Environmental Impact Assessment Report

Swarclett Wind Farm

Chapter 14: Other Considerations

Swarclett Wind Energy Limited

June 2024

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Glossary of Terms

Term	Definition
The Applicant	Swarclett Wind Energy Limited
Environmental Advisors and Planning Consultants	Atmos Consulting Limited
Environmental Impact Assessment	Environmental Impact Assessment (EIA) is a means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development.
Environmental Impact Assessment Regulations	The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations)
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations
The Proposed Development	The Swarclett Wind Farm
The Proposed Development Footprint	The area within which the Proposed Development will be located
The Proposed Development Site	The full application boundary, ie the red line boundary (Figure 1-1 Site Location).
The Planning Act	The Town and Country Planning (Scotland) Act 1997 (as amended)

List of Abbreviations

Abbreviation	Description
ANO	Air Navigation Order
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CEDA	Centre for Environmental Data Analysis
DECC	Department of Energy and Climate Change
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMI	Electromagnetic Interference
EnvCoW	Environmental Clerk of Works
Hz	Hertz
IFP	Instrument Flight Procedure
LFA	Low Flying Area
MoD	Ministry of Defence
NATS	National Air Traffic Services
OTA	Operational Training Area
PSR	Primary Surveillance Radar

14 Other Considerations

14.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) identifies and assesses the potential effects that the 'Proposed Development may have on aviation, telecommunications and as a result of shadow flicker.

The assessments reported in this chapter have been carried out by Atmos Consulting Limited.

14.2 Methodology and Approach

14.2.1 Legislation, Planning Policy and Guidance

Planning policy at a national and local level and its relevance to environmental design and assessment is discussed in Chapter 4 Planning Policy of this EIAR. The key planning policies and guidance relevant to this chapter are set out below along with other reference documentation related to each of the technical areas.

Planning Policy

- Fourth National Planning Framework (NPF4, Scottish Government 2023);
- Onshore Wind Policy Statement (Scottish Government, 2022);
- Scottish Government web-based Advice 'Onshore wind turbines: planning advice';
- The Highland-wide Local Development Plan (HwLDP); and
- The Caithness and Sutherland Local Development Plan (CaSPlan)

Aviation and Radar

- CAP 764 Policy and Guidance on Wind Turbines (Civil Aviation Authority 2016);
- Air Navigation Order (ANO) 2016 Article 222 (UK Government 2016);
- DAP Policy 124: 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 (Civil Aviation Authority 2017a);
- CAP 493 Manual of Air Traffic Services Part 1 (Civil Aviation Authority 2017b);
- CAP 738 Safeguarding of Aerodromes, (Civil Aviation Authority 2020);

Telecommunications and Television

- Tall Structures and their Impact on Broadcast and other Wireless Services (Ofcom 2009)

Shadow Flicker

- Update of UK Shadow Flicker Evidence Base, 2010, Parsons Brinckerhoff (DECC, 2011); and
- Scottish Government Online Renewables Planning Advice: Onshore Wind Turbines.

14.2.2 Consultation

The assessment process has been informed by consultation with The Highland Council (THC), and relevant stakeholders including Pre-Application Advice dated 22nd September 2021 and the Scoping Opinion dated 28th March 2022. A summary of the key consultation responses is described in Table 14-1.

Table 14-1: EIA Consultation - Other Considerations

Consultee	Pre-Application (September 2021)	Scoping (March 2022)	Applicant Response
Aviation and Radar			
THC	A Shadow Flicker Assessment and Aviation Impact Assessment are requested as a part of the EIAR.	The EIAR should recognise community assets that are in operation, including TV, radio, telecommunications links, aviation interests including radar and MOD safeguards.	Consultation has taken place with relevant bodies. There are no fixed links crossing the Proposed Development Site. Noted, the potential for shadow flicker is assessed in this chapter. See below under Highland and Islands Airport Limited, MOD and NATS for further detail on the response to aviation related consultations.
Highlands and Islands Airport Limited (HIAL)	n/a	Preliminary calculations showed that the Proposed Development may infringe the safeguarding criteria and operation of Wick Airport. HIAL request that the Applicant commission an Aviation Impact Feasibility Study (AIFS) to understand the impact of the Proposed Development on the infrastructure and operation of Wick Airport. The following should be assessed: • Safeguarding of technical sites (CAP670 & CAP764) requirement; • Instrument Flight Procedures (CAP785) requirement; • Aviation Lighting Requirements (see article 222 of the ANO, CAP168 & CAP764) requirements; and • Crane and lifting equipment use during construction (see CAP1096) requirement. Once the AIFS has been reviewed by HIAL, the Applicant will have formal discussion with HIAL.	The below assessments have been carried out as requested by HIAL: An IFP Safeguarding Report is provided in Technical Appendix 14-1. A Wind Turbine Lighting Review is provided in Technical Appendix 14-2. A Crane Requirements Review is provided in Technical Appendix 14-3. Further consultation with HIAL has been conducted following completion of the above reviews with a suspensive condition drafted by HIAL in agreement with the Applicant.
Ministry of	n/a	The Proposed Development is within UK Military Low	Noted, consultation has taken place.

Consultee	Pre-Application (September 2021)	Scoping (March 2022)	Applicant Response
Defence (MOD)		Flying Area 14, within which aircrafts are permitted to fly down to 250 feet above terrain features. The Proposed Development may cause obstruction hazard to low flying training activities. Any variation of the parameters provided in the Scoping Report dated January 2022 should be provided to the MOD.	Technical Appendix 14-2 Wind Turbine Lighting Review indicates that the Proposed Development is adjacent to UK Military Low Flying Area 14. The potential for effects is discussed in this EIAR Chapter.
National Air Traffic Services (NATS)	n/a	The Proposed Development was examined from a technical safeguarding aspect and does not conflict with NAT's safeguarding criteria. Accordingly, NAT's (en route) Public Limited Company ("NERL") has no objection.	Noted.

14.2.3 Assessment Methodology and Significant Criteria

In order to predict and quantify the effects that will result from the Proposed Development on aviation, telecommunications and television, and the effects of shadow flicker on sensitive receptors, this assessment has considered:

- **Baseline Conditions** – a review of existing information in relation to existing public rights of way, telecommunication links, aviation, television reception, existing infrastructure on the Site and local area, and properties in the area that might be sensitive to shadow flicker effects;
- **Significance of Effects** – an assessment of the effect of the Proposed Development against the baseline conditions and assessment of the cumulative effect of the Proposed Development with other existing, consented or proposed wind turbine developments in the area;
- **Mitigation Measures** – details of the proposed mitigation measures to be incorporated into the Proposed Development that will be implemented to avoid significant effects; and
- **Residual Effects** – an assessment of residual effects following the implementation of mitigation measures.

Shadow Flicker

There is no applicable legislation setting out any relevant rules or requirements for the assessment or control of shadow flicker.

The update of UK Shadow Flicker Evidence Base (DECC, 2011) reviewed international legislation relating to the assessment of shadow flicker for wind turbine development and concludes that the area within 130 degrees either side of north from the turbine, and out to 10 rotor diameters, is considered acceptable as a study area for shadow flicker assessment.

The DECC study concluded that there have not been extensive issues with shadow flicker in the UK and, in circumstances where the potential for significant shadow flicker issues effects have been identified, these have been resolved using standard mitigation.

Therefore, the approach which has been taken for the Proposed Development has been to assess the potential effects of shadow flicker on residential properties within 1328m (10 rotor diameters) of each turbine, a study area which is in line with recommendations of DECC (2011).

This assessment also takes into consideration the Scottish Government Online Renewables Planning Advice: Onshore Wind Turbines (Scottish Government, 2014).

Study Area

OS mapping was used to identify properties with potential susceptibility to shadow flicker, in line with the Parsons Brinckerhoff study Update of UK Shadow Flicker Evidence Base (2011). The candidate wind turbine modelled in the assessment has an indicative rotor diameter of 132.8m to reflect the maximum diameter for the Proposed Development.

The area around turbine locations within a distance 10 rotor diameters (1328m) and 130 degrees either side of north (the zone of potential shadow flicker) was mapped. There

are a total of eight receptors within this zone of potential shadow flicker, with the potential to experience shadow flicker as illustrated in Figure 14-1.

Shadow Flicker Assessment Modelling - Cumulative sites

There are no operational wind farms within 5km of the Proposed Development. Red Moss wind farm, a project currently in scoping, lies less than 1km northeast of the Proposed Development. Therefore there is a possibility of cumulative shadow flicker,

However, determination of the extent of cumulative effect would be dependent on a comparison of a shadow flicker model of the Red Moss turbines and this assessment. As no model is available for the Red Moss turbines, no detailed assessment is possible.

Health and Safety

Given the nature and location of the Proposed Development, i.e. rural in nature and not within close proximity of settlements, it is considered that the likelihood and effect from potential accidents and disasters is minimal and therefore, excluded from detailed assessment.

Therefore, no significant effects are anticipated, and it is considered this can be scoped out from further assessment.

Nevertheless, high standards of health and safety will be established and maintained throughout the lifecycle of the Proposed Development.

At all times activities will be undertaken in a manner compliant with applicable health and safety legislation and with relevant good practice as defined under applicable statutory approved codes of practice and guidance.

This includes the Health and Safety at Work Act 1974, (HSE Executive, 1974) the Construction (Design and Management) Regulations 2015 (UK Government, 2015) the Work at Heights Regulations 2005 (as amended) etc, (UK Government, 2005); and Onshore Wind Health & Safety Guidelines (Renewable UK, 2015).

14.3 Baseline Conditions

14.3.1 Aviation and Radar

NATS Consultation Zones

The Proposed Development is located out with any NATS Consultation Zones as shown on Figure 14-2, confirmed by the Scoping Opinion.

Military Low Flying Area

The Proposed Development is adjacent to MOD Low Flying Area (LFA) 14 within which aircrafts are permitted to fly down to 100 feet above terrain features. The Proposed Development has potential to cause obstruction hazard to military low flying training activities.

Highlands and Islands Airports Limited

Highlands and Islands Airports Limited (HIAL) stated that the Proposed Development may infringe on the safeguarding criteria and the operation of Wick Airport. Wick Airport is approximately 19km southeast of the Proposed Development.

IFP Design Ltd were appointed through Cyrrus Ltd to assess the impact of the Proposed Development on Wick Airport's Instrument Flight Procedures (IFPs).

The IFP assessment (Technical Appendix 14-1) concluded there would be an effect on one of Wick Airport IFP's. Through consultation with HIAL, draft wording of a planning condition has been agreed that has been designed to provide assurance of the commitment of The Applicant to continue consulting with HIAL and THC to agree an appropriate mitigation plan.

The height of the proposed turbines is 149.9m, placing them under the mandatory requirement for lighting. As requested by HIAL, a Wind Turbine Lighting Review (Technical Appendix 14-2) was carried out by Cyrrus.

The IFP Assessment Report and Wind Turbine Lighting Review will be reviewed by HIAL, and further discussion will take place to come to a suitable mitigation strategy to avoid negatively affecting Wick Airports operations.

Civil Aviation Authority

As requested by HIAL, a Crane Requirements Review (Technical Appendix 14-3) has been carried out. Cyrrus were appointed by the Applicant to undertake this review in order to ascertain if aviation lighting will be required for the cranes which will be required to construct the Proposed Development.

14.3.2 Telecommunications

The moving rotors of wind turbines have the potential to effect telecommunication and television signals by causing Electromagnetic Interference (EMI). Wind turbines can cause EMI by reflection of signals from rotor blades so that a nearby receiver picks up both a direct and reflected signal.

The types of civilian and military communication signals which may be affected by EMI include TV and radio broadcasting, microwave and cellular radio communications and various navigational and air traffic control systems. A turbine located within, or near to, the communication link may interfere with the signal causing unwanted 'noise'.

The potential for negative effects on domestic television reception are greatly diminished post digital switchover, which was completed across the UK in 2012.

As shown in Figure 14-2, there are no telecommunications links in the vicinity of the Proposed Development.

14.3.3 Shadow Flicker

Shadow flicker can arise from the passing of the moving shadow of a wind turbine rotor-blade over a narrow opening such as the window of a nearby residence. A similar effect can also occur when the blades of a rotating turbine reflect the sun causing a flashing light.

Shadow flicker happens only when a certain combination of conditions coincide at particular times of the day and year, mainly in the winter months when the sun is low in the sky (BERR 2009).

The occurrence of shadow flicker and the extent of its effects are dependent on a number of factors, namely:

- Distance from the wind turbine;

- Turbine hub height and rotor diameter;
- Speed of blade rotation;
- The proportion of sunny weather during the months when flicker can occur; and
- The size, shape and orientation of any windows or doors of neighbouring properties.

The flickering may have the potential to cause disturbance and annoyance to residents. People with photosensitive epilepsy are usually sensitive to flickering light between 3 and 30 Hertz (Hz) per second (Epilepsy Action 2023). As detailed by Berr (2009) turbines maximum frequency is usually under 1 hertz and therefore below the frequencies known to trigger photosensitive epilepsy.

There are eight dwellings within the study area with the potential to experience shadow flicker.

14.4 Assessment of Effects

14.4.1 Aviation and Radar

The height of the turbines of the Proposed Development is proposed at 149.9 metres which places them under the mandatory lighting requirement height of 150 metres.

However as described in Technical Appendix 14-2 if THC and HIAL determine that the turbines are located in a position which is potentially a hazard to aviation then a bespoke lighting scheme may be required to be developed that maintains flight safety for aviation operations in the area.

Ministry of Defence (MOD) indicated in the Scoping Opinion that the Proposed Development is located within a MOD Low Flying Area (LFA 14) however following an IFP assessment, it was determined that the Proposed Development lies adjacent to LFA 14. Therefore, the Proposed Development is not expected to interfere with MOD operations.

It has been shown in Technical Appendix 14-1 IFP Safeguarding Report, that the Proposed Development would have an impact on Wick Airports Instrument Flight Procedures (IFPs).

14.4.2 Telecommunication

As there are no fixed communications links in the vicinity of the Proposed Development, there is no likely effect caused by the Proposed Development.

14.4.3 Shadow Flicker

A Shadow Flicker model was run using the Wind Pro software. The model also takes account of cumulative effect from multiple turbines. Figure 14-1 shows the hours per year predicted to be experienced at the properties identified.

UK Government guidelines (Parsons Brinckerhoff, 2011) note that a limit of up to 30 hours per year or 30 minutes on the worst affected day is considered acceptable.

As shown on Figure 14-1, there are eight properties that may experience shadow flicker.

Receptors 2, 18, 19 and 24 are shown as experiencing less than 30 hours shadow flicker per year. Receptors 1, 7, 17 and 25 are within areas which would experience more than 30 shadow flicker hours per year.

This method of quantifying shadow flicker does not take account of cloud cover or turbine orientation, true flicker is expected to be around one third of these values. When quantified using average sunshine hours per month data from the Centre for Environmental Data Analysis (CEDA), the predicted shadow flicker hours for receptors 1, 7, 17 and 25 fall below the accepted threshold of 30 hours per year at 8.8, 9.3, 9.1, 11.2 hours respectively. This method of calculation is often referred to as 'climate adjusted'.

The properties shown as receptors 1 and 2 have been identified as being financially involved in the Proposed Development. Considering this, and the climate adjusted values, there is no significant effects expected for shadow flicker from the Proposed Development.

14.5 Assessment of Cumulative Effects

14.5.1 Shadow Flicker

There are no operational wind turbines within 5km of the Proposed Development. Red Moss wind farm (currently in scoping) lies to the northeast of the Proposed Development.

In the event that both the Proposed Development and Red Moss become operational, there is the potential that receptors 1 and 2 shown on Figure 14-1 would experience cumulative effects from shadow flicker. As both receptors are financially involved, there is no anticipated significant adverse cumulative effect.

14.6 Mitigation Measures

14.6.1 Aviation and Radar

A Wind Farm Lighting Review (Technical Appendix 14-2) has been produced in support of this planning application. Final agreement on whether aviation lighting is required for the Proposed Development will be determined through further consultation with THC and HIAL.

Subject to the approval of the IFS (Technical Appendix 14-1), Wind Turbine Lighting Review (Technical Appendix 14-2) and Crane Requirements Review (Technical Appendix 14-3) and the agreement of suitable mitigation measures with THC and HIAL, it is anticipated that the Proposed Development will not adversely affect aviation interests.

14.6.2 Telecommunication

There will be no development within close proximity to the existing telecommunications links. Therefore, no further mitigation is required and the potential effects from the Proposed Development are not significant.

14.7 Residual Effects

Following implementation of mitigation, it is considered that there will be **no significant** effects on aviation interests as a result of the Proposed Development.

It is considered that there will be **no significant** effects on telecommunications and television reception a result of the Proposed Development.

It is considered that there will be **no significant** effects as a result of Shadow Flicker.

14.8 Summary and Statement of Significance

14.8.1 Aviation

Subject to the implementation of the mitigation, to the satisfaction of the HIAL; there will be **no significant** effects as a result of the Proposed Development.

14.8.2 Telecommunication

Due to the distance of the telecommunication links from the nearest proposed turbines, **no significant** effects are anticipated on telecommunication links as a result of the Proposed Development.

There are no necessary mitigation measures over and above embedded design mitigation already in place, and the potential effects from the Proposed Development are not significant.

14.8.3 Shadow Flicker

There are eight properties within potential shadow flicker distance of the Proposed Development, however modelling has determined no properties will experience significant shadow flicker as a result of the Proposed Development. There are also no receptors within 10 rotor diameters of any turbines within the Proposed Development and any other operational turbines.

As such **no significant** effects are anticipated as a result of the Proposed Development.

14.9 References

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