which the wind turbines are situated. Increases in temperature, wind speed and solar radiation can cause the ice to loosen and fall. This makes the area under the turbine the area of the greatest risk. Dependent on the conditions, there is the potential for the blades to propel the ice up to several hundred meters when they commence operation. This can cause damage to people, structures and vehicles.
- 19.2.3. Siting the turbines away from occupied buildings, roads and public areas can mitigate the risk, as is the case at the proposed Y Bryn Wind Farm development. There are also nowadays specific turbine sensors that can identify the likeliness of the climatic conditions that cause icing, so if ice accumulation is expected or occurs the turbines can be shut down. This works when icing on the blades results in reduced performance, unusual loads, and/or vibrations. These are then detected by a control system and trigger an automatic shutdown of the turbine. Project operators use these detection systems to halt operation of certain turbines during icing events to prevent ice throws and equipment damage and, in these cases, the turbine remains off-line until an operator visually inspects and manually restarts the turbine when the blades are clear of ice.
- 19.2.4. The overall view is that modern turbines which are fitted with climatic detection systems like the ones being considered for Y Bryn Wind Farm, together with good practice site management procedures including the use of visual warnings signs and restricted access to turbines where ice is present on blades, will mitigate and manage this potential hazard.
- 19.2.5. TAN 8 notes that the '*build up of ice on turbine blades is unlikely to present problems*' and has not been reported as a significant issue at operational sites in Wales. Ice throw will **not** be assessed in the ES.

19.3. Lightning

- 19.3.1. The danger to human or animal life from lightning strike via a turbine is rare since lightning is directed down the turbine to the earth. Maintenance of the turbines would not be undertaken during high lightning risk weather conditions. Lightning will **not** be assessed in the ES.

19.4. Health & Safety

- 19.4.1. The assessment of the safety aspects of the construction, operation and decommissioning of the wind farm will consider the health and safety of construction workers and risks to safety of members of the general public. NPT and Bridgend Councils will be consulted with regard to the location of any hazardous sites within the vicinity of the proposed development.

⁸⁸ Evaluating risk caused by ice throw from wind turbines (2017). Available from <https://www.lr.org/en-gb/insights/articles/evaluating-risk-caused-by-ice-throw-from-wind-turbines.aspx> [Accessed 03.12.2020]