

Breackerie Wind Farm

Environmental Impact Assessment Report Volume 1 Chapter 15: Other Issues

October 2023 (amended December 2024)

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15 OTHER ISSUES

Introduction

- 15.1 This chapter considers potential effects and features which have been scoped out of full assessment but raise pertinent points for the proposed development or link to other areas of assessment contained within this Volume.
- 15.2 Specifically, the purpose of this chapter is to summarise the relevant subject matters to provide context to other areas of assessment. Topics addressed within this chapter include summaries of:
- Aviation, including consultation and potential impacts upon civilian and military airspace and operations;
 - Aviation lighting, which includes a summary of the approach taken and layout agreed with the Civil Aviation Authority (CAA);
 - Results of the carbon calculator exercise to understand and report on the carbon payback of the proposed development; and
 - Shadow flicker, to demonstrate that significant effects on residential receptors are not likely to occur, or where they might, that mitigation is possible.
- 15.3 The chapter is supported by a number of Technical Appendices (as set out within Volume 4: Technical Appendices), comprising:
- Technical Appendix 10.4: Carbon Calculator, prepared by RPS; and
 - Technical Appendix 15.1: Aviation Lighting Report prepared by WPAC
- 15.4 Other relevant assessments are set out in Volume 1: Written Statement and include:
- Chapter 6: Landscape and Visual;
 - Chapter 8: Ecology; and
 - Chapter 10: Geology, Hydrology and Hydrogeology.

Legislation, Policy and Guidance

- 15.5 Chapter 5 of the EIA Report sets out the renewable energy and planning policy framework that is relevant to the EIA process and the proposed development. The policies set out include those from the Argyll and Bute Local Development Plan (LDP), relevant aspects of National Planning Framework 4 (NPF4), Planning Advice Notes and other relevant guidance.
- 15.6 The principal legislation, policies and guidance relevant to this chapter are listed below. They include relevant local and national planning policy and guidance documents as well as technical guidance relating to the specific issues dealt with herein.
- Argyll and Bute Local Development Plan (2015);

- Argyll and Bute Local Development Plan Supplementary Guidance 2: Renewable Energy (2016);
- Argyll and Bute Proposed Local Development Plan 2 (2023);
- The National Planning Framework 4 (2023);
- Scottish Government Onshore Wind: Policy Statement (2022);
- Civil Aviation Publication (CAP) 764 Civil Aviation Authority (CAA) Policy and Guidance on Wind Turbines Version 6 (Feb 2016);
- CAA 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 (dated 01/06/17);
- Air Navigation Order (ANO) Article 222;
- Update of UK Shadow Flicker Evidence Base (DECC) (March 2011);
- and
- Carbon calculator: technical guidance.

Consultation

- 15.7 As part of the Scoping process, a consultation exercise was undertaken to inform the design of the proposed development and to seek agreement on likely significant environmental effects that result from the proposed development as well as the scope of any assessment work required as part of this EIA.
- 15.8 The Scoping Opinion was received from Scottish Ministers on 9th September 2022.
- 15.9 Consultation relevant to Aviation and the Aviation Lighting assessment were undertaken with Defence Infrastructure Organisation, Edinburgh Airport, Glasgow Airport, Glasgow Prestwick Airport, Highlands and Island Airport, and NATS Safeguarding who commented on aspects of methodology, sources of information, scope of assessment and cumulative development. A summary of these consultation responses is provided in Table 15.1.

Table 15.1: Consultation Responses

Consultee	Date Received	Consultation Response(s)	How and where is this addressed?
Aviation and Aviation Lighting			
Defence Infrastructure Organisation	22 nd June 2022	Within Low Flying Area 14 – MOD requires a condition requiring that the development is fitted with aviation safety lighting and sufficient data is submitted to ensure structures can be accurately charted. As a minimum, MOD require the development is fitted with MOD accredited aviation safety lighting in accordance with ANO 2016.	Noted – this is a standard and acceptable condition and will be addressed in Chapter 15: Other Issues

Consultee	Date Received	Consultation Response(s)	How and where is this addressed?
Edinburgh Airport	14 th June 2022	The wind farm is outside jurisdiction	No further action required.
Glasgow Airport	N/A	No Response	No further action required.
Glasgow Prestwick Airport	20 th May 2021	Outside of GPA controlled airspace and at boundary of designated operational coverage. Mitigation would be required for turbines which are visible to primary radar.	Further discussions are required with GPA at the appropriate time.
Highlands and Islands Airport	9 th June 2022	HIAL require an aviation feasibility study to be carried out to include impacts upon IFPs	The Applicant has undertaken several iterations of Instrument Flight Procedure assessments and Obstacle Limitation Surface assessments. A lighting strategy has been agreed, and HIAL have noted that they are content with all reports provided which confirm that Breackerie Wind Farm will not impact Campbeltown Airport's Instrument Flight Procedures.
NATS Safeguarding	22 nd June 2022	Would object based upon TOPA SG33478 report which highlights Lowther Hill issues.	The mitigation solution for this is known and a commercial agreement (if appropriate) would be entered into at the appropriate time.

Summary of Aviation

- 15.10 The scoping response and subsequent Technical and Operational Assessment (TOPA) report from NATS Safeguarding determined the terrain screening available will not adequately attenuate the signal of the Lowther Hill radar. Therefore, establishing that the development is likely to cause false primary plots to be generated, as well as anticipating a reduction in the RADAR's probability of detection. Based on these findings, NATS Safeguarding lodged an objection to the proposed development at the Scoping stage, citing an unacceptable impact on operation of the Lowther Hill Radar for Prestwick Air Traffic Control (ATC) and Military Air Traffic Control (ATC).
- 15.11 The Applicant consulted with Wind Power Aviation Consultants (WPAC) Ltd to understand the potential viability of future options. Viable mitigation was identified whereby Lowther Hill implements a blank over the proposed development.
- 15.12 Further discussion requires to be held to reach a commercial agreement on mitigation as appropriate which could be subject to conditions attached to any consent, however the technical solution is known and has been implemented on other sites.
- 15.13 Consultation was undertaken post-Scoping with HIAL to ensure that the safeguarding of Campbeltown Airport could be assured. An Instrument Flight Procedure Report was

prepared by IFP Design on behalf of the Applicant in order to assess if there would be any effect upon flight procedures issued to pilots for landing or taking off from the Airport.

- 15.14 The IFP Report found that using the specifications of candidate turbine provided, then no impact was predicted upon the IFPs of Campbeltown Airport.
- 15.15 It was also necessary to instruct an assessment into the Outer Horizontal Surface of the Airport's safeguarding zone. It was found that in the absence of mitigation, the proposed development would impact the OLS at a distance of approximately 6.7km. A lighting strategy would mitigate the impact of this. The lighting strategy illustrated below was therefore provided to HIAL who responded on 4th June 2023 to confirm that they approve the contents of the reports, including the proposed lighting mitigation (which was also agreed with the CAA as per below).
- 15.16 Glasgow Prestwick Airport (GPA) stated that they would be minded to object to the proposed development at a distance of approximately 72km based on "safety concerns" that would have an "operational impact". They wish to work through their full assessment and open a dialogue concerning "*the cost and risks which will be imposed on it as a result of the proposed development*". They would not be minded to remove the objection until all technical and operational safety risks are addressed to the satisfaction of the airport, and "*a mitigation agreement is put in place for the lifetime of the wind farm*".
- 15.17 GPA have a Terma radar system which is optimised for current and future turbines. At a distance of 72km, it is debatable whether they have any operational impact upon GPA. A technical solution exists where in theory the turbines could be blanked from the Terma system. The Applicant is committed to covering any reasonable and demonstrable costs in securing a Terma solution, including flight trials and implementation of mitigation if deemed necessary. However, the Applicant rejects recent approaches from GPA which involve service agreements for unspecified and unquantified risk over the lifetime of the proposed development. The Scottish Ministers have also recently found against this practice within the Clauchrie (Energy Consents reference: ECU00002001) and Sanquhar 2 (Energy Consents reference ECU00001801) appeal decisions. Further dialogue is required, however a condition could be applied similar to that within the Sanquhar 2 decision.

Summary of Approach to Aviation Lighting

- 15.18 The Applicant commissioned WPAC to produce an aviation lighting and mitigation report and agree a lighting scheme that meets all requirements of the Civil Aviation Authority (CAA) and Defence Infrastructure Organisation (DIO) as well as HIAL with regards to the infringement of OHL.
- 15.19 In correspondence on the 9th May 2023, the CAA approved an obstacle lighting plan for Breackerie Wind Farm, the design of which is summarised below and detailed in full in Technical Appendix 15.1.
- 15.20 The site is located in MoD Low Flying Area (LFA) 14, known also as Night Allocated Region 2B during night-time flying exercises and, as such, has been assessed for Night Vision Device (NVD) compatible and Infra-Red (IR) lighting in accordance with MoD obstruction lighting specifications.

- 15.21 To fulfil all MoD requirements, all 13 turbines will be fitted with Infra-Red lights (at hub height) and 7 dominant, by position, turbines fitted with ANO compliant medium intensity visible red lights. These lights are invisible to the naked eye and do not have any impact of the surrounding environment.
- 15.22 The proposed development is located in and below unregulated airspace, which is designated Class G by the CAA and away from any civil or military airfields.
- 15.23 Seven of the 13 proposed turbines will be fitted with ANO visible red aviation lights to fulfil the CAA's requirements, which state that turbines T1, T3, T5, T8, T9, T11 and T13 must be lit with medium intensity steady red (2000 candela) lights. The CAA also state a second 2000 candela light should be fitted on the nacelles of the above turbines to act as alternates in the event of a failure of the main light (although both lights are never lit concurrently). These requirements have allowed for the removal of lights from six perimeter turbines.
- 15.24 The visible aviation lights have a maximum brightness of 2000 candela (cd) when viewed on a horizontal plane. This figure is reduced significantly as the viewing angle changes. For example, the brightness is reduced by 50% to 1000cd when viewed from 1 degree below the horizontal (as outlined in Technical Appendix 6.3 within Volume 4).
- 15.25 Distance from aviation lights also reduces their perceived brightness, a phenomenon known as attenuation. Measurements indicate that attenuation is typically in the order of 10 to 20% but can be as much as 75% depending on atmospheric conditions.
- 15.26 Visible aviation lights are only operated at their maximum brightness when visibility is less than 5km in all directions, such as during thick mist or heavy rain. In all other conditions, which account for approximately 95% of the time, visible aviation lights are operated at 200cd, or 10% of their maximum brightness. This means that maximum brightness is only required for approximately 5% of the time.

Summary of Carbon Calculator

- 15.27 The results described in the following section use the Scottish Government's Carbon Calculator⁽¹⁾ for wind farms on peat to estimate the benefit of displacing conventionally generated electricity in the grid relative to the predicted direct and indirect emissions of carbon resulting from the construction and operation of the proposed development. This includes losses of stored carbon from felled forestry and affected peatland. The Carbon Calculator also provides an estimate of the carbon payback time for the proposed development.
- 15.28 The Scottish Government's Carbon Calculator was designed in response to concerns on the reliability of methods used to calculate reductions in greenhouse gas emissions from large scale wind farm developments on peat land. The methodology used considers the wider potential impacts on peat land hydrology and the decomposition of organic matter. The baseline assessment of carbon stored in soils at the proposed development has been calculated using site-based data and standard conversion factors.
- 15.29 The results of the Carbon Calculator for the proposed development show that it is estimated to produce annual carbon savings in the region of 157,802 tonnes of CO₂e per

year, and lifetime savings of over 12.7 Mt of CO₂e. These savings come about through the displacement of grid electricity, based on the current average grid mix.

- 15.30 The assessment of the carbon losses and gains has estimated an overall loss of **196,852** tonnes of CO₂e, mainly due to embodied losses from the manufacture of the turbines and provision of backup power to the grid, which should be reduced through the provision of on-site energy storage. Ecological carbon losses account for only 8 % of the total emissions, resulting from the proposed development's construction and operation.
- 15.31 The estimated payback time (against grid mix) of the proposed development, using the Scottish Government's Carbon Calculator, is estimated at 2.8 years, with a minimum/maximum range of 2.2 to **3.9** years. The carbon intensity of the electricity produced by the proposed development is estimated at 0.015 kgCO₂e/kWh. This is below the outcome indicator for the electricity grid carbon intensity of 0.05 kgCO₂e/kWh required by the Scottish Government in the Climate Change Plan (2018-2032) and therefore the proposed development is evaluated to have an overall beneficial effect on climate change mitigation.

Summary of Shadow Flicker Effects

- 15.32 There is no standard guidance for assessing shadow flicker in Scotland and therefore the industry along with planning and environmental health professionals in local authorities have, over many years, gathered an understanding of the parameters that are required in order to determine whether or not shadow flicker would be acceptable.
- 15.33 The Scottish Government's Onshore Wind Turbines: Planning Advice (2014)⁽²⁾ recommends that a separation distance of 10 times the rotor diameter between turbines and residential properties will mean that shadow flicker should not be a problem. Northern Ireland Department for Infrastructure - Best Practice Guidance to Planning Policy Statement (PPS) 18 Renewable Energy (2009, updated 2019) recommends that for properties within 500 m of turbines, shadow flicker should not exceed 30 hours per year or 30 minutes per day.
- 15.34 The turbines used within this EIA Report have a rotor diameter of 155m, meaning that, if there are no residential properties within 1.55km of any turbine, shadow flicker should not be an issue. The guidance further specifies that shadow flicker is only a consideration through 130 degrees either side of geographic north, where in this instance there are no properties.
- 15.35 An assessment of the area surrounding the proposed development using GIS mapping software combined with both aerial imagery and Ordnance Survey mapping shows that there are five properties (highlighted yellow) within 1.55km of any turbine in any direction. Diagram 15.1 below shows this. These properties are: Lochorodale Woods, Lochorodale, Gartnacopaig, St Mary's of Dalsmirren and Lecknacrevie Woods.
- 15.36 Instantly, three of the five properties could be scoped out. The two properties in the south (St Mary's of Dalsmirren and Lecknacrevie Woods) of Diagram 15.1 were scoped out due to the fact that although they lie within 1.55km of T9, they do not lie within the 130 degree angle north of any turbine. The property to the west (Gartnacopaig) lies within 1.55km of

T4 and T5, however, just as the southern receptors, it does not lie within the 130 degree angle of either of these turbines.

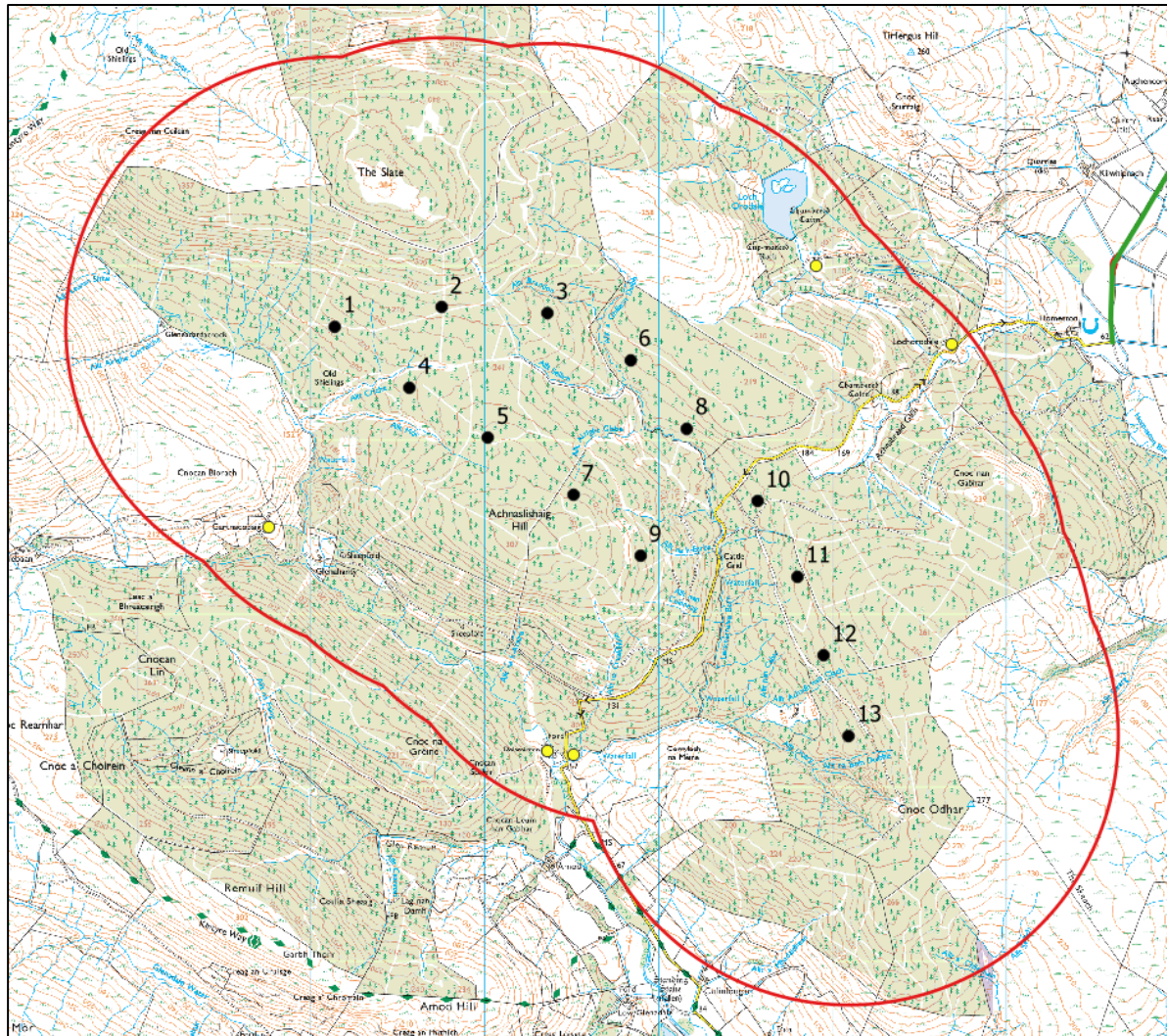


Diagram 15.1: 1.55km buffer around all turbines

- 15.37 The properties Lochorodale Woods (the northernmost of the two properties to the north-east of T8) and Lochorodale (by the roadside) have been scoped into assessment. The former is financially involved with the project and is used as an occasional leisure base for a European-based landowner (and therefore not occupied year-round), whilst the latter is presently unoccupied and has been for several years (although is occupiable).
- 15.38 The shadow flicker analysis was conducted using the Shadow Flicker module of the WindPro software.
- 15.39 The modelling was undertaken based on the proposed turbine layout comprising eleven turbines each with a rotor diameter of 155 m and a hub height of 122.5 m. Each receptor

was modelled as one window (2m by 2m in dimension), directly orientated towards the proposed development.

15.40 The WindPro analysis reports the 'worst case' scenario, that is, a situation where there is always sunshine, the wind is always blowing, and the wind and the wind turbine rotor track the sun by yawing the wind turbine exactly as the sun moves. In addition, the model does not include consideration of any screening effects of existing vegetation and buildings. Shadow flicker happens only when a certain combination of conditions coincides at particular times of the day and year, mainly in the winter months when the sun is low in the sky (BERR, 2009¹). The occurrence of shadow flicker and the extent of its impacts are dependent on a number of aspects, 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.

15.41 There are a number of factors that are likely to reduce the incidence of shadow flicker. These include weather conditions (lack of bright sunshine), presence of vegetation and buildings, the turbine being in shut down mode, due to wind speeds being too high or too low, and orientation of the rotor disc. These factors are not taken into account in the WindPro software analysis.

15.42 The predicted effects are therefore based on a worst-case scenario. If there is no direct sun then the intensity of shadow flicker is dramatically reduced. To adjust the shadow flicker effects predicted by the WindPro software for local occurrence of sunshine, the average annual percentage of sunshine for the proposed development site was determined (16.4%)² and applied to the WindPro results.

Table 15.2: Quantified results

Receptor Name	Easting	Northing	Days per Year	Max hours per day	Total hours per year	Adjusted total hours per year ²
Lochorodale Woods	165902	616011	165	0.46	81	13.3
Lochorodale	166652	615551	159	0.26	52	8.5

¹ Business Enterprise & Regulatory Reform (BERR). 2009. Onshore Wind: Shadow Flicker [website]. Available at: <http://webarchive.nationalarchives.gov.uk/+/http://www.berr.gov.uk/whatwedo/energy/sources/renewables/planning/onshore-wind/shadow-flicker/page18736.html>.

² [Campbeltown Airport \(Argyll and Bute\) UK climate averages - Met Office](#) (1441 hours of sunshine / 8760 hours per year)

- 15.43 It is noted in table 15.2 that even whilst not allowing for sunshine adjustment, neither property is above the recommended 30 minutes per day, although both are above 30 hours per year before adjustment.
- 15.44 The adjustment of hours per year, correlating to the predicted sunshine hours in a year (using Machrinhanish as a base), suggests that both properties would experience a considerably lower amount in reality. As previously noted, the modelling also does not account for vegetation. Given the extent of commercial coniferous forestry, it is likely that the noted amounts above would be lower in reality.
- 15.45 In the unlikely event of shadow flicker complaints, the Applicant would be willing to commit to a shadow flicker management plan to be agreed with Argyll and Bute Council post-consent. Mitigation measures could include provision of blinds, curtains or vegetation as deemed appropriate.

Matters Scoped Out

- 15.46 Air Quality and Ice Throw were proposed to be scoped out of any assessment during the Scoping Consultation and this approach was subsequently approved by the ECU. The following paragraphs will briefly explain why this was the case.

Air Quality

- 15.47 No adverse air quality impacts are anticipated from the operation of the proposed development given the rural nature of the site and the distance from sources of air pollution. Additionally, due to the short term, temporary nature of the construction and decommissioning phases, air is scoped out of the EIA Report.
- 15.48 Potential impacts on air quality from dust during the construction and decommissioning phases will be addressed through standard mitigation techniques to be agreed as part of a Construction Environmental Management Plan (CEMP) post-consent. No further specific assessment is proposed.

Ice Throw

- 15.49 If there is significant ice build-up on turbine blades, it can be detected by the machines' own sensors and operation curtailed until it melts.
- 15.50 The Scottish Government states the following in its Onshore Wind Farms: Planning Advice (2014) regarding the likelihood of ice build-up posing a risk to the public: *"The build-up of ice on turbine blades is unlikely to present problems on the majority of sites. When icing occurs the turbines' own vibration sensors are likely to detect the imbalance and inhibit the operation of the machines. Site operators also tend to have rigorous and computer aided maintenance regimes and control rooms can detect icing of blades. Danger to human or animal life from falling parts or ice is rare."*
- 15.51 As an added precaution, warning signage may be placed around the site to make the public aware of any risks.

Summary

- 15.52 The topics of Aviation, Aviation Lighting, the Carbon Calculator, and shadow flicker have been discussed in this chapter along with associated mitigation where required. These issues were scoped out of the formal EIA assessment process and this approach was accepted by the ECU at the Scoping stage. This chapter has therefore provided a summary of results, relevant information, and viable solutions agreed with consultees where necessary.

References

The Scottish Government. Carbon calculator: technical guidance. Gov.scot. Published 2018. Accessed December 22, 2021. <https://www.gov.scot/publications/carbon-calculator-technical-guidance/>

The Scottish Government. Onshore wind turbines: planning advice. Gov.scot. Published May 28, 2014. Accessed December 21, 2021. <https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/>

Department of Energy and Climate Change. Update of UK Shadow Flicker Evidence Base. Published 2011. Accessed December 21, 2021. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48052/1416-update-uk-shadow-flicker-evidence-base.pdf