

4. Assessments Required

The proposed development falls within the assessment area of the following systems:

RADAR	Lat	Long	nm	km	Az (deg)	Type
Burrington Radar (cmb)	50.9343	-3.9854	40.4	74.9	14.9	CMB
Clee Hill Radar	52.3983	-2.5975	61.3	113.5	221.0	CMB
Debden Radar	51.9902	0.2638	148.5	275.0	262.6	CMB
Pease Pottage Radar	51.0834	-0.2143	134.2	248.5	284.7	CMB
Nav	Lat	Long	nm	km	Az (deg)	Type
None						
AGA	Lat	Long	nm	km	Az (deg)	Type
None						
Airports	Lat	Long	nm	km	Az (deg)	Type
Cardiff	51.39390	-3.35260	19.2	35.5	317.3	PSR
Bristol	51.37980	-2.71770	39.7	73.6	292.4	PSR

Table 2 – Impacted Infrastructure

4.1. En-route RADAR Technical Assessment

4.1.1. Predicted Impact on Bristol RADAR

No impact is anticipated on NATS' en-route radar.

4.2. En-route Navigational Aid Assessment

4.2.1. Predicted Impact on Navigation Aids

No impact is anticipated on NATS' en-route navigation aids.

4.3. En-route Radio Communication Assessment

4.3.1. Predicted Impact on the Radio Communications Infrastructure

No impact is anticipated on NATS' radio communications infrastructure.

4.4. Airport Assessment

4.4.1. Predicted Impact on Cardiff RADAR

Using the theory as described in Appendix A and development specific propagation profile it has been determined that the terrain screening available will not adequately attenuate the signal, and therefore this development is likely to cause false primary plots to be generated. A reduction in the RADAR's probability of detection, for real aircraft, is also anticipated.

4.4.2. Cardiff Operational Assessment

This proposed wind farm is sited in an area that is very popular, especially with VFR traffic from Cardiff and St Athan who will be on our LARS frequency. Although often these aircraft will often be under a Basic Service they may request a Traffic Service. This service is provided in an area that is already busy with other aircraft and additional clutter from a windfarm would make provision of this extremely difficult potentially leading to a safety event if conflicting traffic were not detected.

In addition to the VFR traffic operating in this area arrivals to runway 12 and departures from runway 30 at Cardiff often route through this area when they request a more direct route. In this circumstance the aircraft would routinely be under a Deconfliction Service which requires conflict detection and avoidance instructions by the ATCO, this would be nearly impossible to do in a high clutter environment.

The clutter could either mask genuine returns or lead to the aircraft being vectored around false returns or avoiding action being issued unnecessarily. Ultimately the clutter presented by the proposed turbines has been deemed to be operationally **unacceptable**.

4.4.3. Predicted Impact on Bristol RADAR

Using the theory as described in Appendix A and development specific propagation profile it has been determined that the terrain screening available will not adequately attenuate the signal, and therefore this development is likely to cause false primary plots to be generated. A reduction in the RADAR's probability of detection, for real aircraft, is also anticipated.

4.4.4. Bristol Operational Assessment

No impact is expected on the operation of Bristol Airport,

5. Conclusions

5.1. En-route/Airport Consultation

The proposed development has been examined by technical and operational safeguarding teams. A technical impact is anticipated at both Cardiff and Bristol, however this has only been deemed to be **unacceptable** in relation to the operation at Cardiff.

Appendix A – Background RADAR Theory

Primary RADAR False Plots

When RADAR transmits a pulse of energy with a power of P_t the power density, P , at a range of r is given by the equation:

$$P = \frac{G_t P_t}{4\pi r^2}$$

Where G_t is the gain of the RADAR's antenna in the direction in question.

If an object at this point in space has a RADAR cross section of σ , this can be treated as if the object re-radiates the pulse with a gain of σ and therefore the power density of the reflected signal at the RADAR is given by the equation:

$$P_a = \frac{\sigma P}{4\pi r^2} = \frac{\sigma G_t P_t}{(4\pi)^2 r^4}$$

The RADAR's ability to collect this power and feed it to its receiver is a function of its antenna's effective area, A_e , and is given by the equation:

$$P_r = P_a A_e = \frac{P_a G_r \lambda^2}{4\pi} = \frac{\sigma G_t G_r \lambda^2 P_t}{(4\pi)^3 r^4}$$

Where G_t is the RADAR antenna's receive gain in the direction of the object and λ is the RADAR's wavelength.

In a real world environment this equation must be augmented to include losses due to a variety of factors both internal to the RADAR system as well as external losses due to terrain and atmospheric absorption.

For simplicity these losses are generally combined in a single variable L .

$$P_r = \frac{\sigma G_t G_r \lambda^2 P_t}{(4\pi)^3 r^4 L}$$

Secondary RADAR Reflections

When modelling the impact on SSR the probability that an indirect signal reflected from a wind turbine has the signal strength to be confused for a real interrogation or reply can be determined from a similar equation:

$$P_r = \frac{\sigma G_t G_r \lambda^2 P_t}{(4\pi)^3 r_t^2 r_r^2 L}$$

Where r_t and r_r are the range from RADAR-to-turbine and turbine-to-aircraft respectively. This equation can be rearranged to give the radius from the turbine within which an aircraft must be for reflections to become a problem.

$$r_r = \sqrt{\frac{\lambda^2}{(4\pi)^3}} \sqrt{\frac{\sigma G_t G_t P_t}{r_t^2 P_r L}}$$

Shadowing

When turbines lie directly between a RADAR and an aircraft not only do they have the potential to absorb or deflect, enough power such that the signal is of insufficient level to be detected on arrival.

It is also possible that azimuth determination, whether this done via sliding window or monopulse, can be distorted giving rise to inaccurate position reporting.

Terrain and Propagation Modelling

All terrain and propagation modelling is carried out by a software tool called ICS Telecom (version 11.1.7). All calculations of propagation losses are carried out with ICS Telecom configured to use the ITU-R 526 propagation model.

A3.3.14 NATIONAL POLICE AIR SERVICE APPROVAL OF REDUCED LIGHTING SCHEME – NOVEMBER 2021

Appendix B – Diagrams



Figure 1: Proposed development location shown on an airways chart

consented/built impact -accepted impact -objection mitigated
mitigation -proposed no impact refused/withdrawn

>From: "Watts, Paul" <[REDACTED]>
>To: Malcolm Spaven <[REDACTED]>
>CC: "Maddox, Paul" <[REDACTED]>
>Subject: RE: NPAS St Athan wind farm consultation
>Date: Wed, 24 Nov 2021 11:08:59 +0000
>
>Hi Malcolm,
>
> Further to our recent conversation I can confirm that the
> proposed lighting scheme would be acceptable and not pose an
> unacceptable risk to police air support operations.
>
>Best regards
>Paul
>Capt Paul Watts MSC
>Head of Flight Operations
>National Police Air Service
>
>Mobile: [REDACTED]
>Email: [REDACTED]
>Web: www.npas.police.uk
>
>
>
>
>
>
>
>-----Original Message-----
>From: Malcolm Spaven <[REDACTED]>
>Sent: 23 November 2021 10:00
>To: Watts, Paul <[REDACTED]>
>Cc: Maddox, Paul <[REDACTED]>

>Subject: Re: NPAS St Athan wind farm consultation
>
>Hi Paul
>
>Thanks for your time on the phone yesterday.
>
>To confirm, the lighting scheme we are proposing involves installing
>the standard 2000 candela steady red lights (as specified in the ANO
>Article 222) on only some of the turbines, not all of them. This
>requires a specific CAA approval under Article 222(6) and 222(7) of the ANO.
>
>The attached graphic shows (in blue) the turbines on which we are
>proposing to fit 2000 candela lights. It's ten turbines out of the
>total of 21 in the wind farm. All of those ten will additionally
>have infra-red lights as well as the 2000 candela lights.
>
>A further eight turbines (shown in yellow on the attached graphic)
>will have IR lights only.
>
>Three turbines in the interior part of the southern block of the
>wind farm will have no lighting. Those are shown in white.
>
>I should also mention that our draft scheme proposes omitting the
>low intensity (32 candela) lights halfway up the turbine
>towers. This is on the basis of prior consultations that indicated
>that those lights are rarely visible to pilots, especially those
>using NVGs, and therefore add little or no safety benefit. I'd be
>happy to provide you with further detail on this if you require it.
>
>If you are happy that the proposed lighting scheme meets your
>operational safety needs I would be grateful if you could send me an
>email to that effect so that we can demonstrate to the CAA that we
>have obtained approval from the key consultees.
>
>If on the other hand you would like to propose any amendment to the
>draft scheme, please advise.
>
>Thanks and regards
>
>Malcolm
>
>At 16:07 04/11/2021, Watts, Paul wrote:
>
>>Hi Malcolm,
>>
>>
>>
>> I have been passed your enquiry by our Ops Support Office.
>>
>>With regard to wind farm lighting we would expect any lighting to
>>comply with the requirements of the UK Air Navigation Order and
>>additionally that they be visible when using Night Vision Goggles.
>>Our base at St Athan rely heavily on NVG for their night operations and
>>I have copied in the Senior pilot there to make him aware of this
>>proposed development.
>>

>>
>>
>>Best regards
>>
>>
>>
>>Paul
>>
>>Capt Paul Watts MSC
>>
>>Head of Flight Operations
>>National Police Air Service
>>
>>
>>
>>Mobile: [REDACTED]
>>
>>Email: [REDACTED]
>>

A3.3.14 AVIATICA REDUCED LIGHTING SCHEME REPORT SUBMITTED TO CIVIL AVIATION AUTHORITY – DECEMBER 2021

Rafe Osborne

From: Malcolm Spaven <[REDACTED]>
Sent: 17 December 2021 10:42
To: Wells Andy
Cc: Ffion Edwards; Lucy Freeman; Trevor Hunter
Subject: Reduced lighting scheme: Y Bryn wind farm
Attachments: Report_21-972-NPC-1.pdf; ATT00001.txt

Good morning Andy

As advised on your voicemail a few minutes ago, please find attached our latest proposal for a reduced lighting scheme, relating to the Y Bryn wind farm in South Wales.

We have consulted the key night low level airspace users on this one and their responses are quoted in the document but please advise if you would like to see full copies of my email exchanges with them.

If you could acknowledge receipt of this email I'd appreciate it - I have had some problems lately with my emails going into people's spam folders.

Thanks for all your assistance this year dealing with the extra workload that our lighting scheme proposals impose on you - much appreciated.

Best regards

Malcolm



Y BRYN WIND FARM, SOUTH WALES:
PROPOSAL FOR ALTERNATIVE LIGHTING
SCHEME

December 2021

Report No.21/972/NPC/1

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EXECUTIVE SUMMARY

1 Y Bryn Wind Farm Ltd proposes a 21 turbine wind farm at Y Bryn, between Maesteg and Port Talbot in South Wales (see Figure 2). The proposed turbines will have tip heights exceeding 150 metres above ground level, triggering the Air Navigation Order (ANO) Article 222 requirement for medium intensity red lights. In order to meet the requirements of users of the night low level airspace while reducing the night time visual impact of such aviation lighting, Y Bryn Wind Farm Ltd requests CAA permission to provide lighting other than in accordance with the ANO, as provided in ANO Article 222(7).

2 ICAO Annex 14 provides for objects 150m or more above ground level not to be regarded as obstacles – and therefore not be lit - if a special aeronautical study indicates that they do not constitute a hazard to aeroplanes. In addition Article 222 (7) of the ANO allows the CAA to grant permissions for lighting other than as stipulated in ANO Article 222 to be fitted to objects 150m or more above ground level. This document is designed to be a special aeronautical study, to provide a basis for the CAA to grant permission for the Y Bryn wind farm to be lit otherwise than in accordance with the ANO.

3 A review of the potential users of the night low level airspace in the vicinity of the Y Bryn site shows that the majority of users are Night Vision Goggle (NVG) equipped.

4 The proposed lighting scheme for the Y Bryn wind farm aims to identify the corners and perimeter of the wind farm and the highest turbine in the development. It takes account of the combined visibility of infra-red and visible lighting since the majority of night low level air operations in the area are by night vision-equipped aircraft.

5 The proposed lighting scheme would consist of:

- medium intensity steady red (2000 candela) lights on the nacelles of five turbines marking the corners and perimeter of the wind farm;
- infra-red lights on all perimeter turbines, including the five turbines with visible lighting;
- intermediate level 32 candela lights would not be fitted on the turbine towers.

6 Potential users of the night low level airspace in the vicinity of the Y Bryn site have been consulted on the proposed lighting scheme. All civilian consultees confirmed that they are content with the proposal. A Ministry of Defence response is awaited.

1

1. Introduction

1.1 This document sets out a request to the Civil Aviation Authority for permission to provide an alternative lighting scheme on the proposed Y Bryn wind farm, South Wales, under the terms of Article 222(6) and 222(7) of the Air Navigation Order.

1.2 This request is submitted by Gladhouse Planning Ltd (trading as Aviatica) on behalf of Y Bryn Wind Farm Ltd. Y Bryn Wind Farm Ltd is a joint subsidiary of Coriolis Energy Ltd and ESB Asset Development.

1.3 A summary of the proposed lighting scheme is in section 11. The configuration of the scheme is illustrated in Figure 1. The proposed lighting configuration on each turbine is set out in Annex A.

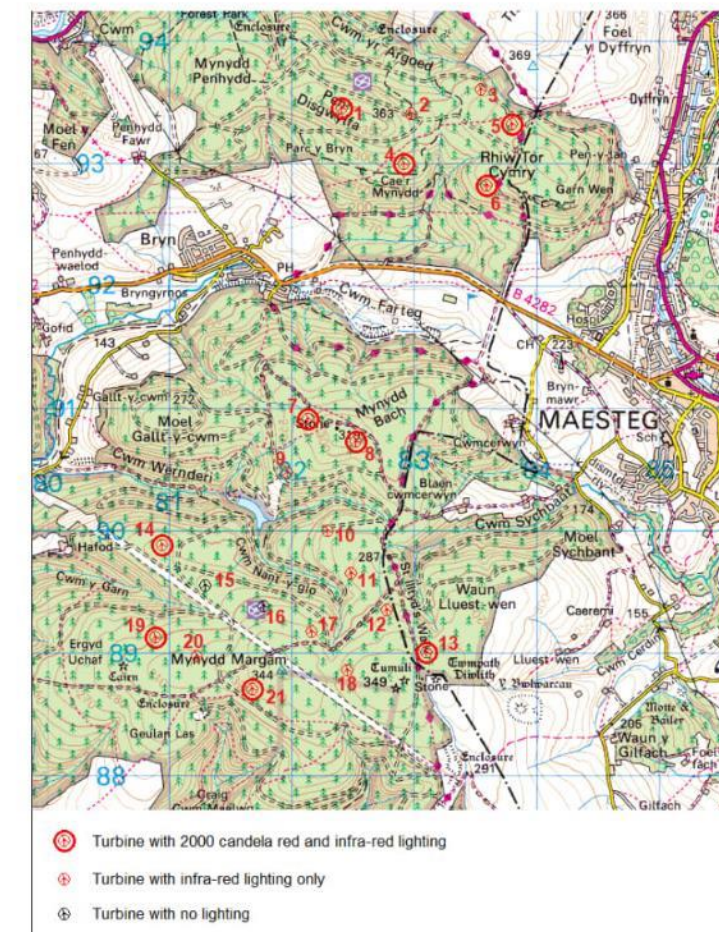


Figure 1: Proposed Y Bryn wind farm lighting scheme

2. Background

2.1 The proposed Y Bryn wind farm consists of 21 turbines located between Maesteg and Port Talbot, Rhondda Cynon Taf.¹ The wind farm will consist of twelve turbines with blade tip heights not exceeding 206 metres above ground level (m agl); two turbines with blade tips up to 230m agl; and seven turbines with blade tips up to 250m agl. The location of the development site is shown in Figure 2.

2.2 As the development will deliver in excess of 10MW of wind energy it will constitute a Development of National Significance (DNS) under the Planning (Wales) Act 2015. A planning application will be made to Planning and Environment Decisions Wales (PEDW) in 2022.



Figure 2: Location of the Y Bryn wind farm

¹ One turbine is located in the administrative area of Bridgend County Borough Council.

3. The obstacle environment around Y Bryn

3.1 There are five existing and two consented wind farms within 10km of the Y Bryn site. These are shown in Figure 3. Their turbine dimensions and lighting status, together with those of the proposed Y Bryn wind farm, are set out in Table 1.

Table 1: Status of existing and consented wind farms ²					
Project	No. of turbines	Tip height (m agl)	Max tip ht (ft amsl)	Operational status	Lighting status
Y Bryn	21	12 x 206 2 x 230 7 x 250	1879	Proposed	To be approved
Pen Y Cymoedd	76	143.5	2280	Operational	No lighting
Llynfi Afan	12	118	2175	Operational	No lighting
Ffynnon Oer	16	93	1833	Operational	No lighting
Mynydd Brombil	4	100	1094	Operational	No lighting
Newton Down	2	125	741	Operational	No lighting
Foel Trawsnant	11	145	1691	Consented	No lighting
Melin Court	5	145	1544	Consented	No lighting

3.2 In summary, the Y Bryn wind farm will have at least 110 existing turbines within 10km, none of which are fitted with any form of obstruction lighting, whether visible spectrum or infra-red. These include turbines with blade tip heights up to 400 feet higher above sea level than the highest Y Bryn turbine.

3.3 There is also terrain up to 1864ft above mean sea level (amsl) – only 15ft lower than the highest Y Bryn turbine blade tips – within 10km of the Y Bryn site.

² Single wind turbines are not included in this table.



Figure 3: Existing and consented wind farms in the Y Bryn area

4. Regulatory basis for the proposed lighting scheme

4.1 Annex 14 to the Chicago Convention sets out the International Civil Aviation Organisation (ICAO) Standards and Recommended Practices (SARPs) governing the marking and lighting of obstacles. The UK, as an ICAO Contracting State, seeks to implement all ICAO SARPs.

4.2 ICAO Annex 14 paragraph 4.3.2 recommends that:
In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation should be regarded as obstacles, unless a special aeronautical study indicates that they do not constitute a hazard to aeroplanes.
Note.— This study may have regard to the nature of operations concerned and may distinguish between day and night operations.

4.3 ICAO Annex 14 paragraph 6.2.4.1 states:
A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.
However Note 2 to that paragraph states “See 4.3.1 and 4.3.2”, which again allows for a wind turbine to be deemed not to be an obstacle, on the basis of an aeronautical study.

4.4 Article 222(1) of the Air Navigation Order (ANO) requires all en route obstacles (defined as any construction 150m or more above ground level) to be lit with medium intensity steady red lights. However Article 222(6) states:
A permission may be granted for the purposes of this article for a particular case or class of cases or generally.
while Article 222(7) states:
This article does not apply to any en-route obstacle for which the CAA has granted a permission to the person in charge permitting that person not to fit and display lights in accordance with this article.

4.5 It is therefore open to the CAA to grant permissions for lighting schemes other than as specified in ANO Article 222(1). ICAO Annex 14 paragraph 4.3.2 provides a methodological basis for the grounds on which any such permission may be given.

4.6 This document is designed to be a ‘special aeronautical study’ as referred to in ICAO Annex 14 paragraph 4.3.2, aimed at providing a safety basis for lighting the Y Bryn wind farm other than in accordance with ANO Article 222(1).

5. Methodological approach to the study

5.1 As set out in section 3, the proposed Y Bryn wind farm is located in an area of existing wind farms, none of which are fitted with any form of lighting. This reflects the fact that (a) none of the existing or consented turbines in the area exceeds 150m in height; (b) the Ministry of Defence (MoD) did not routinely request lighting on wind turbines before 2008; and (c) it appears not to have been the practice of wind farm developers or planning authorities in this part of Wales to consult the relevant aviation bodies.

5.2 During the past decade, the national search and rescue function has been transferred from military to civil responsibility and police and air ambulance helicopter units now cover the whole of the UK. A growing proportion of these civil operators routinely fly at night at low level using Night Vision Imaging Systems (NVIS). Military night low level operations in this part of UK airspace are limited since the site is within the Glamorgan Transit Area. Any such operations that do take place can be expected to be conducted using NVIS.

5.3 In view of the type of night low level air operations conducted in the airspace surrounding the Y Bryn wind farm site, this lighting scheme proposal has been designed on the basis that the effectiveness of any obstruction lighting should be considered in the round, taking into account the combined effect for aircrew of the visibility of both infra-red lighting and visible spectrum lighting, since aircrew using NVIS may use both types of lighting to identify obstacles.

5.4 The method adopted in developing this proposal aims to accord with ICAO Annex 14 paragraph 6.2.4.3, i.e.:

- a) to identify the perimeter of the wind farm;
- b) respecting the maximum spacing, in accordance with 6.2.3.15, between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;³

5.5 The proposal has also been developed on the basis of consultation with key aviation stakeholders. A review of likely or possible users of the night low level airspace in this part of Wales identified the following operators:

- MCA/Bristows search and rescue (SAR) helicopter unit, St Athan;
- Wales Air Ambulance, Cardiff City Heliport;
- National Police Air Service, St Athan;
- Ministry of Defence.

³ ICAO Annex 14 paragraph 6.2.3.15 recommends that medium-intensity lights should be spaced not more than 900m apart.

6. The night low level air traffic environment around Y Bryn

6.1 ICAO Annex 14 paragraph 4.3.2 advises that a special aeronautical study of the nature of any hazard created by an obstacle of 150m or more "may have regard to the nature of operations concerned and may distinguish between day and night operations." For the purposes of this report, an assessment has been made of the volume and types of air traffic that may use the night low level airspace in the vicinity of the Y Bryn site.

6.2 The Y Bryn site is in Class G (uncontrolled) airspace from surface level to Flight Level 195 (approximately 19,500 feet). Above that level is the Class C controlled airspace of the West Control Area and London Upper Information Region. The nearest controlled airspace at low level is the Cardiff Control Area, 9.9km (5.3 nautical miles (nm)) to the south east.

6.3 The Y Bryn site is located within the Glamorgan Transit Area, a part of the UK low flying system where military low flying is restricted in order to reduce noise disturbance over populated areas. Military rules⁴ provide that:

- fixed wing aircraft should not overfly Transit Areas at less than 2000 ft agl;
- large helicopters⁵ should not overfly Transit Areas at less than 1000 ft agl;
- smaller helicopters⁶ should not overfly Transit Areas at less than 500 ft agl in rural areas, and 1000 ft agl in Congested Areas.⁷

6.4 In addition, Y Bryn is in a part of the military low flying system subject to mandatory flow control, i.e. where aircraft are required to fly in one direction only, in order to minimise the risk of collision between aircraft. All flights in the area between Maesteg and Port Talbot are required to fly in a southerly direction. Figure 4 is an excerpt from the UK Aeronautical Information Publication (AIP) showing the boundaries of the mandatory flow control in this area. The practical result of this flow control rule is that any military aircraft routing through this area at low level in a southerly, easterly or westerly direction cannot fly over this area, thus the frequency of military night low level traffic over the Y Bryn site is likely to be of the order of a quarter of the overall frequency of traffic through the area. This flow control measure applies to night low flying as well as daytime.

6.5 In the military Night Low Flying System, the Y Bryn site is located within Night Rotary Region 7 South (NRR7S), where priority is given to military helicopter flying but fixed wing low level flights may also occur. NRR7S stretches from Chepstow and Monmouth in the east to the boundary of UK airspace in the west, some 160 km west of Milford Haven. Approximately 80% of NRR7S is over the sea. In the year 1 April 2019 to 31 March 2020, military aircraft spent 47.37 hours on night low level flights

⁴ Military Aviation Authority *Regulatory Article 2330: Low Flying*, Issue 5, May 2021, paragraph 44.

⁵ Defined as those with a Maximum All Up Mass exceeding 5700 kg. This encompasses the Chinook, Puma, Wildcat, Merlin and Apache in UK military service.

⁶ Defined as those with a Maximum All Up Mass less than 5700 kg. This encompasses the Dauphin, Gazelle, Juno and Jupiter in UK military service.

⁷ A congested area is defined as "Any area in relation to a city, town or settlement which is substantially used for residential, industrial, commercial, or recreational purposes."

through NRR7S – an average of 55 minutes per week.⁸ In view of the size and shape of NRR7S, as well as the Transit Area and flow control restrictions over the Y Bryn site, it is concluded that the Y Bryn area sees only a small proportion of the night low level activity in NRR7S, and any such activity by fixed wing aircraft cannot, by regulation, be at a height less than 1180 feet above the blade tips,⁹ thus obviating the need for any obstruction lighting in relation to those aircraft.

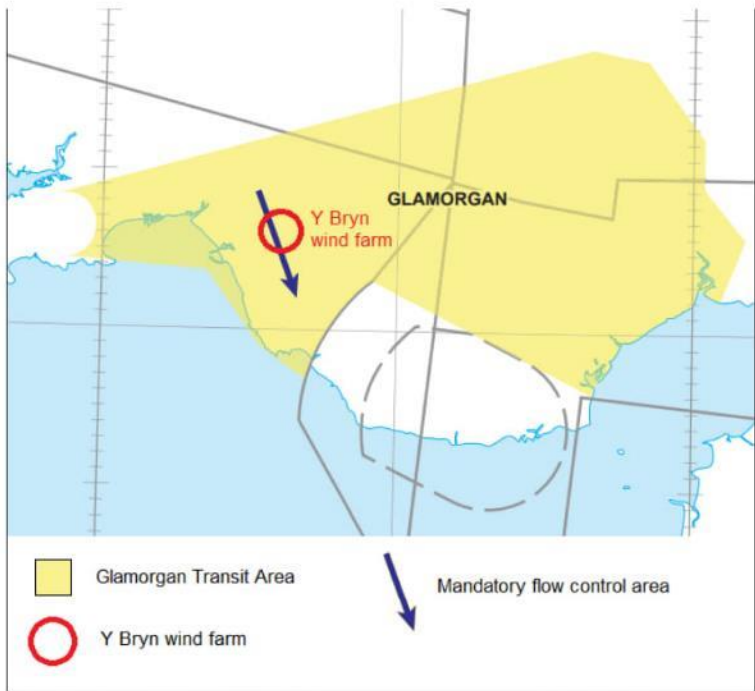


Figure 4: Military low flying system features in the Y Bryn area¹⁰

6.6 Licensed, government and training airfields within 30 nautical miles (56km) of the Y Bryn site, with their lighting and night operations status, are shown in Table 2.

6.7 Night Visual Flight Rules (VFR) operations from Cardiff Airport include night training flights by the based training organisation, Aeros Flight Training. However such training flights away from the airfield circuit area are not conducted at low altitude, and while it is legal in the UK to fly at night as low as 500 feet above ground level or 500ft above the highest obstacle within a radius of 500ft from the aircraft,¹¹ night training flights are conducted at significantly higher altitudes, based on pre-flight calculations of the minimum safe level, taking account of terrain and obstacles in the

⁸ Ministry of Defence, *The Pattern of Military Low Flying Across the UK 2019-20*, Table 2.
⁹ Minimum 2000ft agl minus the height of the highest blade tips, 250m (820ft) agl.
¹⁰ Source: UK AIP ENR 6.76, June 2021.
¹¹ Civil Aviation Authority, Official Record Series 4, No 1496: *(UK) Standardised European Rules of the Air – Exceptions to the Minimum Height Requirements*, 28 June 2021, paragraph 6.

area where the flight is to be conducted. Table 3 sets out the resulting minimum flight altitudes over the Y Bryn site calculated using different methods.

Table 2: Licensed, government and training airfields within 30nm ¹²			
Airfield	Distance from Y Bryn (nm)	Equipped and open for night flying?	Remarks
Cardiff	17	Yes	Open 24 hours. Based training organisation.
St Athan	14	Yes ¹³	SAR helicopter unit, police helicopter unit.
Swansea	13	No	Day VFR only
Pembrey	23	No	Day VFR only

Table 3: Minimum night VFR flight altitude calculations		
Method	Description	Calculated minimum flight altitude over the Y Bryn site (ft amsl)
Maximum Elevation Figure (MEF)	CAA 1:500,000 and 1:250,000 VFR aeronautical charts publish a Maximum Elevation Figure for quadrangles bounded by each half degree of latitude and longitude. Each MEF is based on the highest known feature in each quadrangle, plus an allowance of 300 feet for unknown and uncharted obstacles, rounded up to the next highest hundred feet.	3500 (assuming flight at 500ft above the MEF)
Minimum Safe Altitude (MSA)	Unofficial but widely used method, typically applying a minimum level criterion of 1000ft above the highest obstacle within 5nm, using VFR charts to ascertain terrain/obstacle heights. ¹⁴	3300 (based on charted maximum height of Pen Y Cymoedd wind farm)
500ft rule	Applying the minimum 500ft vertical separation above the highest obstacle over which the aircraft is likely to fly, rounded up to next highest hundred feet.	2700 (based on charted maximum height of Llynfi Afan wind farm)

¹² Unlicensed airfields, airstrips and gliding sites are excluded from this table. There are no such facilities within 30nm of Y Bryn that are equipped or open for night flying, with the exception of Wales Air Ambulance operations from Cardiff City Heliport.
¹³ However the pilot-controlled runway lighting system in use for out of hours operations is only available to the based SAR and Police helicopters.
¹⁴ This criterion differs slightly from the ICAO and SERA minimum level for IFR flight which is 1000ft above the highest obstacle within 8km. However UK aviation uses nautical miles, not kilometres, for distance measurement. The origin of the 5nm criterion is in the pre-SERA UK rules for IFR – *Rules of the Air Regulations 2007*, Rule 33(1).

6.8 The lowest altitude calculation in Table 3 is 2700ft amsl. This is based on the height of the highest existing wind turbine blade tips (Llynfi Afan - 2175ft) within 5km of the Y Bryn site. This will be unchanged when the Y Bryn wind farm is built since Y Bryn's highest blade tips will be 1879ft amsl.

6.9 Light aircraft VFR Night Rating training flights from Cardiff Airport, insofar as they use the area of uncontrolled airspace north west of Bridgend and Tonypany in which Y Bryn is located, are currently operating over existing wind farms, none of which have any obstruction lighting, and which have blade tip heights up to 400 feet higher than those of the proposed Y Bryn wind farm. It is concluded that the Y Bryn wind farm will not pose any additional hazard to these aircraft over and above the hazards already presented by the many existing unlit wind turbines in this area. Consequently there is no prima facie case for lighting on the Y Bryn turbines to address this risk. And since the proposal set out in this document is to install visible lighting on ten of the 21 turbines, becoming the first wind farm in South Wales with any visible spectrum lighting, it is concluded that any hazard presented to light aircraft conducting Night Rating training flights in the area of the development is more than adequately addressed by the proposed lighting scheme.

6.10 As regards civilian night VFR transit traffic over the Y Bryn area flying to or from airfields other than Cardiff and St Athan, these are likely to be restricted to flights that are either (a) emergency services helicopters or (b) aircraft that, for aircraft certification and/or pilot licensing reasons, are unable to fly at higher altitudes and/or under the Instrument Flight Rules (IFR). In practice this means that the possible types of civil aircraft flying VFR at night in the Y Bryn area at altitudes less than 1000 feet above the highest obstacle within 8km of the aircraft are:

- light (mainly single piston-engined) fixed-wing aircraft;
- helicopters not certified for flight in known icing conditions, when the cloudbase and freezing level are below c.3200ft;¹⁵
- emergency services helicopters.

6.10 Light fixed-wing aircraft night VFR transit flights over this part of South Wales are rare due to high terrain, relative scarcity of airports open and equipped for night flying¹⁶ and frequent weather conditions precluding VFR flight at altitudes that provide adequate terrain and obstacle clearance. These factors compound the generic risks of flying VFR at night – i.e. the inability to see and avoid cloud and obstacles or to select a suitable forced landing field in the event of engine failure. For these reasons, commercial fixed wing flights at night operate under the IFR and therefore fly above the levels at which lighting of obstacles is required. Pilots of private VFR flights in light fixed wing aircraft will seek to avoid flying at night at altitudes where terrain and obstacle clearance become a factor and will also seek to avoid flight over higher ground where the margin between the cloudbase and the terrain is reduced and where forced landing options are poor.

¹⁵ The highest obstacle in the Y Bryn area is and will be Turbine 8 of the Llyn Afan wind farm, 2175ft amsl, requiring flight not below 3200ft to comply with IFR (assuming rounding-up to the next highest hundred feet).

¹⁶ The licensed/certificated civil aerodromes in Wales to the north and west of Cardiff and St Athan – Swansea, Pembrey, Haverfordwest, West Wales and Caernarfon – are either not equipped with the required runway lighting or are not open during night hours.

6.11 For helicopters not certified to fly in icing conditions – all but the larger multi-engined types – the same considerations apply as to light fixed wing aircraft. Commercial helicopters in transit in the Y Bryn area are most likely to be flying IFR and therefore do not drive a requirement for lighting on obstacles. Private helicopter VFR flights at night in the Y Bryn area are even less likely to occur than private fixed wing flights and can effectively be discounted.

6.12 The remaining category – emergency services helicopters – are therefore, in practice, likely to be the only civil aircraft operating VFR at low level at night in the vicinity of the Y Bryn wind farm. In this part of the UK the emergency services operators are:

- Bristow Helicopters/Maritime & Coastguard Agency Search & Rescue Unit, St Athan (AgustaWestland AW189);
- National Police Air Service, St Athan (Eurocopter EC135 P2+);
- Wales Air Ambulance, Cardiff City Heliport (Airbus H145).

6.13 The first two operators are certified, equipped and crewed to use NVGs to aid VFR flight at night. Obstacle acquisition and identification is typically carried out using a combination of NVGs and unaided vision. Thus the visibility of a wind farm at night to aircrew on these aircraft will be determined by any and all lighting on the turbines – infra-red and visible spectrum.

7. Visibility of LED lights

7.1 In 2013 the crew of a Royal Navy Lynx helicopter filed an incident report after finding that the lights of another Lynx flying in proximity to them at night were not visible to the crew through their NVGs. Investigation of the incident determined that the other Lynx had visible spectrum red light emitting diode (LED) lights switched on, and that these were not visible through NVGs because LED lighting emits in a very narrow wavelength band which is only narrowly within the spectrum visible to NVG wearers.¹⁷

7.2 Following the 2013 incident, research by QinetiQ for the Defence Science & Technology Laboratory found that, while the vast majority of the emissions from traditional incandescent lighting overlapped with the wavelength range visible to NVGs, LED lights occupied only a narrow part of the NVG visible spectrum and, while technically still visible, the NVG weighted radiance of LED lights was 369 times less than that of an incandescent red light. This translates to the LED light being theoretically detectable at a range 19 times less than that of the incandescent light.

7.3 Similar experiences by civilian aircrew using NVGs led EASA to issue a Safety Information Bulletin in 2019 which noted that the issue was more pronounced for civilian users because NVGs approved for civilian use are not sensitive to energy generated in the narrow band of LED lights, and advised:

¹⁷ D Bigmore, 'Why NVG Users Might Not Be Seeing Anti-Collision/Obstruction Lighting As Well As They Used To', *Air Clues* Issue 23, 2017, pp.36-38.

NVG users should be aware that LED obstacle lighting systems falling outside the combined visible and near-infrared spectrum of NVG (approximately 665 to 930 nm) will not be visible to their goggles. Crews that use NVGs should be extra cautious when flying near obstacle areas and to report any hazardous sites to their competent authority.¹⁸

7.4 The non-visibility of LED obstruction lights to civilian NVG users has also been reported by search and rescue helicopters and other consultees during research conducted by Aviatica on the scope for reduced lighting schemes in 2019-20.

7.5 The issue of non-visibility of LED lights to NVG users has significance for the design of lighting schemes for wind farms with blade tip heights of 150m or more. CAA policy requires these turbines to have a 2000 candela light on the nacelle plus 32 candela lights at mid-tower height. All current obstacle aviation warning lights on the market use LED technology. Setting the 19-fold detection range reduction for military specification NVGs referred to above against the minimum light detection ranges promulgated by the Federal Aviation Administration, the theoretical detection ranges of LED lights by NVG wearers, assuming the minimum in-flight visibility for VFR flight at night, are set out in Table 4.¹⁹

Table 4: LED light detectability using NVGs ²⁰			
In-flight meteorological visibility (km)	Light intensity (candela)	Detection range with unaided vision (metres)	Detection range with NVGs (metres)
4.8	2000	4900	258
4.8	32	2200	116

7.6 Since the rotor blade length of the largest onshore turbines now being built is up to 75 metres, the detection ranges of LED lights using NVGs are clearly inadequate to ensure collision avoidance, even for 2000 candela lights. Since almost all regular VFR flights at night in the low level airspace are conducted by aircraft whose crews are using NVGs, the fitting of visible spectrum LED lights only to turbines provides little or no safety benefit. Additionally, since all new commercial-scale wind farms in the UK for over a decade have had MoD-specification infra-red lights fitted to the perimeter turbines (as a minimum), the installation of visible spectrum lighting provides no additional benefit to NVG-equipped airspace users.

¹⁸ EASA Safety Information Bulletin No 2019-04, 28 February 2019: Avoiding Obstacles Lighted with Light-Emitting Diode Obstacle Lights whilst Operating with Night Vision Goggles.
¹⁹ Federal Aviation Administration, Advisory Circular No.70/7460-1L: Obstruction Marking and Lighting, 17 August 2018, Table B-1. The minimum in-flight visibility for VFR flight is 4.8km in the USA. In the UK it is 5km.
²⁰ It should be noted that the figures shown for detection range with NVGs relate to military specification NVGs, which have a sensitivity wavelength range of approximately 630 to 930 nanometres (nm). For civil NVGs, which have a sensitivity wavelength range of 665 to 930 nm, it is likely that the lights will not be detectable at any range.

8. Design of the lighting scheme

8.1 The proposed Y Bryn wind farm consists of 21 turbines, all with tip heights exceeding 150 metres above ground level. The wind farm consists of two distinct blocks of turbines, with Turbines 1 to 6 located to the north of the B4282 Maesteg to Bryn road and Turbines 7 to 21 located south of the B4282.

8.2 Given the nature of night low level air traffic patterns in the area, the lighting scheme has been designed with the aim of achieving definition of the corners of each of the two groups of turbines, using a combination of visible spectrum and infra-red lights, and additionally defining the perimeter of each group of turbines using infra-red lights. The proposed lighting scheme is shown in Figure 1.

8.3 In the northern group of turbines, Turbines 1, 4, 5 and 6 clearly mark the corners of the group and its southern boundary, to facilitate identification by helicopters routing along the B4282 road. Those four turbines are proposed to have a combination of ICAO Type C 2000 candela steady red lights and infra-red lighting to MoD specification. The remaining two turbines in the northern group – T2 and T3 – will be fitted with infra-red lights. Thus all turbines in the northern group will be fitted with either infra-red, or a combination of visible and infra-red lighting.

8.4 In the southern group of turbines, Turbines 7, 8, 13, 14, 19 and 21 clearly mark the corners of the group. These are proposed to have a combination of 2000 candela steady red lights and infra-red lighting.

8.5 In line with the recommendation in paragraph 6.2.4.3 (a) of ICAO Annex 14, it is proposed to fit all perimeter turbines in the Y Bryn wind farm with either combination visible spectrum and IR lights, or IR lights only. Turbines 9 to 12 mark the eastern and western perimeters of the group, and Turbines 18 and 20 mark the southern perimeter. Therefore, it is proposed to fit these turbines with infra-red lights.

8.6 Turbine 17 is not located on the perimeter of the wind farm. However it will be the highest turbine in the Y Bryn wind farm, with blade tips reaching 1879ft amsl – 30ft higher than the next-highest turbine in the southern group. ICAO Annex 14 paragraph 6.2.4.3(d) recommends that lights should be installed on a wind farm “so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located”. Following consultation with night low level airspace users, it is proposed to fit an infra-red light to this turbine.

8.7 The lighting scheme has also been designed with the aim of meeting the recommendations in paragraphs 6.2.4.3 (a) and 6.2.3.15 (b) of ICAO Annex 14 that lights be spaced at intervals not exceeding 900m. Table 5 sets out the separations between turbines that are proposed to be lit with 2000 candela visible spectrum lights. Where the distances between adjacent lit turbines exceeds 900m, the table also shows the maximum separation between lit turbines when the intervening IR-lit turbines are also taken into account.

8.8 It can be seen that, of the ten gaps between 2000cd-lit turbines along the perimeter of the wind farm, five are less than 900m and therefore meet the ICAO recommendation. Of the five cases where the gap exceeds 900m, four are reduced to well under 900m when turbines with IR lights are also taken into consideration. The 900m criterion is not met in one case – the gap between T14, on the north west corner of the southern group, and its next nearest perimeter turbine, T9. This is because there are no other intervening turbines in this part of the wind farm that could be lit. T14 and T9 are located on either side of the Cwm Wernderi/Cwm Nant-y-glo valley and both will be lit – T14 with 2000cd visible lighting, T9 with infra-red.

Table 5: Distances between lit turbines		
<i>Turbine numbers</i>	<i>Separation between visible-lit turbines(m)</i>	<i>Maximum separation between visible and/or IR-lit turbines</i>
1 to 4	684	-
4 to 6	696	-
6 to 5	542	-
5 to 1	1402	609
7 to 8	435	-
8 to 13	1816	763
13 to 21	1455	791
21 to 19	902	374
19 to 14	757	-
14 to 7	1575	1178

Mid-tower lighting

8.9 The CAA Policy Statement of June 2017 on lighting of turbines 150m or more in height recommends that "at least three (to provide 360 degree coverage) low-intensity Type B lights (32 candela) lights should be provided at an intermediate level of half the nacelle height." This reflects an ICAO recommendation in Annex 14 paragraph 6.2.4.3(e)(iii) for turbines between 150m and 315m tip height.

8.10 The purpose of the intermediate-level lights is understood to be to enable pilots to identify particular turbines that are greater than 150m in height. However, during consultations with stakeholders on this and other proposed wind farm lighting schemes, the point was made that because of their low intensity, 32 candela lights are of limited visibility to pilots especially when operating in low visibility conditions. In addition it is likely that they will not be visible to aircrew wearing NVGs, for the reasons set out in Section 7. Consequently, Y Bryn Windfarm Ltd proposes not to fit intermediate-level 32 candela lights to any of the Y Bryn turbines, and seeks CAA permission for that deviation from the provisions of the 2017 Policy Statement.

9. Consultations

9.1 Consultations on the proposed lighting scheme for the Y Bryn wind farm have been undertaken with the aviation stakeholders listed in paragraph 5.5. The contacts made with consultees are summarised in Appendix A.

9.2 The Wales Air Ambulance helicopters are operated by Babcock International Group. Their Regional Managing Pilot (Wales) and Helicopter Landing Site Surveyor were consulted. They responded with a proposed visible lighting scheme layout designed so that "from all potential routings across the site the aircrew should be able to identify a minimum of three lights to allow them to draw a mental triangle of area to avoid", with additional lights on the southern perimeter of the northern group of turbines and the northern corner of the southern group of turbines, due to a potential requirement for their helicopters to fly between the northern and southern groups of turbines. This layout requested visible lighting on Turbines 1, 4, 5, 6, 7, 8, 13, 14, 19 and 21.

9.3 The Wales Air Ambulance suggested lighting scheme was then used as a basis for consultation with other stakeholders. In addition to the suggested visible lighting layout, it was proposed to fit all turbines except T15, 16 and 17 with infra-red lighting, in order to clearly identify the wind farm perimeter to NVG-equipped aircrew. This modified scheme was then submitted to Bristow SAR and NPAS for consideration.

9.4 Bristow Helicopters Search and Rescue now has a UK-wide single point of contact for wind farm lighting issues. He responded to the amended draft lighting scheme proposal (as set out in paragraph 9.3 above) as follows:

this proposal is somewhat different to the ones we have dealt with in Scotland as these turbines are in close proximity to significant cultural lighting. Cultural lighting can present difficulties for crews operating on NVG as the light can cause blooming and individual lights can be 'lost' in the noise. This means crews might elect to work off NVG when operating in or near built up areas. With this in mind, this development will probably benefit from both IR and visible lighting. I'm agreement that the northern cluster will require all turbines to be lit but perimeter lighting on the southern one would be sufficient.

As always, any lighting would have to ensure that the perimeter of the development is clearly de-lineated and any turbines that protrude significantly above the rest would have to be lit. Furthermore, it is vitally important that the development is clearly marked on aviation charts and listed in appropriate databases.

9.5 In further consultations with Bristow SAR it was agreed that T17, as the highest turbine in the southern group, would also be lit, but that an infra-red light would be sufficient for this purpose.

9.6 The Head of Flight Operations at the National Police Air Service was consulted on the amended proposed lighting scheme and responded:

I can confirm that the proposed lighting scheme would be acceptable and not pose an unacceptable risk to police air support operations.

9.7 The Ministry of Defence has been consulted on the proposed lighting scheme. A response is awaited.

10. Proximity-activated lighting

10.1 In addition to the reduction in the number of turbines to be fitted with visible spectrum lighting, it is proposed to install a proximity-activated lighting system (also known as Aircraft Detection Lighting Systems or ADLS) on the Y Bryn wind farm.

10.2 It is appreciated that, while ADLS are in operation on wind farms in the USA, Canada and several European countries, policy and regulation for their introduction in the UK is not yet in place. It is also acknowledged that the deployment of such systems on any UK wind farms will require a separate and specific authorisation from the CAA.

10.3 When CAA policy and regulation on ADLS is established, Y Bryn Wind Farm Ltd will submit an ADLS scheme to the CAA for approval. Until that time, it is requested that the proposal for a reduced lighting scheme set out in this document is considered as a stand-alone proposal, notwithstanding any subsequent approval for an ADLS.

11. Summary of the proposed lighting scheme

11.1 The 21 wind turbines in the proposed Y Bryn wind farm will have tip heights exceeding 150 metres above ground level and will therefore trigger the ANO Article 222 requirement for medium intensity steady red lighting. In order to meet the requirements of users of the night low level airspace while reducing the night time visual impact of such aviation lighting on observers on the ground, Y Bryn Wind Farm Ltd requests CAA permission to provide lighting other than in accordance with the ANO, as provided in ANO Article 222(7).

11.2 The proposed Y Bryn lighting scheme is as follows:

- medium intensity steady red (2000 candela) lights on the nacelles of Turbines 1, 4, 5, 6, 7, 8, 13, 14, 19 and 21;
- a second 2000 candela light on the nacelles of Turbines 1, 4, 5, 6, 7, 8, 13, 14, 19 and 21, to act as alternates in the event of failure of the main light;
- the medium intensity lights on Turbines 1, 4, 5, 6, 7, 8, 13, 14, 19 and 21 will be switched on at sunset plus 30 minutes and switched off at sunrise minus 30 minutes by means of a timer device;
- the lights on Turbines 1, 4, 5, 6, 7, 8, 13, 14, 19 and 21 will be capable of being dimmed to 10% of peak intensity when the visibility as measured at the wind farm exceeds 5km;

21/972/NPC/1

- infra-red lights to MoD specification will be installed on the nacelles of all perimeter turbines and to the highest turbine in the Y Bryn wind farm, i.e. on all turbines except T15 and T16;
- intermediate level 32 candela lights will not be fitted on the turbine towers;
- the intention of Y Bryn Wind Farm Ltd is that the visible spectrum lighting proposed in this document will be activated by an Aircraft Detection Lighting System (ADLS). This will be subject to a separate application to the CAA for approval.

A3.3.15 CONSULTATION WITH CARDIFF AIRPORT REGARDING AIR TRFFIC SERVICES -
DECEMBER 2021

APPENDIX A

Y BRYN WIND FARM LIGHTING SCHEME			
<i>Turbine no.</i>	<i>Easting</i>	<i>Northing</i>	<i>Proposed lighting configuration</i>
1	282409	193443	2000cd red + infra-red
2	282978	193397	Infra-red only
3	283552	193600	Infra-red only
4	282920	192989	2000cd red + infra-red
5	283805	193313	2000cd red + infra-red
6	283594	192814	2000cd red + infra-red
7	282136	190907	2000cd red + infra-red
8	282528	190718	2000cd red + infra-red
9	281963	190469	Infra-red only
10	282300	189990	Infra-red only
11	282490	189646	Infra-red only
12	282783	189343	Infra-red only
13	283107	188997	2000cd red + infra-red
14	280945	189877	2000cd red + infra-red
15	281299	189545	None
16	281770	189376	None
17	282165	189164	Infra-red only
18	282459	188852	Infra-red only
19	280887	189122	2000cd red + infra-red
20	281227	188966	Infra-red only
21	281683	188698	2000cd red + infra-red

Ffion Edwards

From: Malcolm Spaven <[REDACTED]>
Sent: 17 December 2021 15:03
To: Rob Elias
Cc: Aidan Cottee; Trevor Hunter
Subject: RE: RE: Safeguarding consultation: Y Bryn wind farm
Attachments: Cardiff Airport radar visibility summary.docx; Cardiff radar cumulative.png; ATT00001.txt

Hi Rob

As advised on your voicemail this morning, in advance of our meeting on the 23rd I have attached some information that I hope will inform and frame our discussion.

In order to get a better understanding of your concerns about the potential impact of the Y Bryn wind farm on your provision of air traffic services, we have looked at your radar's line of sight to existing and consented wind farms in the airspace to the north and north west of Cardiff. We have found that there are 143 existing operational turbines within line of sight, with a further 17 turbines in wind farms that are consented but not yet built.

I have attached a list of these wind farms plus a graphic showing their location on the CAA 1:250k chart.

I hope we can have a discussion about how the impacts of those existing wind farms are managed by your controllers, and how Y Bryn might alter the situation.

Coriolis Energy's project manager for the Y Bryn wind farm, Trevor Hunter (copied in) will be joining me on the call next Thursday. I look forward to receiving your invite for the call.

Let me know if you need any further information in the meantime.

Thanks and regards

Malcolm

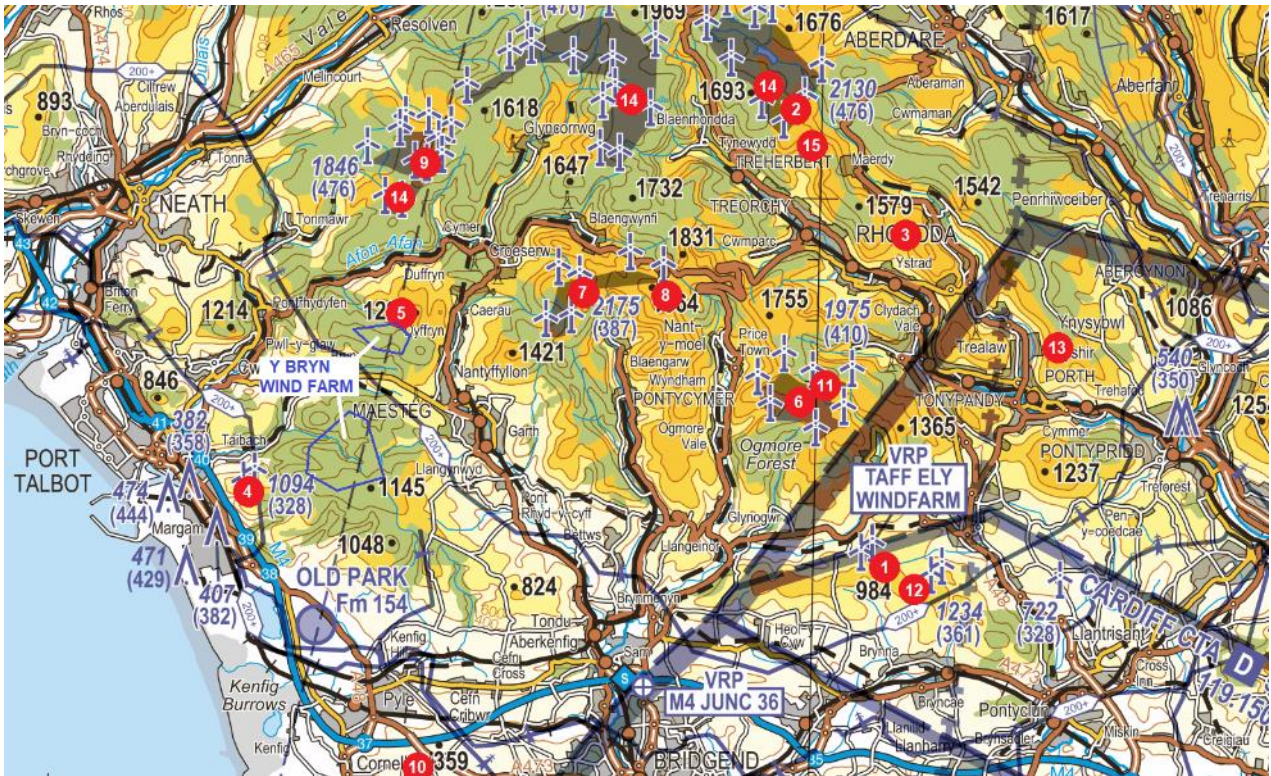
Cardiff Airport radar visibility summary

All cumulative projects in the sector 300° to 360° from Cardiff Airport radar assessed. Projects found to have no visibility are not listed.

Map no.	Project	Status	Visibility
1	Taff Ely	Operational	16 turbines visible out of 20
1	Taff Ely Repowering	Consented	All 7 turbines visible
2	Maerdy	Operational	4 turbines visible out of 8
3	Ferndale	Operational	All 8 turbines visible
4	Mynydd Brombil	Operational	All 4 turbines visible
5	Foel Trawsnant	Consented	All 11 turbines visible
6	Pant y Wal	Operational	All 10 turbines visible
6	Pant y Wal Extension	Operational	All 8 turbines visible
6	Pant y Wal Extension Phase 2	In planning	Both turbines visible
7	Llynfi Afan	Operational	All 12 turbines visible
8	Upper Ogmore	In planning	All 7 turbines visible
9	Ffynnon Oer	Operational	2 out of 16 turbines visible
10	Newton Down	Operational	Both turbines visible
11	Fforch Nest	Operational	All 11 turbines visible
12	Mynydd Portref	Operational	All 11 turbines visible
12	Mynydd Portref Extension	Operational	All 6 turbines visible
13	Llwynceilyn	Consented	Both turbines visible
14	Pen y Cymoedd	Operational	45 turbines visible out of 76
15	Abergorki	Consented	All 3 turbines visible
-	Graig Fatha	Awaiting construction	Single turbine visible
-	Site of former water tower Stormy Down	Operational	Single turbine visible
-	Parc Stormy Down	Operational	Single turbine visible
-	Haregrove Farm	Operational	Single turbine visible
-	Bwlfa Farm	Operational	Single turbine visible

Summary

143 operational turbines in radar line of sight
A further 17 consented turbines are in radar line of sight (excluding Taff Ely Repowering)



A3.3.16 GLAMORGAN GWENT ARCHAEOLOGICAL TRUST (GGAT) CONSULTATIONS

GGAT Scoping Response – February 2021

Our ref: NPT0566/JBHD

ARCHAEOLOGICAL PLANNING

Archaeological
Planning

Head of Planning
Neath Port Talbot County Borough Council
The Quays
Brunel Way
Baglan Energy Park
NEATH
SA11 2GG

1st February 2021

FAO: Steven Jenkins

Dear Sir

Re: Consultation Request from the Welsh Ministers on the Content of a Scoping Direction (EIA Development) Relating to a Proposed Application to be Made for a Development of National Significance (DNS) in Relation to a Proposed Wind Farm of up to 26 Turbines (6.6 MW per Turbine) and Battery Storage: Land at Bryn and Penhydd Forest, Located Between Port Talbot and Maesteg.
PI.App.No.: P/2021/0057.

Thank you for notifying us of this scoping request. **The proposal will require historic environment mitigation.**

The proposed application site lies within a Registered Landscape of Special Historic Interest, Margam Mountain/Mynydd Margam (Cadw Reference HLW (WGI MGI) 2). Information in the Historic Environment Record curated by this Trust and adopted by your Authority also includes information that there are remains of multi-period date within the area of the proposed development.

Our advice is that two assessments are needed in order for the impact of the proposal on the historic environment to be understood and for an appropriate mitigation strategy to be set out if necessary; an Assessment of Significance of Impact of Development on a Historic Landscape (ASIDOHL); and an archaeological desk-based assessment.

Given that an EIA is proposed, the impact on the historic environment of the proposal falls both within the remit of Cadw, and ourselves.

As the area is within the Registered Landscape, the impact of the proposal on the Registered Landscape will need to be determined, using the ASIDOHL2 process, and it is the remit of Cadw to oversee this.

Advice relating to the assessment of the impact of the proposal on the part of the historic environment which is not the Registered Landscape, falls within the remit of GGAT Archaeological Planning Management. We recommend that an archaeological desk-based assessment is undertaken, and this is the normal

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procedure for informing the content of a chapter in the EIA which deals with cultural heritage.

The supporting documentation includes the scoping report, and this in turn includes information regarding the historic environment, named as Chapter 14, Cultural Heritage. This states that an archaeological assessment will be undertaken by Headland Archaeology; initial figures are included in the supporting information.

However, there are errors in the scoping report, in paragraph 14.2.1 the Gwynedd Archaeological Trust is named, this should be Glamorgan Gwent Archaeological Trust. In the same paragraph, the use of Coflein is mentioned. Coflein should not be used for development proposals as the record is incomplete, being low level public access only; it is contrary to its terms and conditions <https://www.coflein.gov.uk/en/about> and a full search of the NMR should be made. In 14.3.1 the nomenclature of Glamorgan Gwent Archaeological Trust is wrong. Paragraph 14.3.5 should refer to the Glamorgan Archives, or the West Glamorgan Archives or the Gwent Archives as there is no Glamorgan Gwent Archive.

As the archaeological advisors to your Members, we have not yet received any correspondence from Headland Archaeology regarding an agreed methodology to meet current professional standards ((www.archaeologists.net/codes/cifa) Chartered Institute for Archaeologists, Standard and Guidance for Archaeological Desk Based assessment, paragraph 3.2.1) which state that the work needs to be undertaken to an agreed methodology.

Question 22 in the scoping report is with regard to the approach and scope of the heritage assessment. The appropriate methodology must be agreed within a document agreed between ourselves and the archaeological consultant/contractor, and there is currently not enough detail for such a document to be supplied or agreed. Headland Archaeology should contact us to ensure that the appropriate methodology is agreed and provide such a document to us.

Question 23 relates to the proposal of mitigation for the scheme. Until the completion of the ASIDOHL, and completion of the desk based assessment, there can be no understanding of the impact of the proposal on the historic environment and therefore no mitigation strategy can be proposed yet.

If you have any questions or require further advice on this matter please do not hesitate to contact us.

Yours faithfully



Judith Doyle BA (Hons) MBA MCIfA
Archaeological Planning Officer

A3.3.17 GGAT EMAIL COMMUNICATIONS – JUNE -SEPTEMBER 2021

From: Rob Dunning [REDACTED]
Sent: 01 September 2021 17:35
To: Jennifer Richards
Subject: RE: Y Bryn Windfarm - scope of baseline assessment and EIA methodology

Dear Jen,

No problem. I would have thought treating the Coast as a whole would be preferable.

Although if there are specific elements that you feel would be better addressed individually for whatever reason, then I think that would be fine.

Regards,

Rob

From: Jennifer Richards <jennifer.richards@headlandarchaeology.com>
Sent: 01 September 2021 09:52
To: Rob Dunning <Rob@ggat.org.uk>
Subject: RE: Y Bryn Windfarm - scope of baseline assessment and EIA methodology

Thank you Rob

That response was not included in the responses received via PINS, I will add it to our consultation log and will send you a WSI for the DBA (this will also address the typology etc from the scoping report).

Regarding the heritage coast, is this something that you would treat as a historic asset as a whole or as simply a collection of individual assets?

Best regards
Jen



HEADLAND
ARCHAEOLOGY
part of the **RSK Group**

REGISTERED
C/A

Jennifer Richards Senior Heritage Consultant
BA (Hons) PGDip MCiA
Headland Archaeology Midlands & West
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Headland Archaeology South & East Building 69C West Park Slace Redditch MK45 4HS t 01525 861 578	Headland Archaeology Midlands & West Unit 1 Clearview Court Twyford Rd Hereford HR2 6JR t 01432 364 901	Headland Archaeology Yorkshire & North Units 23-25 Acorn Business Centre Balne Road Cleckheaton BD19 4EZ t 01274 903 8019	Headland Archaeology North West RSK Fourways House 57 Hilton St Manchester M1 2EJ t 0161 234 6863	Headland Archaeology Scotland 15 Jane St Edinburgh EH6 5HE t 0131 467 7705
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Registered office: 65 Sussex Street, Glasgow, G41 1DX.

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From: Rob Dunning [REDACTED]
Sent: 31 August 2021 11:45
To: Jennifer Richards [REDACTED]
Subject: RE: Y Bryn Windfarm - scope of baseline assessment and EIA methodology

Dear Jen,

Many thanks for the email. I have checked our file (NPT0566) and note a scoping response from Judith back in February 2021 (see attached). The response discusses the scoping and the requirement to agree a WSI. Cadw will be the curator of any ASIDHOL2 and I don't have anything further on the Heritage Coast, beyond what is on the Vale's website.

Should you have any further queries, please get in touch.

Regards,

Rob

Rob Dunning BSc MCiA
Archaeological Planning Officer
Glamorgan-Gwent Archaeological Trust Ltd
SA12 Business Centre
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From: Jennifer Richards [REDACTED]
Sent: 25 August 2021 13:42
To: GGAT Planning [REDACTED]
Subject: FW: Y Bryn Windfarm - scope of baseline assessment and EIA methodology

My previous email bounced back as the attachment was too large – I am sending the scoping report via WeTransfer, please can you let me know when it is received and when I can expect a response

Best regards

Jen



Headland Archaeology South & East Building 68C West Park Slisloe Bedfordshire MK45 4HS t 01525 861 578	Headland Archaeology Midlands & West Unit 1 Cleanview Court Twyford Road Hereford HR2 6JR t 01432 364 901	Headland Archaeology Yorkshire & North Units 23-25 Acorn Business Centre Balme Road Cleethorpe BD19 4EZ t 01217 493 8019	Headland Archaeology North West RSK Fourways House 57 Milton St Manchester M1 2EL t 0161 234 6663	Headland Archaeology Scotland 13 James St Edinburgh EH6 5HE t 0131 457 7705
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From: Jennifer Richards
Sent: 23 June 2021 08:57
To: [REDACTED]
Subject: Y Bryn Windfarm - scope of baseline assessment and EIA methodology

I am emailing in response to comments received on the EIA scoping for the proposed Y Bryn windfarm. The scoping response from Simon White of White Consultants (LVIA consultants to NPTBC and BCBC – appendix 1 of the responses attached) indicates that you have not seen the report for this, I attach the scoping report in which Chapter 14 covers cultural heritage (with apologies for the typo on the HER in paragraph 14.2.1) along with the figures that accompany chapter 14. A desk-based assessment is in progress which will form the baseline for the EIA but had not been completed for the scoping stage.

I would welcome your thoughts on our proposed methodology for assessment including the sources of information to be consulted, the study areas proposed and the criteria for importance/significance, magnitude of effect and significance of effect. The response from White Consultants requested that we refer to Aeron Afan's *Cyfansoddiadau Buddugol yn Eisteddfod Iforaidd Aberafan* of 1853 as this contains descriptions of the changing landscape around Margam at the time and we will include this within our baseline DBA. If there are any other particular sources that you wish us to consult as part of the DBA please do let me know.

The baseline DBA will include a "stage 1 setting assessment" and we will be consulting with Cadw regarding the scope of this as well as which Historic Landscape Character areas will need to be included in the ASIDOHLZ assessment (which will form a separate technical appendix to the EIA) but would welcome any additional comments you may wish to make on this also.

I would welcome your thoughts on our proposed methodology for assessment and hope that we can agree the scope of the DBA. We would also welcome your views on whether the Glamorgan Heritage Coast should be considered as "historic asset" within our assessment and if so any additional information on this that would help us to assess its importance.

Best regards
Jen



Headland Archaeology South & East Building 68C West Park Slisloe Bedfordshire MK45 4HS t 01525 861 578	Headland Archaeology Midlands & West Unit 1 Cleveville Court Twyford Rd Hereford HG4 6JR t 01432 362 901	Headland Archaeology Yorkshire & North Units 23-25 Acorn Business Centre Balme Road Cleckheaton BD19 4EZ t 01274 493 8019	Headland Archaeology North West RSK Fourways Hobart 57 Hilton St Manchester M1 2EJ t 0161 234 6863	Headland Archaeology Scotland 13 Jane St Edinburgh EH6 5HE t 0131 467 7005
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A3.3.18 MEETING WITH LLYNFI HISTORICAL SOCIETY – JULY 2021

Summary of meeting with Bill Howells of Llynfi Historical Society

Date 22nd July 2021 1pm

Attendees: Jen Richards (Headland Archaeology), Trevor Hunter (Coriolis), Bill Howells (Llynfi Historical Society)

1 - Introductions

2 – Trevor outlined the scheme and work carried out to date. He shared the GIS with currently known assets including an overlay of the assets taken from Bill’s book “the Antiquities of Margam Mountain” (many of which are also recorded in the GGAT HER data we have received)

3 – Bill expressed the importance of the historical and archaeological remains on Margam Mountain, including several braided trackways of antiquity, and the Princess Royal memorial stone on Mynydd Bach.

4 – It was noted that the historical society had published several volumes, others that may be relevant to the baseline research included one on the historic farmsteads (though this referenced an earlier volume “Forts and Farms of Margam Mountain” by Cyril Fox (1934)).

5 – discussion about the apparent two battle sites on the mountain “Rhiw Tor Cymru” close to the turbines, and Cwm Lladdfa which was raised by the Hafod residents (and is unaffected by the scheme)

6 – Bill expressed concerns about cumulative impacts with other wind farms (particularly Penycymoedd and Mynydd Brombil)

7 – Bill suggested that the turbines would be better sited off the ridge further west to minimize effects

Action point – Trevor will send Jen his copy of Antiquities of Margam Mountain for review in the baseline, update the GIS layer with the antiquities locations and recirculate (Bill pointed out that there is an error on P12 of the book and that the labels for sites 8 and 9 should be the other way around)

A3.3.19 MEETING WITH MARGAM PARK NPT OFFICERS – NOVEMBER 2021

Y Bryn Wind Farm – consultation re: Margam Park

Meeting date 9th November 2021 (via Teams)

Attending: Jen Richards ((JR) Headland Archaeology), Trevor Hunter ((TH) Coriolis), Michael Wynne ((MW) NPT) and Paul Walker ((PW) NPT)

Following introductions TH described the evolution of the proposed scheme to the present iteration and demonstrated key viewpoints using the virtual model

AW and PW set out the main aims that Margam Park has for the future, particularly the need for financial stability and forthcoming planning applications to deliver that including a zip wire facility and other attractions at the old Estate Managers Office and a feasibility study for future uses of the castle including improved catering offer, retain, exhibition spaces and possible wedding accommodation (the orangery is currently used as a wedding venue with off-site accommodation).

MW and PW raised concerns about potential impact of turbines on the attractiveness of Margam Park as a film location (currently used frequently) but noted that the existing Brombil turbines were more intrusive.

There was discussion of the possible mountain bike trails at Y Bryn and thoughts about connecting these with the Afan trail to the north and the existing blue run at Margam. Margam Park are looking at how to attract more families so would not wish to see this run developing into a more challenging route and separation of the other users of the park (walkers, horse riders) would need to be considered.

Margam Park have grant funding to refurbish the citrus house and would like to develop this further.

Noted that the Friends of Margam Park are currently restoring the garden at Twyn y Hydd which was one of the last designs by Ralph Hancock (famous for roof gardens in New York) and that NPT are having to be careful with timing of this project and their own plans in this area so as to avoid conflict.

TH provided information about the size of the potential community benefit fund (c. £1million per year). MW and PW noted that the park would like to see the original carriage drive (north of the castle) restored and brought back into use but noted that they didn’t expect this to provide a financial return for the park.

A3.3.20 BRIDGEND CBC LVIA CONSULTATION LETTER – OCTOBER 2021

13 October 2021



FAO Rhodri Davies

Bridgend County Borough Council
Civic Offices,
Angel Street,
Bridgend,
CF31 4WB

Landscape Architects
Assessment
Planning
Design

UK & Ireland

Dear Rhodri

RE: Y Bryn Wind Farm

Following your comments on the proposed Y Bryn Wind Farm, which were included within Appendix 1 of the EIA Scoping Direction (dated 08/03/21), please find below our response to your queries (shown in blue) which were raised in relation to the Landscape and Visual chapter of the Environmental Statement (ES).

Question 14: Do consultees agree that assessing the maximum hub height available for the tip height in question is appropriate?

The taller the hub height, the smaller the blade length and therefore blade sweep area. This means that the likely visual effect of a turbine 250m tall with a larger blade sweep is likely to be greater. It is suggested that the ZTVs are based on a maximum blade tip height and maximum hub height but that the visual impact assessment takes into account the maximum sweep area (as in the Rochdale envelope approach). It would be helpful to have clear drawings illustrating the two types of turbines - one with the highest hub height and one with the largest blade length. Our view is that the 250m high turbines are likely to be too large for this site and a more realistic alternative should also be considered to inform PINS and the Ministers.

As requested, we will produce a ZTV based on the maximum blade tip height and also a ZTV based on the maximum hub height available for the proposed turbine model. The assessment of effects on seascape/landscape and visual amenity, including all visualisations will be based on the maximum swept area (i.e. largest rotor diameter) for the turbine model available.

Question 15: Do you agree with the proposed size of the study area?

The outer 45km study area appears to be reasonable for development of this scale. The main concern from a BCBC point of view is the likely significant effects more locally and therefore sufficient detailed assessment should be carried out for an inner study area of 15km supported by mapping and information at a more detailed scale such as ZTVs, viewpoints and constraints.

While we note that you consider a 45 km radius study area to be reasonable, as requested, a more detailed assessment of effects on landscape character and visual amenity, within a 15 km inner study area will be included within the Seascape Landscape and Visual Impact Assessment (SLVIA) ES chapter. This will be supported

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by mapping information, ZTVs and, viewpoints.

Question 16: Do consultees agree with the number, location and receptor types that have been selected as the representative viewpoints in order to assess the effects on visual amenity within the study area?

The range of viewpoints located within the BCBC administrative areas have been assessed through desk study and site visits. Overall, it is considered that most of the viewpoints are acceptable but a fuller picture of effects on the Llynfi valley, coastal area, heritage assets and cumulative effects is needed to understand the impact of this very large development. More specifically, to give a fuller picture of the development in its context and to cover sensitive receptors the following additional viewpoints are proposed for BCBC:

- Kenfig Burrows registered historic landscape/ Kenfig visitors carpark/ Wales Coast Path- to inform LVIA and cultural heritage assessments.*
- Ogwr Ridgeway Walk/ nearby Y Bwlwarcu hillfort and Roman Camp setting to inform LVIA and cultural heritage assessments.*
- Cemetery/ view from eastern edge of Maesteg/ associated eastern Llynfi valley slopes to show development more fully in context of the Llynfi valley.*
- Llangynwyd Conservation Area (south of cross)- nearby heritage and visual receptor and distinctive hilltop village- to inform LVIA and cultural heritage assessments.*
- A4063 users/residents on southern edge of Croeserw/ open access land/to explore cumulative effects with windfarms to east.*
- Bettws - consider settlements at a medium distance with clear views of the development.*

Guidance set out in TGN2/19 Residential Visual Amenity Assessment, Landscape Institute, March 2019 mentions wind turbines at 150m and taller when discussing realistic buffers but these turbines at 250m are significantly larger. It goes on to state: 'When assessing relatively conspicuous structures such as wind turbines, and depending on local landscape characteristics, a preliminary study area of approximately 1.5-2km radius may initially be appropriate in order to begin identifying properties to include in a RVAA.'

The public inquiry decision for Mynydd Marchywel wind farm in NPT found that its five turbines at 126.5m high breached the RVA threshold of acceptability with wind turbines at a distance of 920m-2.4km from a property. The wind farm was refused. Taking into consideration the above, our view is that distance of 2km should be scoped for the RVAA A mix of individual properties and groups of properties should be assessed as appropriate, depending on distance and arrangement

We note your request for 6no. additional viewpoints from within the study area, in order for you to gain a fuller picture of the development in its context and to cover sensitive receptors. We propose to include five of the six viewpoints requested. These are noted in the table below, along with a full list of the viewpoints that we propose to include within the SLVIA chapter of the ES. This incorporates the additional viewpoints requested from all statutory consultees, plus 5no. viewpoints to be included as part of the seascape assessment.

Please note that we propose to replace the original VP20 that was included in the Scoping Report, and which is located on Bridgend Circular Walk, Bryncoch (OS 290961, 183470), with a viewpoint from the village of Bettws (Viewpoint H) as referred to in White Consultants' report Table 2). This is located at a distance of approximately 4 km away from VP20. The location to Viewpoint 21 from Sarn Helen, Aberdulais has also been adjusted slightly to ensure that it is within open access land.

We propose to exclude a viewpoint from A4063 users/residents on southern edge of Croeserw (VP G) due to its close proximity to VP1, as this is located approximately 1.3km to the north east from VP1 – Evans Terrace, Caerau.

VP	Location	OS Co-ordinates		Distance from Nearest Turbine (km)	Wireline	Photomontage
		x	y			
1	Evans Terrace, Caerau.	285601	193880	2.04	Y	Y
2	Maesteg Golf Course	283616	191592	0.95	Y	Y
3	Bryn, (Play area, off Neath Road).	281616	191592	1.49	Y	Y
4	Brynna Road, Cwmafan	277535	192500	4.28	Y	Y
5	Rhiwlas, Neath	274240	198775	9.41	Y	Y
6	Mumbles Hill, Swansea	262781	187443	17.96	Y	Y
7	Gower Way National Trail, Cefn Bryn	249418	189883	31.24	Y	N
8	Margam Park (Deer Park)	281391	186390	2.25	Y	Y
9	Ogof-Ffynnon-Ddu (BBNP)	287452	216032	22.33	Y	N
10	St Illtyd's Way National Trail, near Cynonville	281835	195244	1.60	Y	Y
11	Wales Coast Path, Ogmore-by-Sea	286146	175100	13.77	Y	Y
12	Twmbarlwm	324198	192624	40.56	Y	N
13	Junction of Heol Gelli Lenor and Brynllwarch, Maesteg	284793	190339	2.17	Y	Y
14	Swansea Promenade, Black Pill	261996	190610	18.70	Y	Y
15	Clwyd Road, Pen-Lan, Swansea	264710	195785	17.24	Y	Y
16	The Princess Margaret Way, Aberavon	273832	190276	6.90	Y	Y
17	Margam Park	280636	186001	2.86	Y	Y
18	Pen-y-Fan (BBNP)	301202	221547	32.72	Y	N
19	Wales Coast	279990	178709	10.06	Y	Y

	Path, Rest Bay/Royal Porthcawl Golf Club, Porthcawl.					
20	Bettws	290961	183470	9.51	Y	Y
21	Sarn Helen, Aberdulais	279491	202151	8.74	Y	Y
22	Baxter Terrace, Glyncorrwg	287629	199343	6.74	Y	Y
23	Margam Park (Access Road)	280104	185810	3.28	Y	Y
24	Wales Coast Path, Kenfig Burrows	279807	181080	7.78	Y	Y
25	Bryn East, picnic area opposite Royal Oak PH	281943	192050	1.20	Y	Y
26	Ogwr Ridgeway Walk, near Bwlwarcaw Hill Fort	283680	187700	1.12	Y	Y
27	Cemetery, eastern edge of Maesteg	286321	191520	3.02	Y	Y
28	Llangynwyd	285745	188793	2.68	Y	Y
29	Oxwich Point	251216	185077	29.73	Y	N
30	Nash Point, Glamorgan Heritage Coast	291191	169275	20.92	Y	N
31	Esgair Hir, Brecon Beacons Way National Trail (BBNP)	277735	220298	26.85	Y	N
32	Open Water off Mumbles	262996	189390	17.66	Y	N
33	South of Porthcawl Marina	281987	173999	14.50	Y	N
34	Bristol Channel	258573	174494	26.64	Y	N
35	Mouth of River Neath	270487	190509	10.25	Y	N
36	Outer Swansea Bay/Bristol Channel	254300	174769	30.05	Y	N

With regards to the study area for the Residential Visual Amenity Assessment (RVAA), as requested we will increase the study area to include all properties/groups of properties within a 2 km radius rather than 1.5 km radius. A methodology for undertaking the assessment and which is based on *LI TGN 2/19 – Residential Visual Amenity Assessment (RVAA)* is included in Appendix 3.

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?

Cumulative impact assessments can be large and confusing and it is important that the most important cumulative effects are addressed clearly. Those that are most important are those with existing or consented turbines, at closer distances and juxtapositions, where there is a large sweep of turbines visible and where receptors (especially residential) have developments on two or more sides.

Additional viewpoints have been selected in this response to better reflect the potential for cumulative effects e.g. at Croeserw. The list of windfarms to be considered in Table 12.8 appear to have one of two errors. It is understood that Foel Trawsnant has been consented. The difference in size of turbine and the adjacency of this proposal are of particular concern.

The turbines east of Porthcawl (e.g. Stormy Down) appear to have been omitted. These affect perceptions in these areas and should be considered. To minimise work, all of these turbines should be considered together in relation to the development.

The comments relating to the sensitivity of landscape effects (relating to Q18 below) also apply to cumulative effects. The factors that make a landscape more or less susceptible to a series of developments, especially of different sizes and design, are not set out. This is important to understand how the judgements are reached.

There are only three categories of sensitivity which means that there is a significant difference between the descriptors of high, medium and low with intermediate categories effectively being omitted. This does not reflect the complexity of most landscapes. Five categories are recommended.

The magnitude of cumulative landscape effects correctly identifies that the combined effects of the proposed development and other wind turbine developments should be considered. This should be assessed against the baseline of no wind turbines on the basis of the temporary nature of the development, albeit long-term. However, the contribution of Y Bryn to the cumulative effect should also be described in terms of relationship with other windfarms including relative size of turbine. The significance of cumulative landscape effects has a very high threshold of significance and the definitions for major and major/moderate are very similar. It is considered that the definitions will tend to lead to under estimation of significant effects.

Magnitude of cumulative visual effects, as with landscape effects, correctly identifies that the combined effects of the proposed development and other wind turbine developments should be considered. However, the contribution of Y Bryn to the cumulative visual effect should also be described in terms of the juxtaposition and relationship with other windfarms including relationships with the viewer (e.g. on either side) and the percentage field of view etc.

The significance of cumulative visual effects includes a definition of 'the loss of some essential landscape features' in the major/moderate category. It is considered that this statement does not make sense as wind turbines usually do not lead to the 'loss of features', just substantial modification of the view.

We note your comments regarding the current status of the Foel Trawsnant Wind Farm development and also the wind turbines located on the Margam coastal plain. This development will be included within the cumulative assessment.

With regards to comments made concerning the cumulative methodology, please

refer to Appendix 1 of this letter, which includes an updated methodology. An updated list of the cumulative developments to be included within the assessment is provided in Appendix 2

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

The following general comments are made on the guidance as set out in 12.2.1.

- The Guide to Assessment of Cumulative Effects of Wind Farm Developments, ETSU (2000) is very outdated and should be given little, if any, weight. The SNH 2012 guidance is more helpful in this regard.
- LANDMAP Information Guidance Note 3 has been superseded by Natural Resources Wales Guidance Note 046 'Using LANDMAP in Landscape and Visual Impact Assessments (LVIA)', January 2021. Note that Cultural Landscape Services succeeds Cultural landscape.
- The Visual Representation of Development Proposals TAN 06/19 should be dated September 2019.
- Seascape effects should be considered in line with the documents set out in the seascape section below.

Landscape

The sensitivity of landscape is not described as combining the susceptibility of a given landscape to a particular type of development with value in line with GLVIA3. The factors that make a landscape more or less susceptible to a particular type and scale of development are not set out. This is important to understand how the judgements are reached.

There are only three categories of sensitivity which means that there is a significant difference between the descriptors of high, medium and low with intermediate categories effectively being omitted. This does not reflect the complexity of most landscapes. Five categories are recommended.

The magnitude of landscape effects does not include the criteria of the proposed development becoming a dominant or key characteristic of an area. The definitions of high and high/medium are very similar with the latter being too high a threshold. The significance of landscape effects appears to use the term 'element' where 'characteristic' would be more appropriate and in line with standard guidance definitions. The combination of sensitivity and magnitude of effect should be in line with the IEMA diagram in Appendix A.

Seascape

The effects on seascape are not addressed in the assessment. The ZTV clearly indicates uninterrupted visibility across Swansea Bay, along the southern coast of Gower and across the Bristol Channel to Exmoor. The proposed heights of turbines are so large that they are likely to modify the coastal backcloth to the seascape.

Visual Amenity

The sensitivity of visual receptors does not mention visitors to the coast, heritage assets and country parks, all of whom would be highly sensitive. It is assumed that medium sensitivity receptors would include users of B roads. As with the landscape sensitivity, three categories do not reflect the range of sensitivities of receptors and users of motorways and A roads may be considered medium/low, not low.

The significance of the visual effects indicates that defining visual elements would become subservient within the view. Presumably, this means that the development would be a dominant feature?

It is agreed that some effects of moderate significance could be significant. The

method does not mention that where a series of linked moderate effects occur (e.g. along the footpath) that this may make the combined views significant. The combination of sensitivity and magnitude of effect should be in line with the IEMA diagram in Appendix A.

LVIA outputs

The following comments are made on the figures:

- All map figures should be prepared to cover the 45km study area and separate more detailed maps showing a 15km study area.
- It is assumed that the non-statutory landscape designations will include Special Landscape Areas.
- The access and movement figures should include access land.
- LANDMAP should include aspect areas in line with updated Natural Resources Wales Guidance Note 046 'Using LANDMAP in Landscape and Visual Impact Assessments (LVIA)', January 2021. The change to cultural landscape services should be noted.
- Character Areas - the method for defining these has not been identified or are they National?
- Blade tip and hub height ZTVs should be at 15km with a 1:25k OS base as well as 45km with a 1:50k base. They should include bare ground and landcover versions to accommodate possible changes in tree cover over the life of the development.
- Viewpoints should be shown as points to give an accurate indication of their location.
- Viewpoint visualisations should include the additional viewpoints suggested in Table 2.
- Photomontages should include a range of key views to be agreed. They should not necessarily be limited to 10 as such a large scale development is proposed and may necessitate more.
- The height of the turbines may necessitate the use of portrait photos in some locations to ensure that full of the height of the turbine is covered.
- Photomontages should include A3 single frame views where possible to allow for ease of printing by third parties and decision-makers and for taking on site. A good example is the Lethans A3 viewpoint pack (see sample in Appendix B).
- The cumulative ZTVs should also be carried out at 15km radius on 1:25k OS mapping for the closest wind turbine developments.

In addition, the following information is regarded as important in understanding effects:

- Seascape character areas at national and local level.
- Forestry resource/management plans are needed showing the phasing of removal and/or replanting of the forest plantation surrounding the proposed wind farm to clearly inform how this may open up or reduce views during the lifetime of the development, or at least 10 years. Expected tree growth rates for proposed species would be helpful.
- Proposed mitigation.
- Elevations of proposed turbines showing alternatives with highest hub height and with the largest blade circumference.
- Location and details of access roads, battery storage and other ancillary infrastructure. Although some of the above will not be part of the LVIA they

should be part of the overall description of the development.

We note your comments regarding the methodology and also the requirement for a seascape assessment, therefore please find attached Appendix 1, which sets out our methodology for undertaking a Seascape/Landscape Visual Impact Assessment (SLVIA).

We also note your comments regarding the figures to be included as part of the SLVIA and confirm that these will be addressed/included as part of the final SLVIA.

We can confirm that Special Landscape Areas will be included as a non-statutory designation within the assessment/figures.

Landscape Character Areas will be derived from published Landscape Character Assessments and LANDMAP data.

With regards to the comments concerning the ZTVs, these will be produced for the 45 km and 15 km study areas, however these will be produced based on 'bare ground' only. Given the size of the study area and the amount of vegetation cover within it, it is considered that it would be difficult to accurately illustrate. Any changes in visibility due to changes in landcover will be assessed through field work surveys. This approach is recommended within paragraph 6.10 of GLVIA 3.

Regarding the points made about the visualisations, as noted we will take portrait photography where required to ensure that the full height of the turbine is covered. These will be produced following best practice guidance and therefore will include A3 single frame views. However, please note that it is proposed not to include any cumulative wirelines/photographs in the 360° (4 x 90°) where there are no turbines visible. In addition, from viewpoints where the extent of the proposed turbines exceeds a horizontal field of view of 53.5°, then the proposed development will be illustrated in the wirelines/photomontages with a horizontal field of view of 90°/180° with a cylindrical rather than planar projection.

Removal of forestry associated with the wind farm (if visible) only will be illustrated on the photomontages. Forestry removal as shown on NRW's Forestry Design Plan not directly associated with Y Bryn Wind Farm or that lie outside of the site boundary will be illustrated on visualisations from viewpoints where it is deemed necessary to illustrate any potential changes in the view due as a result of felling. Any potential effects on landscape character and visual amenity as a result of felling will also be described within the assessment text.

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

Landscape enhancement measures would need to be considered hand-in-hand with biodiversity enhancement and cultural heritage measures such as interpretation. The measures should take into consideration the effects of climate change and reinforce resilience to species loss and issues such as flooding. They should be in line with NRW advice on management of forests and general climate change guidance e.g. Communicating landscape change from adaptation and mitigation in a changing climate, Natural Resources Wales report no.396.

The clearance of forest to accommodate the development may reduce the capacity of the area to reduce run-off and this should be compensated and enhanced if at all possible.

Whilst the above may be considered as benefits, they are likely to be very minor in comparison to the level of landscape and visual effects. Whilst they need to be set out clearly with appropriate commitments, they should not be used to obscure the overall residual effects.

Comments noted

Yours sincerely

Richard Cole

Encs:
Appendix 1: Seascape/Landscape Visual Impact Assessment (SLVIA) Methodology
Appendix 2: Cumulative Wind Farm Developments
Appendix 3: Residential Visual Amenity Assessment (RVAA) Methodology

Appendix 1:

Seascape/Landscape Visual Impact Assessment (SLVIA) Methodology

1.1. Scope

- 1.1.1. The Seascape/ Landscape and Visual section of the EIA will assess effects on the physical seascape/landscape within the site boundary, together with the wider seascape/landscape character and visual amenity within the study area. A study area of 45 km from the outermost proposed wind turbine will be adopted. The SLVIA will assess the construction phase of the wind farm, and the operational phase, which would last up to 50 years.

1.2. Guidance

- 1.2.1. The assessment will adopt a methodology developed in accordance with the following current guidance:
- *Guidelines for Landscape and Visual Impact Assessment, Third Edition. Landscape Institute with the Institute of Environmental Management and Assessment (2013);*
 - *Assessing the Cumulative Impact of Onshore Wind Energy Developments, SNH, (March 2012);*
 - *Siting and Designing Wind Farms in the Landscape, Version 3, SNH (2017);*
 - *NRW Guidance Note 046, 'Using LANDMAP in Landscape and Visual Impact Assessments, (LVIA),' January 2021;*
 - *Visual Representation of Wind Farms, Version 2.2, SNH (February 2017);*
 - *Visual Representation of Development Proposals – Technical Advice Note 06/19, Landscape Institute (September 2019), including supporting Technical Information Notes 07/19, 08/19 and 09/19;*
 - *Seascape And Visual Sensitivity to Offshore Wind Farms in Wales: National Seascape Assessment for Wales – NRW Evidence Report No. 80, NRW (November 2015), Strategic Assessment and Guidance, Stage 1- Ready Reckoner of Visual Effects Related to Turbine Size, Report no. 315, NRW (March 2019)*
 - *National Seascape Assessment for Wales, NRW Evidence Report No.80, NRW (November 2015)*
 - *Carmarthen Bay, Gower and Swansea Bay Local Seascape Character Assessment, White Consultants/Cardiff University (November 2017)*
- 1.2.2. The assessment will be in accordance with best practice guidance. In order to provide a less prescriptive approach, there will be an emphasis on creating a narrative approach to describing the seascape/landscape and visual effects and any judgements made on their significance. The assessment will follow the methodology set out below.

1.3. Effects on Seascape/Landscape Character

- 1.3.1. The first stage of the assessment establishes the existing character, value and susceptibility of seascape/landscape receptors to change. Combining judgements made on susceptibility to change (Table 1.1) and value (Table 1.2) enables a considered judgement to be made on the level of sensitivity (Table 1.3) to be apportioned to each defined Seascape Character Area (SCA) and Landscape Character Area (LCA) within the study area. The criteria for informing the susceptibility of the seascape/landscape, its value and sensitivity are illustrated in the following tables:

Y Bryn Wind Farm
Appendix 1: SLVIA Methodology
October 2021

Seascape/Landscape Susceptibility

- 1.3.2. The following parameters will be applied in determining the susceptibility of the landscapes within the study area, in accordance with Table 1.1:
- Seascape/landscape quality;
 - Existing land-use;
 - The pattern and scale of the landscape;
 - The scope for mitigation, which would be in character with the existing landscape; and
 - The degree to which the particular element of characteristic contribution to the landscape character can be replaced or substituted.

Table 1.1: Susceptibility of Seascape/Landscape Receptors to Change

Susceptibility	Description
High	A seascape/landscape where the majority of attributes are unlikely to withstand change from the type of development proposed without causing a change to overall character to the extent that it would be difficult or impossible to restore. The frequency and quality of seascape/landscape characteristics is also likely to be high.
Medium	A seascape/landscape with a combination of attributes that is capable of absorbing some degree of change from the type of development proposed without affecting overall character. Restoration of landscape character may be possible. The frequency and quality of seascape/landscape characteristics is likely to be medium.
Low	A seascape/landscape where the majority of attributes are robust and/or tolerant of change from the type of development proposed to the extent that change or development would have little or no effect on overall character. It is likely to be easily restored and the frequency and quality of seascape/landscape characteristics is likely to be low.

Source: Soltys Brewster

Seascape/Landscape Value

Table 1.2: Seascape/Landscape Value

Value	Description
Outstanding	Seascape/Landscapes, which are outstanding of value by nature of their scenic quality, aesthetic and perceptual characteristics. They will have a strong sense of place that will be reinforced through their historic, cultural, geological or natural habitat importance. These areas will be important tourist destinations and may be of national or international importance as defined by statutory designations.
High	Seascape/Landscapes, which are of high value by nature of their scenic quality, aesthetic and perceptual characteristics. They may have a distinctive sense of place that may be reinforced through some historic, cultural, geological or natural habitat importance. These areas may be tourist destinations and may be of regional or county importance as defined by statutory and local authority designations.

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Medium	Seascape/Landscapes, which are of medium value by nature of their scenic, aesthetic and perceptual characteristics. Sense of place is unlikely to be perceived as distinctive, although some historic, cultural, geological or natural habitat features may be of note. The area may have some tourist associations, though tourism is not the primary attraction. These areas may be of local importance as defined by local authority designations.
Low	Seascape/Landscape, which are of low value by nature of their scenic quality, aesthetic and perceptual characteristics. Very little coherent character and a weak sense of place and are unlikely to be rare in terms of character type. They are unlikely to contain tourist attractions, or to be of local importance as defined by local authority designations.

Source: Soltys Brewster

Seascape/Landscape Sensitivity

Table 1.3: Seascape/Landscape Sensitivity

Sensitivity	Description
Very High	A seascape/landscape of outstanding or high value that may have key characteristics that will have a very high sensitivity to wind farm development of the size proposed. The seascape/landscape will be highly susceptible to change and is likely to be designated at an international or national level.
High	A seascape/landscape of high value that may have key characteristics that may have a high sensitivity to wind farm development of the size proposed. The seascape/landscape may be highly susceptible to change and is likely to be designated at a national or regional level.
Medium	A seascape/landscape of medium value that will have a range of characteristics, with varying degrees of tolerances and sensitivities to wind farm development of the size proposed. The seascape/landscape will be of medium susceptibility to change and may be designated at a regional or local level.
Low	A seascape/landscape of medium or low value that may have key characteristics that will be tolerant of wind farm development of the size proposed. The seascape/landscape will have a low susceptibility to change and may be designated at a local level only.
Very Low	A seascape/landscape of low value that will have key characteristics that will be tolerant of wind farm development of the size proposed. The seascape/landscape will be of low susceptible to change and is unlikely to be designated.

Source: Soltys Brewster

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Magnitude of Seascape/Landscape Impacts

1.3.3. The second stage of the assessment establishes the magnitude of impact on seascape/ landscape character. The criteria for informing the magnitude of impacts is illustrated in Table 1.4 below:

Table 1.4: Magnitude of Seascape/Landscape Impacts

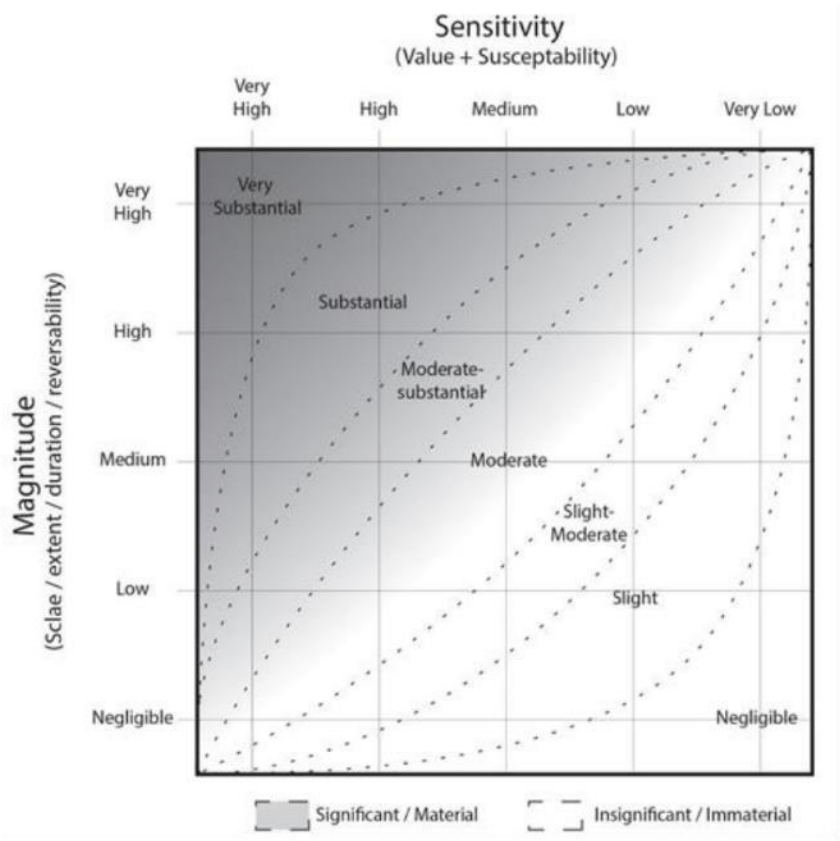
Magnitude	Description
Very High	The proposed development would result in a very large-scale loss or major alteration to key elements of seascape/landscape character. The extent of the impact will result in a fundamental and permanent change to seascape/landscape character. Impacts may occur over an extensive area.
High	The proposed development would result in a large-scale loss or alteration to key elements of seascape/landscape character. The extent of the impact will result in a considerable change. Impacts may occur over a wide area and would likely be permanent or long-term.
Medium	The proposed development would result in a moderate loss or alteration to key elements of seascape/landscape character. The extent of the impact will result in a partial change to seascape/landscape character. Impacts may extend over a notable area and may be long-term.
Low	The proposed development would result in a minor scale loss or alteration to key elements of seascape/landscape character. The extent of the impact will result in a slight change to seascape/landscape character. Impacts may extend over a limited area and may be medium to long-term.
Negligible	The proposed development would result in such a minor scale loss or alteration to key elements of seascape/landscape character that there would be no perceptible impact.

Source: Soltys Brewster

Significance of Seascape/Landscape Effects

- 1.3.4. The third stage of the assessment establishes the significance of effects on seascape/landscape character. This is determined by combining the sensitivity (Table 1.3) of the SCA/LCA with the magnitude of impact (Table 1.4) that would occur as a result of the proposed development.
- 1.3.5. Figure 12.1 has been used as guidance in combining judgements on sensitivity and magnitude of impact to determine the significance of effects on seascape and landscape character. This is adapted from the version provided in IEMA's Special Report entitled; The State of Environmental Impact Assessment Practice in The UK (2011). The significance of the effect is defined in Table 1.5 below.

Figure 12.1: Significance of Effects on Seascape/Landscape Character



- 1.3.6. Figure 12.1 has been used as guidance in combining judgements on sensitivity and magnitude of impact to determine the significance of effects on seascape/landscape character. This is adapted from the version provided in IEMA's Special Report entitled; The State of Environmental Impact Assessment Practice in The UK (2011). The significance of the effect is defined in Table 1.5 below.

Table 1.5: Significance of Seascape/Landscape Effects

Significance	Description
Very Substantial	The proposed development will typically have very substantial effects upon landscape character. These effects would typically result from a very high magnitude of impact on seascape/landscape character. The receiving seascape/landscape will typically have a very high sensitivity to wind farm development of the size proposed.



Substantial	The proposed development will typically have substantial effects on seascape/landscape character. These effects would typically result from a high magnitude of impacts. The receiving seascape/landscape will typically have a high sensitivity to wind farm development of the nature and size proposed.
Moderate/Substantial	The proposed development will typically have moderate to substantial effects on seascape/landscape character. These effects would typically result from a medium to high magnitude of impacts. The receiving seascape/landscape will typically have a medium to high sensitivity to wind farm development of the nature and size proposed.
Moderate	The proposed development will typically have moderate effects on seascape/landscape character. These effects would typically result from a medium magnitude of impacts. The receiving seascape/landscape will typically have a medium sensitivity to wind farm development of the nature and size proposed.
Slight/Moderate	The proposed development will typically have slight to moderate effects on seascape/landscape character. These effects would typically result from a low to medium magnitude of impacts. The receiving seascape/landscape will typically have a low to medium sensitivity to wind farm development of the nature and size proposed.
Slight	The proposed development will typically have slight effects on seascape/landscape character. These effects would typically result from low magnitude of impacts. The receiving seascape/landscape will typically have a low sensitivity to wind farm development of the nature and size proposed.
Negligible	The proposed development will typically have negligible effects on seascape/landscape character. These effects would typically result from a negligible magnitude of impacts. The receiving seascape/landscape will typically have a very low sensitivity to wind farm development of the nature and size proposed.

Source: Saltys Brewster

- 1.3.7. Effects determined to have moderate/substantial seascape/landscape significance or above will be considered to be significant. Conversely, effects determined to be slight/moderate and below will be considered not significant.
- 1.3.8. Where effects are determined to have moderate significance, whether these effects are significant or not significant will depend on the individual and specific mitigating circumstances and the professional opinion of the landscape specialist will determine this.

Effects on Visual Amenity

- 1.3.9. The first stage of the assessment establishes the susceptibility and value of visual receptors to change from each of the agreed viewpoint locations. Combining judgements made on susceptibility and value enables a considered

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judgement to be made on the level of sensitivity to be apportioned to the viewpoint receptor. The criteria for informing the susceptibility of visual receptors, their value and sensitivity are illustrated in the following tables.

Susceptibility of Visual Receptors to Change

Table 1.6: Susceptibility of Visual Receptors to Change

Susceptibility	Description
High	May typically include residents of properties, including private houses, caravans, B&Bs, guest houses and hotels where the main view is orientated towards the proposed wind farm development, or people undertaking recreation where the seascape/landscape within which the wind farm development is seen as the primary reason for attraction or reason for visit (e.g. walkers and hikers on recognised footpaths, open access land, rights of way and scenic route users, yacht and inshore recreational boat users). Receptors are more likely to be within a recognised tourist attraction where views of the surroundings are an important contributor to the experience. It is unlikely that receptors will be able to accommodate any degree of new visual elements of the type proposed, by virtue of their location, nature and/or existing visual qualities and elements.
Medium	May typically include people undertaking recreation which is site or activity focussed, e.g. hunting, shooting, angling, nature conservation, golf, water based activities, cultural heritage based activities; outdoor workers or travellers on road, rail, ferries or other transport routes. Receptors are able to accommodate a degree of new visual elements of the type proposed, by virtue of their location, nature and/or existing visual qualities and elements. Receptors may be susceptible to change, although less likely to be at a recognised tourist attraction where views of the surroundings are an important contributor to the experience.
Low	May typically include people engaged in outdoor sport, either on land and on the water or undertaking a recreation that does not involve or depend on appreciation of views of the landscape; people at work, whose attention would not be focused on the surrounding seascape/landscape and whose setting is not typically important to the quality of their working life. Receptors where new visual elements of the type proposed may be readily accommodated, by virtue of location, nature and/or existing visual qualities and elements. Receptors will not be at a location recognised as a tourist attraction where views of the surroundings are an important contributor to the experience.

Source: Saltys Brewster

Value Attached to the View

Table 1.7: Value Attached to the View

Value	Description
High	Location where the views are widely acknowledged at a national/regional level through reference to them in officially promoted guide-books and leaflets or referenced in literature or art and are of primary importance to the receptors experience and perception of the view. Provision of facilities that specifically promote the enjoyment of the view, including views

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	towards the proposed development will be present such as seating and interpretation boards. Views towards the wind farm development may be more typically unrestricted and or panoramic and would be devoid of detractor elements.
Medium	Location where the view may be locally recognised or positively contributes to the setting of the area. Views may contribute to the setting of regional/locally designated seascape/landscape(s) or features of local seascape/landscape value. Provision of facilities, such as seating and interpretation boards, but these are unlikely to be related or connected to the enjoyment of the view, including views towards the proposed development. Views towards the wind farm development may be more typically primary, direct or open, and may have some detracting elements.
Low	Location where the view is not recognised, documented or associated with a designated seascape/landscape. The views will not be acknowledged or provided for in terms of facilities. Views towards the wind farm development may be more typically secondary, oblique or filtered, and may have multiple detracting elements.

Source: Soltys Brewster

Sensitivity of Visual Receptors

Table 1.8: Sensitivity of Visual Receptors

Sensitivity	Description
Very High	The majority of receptors would be particularly responsive to wind farm development of the size proposed, by virtue of their location, nature and/or existing visual qualities and elements. Receptors are likely to have a high susceptibility to change and considered to be at a location that may be valued for its views at a national level. Receptors would typically include occupiers of residential properties and people engaged in recreational activities in the countryside or on water such as designated long-distance footpaths or other promoted walking or recreational routes
High	The majority of receptors may be responsive to wind fam development of the size proposed, by virtue of their location, nature and/or existing visual qualities and elements, but not exclusively so and may be able to accommodate some new visual elements. Receptors are likely to have a medium to high susceptibility to change and considered to be at a location valued for its views at a regional level. Receptors would typically include residents or people engaged in recreational activities in the countryside or on water such as using local public rights of way, National Cycle Routes, or recreational users of coastal areas, such as yachting, pleasure boating, bathing and promenading.
Medium	The majority of receptors are able to accommodate some new visual elements of the type proposed, by virtue of their location, nature and/or existing visual qualities and elements. Receptors are likely to have a medium susceptibility to change and considered to be at a location that may not be valued for its views. Receptors would typically include people engaged in outdoor sporting activities that are connected to the landscape or seascape, such as golfers

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	and water sport enthusiasts and also people travelling through the landscape on minor roads, trains and ferries.
Low	The majority of receptors are unlikely to be responsive to wind fam development of the size proposed, by virtue of their location, nature and/or existing visual qualities and elements, but not exclusively so. Receptors are likely to have a low to medium susceptibility to change and not considered to be at a location that is recognised or valued for its views. Receptors would typically include people undertaking outside work, such as farmers and commercial trawlerman, or a sporting activity that is unconnected with the seascape/landscape.
Very Low	Receptors are able to accommodate a high degree of new visual elements of the type proposed by virtue of their location, nature and/or existing visual qualities and elements. Receptors are likely to have a low susceptibility to change and not considered to be at a location valued for its views. Receptors would typically include people at a place of work, such as an in an office or dock worker and people travelling through the landscape on A roads and motorways.

Source: Soltys Brewster

Magnitude of Visual Impacts

- 1.3.10. The second stage of the assessment establishes the magnitude of impacts on visual amenity. The criteria for informing the magnitude of impacts are illustrated in Table 1.9:

Table 1.9: Magnitude of Visual Impacts

Magnitude	Description
Very High	The proposed development would be immediately apparent as a very large-scale feature that would occupy a wide proportion of the view, contrasting with existing features such as the extent and nature of other built development visible within the view, including vertical elements. The proposed development is likely to be visually dominant and would affect and change the overall appearance of the view to the extent that other features would become subordinate. Views of the development are likely to be from close distance. Views will be very long in duration.
High	The proposed development would be an apparent feature, as a large-scale feature that is likely to occupy a significant proportion of the overall view. The development may contrast with existing features such as the extent and nature of other built development visible within the view, including vertical elements. The proposed 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 of the development are likely to be medium to close distance and may be long in duration.
Medium	The proposed development would form a recognisable new element of moderate scale within the view and would be readily observed without fundamentally changing the overall nature of the view, including the extent and nature of other built development including vertical elements. Overall quality of the view may remain intact. Development is likely to be visible across a moderate proportion of the view, to the extent that the proposed wind farm is not prominent. Views of the development are likely to be medium distance and moderate in duration.

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Low	The proposed development would form a component of small scale within the wider view that might be missed by the casual observer. Awareness of the development would not have a marked impact on the overall quality of the view. Development may be visible to a limited proportion of the view, to the extent that the proposed wind farm is not a defining element. Views of the development are likely to be medium to long distance and glimpsed or brief in duration.
Negligible	The proposed development would be viewed at a scale that would be barely perceptible, or imperceptible, and would have no discernible impact on the overall quality of the view. The proposed development is unlikely to be visible or restricted to long distance views that would be glimpsed or very brief in duration

Source: Soltys Brewster

Significance of Visual Effects

- 1.3.11. The third stage of the assessment establishes the significance of effects on visual amenity. This will be determined by combining the sensitivity of the visual receptor (Table 1.8) with the magnitude of impact (Table 1.9) that would occur as a result of the proposed development.
- 1.3.12. Figure 12.2 has been used as guidance in combining judgements on sensitivity and magnitude of impact to determine the significance of effects on visual amenity. This is adapted from the version provided in IEMA's Special Report entitled; The State of Environmental Impact Assessment Practice in The UK (2011). The significance of the effect is defined in Table 1.10.

Figure 12.2: Significance of Effects on Visual Amenity

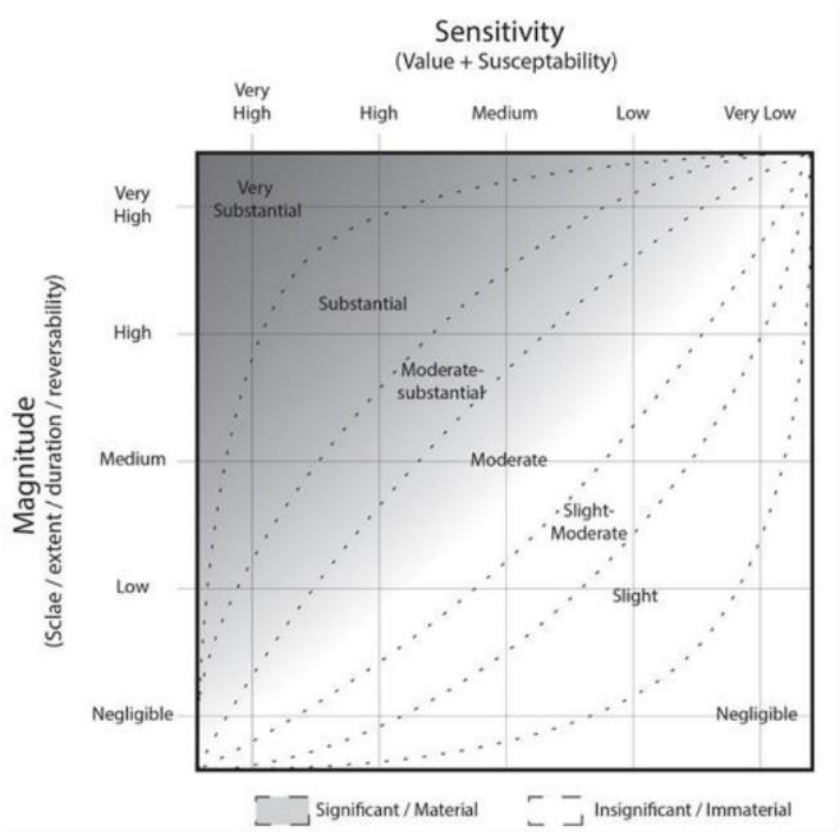


Table 1.10: Significance of Visual Effects

Significance	Description
Very Substantial	The proposed development will typically have very substantial effects upon visual amenity. These effects would typically result from a very high magnitude of impact on views. The receptor will typically have a very high sensitivity to wind farm development of the nature and size proposed.
Substantial	The proposed development will typically have substantial effects upon visual amenity. These effects would typically result from a high magnitude of impact on views. The receptor will typically have a high sensitivity to wind farm development of the nature and size proposed.

Moderate/ Substantial	The proposed development will typically have moderate to substantial effects upon visual amenity. These effects would typically result from a medium to high magnitude of impact on views. The receptor will typically have a medium to high sensitivity to wind farm development of the nature and size proposed.
Moderate	The proposed development will typically have moderate effects upon visual amenity. These effects would typically result from a medium magnitude of impact on views. The receptor will typically have a medium sensitivity to wind farm development of the nature and size proposed.
Slight/ Moderate	The proposed development will typically have a slight to moderate effects upon visual amenity. These effects would typically result from a low to medium magnitude of impact on views. The receptor will typically have a low to medium sensitivity to wind farm development of the nature and size proposed.
Slight	The proposed development will typically have a slight effect upon visual amenity. These effects would typically result from a low magnitude of impact on views. The receptor will typically have a low sensitivity to wind farm development of the nature and size proposed.
Negligible	The proposed development will typically have negligible effects upon visual amenity. These effects would typically result from a negligible magnitude of impact on views. The receptor will typically have a very low sensitivity to wind farm development of the nature and size proposed.

Source: Soltys Brewster

- 1.3.13. Viewpoint locations where effects are determined to have moderate/substantial visual significance or above will be considered to be significant. Conversely locations determined to have visual effects that are slight/moderate or below will be considered not significant.
- 1.3.14. Where effects are determined to have 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.

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1.4. Assessment of Cumulative Effects

- 1.4.1. In addition to assessing the individual effects of the proposed wind farm on seascape/landscape character and visual amenity the SLVIA will also assess the cumulative effects of existing, consented, and those wind farms submitted for planning.
- 1.4.2. 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 seascape/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.
- 1.4.3. It is proposed that the same viewpoints used to assess the individual effects on visual amenity, will be used to illustrate cumulative effects.

1.5. Cumulative Effects on Seascape/Landscape Character

- 1.5.1. The significance of cumulative effects on seascape/landscape character will be determined by combining the sensitivity of the Seascape/Landscape Character Area with the magnitude of cumulative that would occur.

Seascape/Landscape Sensitivity

- 1.5.2. The first stage in assessing the cumulative effects on seascape/landscape character is to establish the sensitivity of the seascape/landscape. 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 1.3 would be applied.

Magnitude of Cumulative Seascape/Landscape Impacts

The second stage of the cumulative assessment establishes the magnitude of cumulative impact on seascape/landscape character. The criteria for informing the magnitude of impacts are illustrated in Table 2.1:

Table 2.1: Magnitude of Seascape/Cumulative Landscape Impacts

Magnitude	Description
Very High	The combined impacts of the proposed development and other cumulative developments would result in a very large-scale loss or major alteration to key elements of seascape/landscape character. The extent of the impact will result in a fundamental and permanent change to seascape/landscape character. Impacts may occur over an extensive area.

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