Technical Appendix

Drummarnock Wind Farm

Technical Appendix 14-1: Windfarm Reduced Lighting Scheme Proposal

Drummarnock Wind Farm Limited

July 2024

Windfarm Reduced Lighting Scheme Proposal

Drummarnock Windfarm

Proposal

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Introduction

Overview

1. Drummarnock Wind Farm Limited (DWFL) is seeking to reduce the overall visual impact of the proposed Drummarnock development by securing agreement with the Civil Aviation Authority to implement a reduced lighting scheme. The proposed development is located approximately 10km south-west of Stirling, in the Fintry, Gargunnock and Touch Hills.
2. The proposed development consists of four wind turbines each with a tip height of up to 180m above ground level. The planning application for the proposed Drummarnock Wind Farm is expected to be submitted to Stirling Council in Spring 2024.
3. The intention to secure agreement for a reduced lighting scheme has been supported by guidance received from LUC, the landscape architects who are responsible for carrying out the Landscape and Visual Impact Assessment, with regards to reducing the visual impact of the proposed development.
4. This proposal sets out a review and recommendation of a reduced lighting scheme without impacting aviation safety.
5. A reduced lighting scheme would reduce visual impacts on the surrounding area including residential properties and scheduled ancient monuments in proximity to the site, most notably, Stirling Castle, King's Yett Cairn and the Wallace Monument.
6. The nearby proposed Earlsburn Extension, which is currently awaiting planning determination, has an agreed reduced lighting scheme with the CAA.

Location

7. Figure 1 provides an indication of the proposed development (blue turbines) relative to the City of Stirling, Stirling Castle and local aerodromes, these are approximately:

    a) 9km southwest of Stirling;
    b) 8km northwest of Cumbernauld Airport;
    c) 36km southwest of Strathallan Airfield;
    d) 41km west-southwest of Balado Airfield; and
    e) 41km north of Strathaven Airfield.

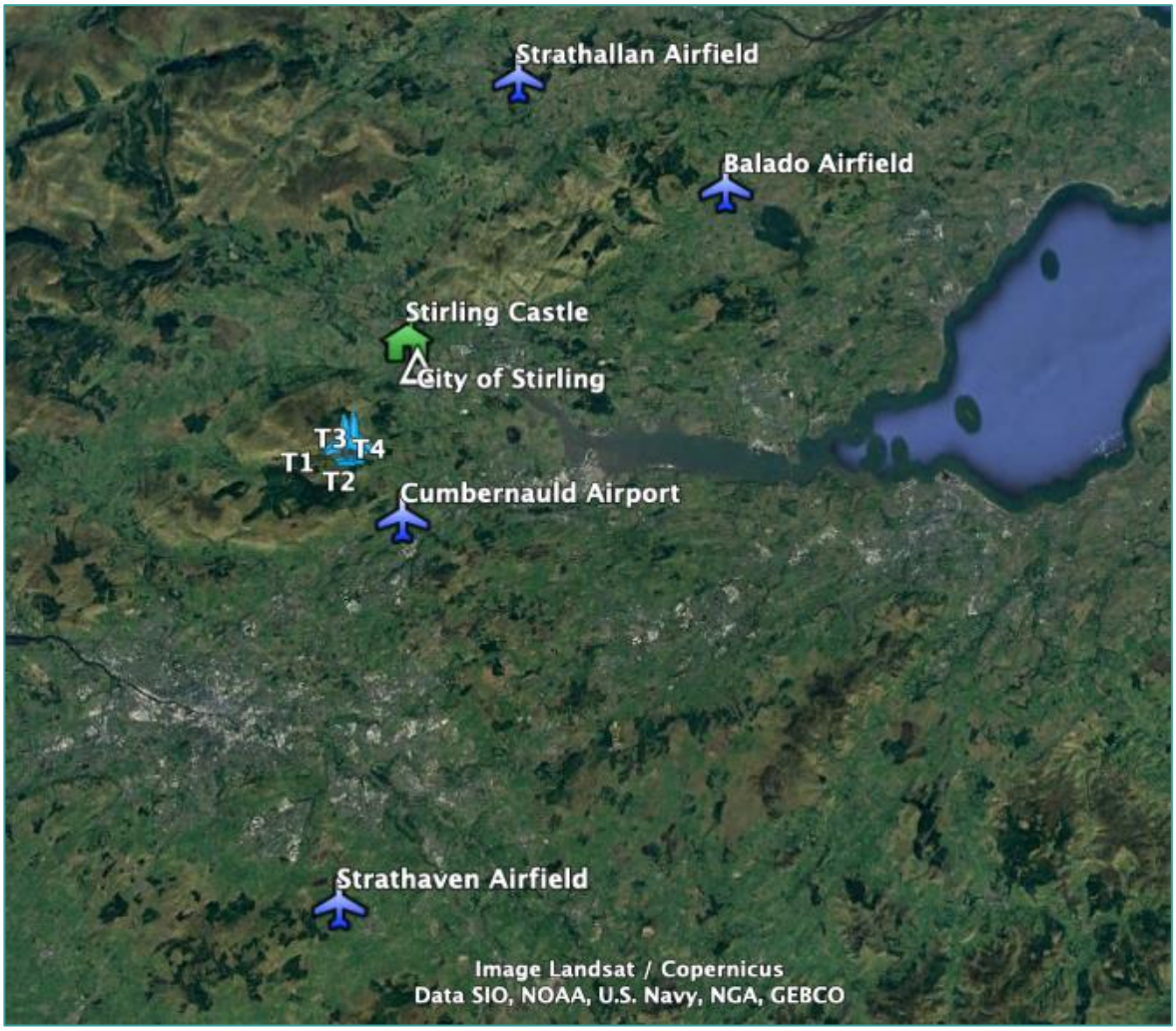

FIGURE 1: PROPOSED DEVELOPMENT RELEVANT TO NEARBY AERODROMES

Background

8. The UK CAA sets out a Policy Statement on lighting of onshore windfarms1 whereby the statutory requirements2 for lighting of en-route obstacles3.

9. Article 222 of the Air Navigation Order requires medium intensity (2000 candela) steady red aviation warning lights to be mounted as close as possible to the top of the structures (at and above 150m). The Article expands further on the exact positioning in relation to turbines including intermediate lighting requirements, of lower intensity (32 candela).

[1] Policy Statement: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150m Above Ground Level.
[2] Article 222 of the UK Air Navigation Order 2016.
[3] Due to the location of the proposed development, the turbines are classified at en-route obstacles.

10. The purpose of lighting of tall obstacles is for aviation safety, lit obstacles permit a pilot to identify tall structures from a distance and permit sufficient time to safely adjust direction and/or altitude of the aircraft.
11. The UK, in compliance with International Civil Aviation Organisation (ICAO) Standards and Recommended Practices (SARPS), sets out the Rules of the Air[4] contained in the Air Navigation Order (ANO).
12. The UK CAA sets out the requirements of Standardised Rules of the Air (SERA) and contained in UK Reg (EU) No 923/2012 (as amended) which applies to every aircraft operating in UK airspace regardless of type or state of registration.
13. Flights operate under Visual (VFR) or Instrument (IFR) flight rules. For the purpose of this document, only VFR applies. The minimum altitude for IFR aircraft, within the area of the proposed development, provides adequate vertical clearance of obstacles and is therefore not under consideration.
14. Section 5 of the SERA regulations contain the applicable requirements for VFR aircraft. The general rule for maintaining VFR is that the flight is flown "clear of cloud and in sight of the surface." There are technical criteria contained within SERA.5005 with specific information to visibility and weather conditions.
15. VFR flights by night are not permitted by all ICAO Contracting States, provision is provided in the UK under SERA.5005 (c) as detailed below:

(c) When so prescribed by the competent authority, VFR flights at night may be permitted under the following conditions:

(1) if leaving the vicinity of an aerodrome, a flight plan shall be submitted in accordance with SERA.4001(b)(6);

(2) flights shall establish and maintain two-way radio communication on the appropriate ATS communication channel, when available;

(3) the VMC visibility and distance from cloud minima as specified in Table S5-1 shall apply except that:

(i) the ceiling shall not be less than 450 m (1500 ft);

(ii) the reduced flight visibility provisions specified in Table S5-1(a) and (b) shall not apply;

(iii) in airspace classes B, C, D, E, F and G, at and below 900 m (3000 ft) AMSL or 300 m (1000 ft) above terrain, whichever is the higher, the pilot shall maintain continuous sight of the surface; and

(iv) Provision repealed before document was retained.

(v) for mountainous area, higher VMC visibility and distance from cloud minima may be prescribed by the competent authority.

[4] ICAO Annex II, Rules of the Air (as amended).

16. In addition, SERA.5005 (c) (5) provides minimum altitude criteria as follows:

> *(5) except when necessary for take-off or landing, or except when specifically authorised by the competent authority, a VFR flight at night shall be flown at a level which is not below the minimum flight altitude established by the State whose territory is overflown, or, where no such minimum flight altitude has been established:*
>
> *(i) over high terrain or in mountainous areas, at a level which is at least 600 m (2000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft;*
>
> *(ii) elsewhere than as specified in i), at a level which is at least 300 m (1000 ft) above the highest obstacle located within 8 km of the estimated position of the aircraft.*

17. In summary, an aircraft may not fly low-level, and in close proximity of a windfarm. CAP1535, The Skyway Code[5], published by the CAA provides further guidance to pilots in terms of pre-flight preparation and planning routes for selecting the appropriate cruising altitude.
18. In summary, aviation regulations contained within SERA and guidance material contained with the Skyway Code ensure that an aircraft will remain clear of obstacles and terrain (as published) to reduce the risk of an airborne conflict. Obstacles, 150m and above, are lit to enhance safety, in addition they are required to be published in the Aeronautical Information Publication (AIP) and on aeronautical charts.
19. This proposal sets out to request a dispensation on the basis that a reduced lighting scheme will ensure that aviation safety is not impacted.

Proposal

20. DWFL is seeking agreement from the CAA that the proposed reduced lighting scheme is acceptable on the basis that there is no change to aviation safety, would allow the Drummarnock to fit into the current lighting environment and is consistent with nearby developments.
21. The requested lighting scheme for the proposed development is as follows:

    a) To reduce the intensity to 10% of the minimum peak intensity, i.e., 200cd lights on the hubs in clear weather conditions. Clear weather conditions are defined as a visibility of greater than 5km.
    b) When visibility reduces to less than 5km, the intensity is increased to 2000cd.
    c) Removing the requirement for the intermediate 32cd lights. These lights do not have shields built into them, which reduces intensity when viewed from below the horizontal. As a result, these lights result in appearing brighter than the hub lights, in certain views to those on the

[5] CAP1535, The Skyway Code, version 4, dated November 2023.

ground. Given the existing aviation criteria for aircraft flying in the area of the proposed development, we do not see these lights as impacting aviation safety.

22. The justification for the proposal is as stated under the requirements of SERA.5005 whereby there are sufficient fail-safes within the planning and operating of a flight at night in clear weather conditions. VFR flights may not operate in reduced weather conditions; however, the proposal considers the potential situation whereby the weather environment closes in quickly on a pilot thereby enhancing safety with the proposed reduced lighting scheme.

Supporting Information

23. Figure 2 provides an overview of the surrounding area and demonstrates that the area presents an 'obstacle rich' environment. The yellow pins represent the surround windfarms with the blue turbines the proposed development under this document. The zoomed in section highlights the relative turbine positions.
24. Neighbouring windfarm developments are Earlsburn (110m to tip), Earlsburn North/Kingsburn (115m), Craigengelt (125m), Tod Hill (125m), Craigannet (99m).
25. An extension to Earlsburn (north of proposed development) is currently in planning with turbines requiring lighting. It is understood that a reduced lighting scheme has been agreed with the CAA comprising six of the 11 turbines lit (perimeter lighting).
26. Shelloch Windfarm is to the western edge of the array in Figure 2 and will consist of two turbines requiring aviation lighting.
27. Not all the turbines are subject to a lighting requirement but given the environment, pilots are aware of the need to be aware of obstacles in the area when overflown. Therefore, the proposed development will be contained within a known 'obstacle rich' environment.

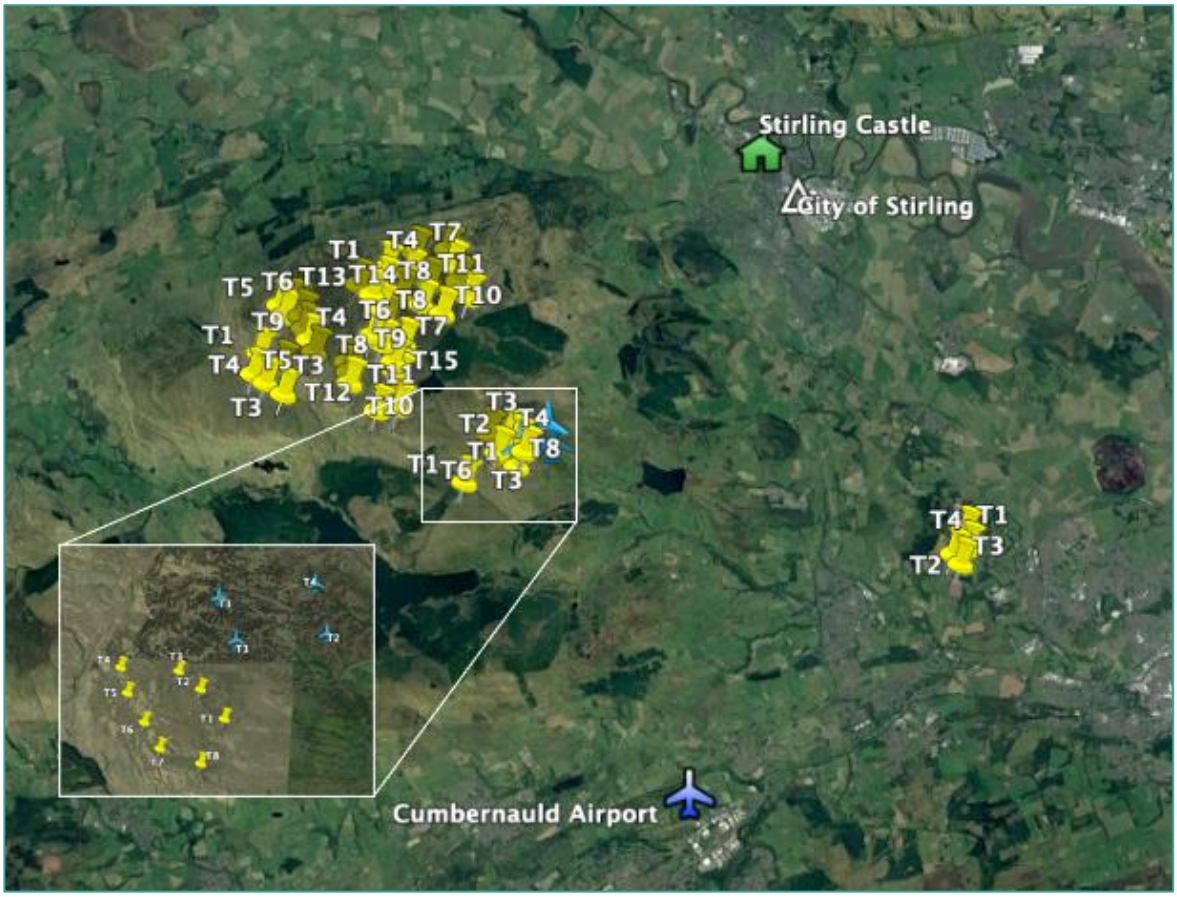

FIGURE 2: SURROUNDING WINDFARM ENVIRONMENT