

APPENDIX 15.1:

WIND POWER AVIATION CONSULTANTS LIMITED REPORT



Wind Power Aviation Consultants Ltd

Briefing Note: MOD Lighting Requirements at the Mynydd y Gwynt Proposed Wind Farm in Wales

Our Reference: WPAC/009/13
Your Reference: Mynydd y Gwent

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Released by: Cdr John Taylor RN

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This paper is written by Sqn Ldr Mike Hale RAF. He has over 40 years piloting, instructing and examining experience on aircraft including RAF Lightnings, Phantoms and Tornados which has included 3500 hours of low level operations and training in the UK and overseas theatres. Over the last 8 years, in parallel to his flying duties, he has held the post of MOD Air Staff Low Level Airspace Manager & Wind-Farm Subject Matter Expert. He has assessed over 14,000 wind-farm applications against low flying, weapons range, specialist airspace and aerodrome safeguarding criteria. Sqn Ldr Hale has also managed two Air Staff Wind Farm Flight Trials for the MOD, CAA, RUK and Trinity House. In 2012, he was awarded an MBE for generating a proactive and mutually successful working relationship between the Wind Power Industry and the MOD Air Staff.

Mynydd y Gwynt (Sweet Lamb) Wind Farm - Background

The Wind Farm at Sweet Lamb, proposed by Mynydd y Gwynt is located close to the centre of MOD Low Flying Area 7 (LFA 7) within the UK Military Low Flying System (LFS) – see Annex A. This important LFA includes most of Wales except for a small area to the northeast of Powys. Military units in the area include RAF Valley, MOD St Athan and the Air Weapons Range at Pembrey Sands. The training opportunities offered by the Welsh landscape, and the lack of controlled airspace above LFA 7, provides a high level of flexibility for military aircraft and helicopters using the area for operational training. Within the LFA, fast jet and tactical transport aircraft are cleared down to 250ft and helicopters down to 100ft and occasionally lower. At night, this part of the UK converts to Night Allocated Regions 5DN and 5CN and Mynydd y Gwent straddles the boundary which runs north-south through the middle of the site. During the hours of darkness, 5DN and 5CN are primarily used by fast jet, and tactical transport aircraft undertaking 250ft training using Night Vision Goggles (NVGs).

Sweet Lamb is also located inside Tactical Training Area 7 (TTA7) which is around one fifteenth of the area of LFA7. This specialist area is situated near the centre of the larger LFA in the triangle formed by Machynlleth, Buith Wells and Lampeter. To afford a greater degree of flexibility for low flying training, the minimum heights in TTAs are reduced to 100ft for fast jets and 150ft for tactical transporters (e.g. C130 Hercules). There is a degree of overlap between TTA7 and the Welsh Assembly designated TAN 8 areas (Technical Advice Note 8: Planning for Renewable Energy) but Sweet Lamb is not in one of these TAN 8 areas. Accordingly the MOD Low Flying Operations Squadron (LFOS) Subject Matter Expert (SME) would have very carefully assessed the proposal for this large Wind Turbine Site which would present a physical barrier to tactical and operational low flying training in the immediate area. Fortunately, Sweet Lamb is in the north of TTA7, which is an area the MOD has agreed to accept wind farms in return for keeping the southern part of TTA7 (Close to the Sennybridge Range) clear of turbines. Accordingly the proposal was accepted with a detailed lighting request attached.

Wind Farm Aviation Obstruction Lighting

Between 2009 and 2012, MOD LFOS developed and trialled a range of low intensity LED (25cd red) and LED IR (Infra Red) lights. These have been cleared for use to assist Wind Farm Developers satisfy the opposing requirements for aviation vertical obstruction lighting and the need to minimise local environmental light pollution. Although the CAA do not mandated lighting below 150m in the off-route environment (away from airfields) requests for flight-safety low level obstruction lighting by MOD LFOS will be supported (CAA DAP ORA) who have issued a statement to that effect. As Sweet Lamb is a large wind farm (25 turbines +) the MOD request would have involved both IR and IR+ Red Lights.

MOD LFOS Specification Lighting

For large on-shore turbine sites, The MOD will normally ask for every second or third perimeter turbine to be lit with IR Lights and aiming for a spacing of 1km between lights. These lights are environmentally friendly (invisible to the naked eye) but are very detectable to aircrew NVGs

For sites of 25 turbines or more the lighting request would include a requirement for a single unit IR+Red light (known as combo lights) on the Cardinal turbines. This helps non NVG crew members (Flying with a NVG equipped pilot) to see the larger turbine sites and boosts the light signature to NVG equipped aircrew.

The Cardinal turbines are defined as the most northerly, most southerly, most easterly and most westerly turbines on a site. Where these turbines do not accurately reflect the site, the four/five/six most obvious outlying turbines can be chosen.

The acceptance of NVG compatible LED IR lighting has negated the requirement for traditional incandescent (filament) lights. LED IR and Red lights are more reliable, longer lasting and use considerably less power (than incandescent/filament lights) and are acceptable to the MOD. The only proviso is that, because of the narrow spectrum of some LED lights, NVG compatible LED lights must be fitted where aircrew will operate at low level using NVGs. For that reason, all IR Vertical Obstruction Lights must be compatible with military NVGs. DIO Safeguarding at Sutton Coldfield hold a list of approved lights.

Mynydd y Gwynt (Sweet Lamb) Lighting

Looking at the proposed Mynydd y Gwynt site layout (Annex B) the MOD will most probably accept the following:

Clock wise around the site.

Combo (IR + Red) on: 1, 3, 12, 27, 20 (the site does not easily fit four cardinal lights)

IR lights on: 8, 19, 24, 25, 16, 13, 5 (perimeter turbines).

IR lighting has proved to be most successful in flight trials undertaken subsequent to the original proving trials. Accordingly, MOD LFOS is now prepared to accept IR lights only (no need for combo lights) where there is strong local opposition to visible lighting in rural areas. Such an application in this instance would probably be successful. If agreed the lighting will be:

IR Lights on: 1, 3, 8, 12, 19, 24, 27, 25, 20, 16, 13, 5 (perimeter turbines).

MOD Lighting Specifications

Specification IR.

IR Wavelength

750 to 900nm. But ideally concentrated within 800 to 850nm for optimum detection by all military NVG types.

IR Intensity

600mW/sr minimum at peak flash but not above 1200mW/sr.

(Note: Typically a 300mW/sr steady burn LED IR light will generate 600mW/sr at peak flash)

This will generate a 7-8 nm NVG pick-up range - remaining above 5nm as the light ages.

Horizontal Pattern

Unrestricted 360 deg.

Vertical Pattern

Minimum intensity of 600 mW/sr between +30 deg and -15 deg elevation.

Up to 50% reduction between +25 to +30 deg and -10 to -15 deg is acceptable.

Maximum intensity of 1200 mW/sr for all angles of elevation.

Vertical overspill is acceptable.

Flash Pattern

60 flashes per min at 100-500 ms duration (ideally 250ms)

Synchronisation – all lights to be visually synchronised across a windfarm site.

Specification Low Intensity Red (25cd) – Combined with IR to Form Combi Light

Light Intensity

Equal or better than 25cd.

Ideally 32-50cd to allow for deterioration with age.

Not greater than 50cd where environmental light pollution planning concerns exist.

Horizontal Pattern

Unrestricted 360 deg.

Vertical Pattern

25cd minimum intensity between +15 deg and level (0 deg).

Overspill

Upwards overspill is acceptable; downwards overspill is to be minimised such that the red light intensity is no more than 10% of the intensity at 0 deg.

Flash Pattern – 60 flashes per min at 100-500ms duration (ideally 250ms)

Synchronisation – all lights fitted to a wind turbine site to be visually synchronised.

Note: A 25cd red light is roughly equivalent to a car tail light and is not obtrusive.

Availability of MOD Specification Lights

Currently three companies have had IR and Red lights approved to the MOD specification: CEL, ORGA & Trade Winds.

All three produce suitable separate IR and Red lights, but only CEL and ORGA produce approved single-unit combo lights: as below.

CEL: **CEL-IR850-R-24-CST** Combo IR and Red Obstacle Light

ORGA: **L450-LIB-IR-G** UK MOD low intensity red and IR LED obstruction lights.

Lighting Requirements from the CAA

NATS are not involved in lighting requirements. The CAA (DAP ORA) do not request lighting on vertical structures below 150m away from airfield safeguarding zones in the off-route environment such as Mynydd y Gwynt. Moreover, in such a location, they will only support third party aviation stakeholders who present a solid case for lighting. MOD requests for Flight Safety lighting will be supported.

In this instance it will be highly unlikely that any party other than the MOD will request lighting.

Mike Hale

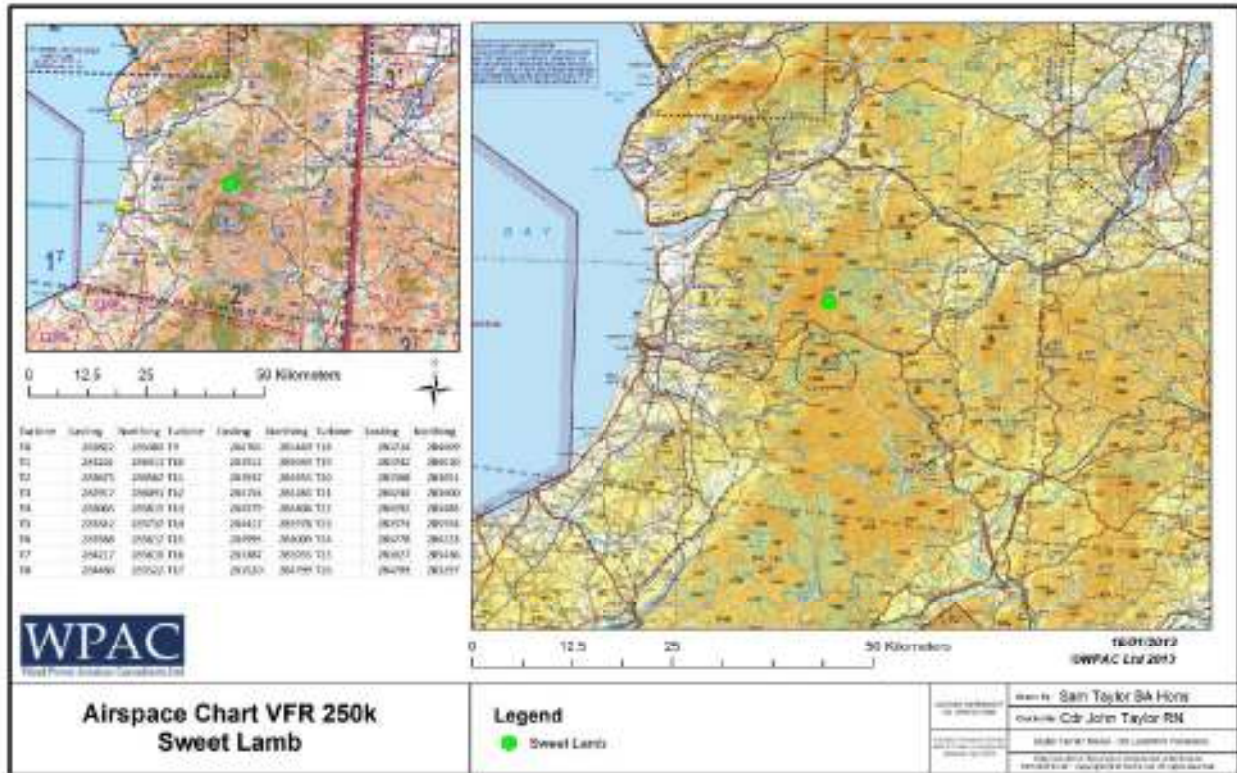
Aviation consultant

For WPAC.

Annexes:

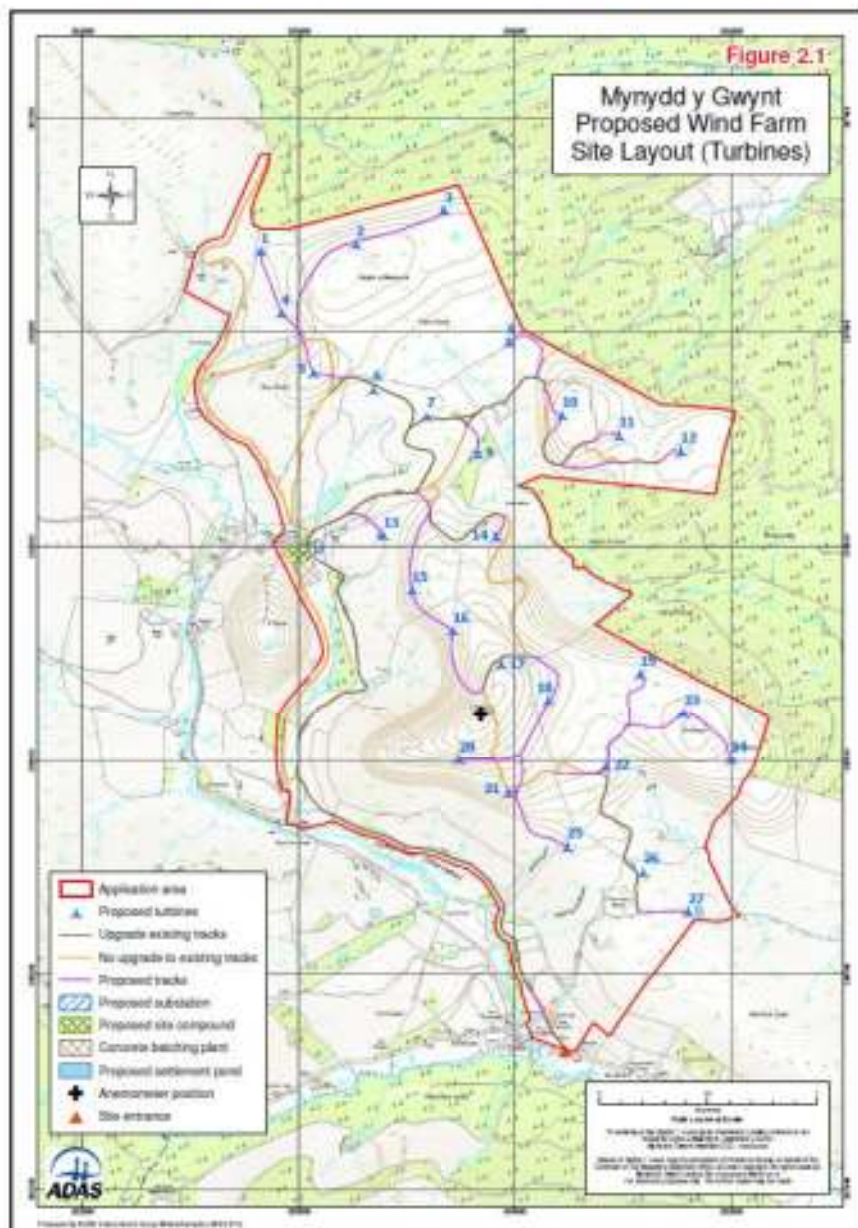
- A. Airspace Chart VFR 250K – Sweet Lamb.
- B. Mynydd y Gwynt Proposed Wind Farm Site Layout (ADAS)

Annex A: Airspace Chart VFR 250K – Sweet Lamb



Note: Military Aviation Charts that accurately display the position of Low Flying Areas and Tactical Training Areas are not subject to public release.

Annex B: Mynydd y Gwynt Proposed Wind Farm Site Layout (ADAS)



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