# 12 Aviation, Radar and Defence

## 12.1 Introduction

### Introduction

12.1.1 This section considers the likely significant effects on aviation, radar and defence associated with the construction, operation and decommissioning of the Proposed Development.

12.1.2 The assessment of potential effects on aviation, radar and defence considers technical acceptability, based on air navigation safety, rather than following a strict EIA process of assessing the significance of effects. Such effects often require the implementation of technical mitigation solutions to ensure continued safe operation in the presence of a wind farm. The assessment of effects on these receptors is therefore one of technical analysis and consultation and seeks to identify whether the effect is likely to be 'acceptable' or 'not acceptable' to air navigation services provision.

### Statement of Competence

12.1.1 The aviation, radar and defence assessment was conducted by Sam Johnson of RES. Sam is the Senior Aviation Manager at RES, with an MMath in Mathematics. Sam has over 25 years' experience in the radar industry with almost 20 years specifically in the area of wind farms. Sam is a member of the Renewable UK Aviation Working Group, Chair of the Aviation Investment Fund Company Limited and Strategic Leadership Group Technical Theme Lead for the Scottish Government Onshore Wind Sector Deal. Further details of qualifications and experience are included in Chapter 1:Introduction.

### Guidance

12.1.2 This assessment has been prepared with reference to Civil Aviation Authority (CAA) Publication (CAP) 764, Policy and Guidelines on Wind turbines (CAA, 2016). This is the primary guidance in relation to the assessment of wind turbines on aviation in the UK.

### Scope of Assessment

### Effects Scoped Out

12.1.3 Interference with surveillance systems and radar can occur when wind turbine blades are moving, therefore potential effects during construction are not assessed.

12.1.4 Upon decommissioning, the Defence Geographic Centre (DGC) will be informed of the removal of wind turbines. Following this, no decommissioning effects are expected and are not considered further.

### Effects Assessed in Full

12.1.5 The assessment identifies and considers the potential effects that the Proposed Development may have on civilian and military aviation, air safeguarding and, if required, the mitigation measures proposed to prevent, reduce or offset any potential adverse effects where possible.

12.1.6 In relation to civil radar aviation assets it considers potential impacts on the NATS En Route Ltd (NERL) radars at Lowther Hill, and the potential mitigation measures identified to address these.

12.1.7 In relation to civil aviation operations it considers potential impacts on the Highlands and Islands Instrument Flight Procedures (IFPs) at Campbeltown Airport, and the potential mitigation measures identified to address these.

12.1.8 The assessment is based on an evaluation of existing data sources and desk studies, and consultation with key stakeholders.

12.1.9 The effects of wind turbines on aviation interests are well known but the primary concern is one of safety. The two principal scenarios that can lead to effects on the operations of aviation stakeholders are:

- physical obstruction: wind turbines can present a physical obstruction at or close to an aerodrome or in the military low flying environment, which itself presents a health and safety risk or otherwise requires changes to flight routes in the area which brings about other operational effects; and
- radar/air traffic services (ATS): wind turbine clutter appearing on a radar display can affect the safe provision of ATS as it can mask unidentified aircraft from the air traffic controller and/or prevent them from accurately identifying aircraft under control. In some cases, radar reflections from wind turbines can affect the performance of the radar system itself.

12.1.10 In this context the scope of the assessment is to consider the impact of the Proposed Development on aviation stakeholders, including military, en route, airports and other airfields, radar systems and air space users. This assessment also considers civil and military stakeholder aviation obstruction lighting requirements.

12.1.11 As standard, the DGC will be provided with the following information for incorporation on to aeronautical charts and documentation:

- the date of commencement of the Proposed Development.
- the exact position of the wind turbine towers in latitude and longitude;
- a description of all structures over 300 feet high;
- the maximum extension height of all construction equipment;
- the height above ground level of the tallest structure; and
- details of a visible and/or infrared aviation lighting scheme.

## 12.2 Consultation

### Consultation Responses relating to Aviation

| Consultee and Date | Scoping / Other Consultation | Issue Raised | Response / Action |
|---|---|---|---|
| Defence Infrastructure Organisation (03.10.23) | Scoping | The principal safeguarding concerns of the MOD with respect to this development of wind turbines relates to their potential to create a physical obstruction to air traffic movements.<br>In this case the development falls within Low Flying Area 14 (LFA 14), an area within which fixed wing aircraft may operate as low as 250 feet or 76.2 metres above ground level to conduct low level flight training. The addition of turbines in this location has the potential to introduce a physical obstruction to low flying aircraft operating in the area.<br>If the developer is able to overcome the issues stated | A suspensive condition will be put in place to ensure a scheme of infrared lighting is agreed with the MOD. |

| Consultee and Date | Scoping / Other Consultation | Issue Raised | Response / Action |
|---|---|---|---|
| | | above, to address the impact up on low flying given the location and scale of the development, the MOD would require that conditions are added to any consent issued requiring that the development is fitted with aviation safety lighting and that sufficient data is submitted to ensure that structures can be accurately charted to allow deconfliction.<br>As a minimum the MOD would require that the development be fitted with MOD accredited aviation safety lighting in accordance with the Air Navigation Order 2016. It is likely that the CAA specified lighting will exceed that required by the MOD but to ensure the safeguarding of any low flying/rotary military aircraft, the MOD would request the wind farm is lit with no less than 25cd or infra-red (IR) lighting on perimeter turbines. | |
| Highlands and Islands Airports Limited (02.02.24) | Other Consultation | In August 2023, the development layout was provided to Highlands and Islands Airports Limited (HIAL) who requested the wind farm be assessed against Campbeltown Airport's IFPs. | An IFP assessment was commissioned that showed there would be no impact on the IFPs. HIAL confirmed that they accepted the findings of the report. |
| NATS<br>(26.09.23)<br>(15.03.24) | Scoping and Other Consultation | At Scoping NATS indicated an impact from the Proposed Development on the Lowther Hill NATS (En Route) plc (NERL) radar. | Following further dialogue, NERL identified Large Blanking as an appropriate mitigation scheme, which will formally be agreed in due course. |
| CAA<br>(23.05.24) | Other Consultation | Scheme of visible aviation lighting required due the turbine tip heights being above 150 metres. | CAA provided a letter confirming that just T03, T06, T08, and T09 require medium intensity steady red lights on the nacelles of turbines, with a second 2000 candela light in case of failure of the main light. These visible lights will be |

| Consultee and Date | Scoping / Other Consultation | Issue Raised | Response / Action |
|---|---|---|---|
| | | | capable dimming to 10% of peak intensity when the visibility exceeds 5 km. Intermediate level lights are not required.<br>CAA also noted the potential plan to implement an Aviation Detection Lighting System (ADLS) for the visible obstacle lights and are happy to discuss further. |
| Glasgow Prestwick Airport (GPA) (05.12.23) | Scoping | No issues were raised as the development is outwith the range of the airport's safeguarding area. | No further action required. |

# 12.3 Methodology

## Scope of Assessment

### Study Area

12.3.1 Consideration is given to aviation infrastructure that is within operational range of the Proposed Development. Operational range varies with the type of infrastructure but broadly includes regional airports operating radar up to 50km of the Proposed Development, non-radar aerodromes within 17km, parachute drops zones within 3km, and military radar and en route radar systems up to 100km from the Proposed Development (dependent on operational range).

### Desk Study

12.3.2 The applicant has a dedicated aviation manager who has provided input to the Proposed Development since its inception. This has included:

- civil and military radar line of sight (LoS) analysis;
- initial Instrument Flight Procedure (IFP) assessment;
- review of relevant aviation charts;
- review of military low flying charts;
- review of aviation obstacle lighting requirements; and
- general aviation advice based on prevailing civil and aviation issues.

## Significance Criteria

12.3.3 Significance criteria for aviation impacts are typically difficult to establish; they are not strictly based on the sensitivity of the receptor or magnitude of change but on whether the industry regulations for safe obstacle avoidance or radar separation (from radar clutter) can be maintained in the presence of the wind turbines.

12.3.4 Any anticipated impact on aviation stakeholders which results in restricted operations is therefore considered to be of significance.

### Assessment Limitations

12.3.5 No limitations have been identified that would affect the findings of the assessment, based on the information available at the time of writing.

## 12.4 Baseline

**CAA**

12.4.1 HIAL and GPA responded to Scoping. GPA had no concerns but HIAL indicated a concern regarding potential impact on their IFPs at Campbeltown Airport.

12.4.2 The Civil Aviation Authority will require visible obstacle aviation lighting at the Proposed Development to assist with air safety.

**NERL**

12.4.3 The Proposed Development is approximately 120 km west of the Lowther Hill radar.

12.4.4 NATS indicated that the Proposed Development will have an unacceptable impact upon the Lowther Hill en route radar as some of the wind turbines at the Proposed Development are visible to the radar.

**Military Aviation**

12.4.5 The Proposed Development is not close to any military radars of infrastructure.

12.4.6 The MOD has a requirement for the Proposed Development to agree a suitable scheme of visible and/or infrared lighting to assist military aircraft in avoiding the Proposed Development.

## 12.5 Mitigation and Residual Effects

**Predicted Operational Effects**

12.5.1 Wind turbines have the potential to impact the performance of air traffic control radars. These impacts include:

- The creation of "false" targets, whereby the wind turbines present on the radar display. Multiple false targets can lead to the radar initiating false aircraft tracks.
- False returns can also cause track seduction, i.e. real aircraft tracks are 'seduced' away from the true position as the radar updates the aircraft track with the false return. This can lead to actual aircraft not being detected.
- Shadowing whereby the aircraft is not detected by the radar as it is flying within the physical 'shadow' of the wind turbine.

12.5.2 Prior to mitigation, it is considered that the Proposed Development would affect the operation of the NERL Lowther Hill radar.

**Proposed Mitigation**

12.5.3 There are a number of mitigation options available to alleviate problems caused by wind turbines to aviation and radar. Mitigation solutions are highly specific to the effect in questions. Consultation with relevant consultees is key to establishing the appropriate method of mitigation.

12.5.4 NERL has identified that a Large Blanking Radar Mitigation Scheme (RMS) will remove or reduce the impact on NERL Lowther Hill Radar. The RMS will be agreed prior to the Proposed Development becoming fully operational.

12.5.5 A reduced visible aviation lighting scheme has been agreed with the CAA. The reduced scheme means that not every perimeter wind turbine needs to be lit and no tower lights are required provided an infrared scheme is agreed with the MOD. A copy of the correspondence from the CAA can be seen in **Technical Appendix 12.1** and **Figure 12.1** presents the wind turbines that are agreed as needing aviation lighting in accordance with this correspondence. The results of the assessment for night-time lighting are contained in **Chapter 5: Landscape & Visual Impact Assessment**. A proposed condition to secure the implementation of the agreed lighting scheme, and also allow for future provision of an Aircraft Detection Lighting System (ADLS), is included in **Technical Appendix 12.2**. The Applicant will continue dialogue with the CAA to agree the condition wording and monitor the progress of ADLS technology. An infrared lighting

scheme will be agreed with the Defence Infrastructure Organisation (DIO) prior to the Proposed Development becoming fully operational.

## 12.6 Summary

12.6.1 The Proposed Development will potentially impact the NERL radar at Lowther Hill, and the IFPs at Campbeltown Airport. For the Lowther Hill radar, a mitigation has been identified and it is expected that an RMA agreement will be agreed. HIAL has accepted the findings of an independent consultant report that the Proposed Development will have no impact on the airport's IFPs. Infrared lighting will be agreed with the DIO for the MOD low flying requirements and a visible lighting scheme has been agreed with the CAA.