16 Other Issues

Contents

This page is intentionally blank.

16 Other Issues

16.1 Executive Summary

16.1.1 This chapter covers the following:

- telecommunications;
- marine radar;
- outdoor access; and
- carbon savings.

16.1.2 An assessment of the likely effects of the Proposed Development on telecommunications infrastructure, both within the site and in the wider area has been undertaken. Through implemented design changes the Proposed Development will have no residual effects on telecommunications.

16.1.3 The likely effects of the Proposed Development on marine radar has been assessed. Most of the potential impacts can be disregarded on the basis of their locations. Any remaining potential impacts are expected to be local and manageable, with competent radar operators both able and used to deciphering the radar picture containing some anomalies.

16.1.4 The likely effects on outdoor access during construction and operation have been assessed. Mitigation, to be agreed through a suitably worded condition, would ensure that residual adverse effects to Core Path H7 would be limited to minor, temporary, short-term and reversible effects during the construction period. Following construction, Core Path H7 would be subject to a number of long-term benefits. It would be directly connected to a further c.4 km of track providing improved access to the hills. Additionally, the proposed creation of a Heritage Trail (see Chapter 10) to improve access to, and understanding of, the heritage assets above Lyness would result in a long-term minor beneficial effect. Improving access to the hills and access to historical and natural heritage directly relate to the key features of the North Walls core paths network as detailed within the Amended Orkney Core Paths Plan (2018). Whilst vehicular access to the Wee Fea viewpoint is not subject to the outdoor access legislation, the Applicant will look to keep vehicular access open where practical during construction. Following construction, vehicular access will be subject to long-term benefits, with upgraded tracks and the addition of passing places.

16.1.5 The Proposed Development is expected to take approximately 11 to 23 months (0.9 to 1.9 years) to repay the carbon exchange to the atmosphere (the CO2 debt) through construction of the wind farm. There are no current guidelines about what payback time constitutes a significant impact, however, this is a relatively small percentage of the lifespan of the Proposed Development (3.6 % to 7.6 % of the conservative 25 year lifespan assumed in the carbon calculator). Compared to fossil fuel electricity generation projects, which also produce embodied emissions during the construction phase and significant emissions during operation due to combustion of fossil fuels, the Proposed Development has a very low carbon footprint and after approximately 0.9 to 1.9 years, the electricity generated is estimated to be carbon neutral and will displace grid electricity generated from fossil fuel sources. The site would, in effect, be in a net gain situation following this time period and will then be contributing to national objectives of reducing GHG emissions and meeting the 'net zero' carbon targets by 2050. Therefore, the Proposed Development is evaluated to have an overall beneficial effect on climate change mitigation.

16.2 Telecommunications

Introduction

16.2.1 This section considers the likely effects of the Proposed Development on telecommunications infrastructure, both within the site and in the wider area, during construction and operation.

Legislation, Policy and Guidelines

16.2.2 The assessment has been informed by relevant legislation, policy and guidelines, details of which are provided below.

- Wireless Telegraphy Act (2006);
- The Orkney Local Development Plan (Orkney Islands Council, 2017a);
- The Orkney Local Development Plan. Supplementary Guidance: Energy (Orkney Islands Council 2017b);
- Planning Advice Note: PAN 62 Radio Telecommunications (2001); and
- Tall structures and their impact on broadcast and other wireless services (Ofcom 2009).

Consultation

16.2.3 Consultation was undertaken with relevant statutory and non-statutory stakeholders to identify any fixed wireless links or scanning telemetry links in the area, and a summary of their responses are set out in Table 16.1 below.

Table 16.1 – Consultee Responses

Consultee	Response	Actions
Joint Radio Company (JRC) Scoping Opinion (August 2018)	JRC raised an objection to the scoping layout in relation to turbines: T24, T26, T27, T28, T29 and T30.	The application layout has been designed to avoid breaching the buffers identified in JRC Scoping Opinion, with all turbines being positioned sufficiently distant from the locations that were of concern to JRC.
BT Scoping Opinion (August 2018)	BT stated they would object to the scoping layout due to the positioning of ten of the turbine locations.	Reconsulted based on revised layout (see below).
BT Further consultation (November 2019)	BT stated they would accept a 75 m clearance from the blade tip, providing there is no micro-siting closer to their link path.	This buffer has been applied to the link path and turbines have been positioned outwith this buffer. Should micro-siting be required, the turbine locations would not be moved to within this buffer unless otherwise agreed with BT.

Assessment Methodology

16.2.4 This section describes the methods by which the key baseline conditions were identified and how the potential effects of the Proposed Development on these have been assessed.

Fixed Links

16.2.5 Consultation has been undertaken with the relevant telecommunication providers to determine the potential for impacts from the Proposed Development (refer to Table 16.1 above).

16.2.6 In addition, the fixed links detailed within the Wireless Telegraphy Register have also been considered (Ofcom, 2020).

Digital Television, Satellite Television and Other Terrestrial Broadcasts

16.2.7 The nearest transmitters have been identified[1] and the transmission between them, the Proposed Development and residential properties beyond the Proposed Development have been considered.

Baseline Conditions

Fixed Links

16.2.8 As detailed above, the baseline was determined through consultation with the key stakeholders (Table 16.1) and with reference to the Wireless Telegraphy Register.

16.2.9 This process identified a number of fixed links to the south of the Proposed Development (Figure 16.1).

Digital Television

16.2.10 Since 2010 the North of Scotland including the Orkney Islands has been fully switched over to digital television from the previous terrestrial signals. Digital television signals are much better at coping with signal reflections than analogue, and digital television pictures do not suffer from ghosting (Ofcom, 2009).

16.2.11 Television reception in the vicinity of the site can be provided by the Keelylang Hill or Rumster Forest transmitters. The Proposed Development does not sit between the transmitters and any receivers on Hoy.

16.2.12 Therefore, potential effects on digital television signals are given no further consideration within this assessment.

Satellite Television Reception

16.2.13 Satellite TV reception is not generally affected by new structures unless the development blocks the 'line-of-sight' between a dish antenna and the satellite in the sky. With satellite signals received from a high elevation, disruption to signals is usually limited to cases where a tall structure is erected very close to a receiver (Ofcom, 2009).

16.2.14 Given the separation distance from neighbouring infrastructure (c.750 m), it is considered highly unlikely that the Proposed Development would impact on satellite television reception.

16.2.15 Therefore, potential effects on satellite television receptors are given no further consideration within this assessment.

Other Terrestrial Broadcasts

16.2.16 Broadcast radio (FM, AM and DAB digital radio) are transmitted on lower frequencies than those used by terrestrial TV signals. Lower frequency signals tend to pass through obstructions more easily than the higher frequency TV signals, and diffraction effects also become more significant at lower frequencies. Both these factors will tend to lessen the impact of new structures on radio reception (Ofcom, 2009).

16.2.17 FM radio in the vicinity of the site can be provided by the Keelylang Hill or Rumster Forest transmitters. The Proposed Development does not sit between the transmitters and any receivers on Hoy. Therefore, potential effects on FM signals are given no further consideration within this assessment.

16.2.18 AM radio in the vicinity of the site can be provided by the Burghead transmitter. The Proposed Development does not sit between the transmitters and any receivers on Hoy. Therefore, potential effects on AM signals are given no further consideration within this assessment.

16.2.19 DAB digital radio in the vicinity of the site can be provided by the Keelylang Hill transmitter. The Proposed Development does not sit between the transmitters and any receivers on Hoy. Therefore,

[1] https://www.bbc.co.uk/reception/check-for-transmitter-faults/#/undefined

potential effects on DAB digital radio receptors are given no further consideration within this assessment.

Likely Effects

Fixed Links

16.2.20 The Proposed Development has been designed to avoid impacts to fixed links through the turbine iteration process (refer to Chapter 2). No impacts or effects upon fixed links are anticipated as a result of the Proposed Development.

Mitigation

Fixed Links

16.2.21 Although no impacts or effects are anticipated on fixed links, the Proposed Development will have a micro-siting allowance of up to 50 m in all directions in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify unsuitable ground conditions or environmental constraints that could be avoided.

16.2.22 Should micro-siting be required, the turbine locations would not be moved within the accepted BT buffer (75 m clearance from the blade tip) unless otherwise agreed with BT.

Residual Effects

16.2.23 Through the implementation of the proposed mitigation measures no residual impacts or effects upon telecommunication services from the Proposed Development are anticipated and it is therefore deemed that there is no significant effect as a result of the Proposed Development.

Cumulative Effects

16.2.24 As no residual effects from the Proposed Development alone are anticipated, the Proposed Development will not have cumulative effects with other wind farm developments on telecommunications.

Summary

16.2.25 This section has reported on the assessment of the likely effects of the Proposed Development on telecommunications infrastructure, both within the site and in the wider area.

16.2.26 Through implemented design changes the Proposed Development will have no residual effects on telecommunications.

16.3 Marine Radar

Introduction

16.3.1 This section considers the likely effects of the Proposed Development on Marine Radar infrastructure.

16.3.2 The potential impacts of any wind turbine on marine radar are:

- False detections (turbine detections);
- Ghost targets (fake targets in the wrong place caused by reflections);
- Side lobe detections (turbine detections shown at the right range but in the wrong place/azimuth);
- Shadowing (Loss of probability of detection behind the turbines); and
- Receiver saturation (reduced probability of detection) in the area of the turbines.

16.3.3 The potential effects are analysed in Appendix 16.1 and summarised within this chapter.

Consultation

16.3.4 OIC's Marine Services and Harbour Authority department has been consulted with respect to any marine and shipping radar installations and the potential for the Proposed Development to create conflicts with any such installations (refer to Table 16.2).

Table 16.2 - Consultation with OIC Marine Services and Harbour Authority

Consultee	Response	Action
Marine Services and Harbour Authority: Orkney Islands Council (Oct 2019)	Marine Services and Harbour Authority stated concern that turbines at Hoy could impact on the Hill of Midland and Sandy Hill radars.	Marine Radar Impact Assessment undertaken (see below).
Marine Services and Harbour Authority: Orkney Islands Council (May 2020)	The Marine Radar Impact Assessment was issued to Marine Services and Harbour Authority for comment. No response was received.	The Marine Radar Impact Assessment identified no significant effects and Marine Services and Harbour Authority has provided no response to query or challenge the findings.

Assessment Methodology and Significance Criteria

16.3.5 An analysis of the potential impacts of the Proposed Development on the marine radar was undertaken by Wind Business Support Ltd. and is provided in Appendix 16.1.

Baseline Conditions

16.3.6 The assessment has focused on the two marine radars identified as a potential concern through consultation with Marine Services and Harbour Authority (Table 16.2). These are the Hill of Midland radar (c.11.9 km) and Sandy Hill radar (c.17 km). Further details are provided in Appendix 16.1.

Likely Effects

16.3.7 All likely effects are summarised below, with further details provided in Appendix 16.1.

Turbine Detection

16.3.8 The direct detection of the turbines should not be of concern as it will be marked on the navigational maps as on land. The turbine returns can therefore be readily ignored without compromise to vessel navigation.

Ghost Targets

16.3.9 Any ghost targets will be generated behind the wind farm with respect to the source radar. Therefore, it will be clear to the radar operators that the returns cannot be from vessels. This is because these areas are screened from the radars at sea level.

Side Lobe Detections

16.3.10 Side lobe detections are detections of the wind turbines when the antenna is not pointing at them. If they occur, they will be generated at the same range as the wind turbines but in a different direction. The potential for these detections depends upon the antenna pattern of the radar and hence how strongly it discriminates between detections in the main beam and in the side-lobes.

16.3.11 These detections will also only occur if/when the turbines are oriented to give a strong enough return, so it will depend upon wind direction. Side-lobe detections are likely to occur in consistent locations, corresponding to the largest side lobes.

16.3.12 The experience to date has been that impacts are local and manageable, with competent radar operators both able and used to deciphering the radar picture containing some anomalies. It is likely that this will also be the case here.

Shadowing

16.3.13 The Island of Hoy causes shadows at the elevation of vessels behind the island (and Proposed Development) with respect to both radars. Therefore, shadowing effect with respect to the Proposed Development is not relevant.

Receiver Saturation

16.3.14 The turbines are 2km or more from sea areas where genuine targets need to be detected and as such no significant effects are predicted.

Mitigation

16.3.15 Side lobe detection is the only effect which could impact on radar. However, competent radar operators are both able and used to deciphering a radar picture containing some anomalies and as such it is envisaged that mitigation will not be necessary.

Residual Effects

16.3.16 No residual impacts or effects upon marine radar services from the Proposed Development are anticipated and it is therefore deemed that there is no significant effect as a result of the Proposed Development.

Cumulative Effects

16.3.17 As no residual effects from the Proposed Development alone are anticipated, the Proposed Development will not have cumulative effects with other wind farm developments on marine radar.

Summary

16.3.18 This section has reported on the assessment of the potential effects of the Proposed Development on marine radar.

16.3.19 Of the potential impacts, only side lobe detections could have an impact, principally because other impacts can be disregarded on the basis of their locations.

16.3.20 The experience to date has been that impacts are local and manageable, with competent radar operators both able and used to deciphering the radar picture containing some anomalies. It is likely that this will also be the case here.

16.4 Outdoor Access

Introduction

16.4.1 This section considers the likely effects on outdoor access during construction and operation.

Consultation

16.4.2 Consultation relating to outdoor access is summarised in Table 16.3 below.

Table 16.3 – Consultee Responses

Consultee	Response	Actions
OIC Development and Infrastructure Scoping Opinion (August 2018)	The Scoping Opinion noted that the EIA should include mitigation of any impacts and improvements to the outdoor access around the site.	Discussed further within this chapter.
	It stated that *"it is recognised that the Core Path identified on the boundary of the proposed site although this may be subject to alteration / de-designation as part of the Core Paths Plan Review 2018"*.	Core Path H7 (Wee Fea) is featured in the Amended Orkney Core Paths Plan (2018). Further consultation with respect to Core Path H7 has been undertaken (see below).
	It also stated: "*Given the nature of wind farms and the track networks built to accommodate and maintain them, full consideration should be given to the opportunity that may be presented to improve public access by integration of public access routes within, through and connecting with other points of interest in relation to the proposed development*".	This has been considered. Further details provided within this chapter.
OIC Development and Marine Planning Scoping Opinion (August 2018)	Whilst there is currently a designated Core Path on the boundary of the site, it is proposed that the path be de-designated as part of the Core Paths Plan Review 2018. The most up to date Core Paths Plan should be considered at the time of undertaking the EIA.	Core Path H7 (Wee Fea) is featured in the Amended Orkney Core Paths Plan (2018). Further consultation with respect to Core Path H7 has been undertaken (see below).
	There are no specific public rights of way within the proposed development site according to the Catalogue of Rights of Way.	Noted.
	Policy 10 – Green Infrastructure (Paths, Open Spaces and Green Networks) of the Orkney Local Development Plan 2017-2022 should be considered.	Policy 10 has been considered.

Consultee	Response	Actions
Ross Irvine – OIC Rural Planner Emails and call (May - June 2020)	Agreed that various options should be included in the EIA and confirmed happy with outlined approach.	Noted. Outlined approach in line with the approach detailed within this chapter.
	Would hope to achieve as little disruption as possible during, and as a result of, any development. The goal would be to see an improvement to the outdoor access provision in the area of the development and certainly for there to be no detriment.	Noted and discussed further within chapter.
	Noted that vehicular access to the viewpoint is possible at the moment and that whilst such access is not covered by the legislation relating to outdoor access, it is worth being aware of.	Noted and discussed further within chapter.
ScotWays Scoping Opinion (August 2018)	Due to limited resource decided not to comment at this time.	N/A

Assessment Methodology

16.4.3 Consultation (Table 16.3), along with a review of Ordinance Survey (OS) Maps and local planning documents (including the Amended Orkney Core Paths Plan (2018)) was undertaken to establish whether there were any statutory access rights, core paths, other public footpaths or rights of way in the vicinity of the Proposed Development.

16.4.4 Discussions were undertaken with the project engineers, archaeologists and with OIC rural planning to establish potential options which would minimise the short-term temporary impacts during construction, whilst ensuring long-term improvements to outdoor access following construction.

Baseline Conditions

16.4.5 Core Path H7 (Wee Fea) as identified on the North and South Walls Map of the Amended Orkney Core Paths Plan (2018) runs from the junction of the B9047 to Wee Fea and covers c.1.4 km (each way).

16.4.6 Branching off Core Path H7 at the eastern end of the woodland, there is an alternative path (shown on 1:10 k and 1:25 k OS maps) up to Wee Fea. To avoid confusion this path will be referred to as Path A.

16.4.7 The above paths are illustrated on Figure 16.2.

Likely Effects

Core Path H7 (Wee Fea)

16.4.8 The existing access track running up to Wee Fea (which Core Path H7 follows) will require to be upgraded as part of the Proposed Development and will be subject to increased traffic flows at times during the construction period.

16.4.9 Closures to Core Path H7 will be necessary in order to comply with site specific Health and Safety requirements during the construction period. If unmitigated these would lead to temporary, short-term and reversible adverse effects.

16.4.10 Whilst vehicular access is not subject to the outdoor access legislation, it is noted that the Wee Fea viewpoint is currently accessible by car. It is envisaged that there will be restrictions during the construction period and that this is likely to extend to closures. Closures are most likely to occur during the initial build period (first couple of months) but may be required at points throughout the construction period. Adverse effects will be temporary, short-term and reversible. For the avoidance of doubt this paragraph relates to general access to the Wee Fea viewpoint and not access to residential properties along the route.

16.4.11 Following construction, Core Path H7 would be subject to a number of long-term benefits. It would be directly connected to a further c.4 km of track providing improved access to the hills. Additionally, the proposed creation of a Heritage Trail (see Chapter 10) to improve access to, and understanding of, the heritage assets above Lyness would result in a long-term minor beneficial effect. Improving access to the hills and access to historical and natural heritage directly relate to the key features of the North Walls core paths network as detailed within the Amended Orkney Core Paths Plan (2018). Vehicular access following construction would also be subject to long-term benefits, with upgraded tracks and the addition of passing places.

16.4.12 Should any restrictions be required for maintenance during operation, these would be temporary and very short term.

Path A

16.4.13 If Core Path H7 were to be closed during construction and no alternative routes provided, there would be temporary, short-term and reversible adverse effects, as access to the northern end of Path A would be restricted. However, if Path A were to be used as an alternative to Core Path H7, some minor beneficial improvements may be required.

Mitigation

16.4.14 Potential mitigation options for the construction period are detailed below and illustrated on Figure 16.3:

- Option 1:
  - The eastern c.430 m of Core Path H7 would be diverted to run parallel and to the north of the existing road. Core Path H7 would then be diverted onto Path A. This option would provide an alternative route to any closures to Core Path H7 and would allow continued access to the Wee Fea viewpoint.
- Option 2:
  - Core Path H7 would be diverted to run parallel and to the north of the existing route. It is envisaged that the final c.250 m of Core Path H7 would be subject to a temporary closure throughout the construction period (up to 18 months). This is because the final section of Core Path H7 crosses the main site access and skirts around the temporary construction compound and as such it would be safer to simply restrict public access in this area during construction.
- Option 3:

- Core Path H7 would be diverted to avoid all interaction with the existing route. It would join Path A, to provide an alternative route to temporary closures to Core Path H7 and would allow continued access to the Wee Fea viewpoint.

- Option 4:
  - Core Path H7 would be diverted to avoid all interaction with the existing route. It would follow the same route as Option 3, but instead of joining Path A, it would continue west along the edge of the woodland. This option would provide an alternative route to Core Path H7 and would allow continued access to the Wee Fea viewpoint.

16.4.15 Clear signage would be put in place throughout the periods of diversion or closure detailed in the above options.

16.4.16 A suitably worded condition could ensure that appropriate mitigation is provided.

16.4.17 With respect to vehicular access to the Wee Fea viewpoint, whilst some restrictions and closures will be necessary (particularly during the initial build), the Applicant will look to keep vehicular access open where practical.

Residual Effects

16.4.18 Through the implementation of the proposed mitigation measures, residual adverse effects to Core Path H7 would be limited to minor, temporary, short-term and reversible effects during the construction period.

16.4.19 The long-term minor beneficial effect relating to the improved access to the hills and access to historical and natural heritage still apply.

Summary

16.4.20 This section has reported on the likely effects on outdoor access during construction and operation.

16.4.21 Mitigation, to be agreed through a suitably worded condition, would ensure that residual adverse effects to Core Path H7 would be limited to minor, temporary, short-term and reversible effects during the construction period.

16.4.22 Following construction, Core Path H7 would be subject to a number of long-term benefits. It would be directly connected to a further c.4 km of track providing improved access to the hills. Additionally, the proposed creation of a Heritage Trail (see Chapter 10) to improve access to, and understanding of, the heritage assets above Lyness would result in a long-term minor beneficial effect. Improving access to the hills and access to historical and natural heritage directly relate to the key features of the North Walls core paths network as detailed within the Amended Orkney Core Paths Plan (2018).

16.4.23 Whilst vehicular access to the Wee Fea viewpoint is not subject to the outdoor access legislation, the Applicant will look to keep vehicular access open where practical during construction. Following construction, vehicular access will be subject to long-term benefits, with upgraded tracks and the addition of passing places.

16.5 Carbon Savings

Introduction

16.5.1 This section details the calculations undertaken to estimate carbon dioxide (CO_2) emissions and the whole life carbon balance of the Proposed Development.

16.5.2 Increasing atmospheric concentrations of greenhouse gases (GHGs), including carbon dioxide (CO_2) – also referred to as carbon emissions – is resulting in climate change. A major contributor to this increase in GHG emissions is the burning of fossil fuels. With concern growing over climate change, reducing its cause is of utmost importance. The replacement of traditional fossil fuel power

generation with renewable energy sources provides high potential for the reduction of GHG emissions. This is reflected in UK and Scottish Governments climate change and renewable energy policy.

16.5.3 The Intergovernmental Panel on Climate Change (IPCC) has warned that human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels and at the current rate global warming is likely to reach 1.5°C between 2030 and 2052 (IPCC, 2018). Following this, the Scottish Government and Orkney Islands Council both declared a climate emergency in May 2019, with OIC stating *"This declaration serves to leave no doubt of the Council's focus on and commitment to reducing our carbon footprint…we'll seek to continue to support the pioneering renewables scene in Orkney – whether that is tidal, wave, wind, hydrogen or biofuels"* (OIC, 2019b).

16.5.4 However, no form of electricity generation is completely carbon free; for onshore wind farms, there will be emissions as a result of manufacture of turbines, as well as emissions from both construction and decommissioning (if required) activities and transportation of materials to site.

16.5.5 In addition to the lifecycle emissions from the turbines and associated wind farm infrastructure, where a wind farm is located on carbon rich soils such as peat, there are potential emissions resulting from direct action of excavating peat for construction. The footprint of a wind farm's infrastructure will also decrease the area covered by carbon-fixing vegetation. Carbon losses and gains during the construction and lifetime of a wind farm and the long-term impacts on the land on which they are sited need to be evaluated in order to understand the consequences of permitting such developments.

16.5.6 The aim of this section is to provide clear information about the whole life carbon balance of the Proposed Development to provide a context for carbon payback of the Proposed Development.

16.5.7 In determining whether an application to build and operate a wind farm should be consented, the assessment of potential carbon losses and savings is a material consideration (Orkney Islands Council, 2019c).

16.5.8 This section explains the policy basis for assessing carbon balance, explains the Scottish Government Carbon Calculator methodology used, details all the inputs into the model (within Appendix 16.2) and provides an estimate of the carbon balance over the lifetime of the Proposed Development, once carbon losses from materials and ecological disturbance have been taken into account.

Legislation, Policy and Guidelines

Legislation

16.5.9 The key legislation for the Scottish Government's renewable targets are:

- the Climate Change (Scotland) Act, 2009; and
- the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019.

16.5.10 These create the statutory framework for greenhouse gas emissions reductions in Scotland and the recent Climate Change (Scotland) Act set a target of net-zero emissions by 2045 and a 75 % reduction by 2030. This requires a doubling of the response between 2020 to 2030. Decarbonisation of grid electricity through increasing the percentage of electricity generated by renewables is identified as one of the key ways to deliver carbon emission reductions.

Policy

16.5.11 Full details of the relevant policies are provided in Chapter 5 and include:

- Orkney Islands Council Statutory Development Plan (Orkney Islands Council, 2017a);
- Orkney Islands Council Supplementary Guidance: Energy (Orkney Islands Council, 2017b);
- Development Management Guidance on Energy (Orkney Islands Council, 2019c);

- Scottish Planning Policy (Scottish Government, 2014);
- Orkney Islands Council – Council Plan and Delivery Plan (Orkney Islands Council, 2018);
- Sustainable Orkney Energy Strategy 2017-2025 (Energy of Orkney, 2017);
- Climate Change Plan, The Third Report on Proposals and Policies 2018-2032 February 2018 (Scottish Government, 2018); and
- Orkney Islands Council Declaration of a Climate Emergency (Orkney Islands Council, 2019b).

Guidance

16.5.12 In 2008 the Scottish Government funded a research report called "*Calculating carbon savings from wind farms on Scottish peat lands: a new approach"* (Nayak *et al,* 2008 and 2010 and Smith et al., 2011) and the creation of an associated excel tool, which utilised a life cycle methodology approach to estimating the wider emissions and savings of carbon associated with wind farms and for calculating how long the development will take to 'pay back' the carbon emitted during its construction. Originally an excel spreadsheet, the most recent version of this tool (hereinafter referred to as the "Carbon Calculator") is a web based application and central database.

16.5.13 In determining whether an application to build and operate a wind farm should be consented, the assessment of potential carbon losses and savings is a material consideration. It is one important consideration among many, and currently there are no official guidelines about what constitutes an acceptable or unacceptable payback time.

Methodology

Carbon & Peatland

16.5.14 Wind farms sited on peatlands which hold stocks of carbon have the potential to release carbon into the atmosphere in the form of CO_2 if the peat is disturbed.

16.5.15 In order to minimise the requirement for the extraction of peat, the iterative design process has taken depth of peat across the site into consideration and avoided areas of deeper peat wherever possible, taking account of other constraints. The site design process is described in Chapter 2 and details of the peat depths across the site are provided in Chapter 11.

16.5.16 The loss of carbon from the carbon fixing potential from plants and vegetation on peatland is small but is calculated for the area from which peat is removed and the area affected by drainage. The carbon stored in the peat itself represents a larger potential source of carbon loss.

16.5.17 To calculate the carbon emissions attributable to the removal or drainage of peat from the site as a result of the Proposed Development, emissions occurring if the soil had remained in situ and undisturbed are subtracted from the carbon emissions occurring after removal or development-related drainage.

16.5.18 The indirect loss of CO_2 uptake by plants originally on the surface of the site but eliminated by construction activity, is calculated on site-specific data collected as part of the EIA process and for the purpose of the carbon calculator is based on blanket bog as identified during the Phase 1 Habitat Survey (detailed in Chapter 8).

16.5.19 Emissions due to the indirect release of CO_2 from carbon stored in peat due to drying and oxidation processes caused by construction of the Proposed Development on the site, are calculated from site-specific data (the habitat loss calculations are detailed in Chapter 8). This figure is a worst-case scenario, as the peat would be re-used where possible to minimise carbon losses (further detail of proposed reuse of peat is given in Appendix 11.2).

Carbon Balance Assessment

16.5.20 The carbon balance assessment is based on site-specific data, where available. Where site specific data is not readily available, approved national/regional information has been used. The Proposed

Development is seeking in-perpetuity consent, however in order to ensure a meaningful result from the application of the Carbon Calculator, an operational lifespan of 25 years has been assumed in this assessment.

16.5.21 GHG emissions and savings are both ultimately a global 'pool' and therefore the spatial scope of this assessment is not restricted solely to those emissions or savings that occur within the site boundary of the Proposed Development. Site-based emissions from peat and habitat losses are based on the Proposed Development footprint, but other activities, for example, emissions resulting from the manufacture of turbine components, are still attributable to the Proposed Development even though they occur off-site.

16.5.22 The carbon balance assessment considers the following parameters across the lifecycle of the Proposed Development:

- Emissions resulting from the manufacture, transportation and erection of turbines and associated components.
- Emissions resulting from the manufacture of concrete required for foundations.
- Emissions resulting from the direct excavation of peat on-site, and the indirect release of CO_2 from carbon stored in peat due to drying and oxidation.
- Emissions from the indirect impact of drainage on peat surrounding the Proposed Development infrastructure.
- Emissions resulting from the loss of active carbon-absorbing habitat, and uptake resulting from the restoration of these habitats.
- Emissions resulting from the decommissioning of turbine components.

The Scottish Government's Carbon Calculator for Wind Farms on Peat Lands

16.5.23 The Scottish Government methodology, titled 'Calculating potential carbon losses and savings from wind farms on Scottish peatlands: a new approach' (Nayak, et al, 2008), was designed in response to concerns on the reliability of methods used to calculate reductions in greenhouse gas emissions arising from large scale wind farm developments on peatland. The Carbon Calculator looks at the benefit of displacing conventionally generated electricity in the grid compared to the predicted direct and indirect emissions of carbon from construction, operation and decommissioning of a wind farm. It provides an estimate of the carbon payback time for the Proposed Development.

16.5.24 The Carbon Calculator models the impacts of installation and operation of wind farms on peat soils, taking into account the wider potential impacts on peatland hydrology and decomposition of organic matter.

16.5.25 The most recent version of the Carbon Calculator (online version 1.6.1) is a web-based application and central database, where all the data entered is stored in a structured manner[2]. This web-based tool allows a range of data to be input in order to address the expected, maximum and minimum values, and incorporates high-level automated checking with cells for identification of data sources and relevant data calculations.

16.5.26 The tool provides generic values for CO_2 emissions associated with some components (e.g. turbine manufacture) and requires site-specific information for other components (e.g. habitat type and extent of peat disturbance).

16.5.27 The input parameters for the Carbon Calculator are detailed in Appendix 16.2. The assessment draws on the Proposed Development parameters (detailed in Chapter 3), data collected during field surveys (detailed in Chapter 8: Ecology and Chapter 11: Geology, Hydrology & Hydrogeology), and results of laboratory testing (detailed in Appendix 11.2).

[2] The latest version of the web-based carbon calculator can be found at https://informatics.sepa.org.uk/CarbonCalculator/index.jsp

Results

16.5.28 This section presents a summary of the carbon balance assessment which has been undertaken in respect of the Proposed Development. An assessment has been undertaken to calculate the carbon emissions which would be generated during the construction, operation and decommissioning (i.e. assumed to be after 25 years for the purpose of the calculator) of the Proposed Development as well as the carbon payback period resulting from the operation of the Proposed Development.

16.5.29 The Carbon Calculator results are provided in Appendix 16.3. A summary of the anticipated carbon emissions and carbon payback period of the Proposed Development is provided in Table 16.4 below.

Table 16.4 - Anticipated Carbon Emissions

Results	Expected	Minimum	Maximum
Net emissions of carbon dioxide (t CO_2 eq.)	60,953	45,055	75,661
Carbon Payback Period of Proposed Development Comparison			
Displacing coal-fired electricity generation (years)	0.7	0.5	0.9
Displacing grid-mix electricity generation (years)	2.5	1.7	3.4
Displacing fossil fuel–mix of electricity generation (years)	1.4	0.9	1.9

Interpretation of Results

16.5.30 The calculations of total CO_2 emission savings and payback time for the Proposed Development indicate that overall payback period of a wind farm of 6 turbines with an indicative installed capacity of 4.8 MW per turbine would be approximately 0.9 to 1.9 years, when compared to the fossil fuel-mix of electricity generation.

16.5.31 The potential savings in CO_2 emissions due to the Proposed Development replacing other electricity sources over the lifetime of the Proposed Development (assumed to be 25 years for the purposes of the carbon calculator) are approximately:

- 89,000 tonnes of CO_2 per year over coal-fired electricity (2.2 million tonnes assuming a 25 year lifetime for the purposes of the carbon calculator).
- 24,500 tonnes of CO_2 per year over grid-mix of electricity (0.6 million tonnes assuming a 25 year lifetime for the purposes of the carbon calculator).
- 43,500 tonnes of CO_2 per year over fossil fuel-mix of electricity (1.1 million tonnes assuming a 25 year lifetime for the purposes of the carbon calculator).

Conclusions

16.5.32 The Proposed Development is expected to take approximately 11 to 23 months (0.9 to 1.9 years) to repay the carbon exchange to the atmosphere (the CO_2 debt) through construction of the wind farm. There are no current guidelines about what payback time constitutes a significant impact, however, this is a relatively small percentage of the lifespan of the Proposed Development (3.6 % to 7.6 % of the conservative 25 year lifespan assumed in the carbon calculator). Compared to fossil fuel electricity generation projects, which also produce embodied emissions during the construction phase and significant emissions during operation due to combustion of fossil fuels, the Proposed Development has a very low carbon footprint and after approximately 0.9 to 1.9 years, the electricity generated is estimated to be carbon neutral and will displace grid electricity generated from fossil fuel sources. The site would, in effect, be in a net gain situation following this time period and will then be contributing to national objectives of reducing GHG emissions and meeting the 'net zero'

carbon targets by 2050. Therefore, the Proposed Development is evaluated to have an overall beneficial effect on climate change mitigation.

16.6 References

BEIS (2019a). 2005 to 2017 UK Local Authority and Regional Carbon Dioxide Emissions National Statistics. Available at: https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2017

BEIS (2019b). Total Final Energy Consumption at Regional and Local Authority Level. Available at: https://www.gov.uk/government/statistical-data-sets/total-final-energy-consumption-at-regional-and-local-authority-level

Energy of Orkney (2017). Orkney Sustainable Energy Strategy 2017/2025. Available at: *http://www.oref.co.uk/wp-content/uploads/2017/10/Orkney-Sustainable-Energy-Strategy-2017-2025-1.pdf*

IPPC (2018). Special Report – Global Warming of 1.5°C. Available at: https://www.ipcc.ch/sr15/

Maritime and Coastguard Agency (2008). MGN 372 Guidance to Mariners Operating in Vicinity of UK OREIs. Available at: https://www.gov.uk/government/publications/mgn-372-guidance-to-mariners-operating-in-vicinity-of-uk-oreis

Nayak, D., Miller, D., Nolan, A., Smith, P. and Smith, J., (2008). Calculating carbon savings from wind farms on Scottish peat lands- A new approach'. Institute of Biological and Environmental Sciences, School of Biological Science, University of Aberdeen and the Macaulay Land Use Research Institute, Aberdeen.

Ofcom (2009). Tall structure and their impact on broadcast and other wireless services. Available at: https://www.ofcom.org.uk/__data/assets/pdf_file/0026/63494/tall_structures.pdf

Ofcom (2020). Spectrum information portal. Available at https://www.ofcom.org.uk/spectrum/information/spectrum-information-system-sis/spectrum-information-portal

Orkney Islands Council (2017a). The Orkney Local Development Plan. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Local-Plan/OLDP_2017/Orkney_Local_Development_Plan_2017_2022.pdf

Orkney Islands Council (2017b). the Orkney Local Development Plan. Supplementary Guidance: Energy. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Adopted_PPA_and_SG/Energy_SG/Energy_SG.pdf

Orkney Islands Council (2018). Council Plan and Delivery Plan. Available at: https://www.orkney.gov.uk/Files/Council/Council-Plans/OIC_Delivery_Plan_2018_2023.pdf

Orkney Islands Council (2018). Amended Orkney Core Paths Plan. Available at: https://www.orkney.gov.uk/Files/Committees-and-Agendas/Council-Meetings/GM2018/09-10-2018/I11_App6_Orkney_Core_Paths_Plan.pdf

Orkney Islands Council (2019b). Declaration of a Climate Emergency. Available at: https://www.orkney.gov.uk/Files/Committees-and-Agendas/Council-Meetings/GM2019/SGM14-05-2019/Urgent_Item_Declaration_Climate_Emergency.pdf

Orkney Islands Council (2019c). Development Management Guidance on Energy. Available at: https://www.orkney.gov.uk/Files/Committees-and-Agendas/Development%20and%20Infrastructure/DI2019/DI25-06-2019/I04__DMG_Energy.pdf

Rashid, L., and Brown, A. (2010) Radar and wind farms. Presentation of the Microwave and Communication Systems Research Group, School of Electrical and Electronic Engineering at the University of Manchester, United Kingdom

Ryu, I., Won, I. and Kwon, J. (2018). Detecting Ghost Targets Using Multilayer Perceptron in Multiple-Target Tracking. Symmetry, 10(1), p.16.

Scottish Government (2001). Planning Advice Note: PAN 62 Radio Telecommunications. Available at: https://www2.gov.scot/Publications/2001/09/pan62/pan62-

Scottish Government (2009). The Climate Change (Scotland) Act, 2009. Available at: www.legislation.gov.uk

Scottish Government (2014). Scottish Planning Policy. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2014/06/scottish-planning-policy/documents/00453827-pdf/00453827-pdf/govscot%3Adocument/00453827.pdf

Scottish Government (2017). Scottish Energy Strategy: The Future of Energy in Scotland. Available at: https://www.gov.scot/publications/scottish-energy-strategy-future-energy-scotland-9781788515276/

Scottish Government (2018). Climate Change Plan, The Third Report on Proposals and Policies 2018-2032 February 2018. Available at: https://www.gov.scot/publications/scottish-governments-climate-change-plan-third-report-proposals-policies-2018-9781788516488/

Scottish Government (2019a). The Climate Change Act 2008 (2050 Target Amendment) Order 2019. Available at: https://www.legislation.gov.uk/ukdsi/2019/9780111187654

Scottish Government (2019b). The Climate Change (Emissions Reductions Targets) (Scotland) Act 2019. Available at: http://www.legislation.gov.uk/asp/2019/15/enacted

The Scottish Government (2010). The Marine (Scotland) Act. Available at: https://www2.gov.scot/Topics/marine/seamanagement/marineact

UK Government (2006). Wireless Telegraphy Act. Available at: https://www.legislation.gov.uk/ukpga/2006/36

Vestas (2019). *Life Cycle Assessment of Electricity Production from an Onshore V136-4.2 MW wind plant.* Available at: https://www.vestas.com/~/media/vestas/about/sustainability/pdfs/lca%20of%20electricity%20production%20from%20an%20onshore%20v13642mw%20wind%20plantfinal.pdf