

13 Aviation

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13 Aviation

13.1 Executive Summary

- 13.1.1 There are likely to be no aviation impacts, subject to an Instrument Flight Procedure (IFP) impact assessment demonstrating no impacts to the Instrument Flight Procedures at Kirkwall Airport.
- 13.1.2 There are no aviation radars in the area that have any potential for impacts. The area is low priority for military low flying training. There are no air-ground-air radio stations or navigational aids sufficiently close to have any potential for impacts.
- 13.1.3 As the Proposed Development turbines exceed 150 m in height, there is a statutory requirement for aviation obstruction lighting. This will be implemented as one medium intensity, steady red obstruction light on the nacelle of each turbine. The MoD has also requested aviation safety lighting in accordance with UK civil requirement.
- 13.1.4 In recognition of the need to minimise light pollution, Aircraft Detection Lighting Systems will be fully evaluated for their potential for deployment at the site, prior to construction. The CAA, together with the UK Wind Sector, is exploring the future use of Aircraft Detection Lighting Systems (ADLS).

13.2 Introduction

- 13.2.1 This Chapter considers the potential effects of the Proposed Development on existing and planned military and civil aviation activities, including those resulting from impacts to radar. Other potential effects result from the physical presence of the turbines as obstacles, and effects on navigational aids and radio communication stations.
- 13.2.2 Radio waves are used in a variety of surveillance and communication systems within aviation and any large structure has the potential to interfere with their broadcast and reception. The potential of a structure to affect the propagation of radio waves is principally dependent upon the size, shape and materials of construction. The blade rotation can cause turbines to show up on radar, which are specifically designed to detect movement. Whilst turbines can impact radar, whether or not this generates significant operational effects depends upon both the use of the radar and of the airspace above the Proposed Development.
- 13.2.3 The potential effects are highly dependent on the location of the wind farm and on the positions of the individual turbines. In some cases, there are no significant consequences, and no mitigation is required, whilst in other cases the turbine specification or layout must be designed to accommodate local infrastructure. Mitigation is often available and appropriate to manage impacts.

13.3 Legislation, Policy and Guidelines

- 13.3.1 The relevant sections of key legislation, policy and guidance documents are described below, which together place a responsibility on the planning authorities and the Applicant to assess potential impacts on aviation.

Legislation

- 13.3.2 Civil Aviation Authority (CAA) CAP 393 (February 2021), The Air Navigation Order (ANO) and Regulations, specifies the statutory requirements for the lighting of onshore wind turbines over 150 m tall.

Planning Policy

Scottish Planning Policy (SPP, 2014)

- 13.3.3 Scottish Planning Policy (SPP) states, under paragraph 169 on Development Management, that consideration should be given to the “impacts on aviation and defence interests and seismological recording”.

Scottish Onshore Wind Policy Statement (December 2017)

- 13.3.4 Within the Scottish Onshore Wind Policy Statement, under Chapter 4, Barriers to Deployment, it is noted wind developments can impact significantly on civil air traffic control primary radar systems because they appear as clutter on radar displays, potentially obscuring aircraft flying above them from view. This is a common factor in creating delay and cost to wind power developments.

- 13.3.5 Paragraphs 61 to 65 in this chapter, specifically address impacts to civil aviation radar, extracted below:

“The main mitigation method which has been deployed in numerous schemes over a number of years involves ‘in-filling’ from a radar which has no line of sight of the turbines in question.

While this is a proven mitigation (albeit not one that can be deployed for every development), the Scottish Government recognises that it can result in a significant financial burden, especially in cases where more than one in-fill feed is necessary. Since the financial environment facing wind energy development has changed radically, we believe that we need to reconsider this approach.

The Scottish Government remains committed to working with airports, radar operators and the wind industry in order to pursue and develop a more strategic approach to mitigating impacts of wind development on civil aviation radar.

Wind farms are no longer the new and unexpected feature that they once were and are an established part of Scotland’s landscape. Given this, we expect in the longer term, a move on the part of the air navigation industry towards self-management of this issue. This could be achieved through the deployment of wind farm tolerant radar, or other technical solutions.

In the shorter term, we will support any strategic use of radar, with a special focus across the central belt, where there is potential to maximise the application of mitigation and reduce costs.

The Scottish Government will also continue to work as part of the UK Government Chaired Aviation Management Board (AMB), and as part of the Renewable UK Aviation Working Group to make progress on this issue.”

Onshore Wind Policy Statement Refresh 2021: Consultative Draft (October 21)

- 13.3.6 Within the Onshore Wind Policy Statement Refresh 2021, under Section 3.3 Aviation Lighting, the document notes that Aviation lighting is becoming a more prominent issue, one which could have a significant effect on the development of onshore wind. Further that work is underway on technical and airspace-related solutions and that The Scottish Government has set up a short-term working group (anticipated lifespan of 18-24 months) to consider this issue and, ultimately, to deliver practical and consistent guidance to aid both the renewables sector and decision makers in assessing these impacts.

Planning Circular 2/03: Safeguarding of Aerodromes, Technical Sites and Military Explosives Storage Areas (revised March 2016)

- 13.3.7 This Circular summarises the Scottish Ministers’ understanding of the general effect of the relevant primary or secondary legislation.
- 13.3.8 It contains four annexes. Annexes 1 and 2 describe the formal process by which planning authorities should take into account safeguarding, including in relation to wind energy developments. Annex 3 lists officially safeguarded civil aerodromes and Annex 4 lists planning authority areas containing civil en-route technical sites for which separate official safeguarding maps have been issued.

- 13.3.9 The Circular also refers planning authorities, statutory consultees, developers and others to CAA CAP 764 (CAA Policy and Guidance on Wind Turbines), which is discussed further under Guidance below, and Met Office guidelines.
- 13.3.10 CAA 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 (June 2017)
- 13.3.11 This policy statement highlights and clarifies the requirements set out in CAP 393, the Air Navigation Order, for the lighting of onshore turbines. Key sections are described further under the assessment methodology below.

Guidance

CAP 764: CAA Policy and Guidance on Wind Turbines (Feb 2016)

- 13.3.12 CAA guidance within CAP 764, sets out recommended consultation and assessment criteria for the impacts of wind turbines on all aspects of civil aviation.
- 13.3.13 The CAA involvement in the Wind Farm Pre-Planning Consultation Process ceased on 25 December 2010. CAP 764 now states that “*developers are required to undertake their own pre-planning assessment of potential civil aviation related issues.*”
- 13.3.14 Within CAP 764 the CAA provides a chapter describing the “*wind turbine development planning process*”, within which the main civil aviation stakeholders and their interests are listed and described in brief. Table 1 within the guidance document provides an overview of considerations and the following paragraphs detail what developers will need to consider, conducting associated consultations as appropriate.
- 13.3.15 The CAA observes in section 2.36 that impact on communications, navigation and surveillance infrastructure alone is not sufficient to support an objection; rather those impacts need to have a negative impact on the provision of an air traffic service.
- 13.3.16 The CAA notes in section 5.25 of CAP 764 that “*it is incumbent upon the developer to liaise with the appropriate aviation stakeholder to discuss – and hopefully resolve or mitigate – aviation related concerns without requiring further CAA input. However, if these discussions break down or an impasse is reached, the CAA can be asked to provide objective comment*”.
- 13.3.17 Section 5.26 of CAP 764 states that “*the CAA will not provide comment on MoD objections or arguments unless such comments have been requested by the MoD.*”

13.4 Consultation

- 13.4.1 Scoping consultation responses were received from NATS En-route, the Ministry of Defence (MoD), Highlands and Islands Airports Limited (HIAL) and the Loganair Senior Pilot. The responses collectively placed a requirement on the Proposed Development for aviation obstacle lighting and an assessment of impacts to the Kirkwall Airport Instrument Flight Procedures.

Table 13.1 – Consultation Responses

Consultee and Date	Issues Raised	Applicant Action
NATS, 24 March 2022	No objection	No actions required
HIAL, 22 March 2022	The following are required to be assessed: <ul style="list-style-type: none"> • Instrument Flight Procedures (IFPs) (see CAP785) requirement. (Ref CAP764 	An IFP impact assessment will be commissioned, to be conducted by a CAA approved procedure design organisation.

Consultee and Date	Issues Raised	Applicant Action
	<p>Preplanning & consultation, 4.2, point 2.)</p> <ul style="list-style-type: none"> • Crane and Lifting equipment use during construction (see CAP1096) requirement. 	<p>Crane and lifting equipment use will be compliant with CAP1096 'Guidance to crane users on the crane notification process and obstacle lighting and marking'.</p>
<p>Loganair Senior Pilot, 27 April 2022</p>	<p>The proposed development is not located near any of the Loganair inter island routes and will have no material impact on the service they operate on behalf of Orkney Islands Council.</p>	<p>No actions required</p>
<p>Defence Infrastructure Organisation</p>	<p>The development proposed will cause a potential obstruction hazard to military low flying training activities.</p> <p>To address this impact, it would be necessary for the development to be fitted with aviation safety lighting.</p> <p>The MOD requests that the development be fitted with MOD accredited aviation safety lighting in accordance with the requirements of the Air Navigation Order 2016</p>	<p>Aviation obstacle lighting compliant with of the Air Navigation Order 2016, will be fitted.</p>

13.5 Assessment Methodology

13.5.1 The requirement is for the Proposed Development to have no significant residual impacts on aviation infrastructure. This is addressed through consultation with all relevant stakeholders within the consenting process. The task of the Applicant is to independently assess the potential effects and where significant effects may occur, to enter a dialogue with the affected stakeholders prior to submission as far as is possible. Whilst the aim of this pre-submission dialogue is to elicit the approval of all stakeholders, typically solutions are identified but do not reach full maturity in terms of the assessment by the stakeholders and the contracting of mitigation where required. The

stakeholders consider dialogue a higher priority and more meaningful once design iterations are completed and a live application exists.

- 13.5.2 An initial scoping study identified those stakeholders potentially affected by the Proposed Development. The scoping process involves considering all military and civil aerodromes in the wider area out to circa 60 km, all radar installations out to the limit of their range, all navigational aids, air-ground-air communications stations and low flying activities. A key sensitivity is the visibility of the turbines to those radars potentially affected. Because of this, studies have been conducted prior to submission to assess the visibility of the Proposed Development to those radars potentially affected.
- 13.5.3 Radar visibility is initially determined using a radar Line of Sight (LoS) analysis. The terrain profile between the radar antenna and the turbine tip is extracted from a digital terrain map. This is interrogated to establish whether or not the terrain blocks the direct path between these points and if so by how much. Refraction arising from atmospheric variations is estimated by using a standard 4/3rds earth radius curvature model. If there is a high degree of screening, i.e., the turbine tip falls well below the LoS path, then there should be no radar impacts. Contrastingly if the turbine clearly projects above the LoS then there are likely to be impacts. In marginal cases a more robust analysis is required that additionally takes account of both specific radar and turbine characteristics and radar diffraction around the terrain. Both these methods of analysis are conducted as required to generate a robust result.
- 13.5.4 The Scoping process identified NATS, HIAL (Kirkwall Airport), the CAA and the MoD as relevant stakeholders.
- 13.5.5 As structures are over 150 m high there is a statutory requirement for aviation lighting on the Proposed Development. The precise details of the lighting to be agreed with the CAA prior to construction. The requirements for the lighting of en-route obstacles (i.e., those away from the vicinity of a licensed aerodrome) are set out in Article 222 of the UK Air Navigation Order (ANO) 2016 as modified by the June 2017 CAA 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. Article 222 requires medium intensity (2000 candela) steady red aviation warning lights to be mounted as close as possible to the top of all structures at or above 150 m above ground level (AGL) and illuminated at night. In terms of requirement for lighting wind turbine generators, the CAA interprets this as the fitting of lights on the top of the supporting structure (the nacelle) rather than the blade tips. Additionally, the 2017 Policy Statement requires at least three (to provide 360-degree coverage) low-intensity lights (32 candela) be provided at an intermediate level of half the nacelle height. The lights should be turned on only when illuminance reaching a vertical surface falls below 500 LUX (dusk like conditions). If the horizontal meteorological visibility in all directions from every wind turbine generator in the Proposed Development is more than 5 km, the intensity of the nacelle mounted lights may be reduced to not less than 10 % of the minimum peak intensity specified for a light of this type.
- 13.5.6 If four or more wind turbine generators are located together in the same group, with the permission of the CAA, only those on the periphery of the group need be fitted with a light. Where acceptable to airspace users, and very much subject to the specific location, the CAA has increasingly supported the use of visible spectrum lighting of the cardinal turbines only that mark the geographical extent of the development; these being the ‘corner’ turbines for non-linear arrays and the ‘end’ turbines for linear arrays.

13.6 Baseline Conditions

- 13.6.1 The site lies approximately 25 km north-west of Kirkwall Airport. Orkney Island Council operates the other islands airfields at Eday, Sanday, Westray and Papa Westray. These airfields are too far away to be directly affected, with the nearest being Eday approximately 26 km north-east of the site.
- 13.6.2 There are no aviation radars in the area that have any potential for impacts. The closest radar is at Compass Head on the Shetland Islands at 138 km distance.
- 13.6.3 The area is low priority for military low flying training.

13.6.4 There are no air-ground-air radio stations of navigational aids sufficiently close to have any potential for impacts. There is a radio beacon used for navigation at Kirkwall Airport; a navigational aid. This is a collocated Distance Measuring Equipment and Omnidirectional Radio Range unit, which is safeguarded out to a maximum distance of 15 km. The Proposed Development is at a range of approximately 26 km and in addition has no direct line of sight to the turbines, with no risk of impacts.

Kirkwall Airport

13.6.5 Kirkwall Airport, operated by HIAL, currently has no radar, though HIAL do have a future Air Traffic Management Strategy involving the introduction of primary radar at Kirkwall, amongst others. The aspiration is to use turbine compliant technology if possible and hence HIAL has a policy of not objecting to proposed wind energy developments.

13.6.6 The process of managing obstacles around a licensed aerodrome, including wind turbines, is achieved by defining obstacle limitation surfaces particular to a runway and its intended use. These surfaces are specified within the CAA publication CAP 168 – The Licensing of Aerodromes. The obstacle limitation surfaces extend to 15 km from the runway. The Proposed Development is approximately 25 km away and hence beyond the physical safeguarding surfaces.

13.6.7 The site is within the range where impacts to Instrument Flight Procedures are possible. An IFP impact assessment will be commissioned to establish if there are any impacts to the Instrument Flight Procedures at Kirkwall Airport.

13.7 Impacts and Mitigation

13.7.1 There are no aviation impacts, subject to the IFP impact assessment demonstrating no impacts to the Instrument Flight Procedures at Kirkwall Airport.

13.7.2 As the Proposed Development turbines exceed 150 m in height, there is a statutory requirement for aviation obstruction lighting. The MoD, through the auspices of the Defence Infrastructure Organisation, has requested aviation safety lighting in accordance with the requirements of the Air Navigation Order 2016. This is the civil requirement as determined by the CAA and approved by the CAA. The MOD requirement will thus be met in meeting the requirements of the CAA.

Lighting Specification

- Medium intensity steady red (2000 candela) lights on the nacelles of all turbines;
- a second 2000 candela light on the nacelles of all turbines, to act as alternates in the event of a failure of the main light;
- lights should be operated so they will be turned on whenever illuminance reaching a vertical surface falls below 500 LUX;
- the lights to be capable of being dimmed to 10% of peak intensity when the visibility as measured at the wind farm exceeds 5 km;

13.7.3 In recognition of the need to minimise light pollution, Aircraft Detection Lighting Systems will be fully evaluated for their potential for deployment at the site, prior to construction. The CAA, together with the UK Wind Sector, is exploring the future use of Aircraft Detection Lighting Systems (ADLS). This can reduce the time that the obstacle lights are on. The lights are triggered by the presence of any aircraft within a defined area around the development, otherwise remaining off. Such systems are unable to be specified within the current regulatory environment, but their future use is anticipated. Whilst the Proposed Development is unable to specify ADLS, the time-scale to implementation may allow for the use of ADLS and its use will be reviewed at the time of implementation.

13.8 Summary

- 13.8.1 There are not likely to be any aviation impacts, subject to the IFP impact assessment demonstrating no impacts to the Instrument Flight Procedures at Kirkwall Airport.
- 13.8.2 The Site lies approximately 25 km north-west of Kirkwall Airport, 26 km north-east of the Eday airfield and further from the other Orkney Island Council operated airfields at Sanday, Westray and Papa Westray. None of these aerodromes should be affected, with no objection responses received from HIAL in terms of operations and the Loganair chief pilot. It should be noted that there has been no response to date from the Orkney Islands Council Airfield Superintendent.
- 13.8.3 As the Proposed Development turbines exceed 150 m in height, there is a statutory requirement for aviation obstruction lighting. Whilst the Proposed Development is unable to specify an Aircraft Detection based Lighting System (ADLS), the time-scale to implementation may allow for the use of ADLS and its use will be reviewed at the time of implementation.

13.9 References

Civil Aviation Authority (Feb 2016). CAP 764: CAA Policy and Guidelines on Wind Turbines.

Civil Aviation Authority (Feb 2021). CAP 393: The Air Navigation Order 2016 (ANO) and Regulations.

Civil Aviation Authority (Jun 2017). 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.

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