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Author	Malcolm Spaven / Ruth Paterson	12/11/2021
Checked	Louise Broatch	16/02/2022
Approved	Emily Galloway	17/02/2022

Client Details	
Contact	Julie Aitken
Client Name	Fred. Olsen Renewables Limited
Address	c/o Fred. Olsen Renewables, 64-65 Vincent Square, London, SW1P 2NU

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Chapter 14

Aviation and Other Matters

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Glossary

Term	Definition
Environmental Impact Assessment	**E**nvironmental Impact Assessment (EIA) is a means of drawing together by the developer, in a systematic way, a description of the development and information relating to the likely significant environment effects arising from a Proposed Development.
Environmental Impact Assessment Report (EIAR)	A document reporting the findings of the EIA and produced in accordance with the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 Regulation 5.
The Proposed Development	The proposed Scawd Law Wind Farm development
The Proposed Development Area	The development area within the red line site boundary (application area) as shown in Volume 3a Figure 1.2: Site Layout

List of Abbreviations

List and describe your abbreviations here.

Abbreviation	Description
agl	Above ground level
AIP	UK Aeronautical Information Publication
amsl	above mean sea level
AR	Allocated Region
ATC	Air Traffic Control
ATCSMAC	ATC Surveillance Minimum Altitude Charts
BT	British Telecom
CAA	Civil Aviation Authority
CNTBT	Comprehensive Nuclear-Test-Ban Treaty
CTA	Control Area
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EKA	Seismometer array at Eskdalemuir
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
JRC	Joint Radio Company
LFA	Low Flying Area
MoD	Ministry of Defence
NATS	National Air Traffic Services
NERL	NATS En Route
nm	nanometres
Nmi	Nautical miles
NVIS	Night Vision Imaging Systems
RRH	Remote Radar Head
SBC	Scottish Borders Council
SPP	Scottish Planning Policy
TMA	Terminal Control Area
TOPA	Technical and Operational Assessment
VFR	Visual Flight Rules

14.1 AVIATION

Statement of Competence

14.1.1 This section of the chapter has been compiled by Gladhouse Planning Ltd, trading as Aviatica. Aviatica is a specialist aviation consultancy with 25 years' experience of assessing the impacts of wind energy developments on aviation. This has included the preparation of more than 100 Environmental Impact Assessment (EIA) chapters for projects across the UK and assessment of more than 50 wind farm developments in the south of Scotland.

Introduction

14.1.2 This section 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.

14.1.3 The assessment concludes that the Proposed Development will have no significant effects on aviation or defence.

14.1.4 This chapter refers to:

- Chapter 6: Landscape and Visual;
- Appendix 13.3: Proposed Multi-Use Trails; and
- Appendix 14.1: Eskdalemuir Seismic Array Mathematical Analysis and Optimising Budget.

Legislation, Policy and Guidance

Legislation

14.1.5 Relevant legislation and guidance documents have been reviewed and taken into account as part of this aviation assessment. This includes the Air Navigation Order 2016 and aviation Statutory Instruments enacted under the European Union (Withdrawal) Act 2018.

14.1.6 The assessment has also taken account of the provisions of the Ministry of Defence (MoD) (Eskdalemuir Seismic Recording Station) Technical Site Direction 2005.

Planning Policy

14.1.7 Scottish Planning Policy (SPP) (2014) advises that wind energy proposals should take account of impacts on aviation and defence interests and seismological recording.

14.1.8 The Scottish Government Onshore Wind Policy Statement (December 2017) advised of the government's intention to pursue a more strategic approach to the mitigation of effects of wind farms on civil and military radar.

14.1.9 Further discussion of the draft National Planning Framework 4 (NPF4) and Onshore Wind Policy Statement Refresh Consultative Draft (2021 are included in Chapter 2: Policy Context of this EIAR).

14.1.10 Policy ED9 of the Scottish Borders Council (SBC) Local Development Plan (2016) advises that "the assessment of wind energy proposals will include…impacts on…aviation and defence interests and seismological recording". That wording is unchanged in the Scottish Borders Council Proposed Local Development Plan (2020).

Guidance

14.1.11 The SBC Supplementary Guidance: Renewable Energy (July 2018) advises that "Airports and their associated airspace are recognised as significant components of national infrastructure. Gradual erosion of airspace through windfarm development has the potential to compromise safety, flexibility, capacity and potentially the viability of the airport. Wind turbines are also known to have significant adverse impacts on instrument landing systems, navigational aids, radar systems and air traffic control. Applicants are therefore encouraged to have early discussions with airport operators, National Air Traffic Services, Civil Aviation Authority (CAA) and the MoD prior to an application being submitted. Where developers can specify technological or other mitigation solutions in relation to specific developments, they will be required to demonstrate agreement between themselves and the relevant operator that it can be delivered within a reasonable timeframe and will provide appropriate mitigation."

14.1.12 The SBC guidance also refers to CAA guidance Civil Aviation Publication (CAP) 764, notably in relation to the requirements for lighting of turbines 150 m or more in height, and further advises developers to consult the (MoD) concerning potential effects on the Eskdalemuir seismic array.

14.1.13 The assessment in this chapter of potential effects on aviation and defence has also been informed by the following aviation guidance and sources of information:

- CAA Policy and Guidelines on Wind Turbines (CAP 764);
- CAA Air Traffic Services Safety Requirements (CAP 670);
- 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 (June 2017);
- International Civil Aviation Organisation (ICAO), Annex 14 to the Chicago Convention, Vol.1, Eighth Edition (2018);
- UK Aeronautical Information Publication (AIP); and
- UK Military AIP.

Method of Assessment

Study Area

14.1.14 Study areas with the following radii were used in determining the aviation and defence baseline:

- 120 km for air traffic control and air defence primary surveillance radars;
- 30 km for Meteorological Office rainfall radars;
- 20 km for secondary surveillance radars and aeronautical radio navigation aids;
- 30 km for licensed, certificated and Government aerodromes;
- 10 km for unlicensed aerodromes, airstrips and gliding sites; and
- 50 km for the Eskdalemuir seismic array.

Desk Study

14.1.15 The description of baseline conditions for aviation and defence has been completed using the following methods:

- Assessment of the turbine visibility to all potentially affected air traffic control and air defence radars;
- Desk studies to identify all potentially affected airfields, airstrips and other aviation activity sites in the vicinity of the Proposed Development Area, referencing the UK AIP, the UK Military AIP, aeronautical charts and published pilots' guides;
- Measurement of the distance of the turbines within the Proposed Development Area from the Eskdalemuir seismic array; and
- Consultation with identified aviation consultees.

14.1.16 The potential impacts of the Proposed Development on aviation and defence have been assessed by considering whether any of the turbines would be within line of sight of, and in an area of operational significance to, any aeronautical or defence radar equipment; whether any of the turbines would breach the obstacle limitation surfaces around civil or military airfields, or pose an obstacle hazard to aircraft in the vicinity of airfields or conducting military

low flying; and whether the turbines would be within the safeguarding zones for aeronautical radio navigation or communication equipment or the Eskdalemuir seismic array.

Assessment of Likely Effect Significance

14.1.17 The significance of an impact on the use of air traffic control or air defence radar has been determined by assessing any technical effects on the radar in the context of the classification of the airspace in which the radar provides a service; the nature and density of air traffic in the airspace; the routes flown by aircraft in the vicinity of the Proposed Development Area; the types of service requested by, and provided to, aircraft using services provided from the potentially affected radar; and the capacity of normal operational air traffic management measures to address the effects on the radar.

14.1.18 Potential obstacle hazard impacts of the turbines have been determined by assessing the proximity of the Proposed Development to airfields, airstrips and aerodromes, including whether any obstacle limitation surfaces at Government or licensed aerodromes would be infringed; and whether the turbines, in combination with the terrain and other vertical obstructions in the area, would impose constraints on military low flying.

14.1.19 The significance of potential effects on aviation and radar receptors is based on industry regulations for safe obstacle avoidance and the ability to maintain radar separation from radar clutter.

Consultation

14.1.20 Scoping consultations have been undertaken with National Air Traffic Services (NATS) and the MoD. NATS advised that they would object to an application at the Proposed Development Area due to predicted impacts on the radars at Lowther Hill and Great Dun Fell.

14.1.21 The MoD advised that they have concerns about the proposal due to its proximity to the Eskdalemuir seismic array and its potential to pose an obstruction hazard to military low flying training. The latter effect would be addressed if aviation lighting was fitted to the turbines.

14.1.22 The Scoping Report for the Proposed Development proposed that effects on air defence or meteorological radars; airfields, airstrips, gliding or other aviation sites; and aeronautical radio navigation aids be scoped out since there are no such facilities within a range that could result in effects from wind turbines on the Proposed Development Area. The Scottish Government Scoping Opinion advised that "Scottish Ministers are generally satisfied with the approach to the scope of the EIA set out at Section 5 of the scoping report" and made no requests for additional information or assessment to be provided in relation to aviation and defence matters.

Baseline

14.1.23 The Proposed Development Area is located in uncontrolled airspace from ground level to 5,500 ft above mean sea level (amsl). Above that level is the Class D controlled airspace of the Scottish Terminal Control Area (TMA), within which air traffic services are provided by the NATS En Route (NERL) Prestwick Centre. Radars used to provide these services include those at Great Dun Fell (Cumbria) and Lowther Hill (South Lanarkshire).

14.1.24 The base of the Scottish TMA reduces to 4500 ft amsl some 700 m north of the Proposed Development Area. Approximately 1.5 km north of the Proposed Development Area the base of controlled airspace reduces further, to 3500 ft amsl. From that point northwards the airspace is the Class D controlled airspace of the Edinburgh Control Area (CTA), under the control of Edinburgh Airport Air Traffic Control (ATC). The airspace overhead the Proposed Development is in frequent and regular use by aircraft inbound to, and to some extent outbound from, Edinburgh Airport and other airports to the north of Edinburgh.

14.1.25 The following primary surveillance radars are located within a radius of 120 km of the Proposed Development Area:

- Leuchars Diversion Airfield;
- Remote Radar Head (RRH) Brizlee Wood;
- Newcastle Airport;
- Deadwater Fell (Royal Air Force (RAF) Spadeadam);
- Berry Hill (RAF Spadeadam);
- Great Dun Fell;
- Lowther Hill;
- Prestwick Airport;
- Glasgow Airport;
- Cumbernauld;
- Kincardine; and
- Edinburgh Airport.

14.1.26 Wind turbines within line of sight and operational range of a primary surveillance radar may cause false targets to be displayed on the radar, which may have an adverse effect on the provision of air traffic services by controllers.

14.1.27 The Proposed Development Area is located within Low Flying Area (LFA) 16, where military aircraft are permitted to fly as low as 250 ft above ground level. However, the Proposed Development Area is wholly located within a part of LFA 16 which has been designated by the MoD as a "low priority military low flying area less likely to raise concerns".

14.1.28 There are no Meteorological Office radars within range and line of sight of the turbines measuring up to 180 m tip height on the Proposed Development Area. There are also no airfields, airstrips, gliding or other aviation sites within 20 km of the Proposed Development Area.

14.1.29 The Proposed Development Area is approximately 37 km from the Eskdalemuir seismic array. The array is used to monitor worldwide compliance with the Comprehensive Nuclear-Test-Ban Treaty (CTBT) and is safeguarded by the MoD to ensure other sources of vibration do not compromise its ability to detect nuclear weapon tests. Wind turbine developments are prohibited within a 10 km radius zone around the array, and a 'noise budget' of 0.336 nanometres (nm) applies to wind turbine developments in a zone of between 10 and 50 km radius from the facility. Existing, consented and in-planning wind energy developments have used up all the 0.336nm budget based on the Standard seismometer array at Eskdalemuir (EKA) algorithm used by the MoD.

14.1.30 Wind turbines with blade tip heights of 150 m or more are subject to the obstruction lighting provisions of Article 222 of the Air Navigation Order.

Assessment of Potential Effects

14.1.31 The assessment has found that the Proposed Development will have no significant effects on aviation or defence.

14.1.32 The Proposed Development Area is beyond the areas of operational responsibility of the radars at Leuchars, Newcastle Airport, RAF Spadeadam, Prestwick Airport and Glasgow Airport. The radar at Remote Radar Head (RRH) Brizlee Wood has no line of sight to the Proposed Development due to the intervening terrain of the Cheviot Hills. The radars at Cumbernauld, Kincardine and Edinburgh Airport have no line of sight to the Proposed Development due to the intervening terrain of the Pentland Hills. Consequently, the Proposed Development will have no effects on those radars.

14.1.33 Assessment of the line of sight from the NERL radar at Lowther Hill indicates that it is likely to be capable of detecting Turbines 2, 3, 4, 6, 7 and 8 of the Proposed Development. This accords with the NATS Technical and Operational Assessment (TOPA) of the scoping layout.

14.1.34 Assessment of the line of sight from the NERL radar at Great Dun Fell indicates that it is likely to be capable of detecting all turbines except Turbine 1 of the Proposed Development. This is consistent with the NATS TOPA of the scoping layout.

14.1.35 The Proposed Development is likely to generate false plots on the Lowther Hill and Great Dun Fell radars. NERL has indicated that it will object to the Proposed Development. The Applicant is in discussions with NERL on technical mitigation measures to address the impacts on these radars. This will lead to agreement on a Radar Mitigation Scheme, to be secured by a planning condition, to ensure that the effects of the Proposed Development are satisfactorily mitigated for the lifetime of the wind farm. Following implementation of the Radar Mitigation Scheme the residual adverse effect will be a low magnitude of change to a receptor of medium sensitivity, resulting in Moderate/Minor significance.

14.1.36 The highest turbine in the Proposed Development will be Turbine 8, whose blade tips will be 2727 ft amsl. This will be the highest obstacle within 25 km of the Proposed Development Area. Aircraft flying under the Instrument Flight Rules (IFR) are required to fly at a level that is not lower than 1000 ft above the highest obstacle within 8 km of the aircraft. This will mean that any aircraft flying IFR within 8 km of the Proposed Development will be required to fly no lower than 3800 ft amsl. Currently, the minimum IFR altitude in this area is 3200 ft amsl, driven by the summit of Windlestraw Law (2163 ft). The increase to 3800 ft amsl will mean that any IFR traffic seeking to remain outside (below) Edinburgh Airport's controlled airspace while approaching from/departing to the south-east will be unable to do so by this route. However, since there would be no practical reason for IFR traffic in this area to remain outside controlled airspace, this is an effect of low magnitude affecting a receptor of low sensitivity, resulting in a residual adverse effect of low significance.

14.1.37 Air traffic flying under the Visual Flight Rules (VFR) overflying the Proposed Development will be required to maintain a minimum altitude 500 ft above the highest turbine blade tips, or 3300 ft amsl (after rounding up to the next highest hundred feet). This will still allow such traffic to transit the area without entering the Edinburgh CTA. However, in conditions when the cloud base is lower than approximately 3400 ft amsl, the Proposed Development will require any such aircraft to remain horizontally clear of the wind farm. Minor lateral diversions to avoid terrain, obstacles and weather are a normal part of VFR cross-country flight so this is an effect of low magnitude affecting a receptor of low sensitivity, resulting in a residual adverse effect of low significance.

14.1.38 The height of the Proposed Development also has the potential to require increases in the minimum altitudes to which radar controllers can clear aircraft to descend, as depicted on ATC Surveillance Minimum Altitude Charts (ATCSMAC). The minimum altitudes are based on aircraft maintaining a minimum vertical clearance of 1000 ft above the highest obstacle within five nautical miles (nmi) of the aircraft. The Edinburgh Airport ATCSMAC currently specifies a minimum altitude of 3900 ft amsl in the vicinity of the Proposed Development. This allows for obstacles up to 2900 ft. Since the Proposed Development will have a maximum altitude of 2727 ft amsl, it will have no effect on the Edinburgh Airport ATCSMAC.

14.1.39 The MoD scoping response (17 September 2020) advised that the Proposed Development would cause a potential obstruction hazard to military low flying training activities in LFA 16, 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, the Proposed Development Area is wholly located within a part of LFA 16 which has been designated by the MoD as a "low priority military low flying area less likely to raise concerns" and, while the Tweed Valley, 3 km south of the Proposed Development Area, is regularly used by low flying military aircraft, these aircraft do not route over the high terrain of the Proposed Development Area since the purpose of their training is to remain below radar cover, using terrain masking.

14.1.40 While the MoD response refers to a requirement for lighting to mitigate impacts on low flying in LFA 16, 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 16. 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) 2A. 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 all turbines in the Proposed Development to meet civil aviation requirements and infra-red lights to all turbines to meet the requirements of military and specialist civil operators. Therefore the effect on military low flying will be of low magnitude affecting a receptor of medium sensitivity, resulting in a residual adverse effect of Moderate/Minor significance.

14.1.41 Since all turbines in the Proposed Development exceed 150 m above ground level to blade tip height, they are within scope of Article 222 of the Air Navigation Order, which requires all obstructions of 150 m or more above ground level (agl) to be fitted with medium intensity steady red lights on the highest practicable point. Core Document 12.2 to the Crystal Rig (Phase IV) documentation (DPEA) reference: WIN-140-8) sets out the detail of aviation lights, how they propagate light and how the human eye perceives them. With reference to this tried and accepted technical information, an assessment of their visual impacts has been carried out in Chapter 6: Landscape and Visual of this EIAR

14.1.42 The Proposed Development will generate seismic noise which currently cannot be accommodated as the 0.336 nm noise budget for developments within 50 km of the seismic array is currently reached. Studies carried out on behalf of the Scottish Government, in particular the Phase 4 updated report published 10th February 2022 (SGV_204_Tech_Report_v12), have concluded that there is scope for revising the method of calculation of the noise budget as the algorithm consistently over-estimates measured noise data. A revised method would facilitate further wind energy development within 50 km of the array. In addition, it has been proposed that an extension of the wind farm exclusion zone to 15 km radius would free up noise budget for projects at greater range from the array, by eliminating the disproportionately high consumption of the budget by large projects close to Eskdalemuir. The Proposed Development is of relatively small scale and is located in the outer third of the zone within which the 'noise budget' applies. Since the detected noise at the array reduces with wind farm size and range from the array, it is expected that the Proposed Development will be capable of accommodation within the revised noise budget and safeguarding zone structure that are under consideration by the Scottish Government and the MoD (Appendix 14.1). Effects on the Eskdalemuir seismic array are expected to be of low magnitude affecting a receptor of high sensitivity, resulting in a residual adverse effect of Moderate significance.

Cumulative Effects

14.1.43 The cumulative effects of the Proposed Development on NERL radars have been considered in relation to all existing and consented wind farms within 10 nmi (18.52 km) of the Proposed Development. This encompasses the operational wind farms at Bow Beat, Carcant, Toddleburn, Dun Law, Dun Law Extension and Long Park, and the proposed wind farm at Greystone Knowe. None of these are within line of sight of the NERL Lowther Hill or Great Dun Fell radars and only Dun Law and Dun Law Extension are within line of sight of any NERL radar asset (the Kincardine radar). The cumulative effects on NERL assets will therefore be of Minor/Negligible significance and will not adversely affect the feasibility of the Radar Mitigation Scheme for the Proposed Development.

14.1.44 The cumulative effects of the Proposed Development on the minimum altitudes for IFR and VFR flight were also considered in relation to existing and consented wind farms within 10 nmi (18.52 km) of the Proposed Development and the proposed wind farm at Greystone Knowe. None of these have blade tip heights that impose limits on minimum altitudes greater than those of the surrounding terrain. Consequently, the Proposed Development has no cumulative effects on minimum altitudes.

14.1.45 The cumulative effects of the Proposed Development on military low flying are assessed as negligible magnitude affecting a receptor of medium sensitivity, resulting in a residual adverse effect of Minor significance. This is because there are no other wind farm developments close enough to the Proposed Development to cause interaction with any vertical or horizontal avoidance manoeuvring by low flying aircraft.

14.1.46 The effects of the Proposed Development on the Eskdalemuir seismic array, set out above, are by their nature cumulative, since they are assessed in terms of the cumulative noise budget for all wind energy developments within a 50 km radius of the array.

Conclusions

14.1.47 The Proposed Development will have no significant effects on aviation or defence.

Mitigation and Residual Effects

14.1.48 A Radar Mitigation Scheme will be agreed by the Applicant and NATS to address the effects of the Proposed Development on the Lowther Hill and Great Dun Fell radars. The residual effects on those radars will be of Moderate/Minor significance.

14.1.49 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 horizontally and/or vertically.

14.1.50 Infra-red lighting will be fitted to all turbines in the Proposed Development to enable aircrew using NVIS to see and avoid them at night. Medium intensity steady red lights will also be fitted to all turbines in the Proposed Development to assist non-NVIS-equipped aircraft to avoid the turbines at night. The residual effects on low flying aircraft will be of Moderate/Minor significance.

14.1.51 Following revision of the noise budget algorithm and the structure of the safeguarding zones around the Eskdalemuir seismic array, the residual adverse effects on that facility will be of Moderate significance.

14.2 OTHER MATTERS

Statement of Competence

14.2.1 This section has been compiled by a suitably qualified and experienced environmental and development professional with a post graduate degree qualification in the environmental sciences and 4 years' experience in the writing and coordination of EIARs for large development projects. She has been involved in several wind farm projects from due diligence through to EIAR coordination and has an understanding of all disciplines which must be assessed within an EIAR for an onshore wind farm.

Microwave Fixed Links

14.2.2 Fixed microwave links are direct line-of-sight communication links between transmitting and receiving dishes placed on masts generally locate on hilltops that vary in length from a few kilometres to over 70 km. They are used for the transmission of information to broadcasting masts for TV and radio and for the mobile telephone networks.

14.2.3 A desk-based study of potential microwave links was undertaken using information already held by the Applicant and through a search using an online resource tool[1].

14.2.4 Telecommunications and broadcasting network operators were consulted during the scoping exercise and British Telecom (BT) and Joint Radio Company (JRC) provided a consultation response. Point to point microwave radio links were investigated by BT and it confirmed that the Proposed Development would not cause interference to its current and planned radio networks. JRC also confirmed that there would be no potential problems with interference. Atkins Global were also consulted and no response was received.

Public Access

14.2.5 There are no Core Paths within the Proposed Development Area. A Right of Way extends into the Proposed Development Area by about 800 m (approximately 1 km to the closest infrastructure) following a route north from the village of Walkerburn along the Walker Burn (river) which joins an undesignated route approaching Priesthope Hill from the north. These paths link to trails within the Tweed Valley Forest Park and Caberston Forest which are out with the Proposed Development Area. No impact is anticipated on these paths since they are some distance from the works as part of the Proposed Development.

14.2.6 A National Cycle Network path follows the Tweed river between Peebles and Melrose outside of the Proposed Development Area.

14.2.7 There are various Core Paths and Rights of Way in the vicinity of the Proposed Development Area within the areas of Peebles, Innerleithen, Walkerburn, Traquair, Broadmeadows and Galashiels mostly focused within the Tweed Valley. The impacts on key viewpoints, agreed during an extensive consultation process are presented in Chapter 6: Landscape and Visual. The impact of the Proposed Development on views from the Southern Upland Way to the south of the Proposed Development are also presented in Chapter 6: Landscape and Visual Impact.

14.2.8 Although members of the public have the right to roam land in Scotland under the Land Reform (Scotland) Act 2003 there will be restricted access during the construction phase for Health & Safety purposes. It is expected that the Proposed Development area will be managed during the construction phase under the Construction (Design and Management) Regulations 2015.

14.2.9 Appropriate Health & Safety signage will be erected in the Proposed Development Area. Information on signage has been included in Chapter 4: Project Description. It is suggested that details of such signage can be agreed with the planning authority through an appropriately worded planning condition.

14.2.10 It is intended that multi-use trails will be applied for as a separate consent within the Proposed Development Area which would improve public access to hills north of Innerleithen and Walkerburn. It is also proposed that the construction compound at the site entrance to remain as a visitor carpark. The trails and their predicted impacts on tourism and the local economy are detailed in Appendix 13.3. To secure the delivery of multi-use trails a Memorandum of Understanding (MoU) will be signed with a community group.

Buried Infrastructure and Overhead Electricity Networks

14.2.11 A desk-based study identified potential infrastructure assets near the Proposed Development. Consequently, a Cadent Gas infrastructure request was made online[2] which resulted in there being no record of Cadent Gas Limited, National Grid Electricity Transmission plc's and National Grid Gas Transmission plc's apparatus in the vicinity of the Proposed Development.

14.2.12 There are no overhead electricity lines entering the Proposed Development Area which could be impacted by the development.

Ice Throw

14.2.13 This section will describe ice throw and consider its risk and mitigation in relation to the Proposed Development.

14.2.14 Blade icing is a rare occurrence that will only happen when the blades of the turbine are stationary and under near freezing temperatures and relatively high humidity, with either freezing rain or sleet. If these certain climatic conditions cause icing to occur, once operation recommences, the operational motion of the turbine blades and the forces of gravity can cause the ice to break off and fall vertically to the ground.

[1] Line Search Before You Dig (n.d.) Available online: https://www.linesearchbeforeudig.co.uk/ (Accessed: 12/11/2021)

[2] Line Search Before You Dig (n.d.) Available: www.beforeyoudig.cadentgas.com (Accessed: 12/04/2021, service has since been merged into the https://www.linesearchbeforeudig.co.uk/ online tool).

14.2.15 The risk of ice throw[3] is dependent on the local climate and weather conditions in which the wind turbines are situated. Increases in temperature, wind speed and solar radiation can cause the ice to loosen and fall. This makes the area under the turbine the area of the greatest risk. Dependent on the conditions, there is the potential for the blades to propel the ice up to several hundred meters when they commence operation. This can cause damage to people, structures and vehicles.

14.2.16 Siting the turbines away from occupied buildings, roads and public areas can mitigate the risk, and this has been done as far as is practical with the Proposed Development. However, as this is a publicly accessible hill some residual risk remains and warning signs will be installed at entry points to the Proposed Development.

14.2.17 There are specific sensors that can identify the likeliness of the climatic conditions that cause icing, so if ice accumulation is expected or occurs the turbines can be shut down. This works when icing on the blades results in reduced performance, unusual loads, and/or vibrations. These are then detected by a control system and trigger an automatic shutdown of the turbine. Project operators use these detection systems to halt operation of certain turbines during icing events to prevent ice throws and equipment damage and, in these cases, the turbine remains off-line until an operator visually inspects and manually restarts the turbine when the blades are clear of ice.

14.2.18 The overall view is that modern turbines which are fitted with climatic detection systems like the model being considered for the Proposed Development will help to mitigate against the occurrence of ice throw. As highlighted in Chapter 4: Project Description, turbine procurement together with good practice site management procedures, including the use of visual warnings signs and curtailment during periods of ice build-up on blades, will mitigate and manage this potential hazard.

Shadow Flicker

14.2.19 Standard guidance[4] states that shadow flicker occurs within ten rotor diameters of the turbine, and that effects only occur within 130 degrees either side of north relative to the turbines. Beyond these limits it is considered that potential impacts associated with shadow flicker will not be significant.

14.2.20 As there are currently no residential properties identified within 10 rotor diameters of the nearest turbines the need to undertake an assessment has been scoped out and is not considered further within this EIAR.

Conclusions

14.2.21 There are no known impacts associated with microwave fixed links, public access or buried/overhead infrastructure which are possible from the Proposed Development.

14.2.22 In terms of the potential impact of ice throw it is considered that with turbine procurement together with good practice site management procedures and with appropriate embedded mitigation in place there will be no significant impact for the public or for site workers using the site. These will include, but not be limited to, the use of visual warnings signs and curtailment during periods of ice build-up on blades.

14.2.23 In relation to shadow flicker, as there are currently no residential properties identified within 10 rotor diameters of the nearest turbines the need to undertake an assessment has been scoped out and is not considered further within this EIAR.

[3] Evaluating risk caused by ice throw from wind turbines (2017) Available: https://www.lr.org/en-gb/insights/articles/evaluating-risk-caused-by-ice-throw-from-wind-turbines-1/ (accessed April 2021).

[4] Onshore wind turbines: planning advice (2014) Available: https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/ (Accessed 08/02/2022)