



Balgray Wind Farm

Chapter 14: Aviation & Radar

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List of abbreviations

Abbreviation	Meaning
agl	above ground level
amsl	above mean sea level
AOR	Area of Operational Responsibility
AR	Allocated Region
ATC	Air Traffic Control
CAA	Civil Aviation Authority
CTA	Control Area
FL	Flight Level
IFP	instrument flight procedure
IFR	Instrument Flight Rules
Km	kilometres
LFA	Low Flying Area
MoD	Ministry of Defence
NVIS	Night Vision Imaging Systems
PSR	primary surveillance radar
RAF	Royal Air Force
SSR	secondary surveillance radar
VFR	Visual Flight Rules



14. Aviation & Radar

14.1. Introduction

- 14.1.1. This chapter considers the likely significant effects on aviation and defence associated with the construction, operation and decommissioning of the Proposed Development. It has been compiled by Malcolm Spaven, Director of Gladhouse Planning Ltd (trading as Aviatica).

14.2. Assessment Methodology

- 14.2.1. The scope of the assessment has been informed by the following policies and guidance:
- Civil Aviation Authority (CAA), Safety Regulation Group, CAP 764: CAA Policy and Guidelines on Wind Turbines, Sixth Edition, 2016 and Draft Seventh Edition, 2024;
 - CAA, Safety Regulation Group, CAP 670: Air Traffic Services Safety Requirements, Third Issue, Amendment 1/2019, 1 June 2019, Part B, Section 4;
 - Scottish Government, Planning Circular 2/2003: Safeguarding of Aerodromes, Technical Sites and Military Explosive Storage Areas: The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosive Storage Areas) (Scotland) Direction 2003 (revised edition March 2016);
 - CAA, Safety & Airspace Regulation Group, Policy Statement: Lighting of Onshore Wind Turbine Generators in the United Kingdom with a maximum blade tip height at or in excess of 150 m above ground level (agl), 1 June 2017.

Study area

- 14.2.2. The study areas for the aviation assessment were selected using the recommended distances set out in CAA guidance (CAP 764), modified to ensure that all radars with the range to detect wind turbines are included. The distances used are radii from the centre of the Proposed Development, as follows:
- 80 km for air traffic control and air defence primary surveillance radars (PSRs);
 - 30 km for secondary surveillance radars (SSRs) and Meteorological Office rainfall radars;



- 12 km for aeronautical radio navigation aids and air-to-ground radio communications sites;
- 30 km for licensed, certificated and Government aerodromes;
- 60 km for instrument flight procedures (IFPs);
- 10 km for unlicensed aerodromes, airstrips, recreational aviation launching sites and specialist military low flying areas.

Baseline assessment

14.2.3. The aviation baseline assessment was carried out by consulting the UK Aeronautical Information Publication, the UK Military Aeronautical Information Publication, civil and military aeronautical charts and Aviatika in-house databases of aviation infrastructure and assets.

Significance criteria

- 14.2.4. Significance criteria for assessment of impacts on aviation, unlike those for environmental effects, are not based on the sensitivity of the receptor. Further, while magnitude of change can be determined in some circumstances, it typically does not provide a standardised metric on which to measure the significance of any effects. In this chapter, the significance of effects on aviation has been determined by application of professional judgement, underpinned by consideration of the magnitude of change (where measurable), the regulations and procedures in place for ensuring that aviation infrastructure meets required performance standards, the safeguarding policies and practices in use by specific aviation stakeholders, and the consultation responses from those stakeholders.
- 14.2.5. Residual adverse effects of the Proposed Development on aviation are described as either none, negligible, minor, moderate or major. None, negligible or minor effects are categorised as not significant. Moderate or major effects are categorised as significant. The criteria applied to define each of the significance categories in this chapter are set out in Table 14.1.

Table 14.1: Aviation significance criteria

Significance of effect	Description
Major	Regular, frequent or permanent effects which require changes to existing operational and/ or technical practice in order to mitigate adequately, or which are not capable of being mitigated adequately.
Moderate	Periodic effects experienced which may require alterations to existing operational practice.
Minor	Occasional effects experienced which do not require any alteration of existing operational and technical practice.



Significance of effect	Description
Negligible	Normally no measurable change from baseline conditions; occasional, fleeting or very short term effects experienced which do not require any alteration of existing operational and technical practice.
None	No measurable change from baseline conditions.

14.3. Baseline conditions

- 14.3.1. The airspace above the Proposed Development is uncontrolled (Class G) from ground level up to Flight Level (FL) 85 – approximately 8,500 feet above mean sea level (ft amsl). Above that level is the Class A controlled airspace of the Borders Control Area (CTA), under the control of the NATS En Route Prestwick Centre ('Scottish Control').
- 14.3.2. The uncontrolled airspace up to FL85 above the Proposed Development is used by civil and military aircraft, mostly operating under the Visual Flight Rules (VFR). The airspace within the Borders CTA over the Proposed Development is used by Instrument Flight Rules (IFR) traffic – principally airliners – routing between Scottish airports and the south and, at higher levels, en route traffic including transatlantic flights between Europe and North America.
- 14.3.3. There are air traffic control PSRs within the Study Area at NATS En Route Lowther Hill, NATS En Route Great Dun Fell, Royal Air Force (RAF) Spadeadam Deadwater Fell and RAF Spadeadam Berry Hill.
- 14.3.4. The Proposed Development is located within a specialist military low flying area known as Low Flying Area (LFA) 20(T), which may be activated for daytime Operational Low Flying down to heights of 100 feet above ground level (agl). For military low flying at night the Proposed dDevelopment is within Allocated Region 2B which covers the western parts of central and southern Scotland.
- 14.3.5. There are no SSRs, Meteorological Office rainfall radars, aeronautical radio navigation aids, air-to-ground radio communications sites, licensed, certificated or Government aerodromes, IFPs, unlicensed aerodromes, airstrips or recreational aviation launching sites within the Study Area.

14.4. Scoped Out Receptors

- 14.4.1. The air traffic control PSRs at RAF Spadeadam Deadwater Fell and RAF Spadeadam Berry Hill have been scoped out of assessment since the Proposed Development is outwith the RAF Spadeadam Air Traffic Control (ATC) Area of Operational Responsibility (AOR).



- 14.4.2. The NATS En Route PSR at Great Dun Fell has been scoped out of assessment since modelling has determined that intervening terrain blocks the line of sight from the radar to the Proposed Development.
- 14.4.3. SSRs, Meteorological Office rainfall radars, aeronautical radio navigation aids, air-to-ground radio communications sites, licensed, certificated or Government aerodromes, IFPs, unlicensed aerodromes, airstrips or recreational aviation launching sites have been scoped out of assessment since there are no such facilities within the Study Area.

14.5. Scoped In Receptors

- 14.5.1. The following aviation receptors have been scoped in to assessment:
- NATS En Route Lowther Hill PSR; and
 - Military low flying.

14.6. Assessment of likely effects

- 14.6.1. Radar modelling indicates that the NATS En Route Lowther Hill radar will have line of sight to up to four of the turbines in the Proposed Development. This has the potential to generate false plots on the radar and to reduce the probability of detection of real aircraft targets in the airspace above the Proposed Development. In view of the small scale of the development and the limited number of turbines within line of sight this is assessed as an effect of **minor** to **moderate** significance.
- 14.6.2. The Applicant is in discussions with NATS En Route on technical mitigation measures to address the impact on the Lowther Hill radar. Following implementation of radar mitigation measures the residual adverse effect will be of **minor** significance.
- 14.6.3. The Ministry of Defence (MoD) scoping response (11 March 2024) advised that the Proposed Development would cause a potential obstruction hazard to military low flying training activities in Low Flying Area 20T, and that it would be necessary for the Proposed Development to be fitted with relevant aviation safety lighting in accordance with the requirements of the Air Navigation Order to address this issue. However, LFA 20T is rarely if ever used - no low flying has taken place in this area since at least 21 August 2023.¹ The effect of the Proposed Development on military low flying is therefore assessed as of **minor** significance.

¹ UK Government (2011). Military low flying: RAF operational low flying training timetable. Available at: <https://www.gov.uk/government/publications/operational-low-flying-training-timetable>. Accessed October 2024.



- 14.6.4. Further, while the MoD response refers to a requirement for lighting to mitigate impacts on low flying in LFA 20T, that is a daytime low flying area only. Lighting on turbines 150 m or more above ground level is only switched on during official night so cannot mitigate effects on aircraft using LFA 20T. The Proposed Development will be notified to the MoD and civil airspace users and marked on aeronautical charts and electronic aviation obstacle databases to enable aircrew to avoid the turbines. The Proposed Development is located in the night low flying area known as Allocated Region (AR) 2B. All users of this night military low flying airspace operate using Night Vision Imaging Systems (NVIS). These enable aircrew to see obstacles fitted with infra-red lights. The MoD policy guidance on lighting of wind turbines states that developments of between 3 and 10 turbines should have 25 candela visible spectrum red lights or infra-red lights on the perimeter turbines. The Applicant proposes to fit 2000 candela steady red visible spectrum lights to selected turbines in the Proposed Development to meet civil aviation requirements and infra-red lights to all turbines to meet the requirements of the MoD. The residual effect on military low flying is assessed as being of **negligible** significance.

14.7. Cumulative effects

- 14.7.1. The assessment of the cumulative effects of the Proposed Development on the NATS En Route Lowther Hill radar has considered all operational, under construction, consented and in-planning wind farms within a 20km radius of the Proposed Development. All of these cumulative developments have technical mitigation measures in place or under discussion with NATS En Route. After implementation of those mitigation measures, the cumulative residual impact of the Proposed Development on the NATS En Route Lowther Hill radar is assessed as having **minor** significance.
- 14.7.2. The assessment of the cumulative effects of the Proposed Development on military low flying has considered all operational, under construction, consented and in-planning wind farms within a 10km radius of the Proposed Development. None of these cumulative developments has received an objection from the MoD on low flying grounds. All of the developments with blade tips 150m or more above ground level will be fitted with 2000 candela steady red visible spectrum lights and all developments with blade tips 100m or more above ground level will be marked on aeronautical charts. The cumulative residual impact of the Proposed Development on military low flying is assessed as having **minor** significance.

14.8. Conclusions

- 14.8.1. Up to four turbines in the Proposed Development are likely to be detectable by the NATS En Route PSR at Lowther Hill. This has the potential to generate false plots on the radar and to reduce the probability of detection of real aircraft targets in the airspace above the Proposed Development. The



Applicant will enter a commercial agreement with NATS En Route to implement technical mitigation measures on the Lowther Hill radar.

- 14.8.2. The MoD has advised that the Proposed Development would cause a potential obstruction hazard to military low flying training activities in Low Flying Area 20T and that it would be necessary for the Proposed Development to be fitted with relevant aviation safety lighting in accordance with the requirements of the Air Navigation Order to address this issue. Since LFA 20T is rarely used, the effect of the Proposed Development on military low flying is assessed as of **minor** significance.

14.9. Mitigation and Residual Effects

- 14.9.1. The Applicant will enter a commercial agreement with NATS En Route to implement technical mitigation measures on the Lowther Hill radar. Following implementation of the mitigation measures the residual effect of the Proposed Development on the NATS En Route Lowther Hill radar is assessed as having **minor** significance.
- 14.9.2. It is a legal requirement under Articles 222 and 225A of the Air Navigation Order for turbines with blade tips of 150m or more above ground level to be fitted with lights and for objects with a height of 100m or more above ground level to be notified to the aviation authorities prior to construction. Following implementation of those measures the residual effect of the Proposed Development on military low flying is assessed as having **minor** significance.





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