

Appendix 15

Aviation & Existing Infrastructure

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List of Abbreviations

Abbreviation	Description
agl	above ground level
AOD	Above Ordnance Datum
CAA	Civil Aviation Authority
ft	feet
km	kilometres
m	metres
MoD	Ministry of Defence
NRR	Night Rotary Region
SAR	Search and Rescue
VFR	Visual Flight Rules
WAA	Wales Air Ambulance

A15.1 ESTIMATED FREQUENCY OF ACTIVATION OF PROXIMITY ACTIVATED LIGHTING SYSTEM

Introduction

- A15.1.1 This appendix assesses the probable amount of time that visible lighting on the Y Bryn Wind Farm (proposed development) would be switched on by passing aircraft if a proximity-activated lighting system was fitted to the wind farm.
- A15.1.2 Proximity-activated lighting systems consist of:
- a sensor or sensors to detect aircraft in the vicinity;
 - a control system to determine whether detected aircraft meet the criteria for the lights to be switched on; and
 - a lighting control network to pass switch on/off commands from the sensors and control system to the lights.
- A15.1.3 There are two principal forms of proximity-activated lighting system: those based on primary surveillance radar sensors, and those based on passive sensors that detect transponder or other electronic conspicuity transmissions from aircraft. This document does not differentiate between these types of proximity-activated lighting system.
- A15.1.4 The document assumes that the activation criteria will be as stated by the Civil Aviation Authority (CAA) in their preliminary views on proximity-activated lighting systems, i.e. an aircraft entering a 4 kilometre (km) radius bubble around the outer perimeter of the wind farm at an altitude less than 1000 feet (ft) above the blade tips of the highest turbine and higher than 150 m (500 ft) above the ground level at the lowest turbine. In the case of the proposed development these altitude criteria translate to a bubble between 423 m (1389 ft) and 867 m (2850 ft) Above Ordnance Datum (AOD). The lighting activation zone around the proposed development is illustrated in Figure A15.1.

Source: Aviatika

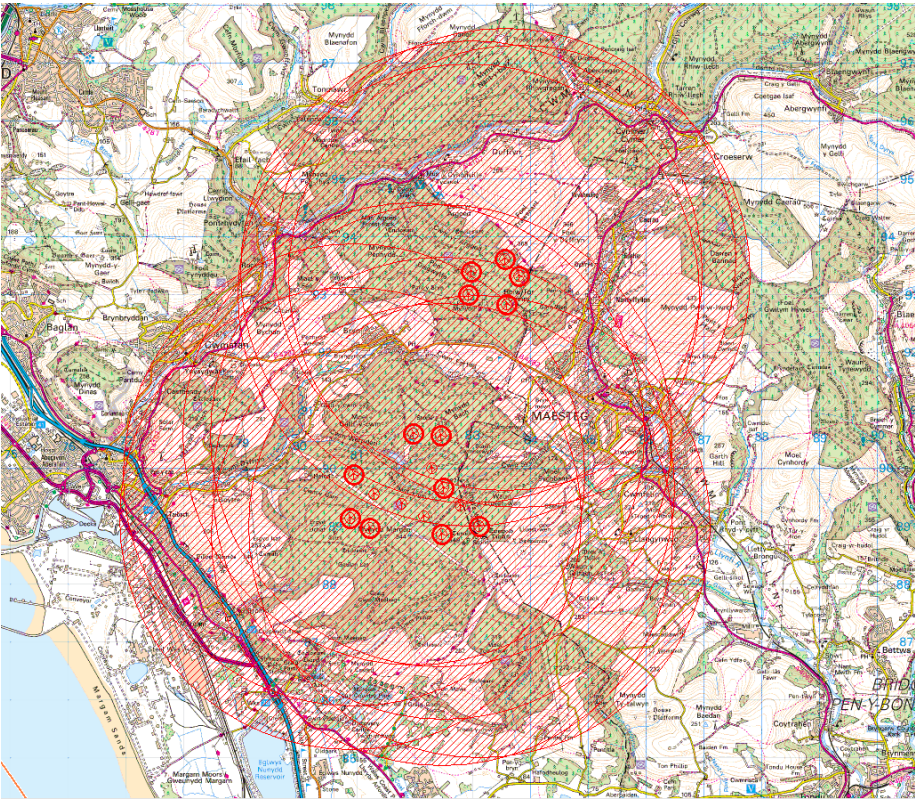


Figure A15.1: Illustrative activation area of a proximity-activated lighting system

Air Traffic Estimates

- A15.1.5 There are no data available for the volume of air traffic at low level passing a particular location. However, some generic data on activity levels by particular forms of air traffic are available and have been used as a basis for the estimates generated in this appendix.

Military Low Flying

- A15.1.6 The proposed development is located in Night Rotary Region 7 South (NRR7S) in the military Night Low Flying System, one of 14 such regions across the southern half of England and Wales where priority is given to rotary wing (helicopter) night low flying but where fixed wing low flying may also take place (see Figure A15.2). The land area of NRR7S covers South Wales from the English border between Monmouth and the Severn Bridges, westwards to Worms Head. However only 22% of the area of NRR7S is over land, the remaining 78% extending over the Bristol Channel to 150 km west of Skokholm Island.

Data published by the Ministry of Defence (MoD) show that, in the latest year for which data is available, NRR7S was the third least busy of the 14 Night Rotary Regions (NRR), as Table A15.1 shows.

Night Rotary Region	No. of flying hours	% of UK night flying hours
1	2139	19.2%
1N	182	1.6%
2	3011	27.0%
3	419	3.8%
4A	128	1.1%
4B	970	8.7%
4C	173	1.5%
5	894	8.0%
7N	179	1.6%
7S	106	1.0%
9	54	0.5%
10	1012	9.1%
13	21	0.2%
18	226	2.0%

A15.1.8 The probability of a military aircraft on a night low level training flight passing over any given location depends not only on the number of hours flown in the relevant NRR, but also on the geographical size of that NRR. Table A15.2 shows a comparison of the ‘density’ of military night low level flying in NRR7S compared to its immediately adjacent neighbour region to the north, NRR7N, for the period 2016-2021. It can be seen that, even if it is assumed that all low flying in NRR7S takes place only over its land area, and none over the sea, the likelihood of a military aircraft flying low at night over any given location in NRR7S is two and a half times less than at any given location in NRR7N.²

Night low flying area	Area (sq km)	Night low flying hours 1 April 2016-31 March 2021	Mean traffic density (minutes per sq km per annum)
NRR7S	13,901	414	0.36
NRR7S (land area only)	3,109	414	1.60
NRR7N	2,608	863	3.97

A15.1.9 There are some other features of NRR7S that have a bearing on the likely frequency with which military aircraft may pass over a particular location. The part of NRR7S containing the proposed development is also within a feature of the low flying system known as the Glamorgan Transit Area (see Figure A15.3). In this area:

- fixed wing military aircraft are not permitted to fly at less than 2000 feet above ground level (agl);
- medium and large helicopters are not permitted to fly at less than 1000 feet agl; and

² Ministry of Defence, The Pattern of Military Low Flying Across the UK 2020-21, Table 2; UK Military Aeronautical Information Publication, ENR 5.2.7; Ministry of Defence, FOI response 2021/12724, 1 November 2021.

- small helicopters are not permitted to fly at less than 500 feet agl in rural areas and 1000 feet agl in congested areas.³

Source: NATS

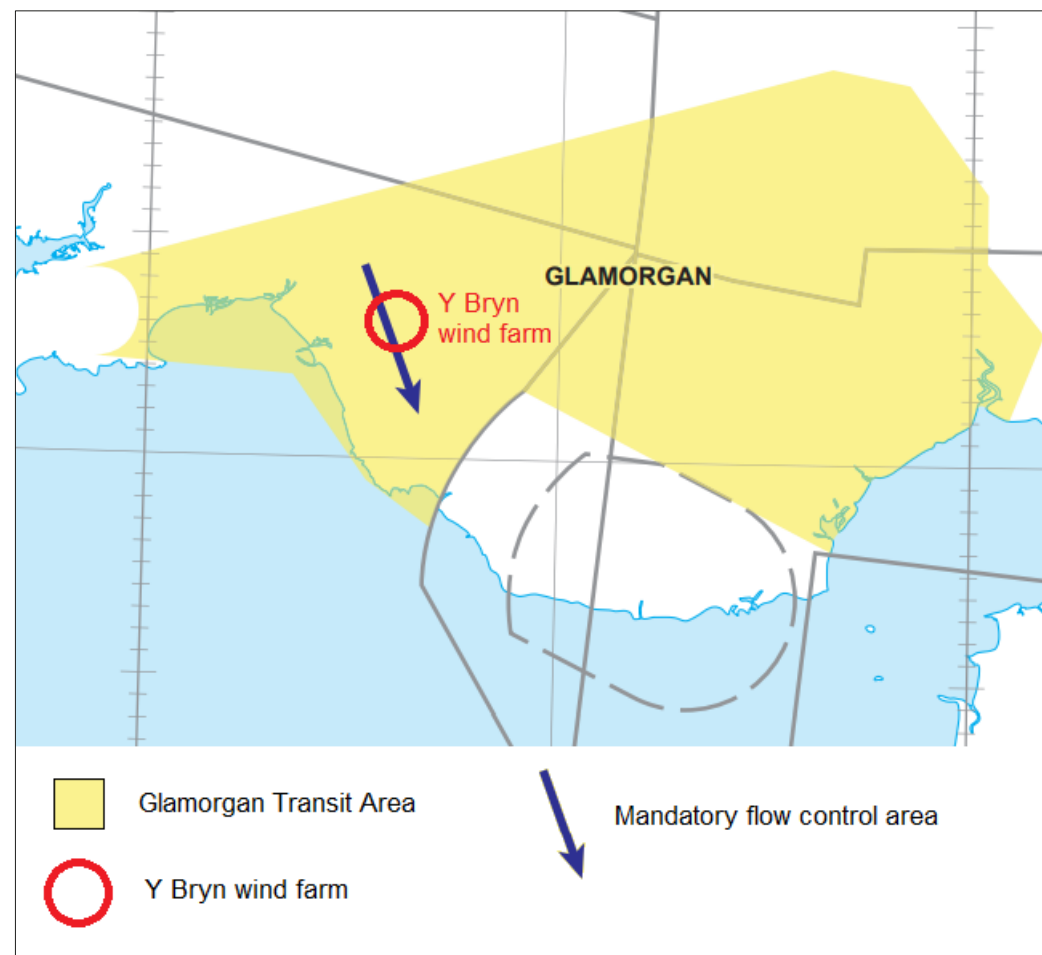


Figure A15.3: Glamorgan Transit Area

A15.1.10 The prohibition on fixed wing aircraft flying at less than 2000 ft agl in the Glamorgan Transit Area puts them outside (above) the military low flying system and also well above the upper height criterion for activating a proximity-activated lighting system (see Paragraph A15.1.4). Consequently, there is no possibility of a fixed wing military aircraft triggering a proximity-activated lighting system at the proposed development. The rules for helicopters mean that they could, theoretically, be within the lighting activation airspace 'bubble' for the proposed development.

A15.1.11 NRR7S, in which the proposed development is located, was used for 106.4 hours of military night low flying in 2020-21. Fixed wing aircraft made up 19.0 of those hours, and since fixed wing aircraft cannot fly over Y Bryn low enough to trigger a proximity activated lighting system, those hours can be discounted, leaving 87.4 hours of helicopter low flying.

A15.1.12 For military helicopters, flying at an assumed cruise speed of 120 knots, a typical transit time through NRR7S, given its land area, can be assumed to be 20 minutes. Thus the 87.4 helicopter hours per annum through NRR7S translates to five flights a week on average.

A15.1.13 Since light activation will occur when an aircraft is within 4 km of the wind farm, the 'light activation swathe' for a helicopter on a 20 minute (=75 km) transit through NRR7S is 600 km². The land area of NRR7S is 3,109 km². If every aircraft flew the same route through NRR7S, the probability of overflight for locations that happened to be under that route would be five times a week. If aircraft were following random routes, the probability of overflight within 4 km of any given location would be somewhere between zero and five a week.

A15.1.14 For a helicopter flying at a typical speed of 120 knots, transit of the 4 km radius lighting activation 'bubble' around the proposed development would take between 2.4 and 3.5 minutes, depending on the flight path. On this basis, military helicopter activations of the lights on the proposed development are estimated to occur for periods ranging from zero up to a maximum of 910 minutes per annum.⁴

A15.1.15 No account has been taken, in preparing these estimates of the frequency of activation of the lights by military aircraft, of aircraft flying below the lighting activation trigger 'bubble', i.e., in the case of the proposed development, at less than 1362 ft above sea level. Due to the height of terrain in the area and the prevalence of 'congested areas' it is considered unlikely that helicopters would be flying below that level.

Search and Rescue (SAR) Helicopters

A15.1.16 In the year to 31st March 2021 the St Athan-based SAR helicopter unit completed 231 taskings⁵. Of these, 107 were to incidents to the north-west of St Athan and could therefore have involved search or transit flying in the vicinity of the proposed development. Of the 107 taskings, 43 occurred between the hours of 1800. and 0600., approximating to the hours of darkness. If it is conservatively assumed that:

- all of the night time taskings to the north-west of St Athan involve flying within 4 km of the proposed development
- all such flights are operating at less than 1000 ft above the highest blade tips; and
- each tasking that takes the helicopter within 4 km of the proposed development involves two activations of the lights – one on the outbound flight, the other on the return;
- that would result in the St Athan SAR helicopter activating the lights at the proposed development approximately 86 times a year. At a typical AW189 cruise speed of 140 knots, each transit of the light activation bubble would take between one and three minutes, depending on the flight path. Assuming all SAR helicopter activations are by transiting aircraft, this would mean that light activations would be between 86 and 258 minutes per annum.

³ Military Aviation Authority (2021) Regulatory Article 2330 – Low Flying, Issue 5, paragraph 44.

⁴ This assumes that all military helicopter flights through NRR7S take place exclusively over its land area.

⁵ Available at - <https://www.gov.uk/government/statistics/search-and-rescue-helicopter-annual-statistics-year-ending-march-2021/search-and-rescue-helicopter-statistics-year-ending-march-2021#maps-of-sarh-taskings-and-bases> [Accessed 26/05/2023]

Air Ambulance Helicopters

A15.1.17 Wales Air Ambulance (WAA) helicopters flew 1870 missions in 2021.⁶ The organisation covers the whole of Wales, with helicopters based at Cardiff, Llanelli, Caernarfon and Welshpool. 27% of the organisation’s overall call-outs – which includes ground-based operations using Rapid Response Vehicles – were to incidents in south-west Wales, covering the local authority areas of Bridgend, Neath Port Talbot, Swansea, Carmarthenshire and Pembrokeshire. This area encompasses the proposed development. While the bulk of the operations in the south-west region are likely to have been served from the Llanelli base, some are expected to have been served by the aircraft based at Cardiff Heliport.

A15.1.18 The Llanelli-based helicopter operates from 0700 to 1900 hours daily. The Cardiff-based helicopter provides a 24-hour service. It is assumed for the purposes of this document that:

- 27% of all Wales Air Ambulance helicopter call-outs were to the south-west region;
- 10% of those call-outs were in the hours of darkness;
- 20% of those night call-outs involved flying within 4 km of the proposed development; and
- each call-out involved two transits past the proposed development – an outbound flight and a return to base.

A15.1.19 That would produce an estimated 20 Wales Air Ambulance flights a year passing within lighting trigger distance of the proposed development. Assuming a ground speed of 120 knots, transit time of the light activation bubble would be between 1 and 3.5 minutes. Thus the annual light activation time by WAA helicopters is estimated to be between 20 and 70 minutes.

Police Helicopters

A15.1.20 Figures are not available for the operations of the National Police Air Service helicopter at St Athan. For the purposes of this analysis it is assumed that the probability of them being active at night in the vicinity of the proposed development is similar to that of the WAA helicopters – approximately 20 to 70 minutes of light activation a year.

Other Night Low Level Traffic

A15.1.21 Other categories of night low level airspace user – private and commercial Visual Flight Rules (VFR) helicopter flights, Private Pilot’s Licence Night Rating training flights and night transits by private light aircraft – are estimated to be rare in the area surrounding the proposed development due to high terrain, prevalence of weather precluding VFR flight and the relative scarcity of airfields open at night. Any such flights through the area are likely to follow the coast, or to remain at altitudes higher than the lighting activation airspace. For the purposes of this analysis it is assumed that one such flight per annum passes within 4 km of the proposed development at an altitude lower than 1000 ft above the highest blade tips. Transit speed is assumed to be 90 knots, giving a transit time of between 1 and 4.7 minutes depending on route and direction of travel.

Overall Estimates

A15.1.22 The estimates of activation times for each category of air traffic, and for all air traffic, are summarised in Table A15.3. It can be seen that, even if the maximum amounts of activity in each category are assumed, the lights would be switched on for less than 0.6% of the periods of official night (sunset +30 minutes until sunrise -30 minutes). In other words, the lights would be switched off for at least 99.4% of the hours of darkness.

Table A15.3: Y Bryn lighting activation time estimates

Category of air traffic	Estimated activation time (minutes/year)			Percentage of official night hours ⁷		
	Min	Max	Mean	Min	Max	Mean
Military helicopter	0	910	455	0.000%	0.389%	0.194%
SAR helicopter	86	258	172	0.037%	0.110%	0.074%
WAA helicopter	20	70	45	0.009%	0.030%	0.019%
Police helicopter	20	70	45	0.009%	0.030%	0.019%
Other users	1	5	3	0.000%	0.002%	0.001%
Totals	127	1313	720	0.054%	0.561%	0.615%

Source: Aviatika

A15.1.23 It should be noted that the estimated activation times do not include periods when the lights are switched on due to a system fault.

Comparison with Operational Proximity-activated Lighting Systems in Germany and Austria

A15.1.24 Table A15.4 shows the percentage activation times for 11 operational wind farms in Germany and Austria where Lanthan Safe Sky proximity-activated lighting systems are deployed.

A15.1.25 The German-Austrian data show generally higher activation times than those estimated for Y Bryn. However two of the three Austrian wind farms – Mistelbach and Rendlbahn - had activation times similar to the minimum estimate for Y Bryn, while three of the wind farms in the vicinity of Bremen had no activations (or, at least, less than 0.01% of the time). It is understood that several of the wind farms are located close to airfields and low flying routes that are routinely used at night. Wiemersdorf, for example, is only 1.8 km from a large Federal Police helicopter base and has the controlled airspace of Hamburg Airport at 4500 ft above the wind farm, and 1000 ft above ground level 1.5 nm to the south of the wind farm, forcing many aircraft to fly at lower levels and therefore activate the lighting system.

⁶ Available at - <https://www.walesairambulance.com/pages/category/our-missions> [Accessed 26/05/2023]

⁷ The total period of Official Night at Y Bryn is estimated to be 3900 hours per annum.

Table A15.4: Lighting activation times at eleven wind farms in Germany/Austria

Wind farm name	Lighting activation times	
	% of night time	Minutes per week
Wiemersdorf	1.96	88.2
Bremen 24	2.80	126
Bremen 26	0.00	0
Bremen 27	6.50	292.5
Bremen 28	1.80	81
Bremen 29	0.00	0
Bremen 30	0.00	0
Bremen 31	7.30	328.5
Mistelbach	0.10	4.5
Eisenstadt	4.80	216
Rendlbahn	0.10	4.5
Average	2.31	103.95

Source: Lanthan Safe Sky