Chapter 15: Other Issues

Figures

Appendices

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15 Other Issues

15.1 Executive Summary

15.1.1 This Chapter considers potential effects of the Development on telecommunications, television / radio, aviation (civil and military), shadow flicker, ice throw, air quality and carbon balance.

Telecommunications, Television / Radio

15.1.2 No disruption to telecommunications such as television and radio reception is anticipated as a result of the Development.

Aviation (Civil and Military)

15.1.3 The Development is not within line of sight to the HIAL Inverness Airport or the RAF Lossiemouth Primary Surveillance Radars (PSRs) and no effects are anticipated.

15.1.4 Assessment showed that no radar line of sight exists between the Development and the Perwinnes and Allanshill PSRs or NATS air to ground communications facilities. This indicates that there will be no technical impacts on NATS operated aviation navigational facilities. As such, there is no anticipated effect on aviation navigational equipment.

15.1.5 The Development lies within an area which is deemed a low flying area by the MOD and by aircraft transiting to and from the Tain Air Weapons Range. The Applicant will agree a suitable aviation lighting scheme with the Ministry of Defence (MOD).

Shadow Flicker

15.1.6 There are no potential impacts of shadow flicker predicted as a result of this Development.

Ice Throw

15.1.7 Following the implementation of proposed mitigation measures, such as making operation crews and members of the public aware of the risks of ice throw, it is considered that the risk of ice throw will be very low.

Air Quality

15.1.8 With the implementation of mitigation measures to control dust, no significant effects on air quality are predicted.

Carbon Assessment

15.1.9 A carbon assessment has been undertaken to estimate the potential savings in carbon dioxide (CO_2) emissions by the Development replacing other electricity sources. This has been calculated as approximately 126,564 tonnes of CO_2 saved per year (tCO_2yr^{-1}) through displacement of coal-fired electricity or 63,282 tonnes CO_2yr^{-1} over grid-mix supply.

15.1.10 The CO_2 payback time, which is the period of operation of the wind farm required before there is a net saving of CO_2 has also been calculated as between 1.3 to 2.6 years (using coal

and UK grid supply mix CO_2 emission factors, respectively). This is a substantially shorter time period than the 25 year operational period applied for.

15.2 Introduction

15.2.1 This assessment considers the following potential issues of relevance to the Development that are not covered within the other environmental chapters, namely:

- Telecommunications, Television / Radio;
- Aviation (Civil and Military);
- Shadow Flicker;
- Ice Throw;
- Air Quality; and
- Carbon Balance.

15.2.2 Due to the lack of similarity between these issues they are considered separately in Sections 15.3 to 15.8, with methods of assessment and structure of reporting varying accordingly.

Scoping and Consultation

15.2.3 Consultation has been undertaken with statutory and non-statutory organisations and members of the public to inform the scope of the assessment reported in this ES (refer to Chapter 6: Scoping and Consultation). The consultation responses relevant to the issues assessed in this chapter are summarised within Table 15.1.

Table 15.1: Consultation Responses

Consultee	Summary Response	Comment/Action Taken
Scottish Government	Scoping Response: A statement of expected carbon savings over the lifetime of the wind farm should be provided. This should include an assessment of carbon emissions associated with track preparation, foundations, steel, transport and any carbon loss from tree felling or degradation of peaty soils. Reference can be made to the technical note "Calculating Potential Carbon Losses and Savings from Wind Farms on Scottish Peatlands (Scottish Government, 2011).	A Carbon assessment has been undertaken as detailed in this Chapter and Appendix 15.2: Carbon Calculation Spreadsheet.
The Highland Council	Scoping Response: The Environmental Statement must recognise community assets that are currently in operation for example road network, footpaths, TV, radio, telecommunication links, radar, aviation interests.	The assessment of potential effects on the road network is provided in Chapter 12: Access, Traffic and Transport. The assessment of potential effects on paths is provided in Chapter 14: Socio-economic & Recreation. Assessment of effects on other community assets i.e. telecommunications and aviation are provided in this chapter.

SEPA	Scoping Response: The ES should contain an assessment of carbon balance using the Scottish Government guidance 'Calculating Carbon Savings from Wind Farms on Scottish Peat Land – A New Approach'.	Carbon assessment has been undertaken and is reported in this chapter and Appendix 15.2.
Civil Aviation Authority	Scoping Response: The Environmental Statement must consider the potential impact upon aviation and the associated positions of NATS and the Ministry of Defence (MoD). If the proposed Development is approved the Developer is to inform the Defence Geographic Centre of the locations, heights and lighting status of the turbines and meteorological masts, the estimated and actual dates of construction and the maximum height of any construction equipment to be used, prior to the start of construction, to allow for the appropriate inclusion on Aviation Charts, for safety purposes.	The assessment detailed within this chapter considers the potential effects of the Development upon aviation. The Defence Geographic Centre will be notified if the Development is approved.
MOD	Scoping Response: The MOD initially objected to the scoping site boundary coordinates as the proposed turbines will be within low flying area LFA 14 and will affect military aircraft approaching the RAF Tain Air Weapon Range. MOD Safeguarding wishes to be consulted and notified about the progress of planning applications and submissions relating to this proposal to verify that it will not adversely affect defence interests.	The MOD withdrew its objection on 15th August 2014 after the Applicant provided accurate turbine locations and heights. The Applicant will agree a suitable aviation lighting scheme with the MOD. The DIO will be kept up-to-date and continually consulted on the progress of the application.
Highlands and Islands Airports Inverness	Scoping Response: HIAL calculations show that the Development would not infringe the safeguarding surfaces for either Inverness or Wick John O'Groats Airports. However, due to its height and position, a red obstacle light may be required to be fitted at the hub height of some of the turbines. Provided that this condition is met HIAL would not object to this proposal.	The Applicant will agree a suitable aviation lighting scheme with the MOD and notify HIAL through the Defence Geographic Centre and updated aviation charts and documentation.
NATS	Scoping Response: No specific issues raised, response listed services that NERL provide to wind farm developers.	NATS online self-assessment maps used to establish if technical impact is to be expected.
Joint Radio Company (JRL)	Scoping Response: JRC does not foresee any potential problems based on known interference scenarios and the [Gordonbush extension] data provided.	None required.

15.3 Telecommunications, Television / Radio

Introduction

15.3.1 This section considers the potential effects of the Development on telecommunications, television and radio.

Methodology

15.3.2 A desk-based assessment and site survey was carried out to collect baseline data and identify television and telecommunications fixed link signal transmissions in proximity to the Development.

15.3.3 In the absence of guidelines for determining significance of effects on telecommunications, television and radio, the methodology used in this assessment is based on establishing whether or not there would be any effect.

15.3.4 Where there is a potential effect, appropriate mitigation measures have been identified to avoid or reduce effects. Significance is not attributed and therefore effects predicted are considered qualitatively using professional judgement.

Baseline

15.3.5 A comprehensive desk study has been undertaken to identify potential effects on telecommunications.

15.3.6 There is currently one television transmitter that provides a service to the area surrounding the Development, which was identified as Rosemarkie. It is situated approximately 48.8km due south from the site, at approximate grid reference E276207 N862271 (see Appendix 15.1 for further details).

15.3.7 A television signal strength survey of the most populated areas served by Rosemarkie was undertaken, the results of which are summarised in Table 15.2 (see also Appendix 15.1).

Table 15.2: TV Signal Strength communities near Development

Community	TV Signal Strength	Comments
Gordonbush	Good signal strength	All aerials point south towards the transmitter, which has gone through digital switchover and is in the opposite direction from the wind farm.
Balnacoil	Poor signal strength	The area receives its signal from the Rosemarkie transmitter which is located to the south and is in the opposite direction from the wind farm. The majority of properties have satellite dishes.
Brora	Good signal strength	The area receives its signal from the Rosemarkie transmitter which is located to the south and is in the opposite direction from the wind farm.
Helmsdale	Poor signal strength	Helmsdale is a village to the north-east of the site and receives a signal from the Rosemarkie transmitter which is in the opposite direction from the wind farm. If the aerials were elevated then the signal would be improved.

Potential Effects

Telecommunications

15.3.8 Turbines have the potential to cause interference to telecommunication links, and exclusion zones for wind farms are often required to ensure the link interference does not occur. Ofcom publishes a method for calculating the size of the exclusion zone around a microwave link beyond which is accepted that a turbine would not interfere with the link. Link operators normally also calculate their own exclusion zone criteria, which may be more onerous. This exclusion zone is known as the Fresnel zone.

Television/Radio

15.3.9 The introduction of a wind farm may cause impairment to television reception in the surrounding areas. This impairment is similar to the impairment caused by other built structures. Even natural features such as trees can have a negative effect.

15.3.10 Turbines have the potential to cause interference to television signals resulting from:

- Physical blocking – this has the potential to significantly affect televisions where aerials are located within 500m of a turbine, as at greater distances signals can propagate around turbines. Any loss of television signals at greater distances are unlikely to affect signal quality and are masked by closer objects blocking the aerial, such as trees.
- Signal reflection – this is the most common cause of turbine television interference. This occurs when a radio signal is reflected off the turbine structure. At most locations, turbines would not affect television signals because any reflected signals are dominated by the principle television signal. However, at certain terrain-shielded locations, the existing principle television signal could be poor, so that any reflected signal from a turbine may start to dominate.

15.3.11 It should be noted that analogue television in the area of the Development ceased to be transmitted in October 2010 as part of the 'digital switchover'.

15.3.12 Digital television signals are generally more robust and less prone to signal reflection. However, a minimum signal level is required for digital television to operate correctly. If a property already receiving a weak digital signal experiences additional blocking or reflections from turbines, the signal level may drop, causing the television screen to pixilate or cut out intermittently. Reflections and blocking from other objects (such as trees) close to the aerial can cause similar effects.

15.3.13 Turbines have the potential to cause disruption to medium and long wave radio broadcasts only in the immediate vicinity of the turbines. FM and DAB digital radio signals are less prone to interference than television signals, and therefore it is likely that no impairments to radio signal quality would be experienced.

15.3.14 A Television Impact Report has been prepared and included in Appendix 15.1, which outlines the findings of a comprehensive survey undertaken to determine the potential effects on TV signal on areas surrounding the Development.

15.3.15 It is predicted that the Development will have no effect on television or radio signals within the study area.

15.4 Aviation (Civil and Military)

Introduction

15.4.1 This section considers the potential effects of the Development on Aviation, including aviation navigational equipment and aviation operations.

Methodology

15.4.2 A desk-based assessment and consultation was carried out to collect baseline data including:

- Radar line of sight (LOS) analysis of civil and military primary surveillance radars (PSR);
- Proximity of civil and military airfields, Helicopter Landing Sites, para-dropping and microlight sites;
- Location of air to ground communications facilities; and
- Consultation with aviation operators and stakeholders.

15.4.3 There are also a number of documents which provide guidance on aviation considerations, including:

- CAP 764 CAA Policy and Guidelines on Wind Turbines (The Stationery Office June 2013) provides guidance on the analysis of potential effects of wind development on aviation navigational equipment;
- United Kingdom Helicopter Landing Sites (UKHLS) booklet (September 2014);
- UK Minor Aerodromes Book (January 2015); and
- NATS online wind farm planning self-assessment mapping.

15.4.4 The study area for the assessment of potential effects on aviation navigational equipment and aviation operations are as follows:

- 10km from air to ground communications facilities;
- 10km from para-dropping sites, microlight sites, gliding sites, helicopter landing sites and minor aerodromes;
- 40 nautical miles (nm) from MOD primary surveillance radar (PSR) facilities;
- 30km of civilian airports and associated PSR facilities; and,
- 200km from NATS En-route (NERL) PSR facilities.

15.4.5 In the absence of guidelines for determining significance of effects aviation navigational equipment and aviation operations, the methodology used in this assessment is based on establishing whether or not there would be any effect.

15.4.6 Where there is a potential effect, appropriate mitigation measures have been identified to avoid or reduce effects. Significance is not attributed and therefore effects predicted are considered qualitatively using professional judgement.

Baseline

15.4.7 The Development is approximately 33 nautical miles (nm) to the north of Inverness Airport and over 30nm to the south-west of Wick John O'Groats Airport. The local airspace is Class G uncontrolled airspace.

15.4.8 The Development is also within the MOD's Low Flying Area 14. There is a MOD airfield radar at RAF Lossiemouth approximately 56km (30nm) to the south-east of the Development. RAF Lossiemouth Air Traffic Control (ATC) will generally provide radar services out to 40nm of the radar installation, but may provide services out to the full operational range of 60nm.

15.4.9 There are no MOD air defence units within the study area.

15.4.10 There are two NERL PSR facilities within the study area: Perwinnes (approximately 150km to the south-east of the Development), and Allanshill (approximately 115km to south-east of the Development).

15.4.11 There are no met office radars, para-dropping sites, gliding sites, minor aerodromes, microlight sites or Helicopter Landing Sites within the study area, therefore these are not considered further in the assessment.

Potential Effects

15.4.12 Turbines have the potential to act as obstructions to low flying aircraft and can be detected by PSRs, resulting in radar clutter being presented on the controlling systems used by air traffic controllers. This clutter can obscure actual aircraft and/or data pertaining to actual aircraft and cause increased controller workload and decreased aviation safety if unmitigated.

15.4.13 An assessment of radar line of sight using the ATDI ICS Basic modelling tool has shown that the Development is not within line of sight to the HIAL Inverness Airport or the RAF Lossiemouth PSR and no effects are anticipated. This analysis is supported by the fact that neither aviation stakeholder objected to the turbine locations during scoping.

15.4.14 Assessment using the NATS online self-assessment maps showed that no radar line of sight exists between the Development and the Perwinnes and Allanshill PSRs or NATS air to ground communications facilities. This indicates that there will be no technical impacts on NATS operated aviation navigational facilities. As such, there is no anticipated effect on aviation navigational equipment.

15.4.15 The turbine development lies within an area which is deemed a low flying area by the MOD and by aircraft transiting to and from the Tain Air Weapons Range. It is feasible that pilots of low flying aircraft would require visual cues denoting the location of the Development.

Mitigation

15.4.16 The Applicant will agree a suitable aviation lighting scheme with the MOD given that the Development is located within an area designated as a low flying area.

Residual Effects

15.4.17 There are no residual effects on aviation navigational equipment assuming any mitigation agreed with the MOD is implemented.

15.4.18 There are no residual effects on aviation operations.

15.5 Shadow Flicker

Introduction

15.5.1 This section considers the potential effects of the Development on Shadow Flicker.

Baseline and Potential Effects

15.5.2 In the UK, only properties within 130 degrees either side of north, relative to the turbines can be affected by shadow flicker, as turbines do not cast shadows on their southern side (ODPM, 2004). As there are no properties within 130 degrees either side of north from the Development (see Figure 15.1), there are no potential impacts on shadow flicker predicted as a result of this Development.

15.6 Ice Throw

Introduction

15.6.1 This section considers the potential effects of the risk of ice throw resulting in injury and/or property damage as a result of the Development.

Methodology

15.6.2 The study area for ice throw is the maximum potential distance (in metres) of ice falling from turbines. This can be approximated using the formula 1.5 x (blade diameter + hub height) (Tammelin *et al.,* 1997 and BOREAS, 2003). The maximum potential distance for the Development is therefore 277.5m (1.5 x (105 + 77.5) and the study area for the ice throw assessment is based on a 277.5m buffer around the turbine locations, based on a 130m tip height.

Baseline and Potential Effects

15.6.3 Ice can build up on turbine blades, nacelles and towers under certain climatic conditions. Ice may fall or be thrown from the turbine during particular circumstances for example, as a result of turbine movement or vibration, temperature rise or strong winds.

15.6.4 During icing conditions there are two types of risks potentially associated with ice collecting on turbines:

- Fragments thrown off from the operating turbine due to aerodynamic and centrifugal forces; or
- Ice falling down from the turbine when the blades are stationary.

15.6.5 For the Development, the maximum distance from the turbine where ice could be expected to fall/throw is 277.5m.

15.6.6 Ice throw has been noted as a risk in very cold conditions, for example in the northerly latitudes of Scandinavia or very high altitudes in continental Europe. Ice falls occurs if ice accumulates on the turbine and falls to the ground when it begins to thaw. This would occur when the temperature warms following a period of extreme cold weather conditions.

15.6.7 Due to the more temperate climate of Scotland, icing is likely to be a rare occurrence. The icing map of Europe (WECO, 1999) shows that Scotland is within a light icing area with an annual average of 2-7 icing days per year.

15.6.8 The nearest residential property is approximately 2km and the nearest public road (C6 Strath Brora road) is approximately 2.2km from the nearest turbine, and well outside the maximum fall/throw distance. It is predicted that the potential for ice throw affecting members of the public is considered to be extremely low.

Mitigation

15.6.9 The following mitigation measures are proposed to avoid or reduce the risk of ice throw:

- Increase awareness provided to service crews regarding the potential for ice throw and associated risks; and
- Notices placed at access points alerting members of the public accessing the site of the possible risk of ice throw under certain conditions. This is will be included as part of any Outdoor Access Plan.

Residual Effects

15.6.10 Following the implementation of proposed mitigation measures it is considered that the risk of ice throw affecting members of the public or operational staff will be very low.

15.7 Air Quality

Introduction

15.7.1 This section considers the potential effects of the Development on Air Quality.

Baseline and Potential Effects

<u>Construction</u>

15.7.2 During the construction of the Development the movement of vehicles and on-site plant would generate exhaust emissions. Given the short term nature of the construction period,

and the limited area to be developed within the context of the large-scale nature of the site, effects on local air quality are likely to be negligible.

15.7.3 Construction activities also have the potential to generate dust during dry spells (such as borrow pit quarrying), which may adversely affect local air quality. During construction of Gordonbush Wind Farm, a short stretch of access track close to the entrance from C6 Strath Brora road was tarmacked to minimise dust to adjacent sensitive receptors.

Operation

15.7.4 An operational wind farm produces no notable atmospheric emissions. The operation of the wind farm would therefore have no discernible adverse effects on local or national air quality.

15.7.5 The operation of wind farms contributes to an overall beneficial effect on local and global air quality by contributing to the offsetting of the atmospheric emissions associated with global warming and acid rain, produced by the generation of electricity from the burning of fossil fuels.

Mitigation

15.7.6 Mitigation measures to control dust are included within the draft CEMP (refer to Appendix 4.1). With mitigation measures in place it is considered that dust from construction is unlikely to cause a nuisance.

Residual Effects

15.7.7 With the implementation of mitigation measures to control dust, no significant effects on air quality are predicted.

15.8 Carbon Balance

Introduction

15.8.1 This section assesses the potential carbon impact of the Development.

15.8.2 Reducing carbon dioxide emissions from electricity generation is one of the primary aims of policies which encourage renewable energy generation. The operation of wind farms offset carbon from other forms of energy generation, but there are carbon costs associated with the construction of wind farms, especially where they are located in carbon rich soils such as peatlands.

Methodology

15.8.3 A carbon assessment has been undertaken for the Development in accordance with Scottish Government recommended methodology 'Calculating Carbon Savings from Wind Farms on Scottish Peatlands – A New Approach' (Nayak *et. al.,* 2010). This methodology has been developed specifically for calculating carbon savings from wind farms on Scottish peat lands. Assessment is undertaken using the calculation spreadsheet v2.9.0 released March 2014.

Carbon Assessment

15.8.4 The carbon calculator is included in Appendix 15.2, the results of which are summarised below.

15.8.5 The potential savings in CO_2 emissions due to the Development replacing other electricity sources over the 25 year lifetime of the wind farm are approximately:

- 126,564 tonnes of CO_2 per year over coal-fired electricity;
- 63,282 tonnes of CO_2 per year over grid-mix of electricity; or
- 89,331 tonnes of CO_2 per year over a fossil fuel mix of electricity.

15.8.6 The CO_2 'pay back', which is the period of wind farm operation required until there is a net saving of CO_2 can be calculated as the total CO_2 losses associated with the Development divided by the CO_2 saving per year of wind farm operation. Based on the Scottish Government recommended methodology, the Development has an expected payback time of between 1.3 to 2.6 years (using coal and UK grid supply mix CO_2 emission factors, respectively). This is a substantially shorter time period than the 25 year operational period applied for.

Mitigation

Design Stage

15.8.7 As part of the design evolution of the wind farm layout, a peat depth survey was undertaken to identify peat depths and to inform a layout which avoids areas of deeper peat and minimises peat slide risk where practicable. Results indicate that the majority of the site comprises of peat <1m in depth; however, pockets of deeper peat (>3m) do exist, and these areas were taken into consideration and avoided during the design process (see Chapter 3: Site Selection, Design Evolution and Consideration of Alternatives).

Construction Stage

15.8.8 Where appropriate, peat and soil from excavations on site would be utilised for reinstatement. Further details are provided in Appendix 4.1: draft Construction Environmental Management Plan (CEMP) and Appendix 9.3: Peat Management Plan.

15.9 References

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