18 Other Issues

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18 Other Issues

18.1 Executive Summary

Telecommunications

18.1.1 A review of telecommunications links showed that there are no telecommunication links within the site boundary or within close proximity to the site boundary. Given the location and relative heights of the nearest television transmitters, as well as the fact they have switched to digital transmission only, there will be no impacts on the television signal.

Air Quality

18.1.2 The Proposed Development has been deemed not to reach the criteria required for air quality assessments for traffic or dust, as no significant effects are anticipated.

Carbon Savings

18.1.3 Although the Proposed Development will generate carbon free electricity, carbon will be released during the manufacturing, delivery and construction of the Proposed Development. However, this generation of carbon is minimal in comparison to the generation of carbon free electricity, and it is estimated that carbon generation will be offset by the Proposed Development's carbon savings within approximately three months. The site would in effect be in a net gain situation following the estimated three month carbon payback period and will be contributing to national objectives of reducing greenhouse gas emissions. Additionally, the Proposed Development would make a material contribution to creating the demand for the proposed new subsea interconnector to Orkney, which in turn would help deliver sustainable development and the drive to net zero.

Marine Licensable Activities

18.1.4 Based on consultation feedback, potential impacts associated with the installation of the new extended slipway and landing jetty to benthos, coastal processes, marine radar and commercial fisheries have been assessed, as summarised below.

Coastal Processes

18.1.5 The installation of the new extended slipway and landing jetty has the potential to interrupt the natural coastal processes within the area, such as tidal flows, local currents and sediment movement.

18.1.6 The coast within the Proposed Development is characterised as intertidal boulder/rocks (H1.3), and therefore is less likely to experience coastal process impacts. As noted by Ramsay and Brampton (2000), North Orkney is highly efficient in dissipating wave energy and provides a high degree of protection to the coastal edge from erosion during storm conditions. This is evidenced by little coastal erosion being recorded at the site over at least the last 130 years. The area is also sheltered, which is evident by the presence of seagrass recorded during the site seabed survey.

18.1.7 Given the relatively small size of the proposed structures, the rocky and sheltered nature of the site, lack of historic erosion recorded and the fact that the slipway was historically longer, effects to coastal processes are considered to be **negligible and not significant.**

18.1.8 The coastal processes assessment was based on the worst case footprint of the new extended slipway and landing jetty, assuming the largest vessels the proposed marine infrastructure can support. Suitable vessels will be determined by the turbine manufacturer. Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the infrastructure and channel dredging requirements. This, in turn, would reduce impacts to coastal processes.

Benthos

18.1.9 Construction of the new extended slipway and landing jetty will result in seabed disturbance. A total of approximately 3,218 m^2 would be disturbed, of which 1,168 m^2 would be permanent impacts from the proposed structures, whilst the remaining 2,050 m^2 would be via dredging, therefore the area is expected to recover over time.

18.1.10 Consultation with NatureScot indicated that seabed survey footage should be obtained to identify biotopes and the potential for Priority Marine Features (PMF) within. The majority of the seabed was classified as sand, with areas of boulders and rock. A bed of seagrass, likely Zostera marina, was identified towards the end of both structures. A band of kelps (Laminaria saccharina and Laminaria hyperborea) with intermittent sandy patches was identified nearer to shore. Both seagrass and kelp are PMFs.

18.1.11 As PMFs, seagrass and kelp are a nationally important species and both features identified by Marine Scotland's (2013) Feature Activity Sensitivity Tool (FeAST) tool as having a relatively high sensitivity to seabed disturbance. However, the works are not within a site designated for either seabed habitats. In addition, there are numerous recordings of both PMFs within the Orkney region, as shown on Marine Scotland's National Marine Plan interactive (NMPi) map (Marine Scotland, 2021; Tyler-Walters et al, 2016). Furthermore, based on site survey video footage, both habitats are likely to be relatively abundant along the east coast of Faray.

18.1.12 In terms of seagrass impacts, the majority of the disturbance would be outside the area of the seagrass bed (see Figure 18.1). Based on the available seabed survey video footage and the planned location of the structures, both structures are out with the band of seagrass, thus impacts to seagrass would likely be limited to dredging. It is estimated that an area of approximately 300m^2 of seagrass would be dredged for the landing jetty. FeAST defines seagrass recoverability as very low, however, given the very small area of estimated impact in comparison to available seagrass PMF habitats in the region effects are considered to be minor and not significant.

18.1.13 In terms of kelps impact, based on the available survey video footage and planned locations of the structures it is estimated that an area of approximately 300m^2 of kelps, rock, boulders, fucoids, and greens and filamentous reds would be impacted by the slipway (see Figure 18.1). The majority of this would be from dredging, with approximately 100m^2 estimated to be within the permanent footprint of the slipway. A further approximately 1,200m^2 would be within the jetty footprint, of this, approximately 550m^2 would be associated with the permanent footprint of the jetty causeway, with the remainder of the area dredged. Note, this area is not exclusively kelps. Feast defines kelp recoverability is medium to high. Thus, given the small area of estimated impact in comparison to available kelp PMF habitats in the region, effects are considered to be minor and not significant.

18.1.14 Overall, given the relatively small area of seabed disturbance, effects to benthic species, including PMFs, are considered to be **minor and not significant**

18.1.15 The benthic impact assessment was based on the worst case footprint of the new extended slipway and landing jetty and associated dredging, assuming the largest vessels the proposed marine infrastructure can support. Suitable vessels will be determined by the turbine manufacturer. Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the structures and channel dredging requirements. This, in turn, would reduce impacts to benthic communities, including the identified seagrass and kelp PMFs.

Marine Navigation and Radar

18.1.16 The installation of the new extended slipway and landing jetty, along with vessel journeys to the island, has the potential to impact marine navigation and radar within the area. OIC's Marine Services and Harbour Authority department and Orkney Ferries Ltd, along with the Northern Lighthouse Board (NLB) have 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. Consultation with them has identified no objections or potential for significant effects caused by the Proposed Development on marine radar.

18.1.17 The Proposed Structures would be within very close proximity to Faray, a maximum of 110 m below MHWS, which would not interact with the existing Kirkwall – Papa Westray and Hollandstoun (North Ronaldsay) – Kirkwall routes which travel through the bay. The construction works, including localised dredging, will be temporary in nature and contained within the bay. As such, the effects to navigation associated with the installation and operation of the extended slipway and landing jetty are considered to be **negligible and not significant.**

18.1.18 A Port Management Plan will be prepared to manage abnormal load deliveries and other marine traffic at Hatston Pier to ensure that there will be no interruption to existing operations. See Chapter 12 for further details.

18.1.19 As per the NLB's feedback from the marine licence public consultation event (see Appendix 4.4), the Port Management Plan will include disposal plans and the appropriate Marine Safety Information and Notice to Mariners will be published prior to, and during, the works. In addition, following completion of the construction works, the UK Hydrographic Office will be notified of the as-built layout of the new slipway and jetty, along with the revised depths as a result of dredging.

Commercial Fisheries

18.1.20 The installation of the new extended slipway and landing jetty has the potential to displace commercial fishing activity within the area.

18.1.21 Fish landings data from Marine Scotland has been analysed for the area, which shows that landings contributions from the area are relatively small in comparison to Orkney's total landings value. In addition, the works will be temporary and localised. Thus, effects to commercial fishing from the proposed marine infrastructure are considered to be **negligible and not significant.**

18.1.22 Consultation with the local fleet, via Orkney Fisheries, will continue as the design develops to ensure fishermen are aware of any works being undertaken and any potential temporary displacement as a result of the works.

18.2 Telecommunications

Introduction

18.2.1 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.

18.2.2 Wind turbines like any other large structure have the potential to interfere with electromagnetic signals, which are used in a variety of communications. If sited within or near to the path between a transmitter and its intended receiver a turbine has the potential to degrade the signal performance. The two possible mechanisms for signal degradation for terrestrial transmissions are physical blocking by the structure, or reflection from the structure sides. Physical blocking will create a 'shadow' zone behind the structure where there will be a reduction in signal levels. The reflection of signals from the tower and rotating blades of wind turbines can cause complex fluctuations in signal reception. Interference can disrupt the image resulting in a delayed image on screen.

Legislation, Policy and Guidelines

18.2.3 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

18.2.4 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 18.1 below.

Table 18.1 – Consultee Responses

Consultee	Response	Actions
Joint Radio Company (JRC) (September 2020)	JRC does not foresee any potential problems based on known interference scenarios and the data provided.	No action required.
BT (September 2020)	The proposed locations of the six turbines should not cause interference to BT's current and presently planned radio network.	No action required.
Ericsson (September 2020)	MBNL/EE have no microwave link within 100m and no mast within 250m of the proposed wind turbine location and therefore have no objections to the proposal.	No action required.

Consultee	Response	Actions
Ofcom (September 2020)	Ofcom no longer replies to these requests. The location of published licences is located on the Wireless Telegraphy Register so you should perform your search there.	The Ofcom online database of fixed links has been interrogated to identify any links near the Proposed Development. None have been identified, with the nearest link path being 800 m or more from the nearest proposed turbine.
Vodafone (September 2020)	Vodafone confirm that the proposal does not affect any of their links.	No action required.
Atkins (September 2020)	Atkins have no objections to the Proposed Development.	No action required.
Arqiva (September 2020)	Arqiva have no objections to the Proposed Development.	No action required.

Assessment Methodology

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

Telecommunications

18.2.6 Consultation has been undertaken with the relevant telecommunication providers to determine the potential for impacts from the Proposed Development (refer to Table 18.1 above).

Television

18.2.7 The nearest transmitters have been identified and the transmission between them, the Proposed Development and residential properties beyond the Proposed Development have been considered.

Baseline Conditions

Telecommunications

18.2.8 As detailed above, the baseline was determined through consultation with the key stakeholders; this process identified that there are no telemetry or microwave links within the site boundary or within close proximity to the site boundary.

Television

18.2.9 Since 2010 the North of Scotland including the Orkney Islands has been fully switched over to digital television from the previous terrestrial signals. Digital signals are considered to be less susceptible to disruption from reflections and do not suffer from ghosting. Digital transmitter powers increased to around ten times previous levels at the point of digital switchover. At the same time digital signals were added to the relay transmitter network. These improvements greatly increased the availability and robustness of digital terrestrial reception.

18.2.10 The closest television transmitters to the Proposed Development Area are the Pierowall transmitter located 16 km away on Westray and the Burgar Hill transmitter located 21 km away on the Orkney Mainland. Both transmitters have switched to digital transmission only.

Likely Effects

Telecommunications

18.2.11 No telecommunication links were identified within the site boundary or within close proximity of the site boundary. As such the design of the Proposed Development has not been influenced by any telecommunication links. No impacts or effects upon telecommunication links are anticipated as a result of the Proposed Development.

Television

18.2.12 The Proposed Development would be located on the island of Faray, 16 km to the south-east of the Pierowall transmitter and 21 km to the north-east of the Burgar Hill transmitter. Given the location and relative heights of the nearest transmitters, as well as the fact they have switched to digital transmission only, the Proposed Development will have no impact on the television signal at these locations. If for any reason a signal was to be disrupted by the Proposed Development (e.g. a receiver's signal from Pierowall transmitter was disrupted), there is an alternative transmitter that could supply a signal to the affected area (e.g. Burgar Hill).

Mitigation

Telecommunications

18.2.13 Although no impacts or effects are anticipated on telecommunication 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 should a new telecommunication link be identified prior to consent being granted.

Television

18.2.14 Although no impacts or effects are anticipated on television signals, the Applicant will fully investigate and provide alternative television reception, for example a satellite dish, should it be determined that the Proposed Development is the cause of an unacceptable level of interference. It is proposed that this is secured through a mitigation scheme requirement condition attached to the permission.

Residual Effects

18.2.15 No residual impacts or effects upon telecommunication links or television 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

18.2.16 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 telecommunication or television links.

Summary

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

18.2.18 The Proposed Development will have no residual effects on television or telecommunication links.

18.3 Air Quality

Introduction

18.3.1 This section considers the potential for local air quality impacts from the Proposed Development. The release and offsetting of carbon by the Proposed Development is covered in Section 18.4.

Consultation

18.3.2 OIC requested an assessment of air quality with the EIA Scoping Opinion, a summary of which is shown in Table 18.2 below.

Table 18.2 - Consultation with OIC

Consultee	Consultation Response	Applicant Response
Orkney Islands Council (EIA Scoping Opinion)	Full assessment of the impacts on air quality should be provided within the EIA report which may arise from activities related to the development, in particular stone excavation.	A full assessment of air quality with a particular focus on stone excavation has been undertaken.

Methodology

Baseline

18.3.3 The air quality baseline was identified through Orkney Islands Council Air Quality Annual Progress Report 2019 (OIC, 2019a).

Traffic Assessment

18.3.4 Assessment of construction and operation traffic is undertaken in line with the Institute of Air Quality Management (IAQM) Land Use Planning and Development Control: Planning for Air Quality guidance which sets out indicative criteria for requiring an air quality assessment as per Table 18.3.

Table 18.3 – Criteria for Air Quality Assessment

The development:	Criteria to Proceed to an Air Quality Assessment:
An air quality assessment will be considered if the Proposed Development is deemed to: 1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors. (LDV = cars and small vans <3.5t gross vehicle weight).	An air quality assessment is required if there is: A change of LDV flows of: - more than 100 Annual Average Daily Traffic (AADT) within or adjacent to an Air Quality Management Area (AQMA) - more than 500 AADT elsewhere.
An air quality assessment will be considered if the Proposed Development is deemed to: 2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant	An air quality assessment is required if there is: A change of HDV flows of: - more than 25 AADT within or adjacent to an AQMA

The development:	Criteria to Proceed to an Air Quality Assessment:
receptors. (HDV goods vehicles + buses >3.5t gross vehicle weight).	- more than 100 AADT elsewhere

Dust Assessment

18.3.5 Fugitive emissions of airborne particulate matter are readily produced through the action of abrasive forces on materials and therefore a wide range of site preparation and construction activities have the potential to generate this type of emissions, including:

- demolition work;
- earthworks, including the handling, working and storage of materials;
- construction activities; and
- the transfer of dust-making materials from the site onto the local road network known as track-out.

18.3.6 The IAQM adopts a broad definition of dust that includes the potential for changes in airborne concentration, changes in deposition rates and the risk to human health and public amenity, when considering the significance of effects from emissions of fugitive particulate matter.

18.3.7 The nature of the impact requiring assessment varies between different types of receptor. In general, receptors associated with higher baseline dust deposition rates are less sensitive to impacts, such as farms, light and heavy industry or outdoor storage facilities. In comparison some hi-technology industries or food processing plants operate under clean air conditions and increased airborne particulate matter concentrations may have an increased economic cost associated with the extraction of more material by the plants air filtration units.

18.3.8 A qualitative assessment of construction phase dust and fine particulate emissions has been undertaken in accordance with the IAQM Guidance on the Assessment of Dust from Demolition and Construction (2016). It is assumed that a desk-based assessment will be sufficient without any additional baseline dust monitoring.

Baseline

18.3.9 The Proposed Development is not within an AQMA and there is no AQMA within Orkney. The Annual Report states that Orkney is currently meeting the air quality objectives and that pollutant levels remain consistently low with no significant risk of Orkney exceeding these objectives. OIC has not identified any areas where action is required to improve air quality (OIC, 2019a).

Likely Effects

Construction

Traffic

18.3.10 The site is not located within an Air Quality Management Area and the anticipated traffic flows for LDVs and HDV are less than the criteria outlined in Table 18.3 (note vehicles will be travelling to the island by barge and numbers are anticipated to be less than 500 cars/LGVs and less than 100 HGV per day) (refer to Chapter 12 for further details). Therefore, no air quality assessment is required, and no significant effects are anticipated.

Dust

18.3.11 Although emissions/dust may be created during construction of the Proposed Development and the extraction of aggregate from the borrow pits, these would be controlled through legislation (e.g. Pollution Act) and standard best practice (e.g. as outlined by Institute of Air Quality Management Guidance on the Assessment of Dust from Demolition and Construction) which would be detailed in the Construction Environmental Management Plan (CEMP) (refer to Appendix 3.1). As per the guidance, as no impacts are anticipated following the implementation of the mitigation, no assessment is required, and no significant effects anticipated[1].

Operation

Traffic

18.3.12 During operation there will be no terrestrial vehicles visiting the site. One boat carrying a foot passenger(s) is anticipated to visit the island once a week, which is less than the criteria outlined above (refer to Table 18.3). Therefore, no air quality assessment is required, and no significant effects are anticipated.

Mitigation

18.3.13 As mentioned in paragraph 18.3.11 the CEMP would contain standard best practice for the control of dust from both construction activities and aggregate extraction from the borrow pits which will be implemented during construction. This will include, but is not limited to:

- maintaining a water bowser on site to suppress dust along the access tracks as required;
- ensuring fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery;
- ensuring sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case it will ensure that appropriate control measures are in place; and
- stripping of topsoil will occur as close as reasonably practicable to the period of excavation or other earthworks activities to avoid risks associated with run-off or dust generation.

18.3.14 Refer to Appendix 3.1 for further details.

Residual Effects

18.3.15 No residual effects from traffic or dust emissions are anticipated due to the Proposed Development.

18.4 Carbon Savings

Introduction

18.4.1 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. Climate change is deemed such a concern that many local authorities and indeed organisations around the world – including Orkney Islands Council – have declared a climate emergency. Therefore, reducing the cause of climate change 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.

18.4.2 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).

[1] Note that impacts from dust on ecological receptors are covered in Chapter 8.

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).

18.4.3 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.

18.4.4 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 or within woodland, there are potential emissions resulting from direct action of excavating peat and/or felling trees 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 it is sited need to be evaluated in order to understand the consequences of permitting such developments.

18.4.5 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, and to respond to queries during public consultation, regarding the Proposed Development's carbon budget.

18.4.6 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).

Legislation, Policy and Guidelines

Legislation

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

- the Climate Change (Scotland) Act, 2009;
- the Climate Change Act 2008 (2050 Target Amendment) Order 2019; and
- the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019.

18.4.8 These create the statutory framework for greenhouse gas emissions reductions in Scotland and the recent Climate Change Act set a target of net-zero emissions by 2045. 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

18.4.9 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

18.4.10 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 associated Microsoft Excel tool (referred to henceforth as the "Carbon Calculator") which utilises 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. However, this tool was not designed for sites with no peat, like the Proposed Development site, and therefore is not appropriate to assess the carbon balance of the Proposed Development.

18.4.11 Although the Applicant has not confirmed which model of wind turbine would be erected at the site, should the Proposed Development be granted consent, a candidate turbine has been used for this assessment within this EIA Report. The candidate turbine is a Vestas V136 4.2 MW machine. Vestas have undertaken a full life assessment for this machine based on a 100 MW development (Vestas, 2019). This document has therefore been used to illustrate the potential carbon emissions and savings of the Proposed Development.

Methodology and Limitations

18.4.12 Whilst the Proposed Development has an indicative capacity of 28.8 MW based on available turbines, the carbon emissions and carbon savings of the Proposed Development have been extrapolated based on the Vestas V136 4.2 MW candidate turbine lifecycle analysis undertaken by Vestas (Vestas, 2019). Therefore, for the purpose of this assessment, a conservative capacity of 25.2 MW is assumed.

18.4.13 The lifecycle analysis by Vestas assumes an operational lifespan of 20 years, while the Applicant is applying for an in-perpetuity consent for the Proposed Development. It is anticipated that the turbines would have a design life greater than the 20 years used in the lifecycle analysis. The duration of operational life and overall MWh of electricity generated figures have a substantial effect on the carbon saving calculations due to the majority of carbon emissions being generated during manufacture rather than operation (refer to Graph 1). As such, it is considered that this assumption is conservative. By way of example, if 24 years were to be used instead of 20 years, the anticipated carbon emissions (g CO_2-e) per kWh of electricity generated across the lifespan of a wind turbine would drop from 5.6 to 4.7[2] (e.g. c.16 % decrease).

18.4.14 The lifecycle analysis assumes a hub height of 112 m, whereas the Proposed Development is anticipated to have a hub height of c.83 m – 92 m. This represents a reduction in tower mass by c.18 % - 26 % from that used in the lifecycle analysis. Consequently, this element of the calculation is also considered to be conservative.

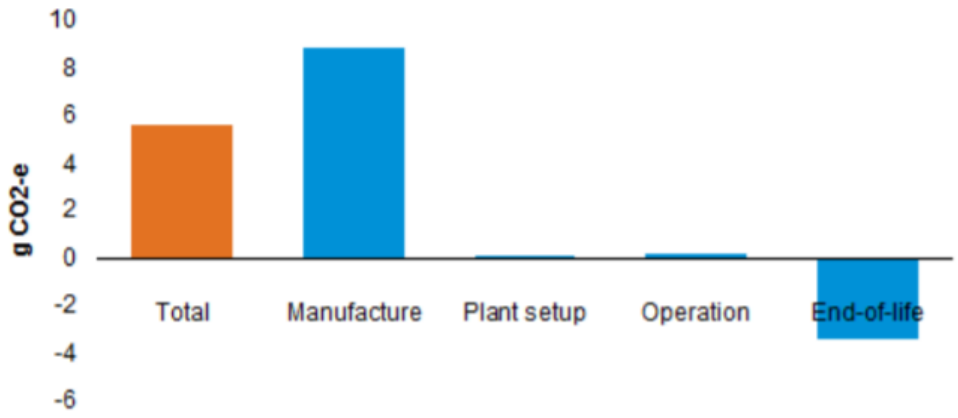
18.4.15 Transport distances from manufacturing facility to site is based on regional level analysis. The lifecycle analysis report states that the baseline represents a conservative assumption and shows transport to account for c.9 % of GHG production. The project specific levels of GHG production will however be dependent on the final turbine supplier selection[3] and therefore origin location of component parts and will be influenced by site specific characteristics such as the island nature of the site. These site specific elements are generalised and as such not fully captured by the lifecycle analysis. Whilst this is a limitation of the assessment, transport contributes a relatively small proportion of the overall GHG production, and in turn a relatively small component of the carbons saving calculations.

Results

18.4.16 Vestas anticipates 5.6 g CO_2-e (0.0000056 tonnes CO_2-e) will be produced per kWh of electricity generated across the lifespan of a wind turbine[4]. This is dominated by the manufacturing stage of

[2] Vestas (2019) – page 77, Table 11
[3] Turbine model selection would be through a competitive tender process that would take place post-consent.
[4] Vestas (2019) – page 50, Table 8, assumed to be 20 years

the life cycle (83%), in particular production of the tower, nacelle, gear and mainshaft, foundations, blades and cables[5] (Graph 1).



Graph 1: Contribution by Lifecycle Stage to Global Warming Potential per kWh (Vestas, 2019)

18.4.17 The Proposed Development, based on an assumption of six V136 4.2 MW machines, is predicted to generate 84,548 MWh per annum (84,548,000 kWh per annum)[6], equating to 1,690,960 MWh (1,690,960,000 kWh) over a 20 year period[7].

18.4.18 Therefore, the Proposed Development is estimated to generate approximately 9,469 tonnes CO_2-e[8] during the manufacturing, erection, operation and end-of-life processes.

18.4.19 The Proposed Development, built using six V136 4.2 MW machines, is predicted to save approximately 38,046 tonnes CO_2-e per year[9] or 3,170 tonnes CO_2-e per month[10] in comparison with equivalent electricity generation by a fossil fuel mix. Therefore, the payback period for the Proposed Development to offset the CO_2-e released during its lifespan (assuming operation for a minimum of 20 years) is estimated to be 3 months[11]. Whilst this figure should be considered approximate, it clearly indicates that the Proposed Development would provide a benefit in terms of renewable electricity generation and carbon reduction, given that after a very short (estimated three month) payback period, the in-perpetuity operation of the Proposed Development would deliver carbon-free electricity and displace carbon emissions which would otherwise result from energy generation by fossil fuels.

Assessment of the Impact of the Proposed Development on Orkney's Carbon Footprint

18.4.20 Data from BEIS (2020a) shows that Orkneys carbon footprint in 2018 (the most recent year for which analysis is available) was 192,365 tonnes of CO_2-e. Notable exceptions from the BEIS figures include domestic and international aviation and shipping along with military transport and exports. Given Orkney's island location and reliance on shipping and aviation for lifeline links, the figures for Orkney's carbon footprint are therefore likely to be significantly underestimated.

[5] Vestas (2019) – page 58, section 5.2.6

[6] This has been calculated by multiplying the annual capacity of the Proposed Development based on a 4.2 MW turbine (25.2 MW) by the hours in a year (8760) by the capacity factor (38.3%) (Renewable UK, 2020).

[7] 84,548 MWh per year multiplied by 20 years.

[8] Calculated by multiplying the kWh per annum of electricity generated (1,690,960,000 KWh) by the tonnes of CO_2-e produced (0.0000056 tonnes CO_2-e)

[9] This has been calculated by multiplying the GWh pa of the Proposed Development (84.548 GWh) by the number of tonnes of carbon which fossil fuels would have produced to generate the same amount of electricity (450 tonnes of carbon dioxide per GWh of electricity) (Renewable UK, 2020).

[10] 38,046 CO_2-e divided by 12 months.

[11] 9,469.4 tonnes CO_2-e generated over the lifespan of the Proposed Development divided by 3,170 tonnes CO2-e saved per month by generating renewable energy.

18.4.21 Although Orkney is known to generate more than its net annual electricity needs from renewables already (OREF, 2018), electricity only accounts for 25 % of Orkney's energy use (BEIS, 2020b). There is significant carbon production from other sectors.

18.4.22 Based on the BEIS (2020a) figure for Orkney's carbon emissions and the expected annual savings against fossil fuel-mix electricity generation, the Proposed Development would offset Orkney's estimated carbon footprint (as noted above) by 19.78 %.

18.4.23 The Proposed Development is assumed to contribute 28.8 MW to the Needs Case for a new interconnector for Orkney. Ofgem has stipulated that 135 MW of new generation is required to trigger construction of a new 220 MW cable, and given requirements relating to status and timing of generation projects, only onshore wind projects currently under development have any chance of contributing to that figure. The Proposed Development therefore contributes 21 % of the required capacity to trigger the cable and would require about 13 % of the available capacity on the cable.

18.4.24 Although it is not practical to determine the exact carbon savings of all the renewable energy projects which would use the interconnector cable, given the scale of the potential renewable energy generation, it is possible that Orkney Islands could become a net zero emissions local authority area as a result of the new cable. The Proposed Development would contribute to achieving this goal, through both its carbon savings, and its contribution to the needs case for the new interconnector cable.

Summary

18.4.25 Although the Proposed Development will generate carbon free electricity, carbon will be released during the manufacturing, delivery and construction of the wind farm. However, this generation of carbon is minimal in comparison to the generation of carbon free electricity, and it is estimated that carbon generation will be offset by the Proposed Development's carbon savings within approximately three months. 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 the electricity generated will displace grid electricity generated from fossil fuel sources. The site would in effect be in a net gain situation following the estimated three month carbon payback period and would contribute to national objectives of reducing greenhouse gas emissions. Additionally, the Proposed Development would make a material contribution to creating the demand for a new subsea interconnector to Orkney, which in turn would help deliver sustainable development and the drive to net zero.

18.5 Coastal Processes

Introduction

18.5.1 Coastal processes are dependent on tides, waves, winds, flora, fauna and the sediment regime. Coastal processes are influenced by both long terms and/or natural processes (such as climate change) and short term human activities (such as installing structures on the seabed).

18.5.2 The installation of the new extended slipway and landing jetty has the potential to interrupt the natural coastal processes within the area, such as tidal flows, local currents and sediment movement.

18.5.3 The exact vessel requirements are not known at the time of writing as construction contractors would not be appointed until post consent. As such, the slipway and landing jetty dimensions and dredging volumes provided are the maximum size of the slipway and landing jetty based on the maximum vessel sizes they could support. Thus, all figures provided in this assessment are conservative estimates.

18.5.4 The new extended slipway would be built in the same location as the existing slipway to allow access onto the existing track. The extant slipway is c.20 m long by 3.5 m wide, though this was originally longer. This would be upgraded to a maximum 36 m long and 8 m wide. This maximum size of the

slipway has been designed to accommodate local vessels up to the size of the OIC reserve ferry, the MV Thorsvoe (35 m by 10 m, 385 gross tonnage, Marine Traffic, 2021). Once constructed the new slipway will be used for primary access of construction materials for the Proposed Development and staff access during both construction and operation. The slipway will then be used for maintenance access during the operational phase of the Proposed Development.

18.5.5 The new landing jetty has been designed to carry abnormal loads. It will comprise a causeway measuring a maximum of 55 m long by 10 m wide, terminating in a square docking structure measuring a maximum 20 m by 20 m. This maximum size of the landing jetty has been designed to accommodate vessels up to the size of the MV Meri (105.4 m by 18.8 m, 3,360 gross tonnage – Marine Traffic, 2021).

18.5.6 Localised dredging would be required for both structures. The footprint of the new marine infrastructure, including dredging areas is provided in Figure 18.1.

18.5.7 Further details on the marine infrastructure are available in Chapters 3 and 12 and Appendix 12.1.

Legislation, Policy and Guidelines

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

- The Marine (Scotland) Act 2010;
- Scotland's National Marine Plan (NMP) (Scottish Government, 2015); and
- Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016) (herein after referred to as "the Plan").

18.5.9 The following NMP General Policy is applicable to coastal processes:

- **GEN 8 Coastal process and flooding**: *"Developments and activities in the marine environment should be resilient to coastal change and flooding, and not have unacceptable adverse impact on coastal processes or contribute to coastal flooding."* (Scottish Government, 2015)

18.5.10 General Policy 5B of the Plan covers coastal processes (Scottish Government, 2016), noting that new developments, such as large areas of reclaimed land to increase harbour lay-down areas may contribute to coastal squeeze or changing sediment patterns.

18.5.11 General Policy 5B states that "*The Plan will support proposals for development and/or activities, including any linked shore-base requirements, that demonstrate, potentially by way of a flood risk assessment:*

- *compliance with Scottish Planning Policy;*
- *that they will not exacerbate present or future risks of flooding or erosion;*
- *that sensitive uses, such as accommodation, should generally not be located in areas shown to be at risk of flooding unless appropriate measures are in place;*
- *how resilience and adaptation strategies have been incorporated within proposed developments over their lifetime to adapt to the effects of climate change, coastal erosion and coastal flooding. Any development must not compromise the objectives of the Flood Risk Management Act"* (Scottish Government, 2016).

Consultation

18.5.12 In consultation on the scope of the assessment of the marine licensable activities, Marine Scotland requested the consideration of coastal processes, see Appendix 4.4 for further details.

Assessment Methodology

18.5.13 A high level desk based assessment of potential impacts of the Proposed Development, along with the risk coastal processes presents to the Proposed Development, has been undertaken by ITPE. Significance of effects has been determined using the methods outlined in Chapter 4; magnitude and sensitivity are defined in Table 18.4 and Table 18.5 respectively.

Table 18.4 – Coastal Processes Impact Magnitude

Level of impact	Definition
High	Permanent changes to key features both locally and in the wider area.
Medium	Permanent changes to key features in the local area.
Low	Small, temporary changes to key features in the local area
Negligible	Changes which are not discernible from background conditions.

Table 18.5 – Coastal Processes Sensitivity

Sensitivity	Description
High	Very low or no capacity to accommodate the proposed form of change; and / or receptor designated and / or of international level importance. High levels of coastal erosion present within the area.
Medium	Moderate to low capacity to accommodate the proposed form of change; and / or receptor designated and / or of regional level importance. Moderate levels of coastal erosion present within the area.
Low	Moderate to high capacity to accommodate the proposed form of change; and / or receptor not designated but of district level importance. Low levels of coastal erosion present within the area.
Negligible	High capacity to accommodate the proposed form of change; and / or receptor not designated and only of local level importance.

Baseline Conditions

18.5.16 Ramsay and Brampton (2000) undertook a review of the coastal characteristics and processes which affect the regime within Orkney. The Proposed Development sits within sub-cell 10d, the Northern Isles. According to Ramsay and Brampton (2000), the solid geology of the islands to the north-east of the Orkney Mainland is dominated by Middle Old Red Sandstone with both the lower and upper groups, i.e. the Rousay Flags and the Eday Beds. Much of the coastal edge is fronted by a low rock platform. The low rock platforms tend to act as hinge points upon which the bay type beach planshapes develop. Most of the beach complexes appear to be relatively stable in terms of the present day marine processes with few significant changes to beach planshapes occurring and no obvious net losses or gains of beach sediment. The stability of these beach areas is highly dependent upon the existence of the shingle storm ridges which are found either exposed on the upper beach or underlying the present sand beaches. These are highly efficient in dissipating wave energy and provide a high degree of protection to the coastal edge from erosion during storm conditions (Ramsay and Brampton, 2000).

18.5.17 Mean spring tidal range within the area is relatively low (2.1 m to 3.0 m), as is annual mean wave power (32 kW/m) (Marine Scotland, 2021). The seabed habitat within the area is classified under the European Nature Information System (EUNIS) as 3.2 Atlantic and Mediterranean high energy infralittoral rock (JNCC, 2018).

18.5.18 According to the Phase 1 Habitat survey (see Chapter 8), the coast within the vicinity of the new extended slipway and landing jetty is characterised as intertidal boulder/rocks (H1.3). Seabed site survey video footage determined that the area within which the new marine infrastructure would be constructed was predominantly sand (see Section 18.6). Sediment sampling showed up to 1.5 m of sediment overlying rock. The proposed location of the new extended slipway and landing jetty is sheltered within the bay, this is evident by the seagrass recorded within the area (see Section 18.6), according to Tyler-Walters et al (2016) seagrass is typically found in sheltered sandy areas.

18.5.19 As detailed in Chapter 11, a review of coastal erosion maps has been undertaken which shows that little coastal erosion has occurred surrounding and adjacent to the site from 1890 to present day (Dynamic Coast Scotland, 2019).

Likely Effects

18.5.20 As discussed in Chapter 11, there is a low risk of coastal erosion affecting the Proposed Development.

18.5.21 The footprint of the new marine infrastructure, including dredging areas is provided in Figure 18.1 with the associated area of seabed disturbance provided in Table 18.6. The coast within the Proposed Development is characterised as intertidal boulder/rocks (H1.3), and therefore is less likely to experience coastal process impacts. As noted by Ramsay and Brampton (2000), the wider area is highly efficient in dissipating wave energy and provides a high degree of protection to the coastal edge from erosion during storm conditions. This is evidenced by little coastal erosion being recorded at the site over at least the last 130 years. The area is also sheltered, which is evident by the presence of seagrass.

18.5.22 Given the relatively small size of the proposed structures, the rocky and sheltered nature of the site, lack of historic erosion recorded and the fact that the slipway was historically longer, both magnitude and sensitivity are considered to be negligible. As such, effects to coastal processes are considered to be **negligible and not significant.**

18.5.23 The likely impacts of alterations to coastal processes on marine sediment and water quality has been included in Chapter 17.

Mitigation

18.5.24 The above assessment is based on the worst case footprint, assuming the largest vessels the proposed marine infrastructure can support. Suitable vessels will be determined by the turbine manufacturer. Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the infrastructure and channel dredging requirements. This, in turn, would reduce impacts to coastal processes. Thus, residual effects are therefore also considered to be **negligible and not significant**.

Cumulative Effects

18.5.25 As no residual effects from the Proposed Development alone are anticipated, the Proposed Development will not have cumulative effects with other developments on coastal processes.

18.6 Benthos

Introduction

18.6.1 The installation of the new extended slipway and landing jetty, including dredging, will result in seabed disturbance. Although the area of impact is predicted to be relatively small, a high level assessment, including identification of seabed biotope and the potential for sensitive features (such as PMFs), has been undertaken following consultation with NatureScot.

18.6.2 As noted in Section 18.5, the exact vessel requirements are not known at the time of writing as construction contractors would not be appointed until post consent. As such, the dimensions and dredging volumes provided are the maximum size of the slipway and landing jetty based on the maximum vessel sizes they could support. Thus, all figures provided in this assessment are conservative estimates.

Legislation, Policy and Guidelines

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

- The Marine Strategy Framework Directive 2008;
- The Marine Strategy Regulations 2010;
- The Marine (Scotland) Act 2010;
- Scotland's National Marine Plan (NMP) (Scottish Government, 2015); and
- Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016) ("the Plan").

18.6.4 The following NMP General Policy is applicable to assessing impacts to benthic communities:

- **GEN 9 Natural Heritage:** *"Development and use of the marine environment must:*

  (a) Comply with legal requirements for protected areas and protected species.

  (b) Not result in significant impact on the national status of Priority Marine Features.

  (c) Protect and, where appropriate, enhance the health of the marine area."

18.6.5 The following general policies of the Plan are also applicable:

- **General Policy 1C Safeguarding the Marine Ecosystem:** *"The Plan will support proposed development(s) and/or activities when they: safeguard the integrity of coastal and marine ecosystems; contribute towards the Marine Strategy Framework Directive objectives to promote enhancement or improvement of the environmental status of the marine environment; demonstrate how any significant disturbance and degradation of coastal and marine ecosystems has been avoided or appropriately mitigated."*
- **General Policy 4C Wider Biodiversity:** *"The Plan will not support development(s) and/or activities that result in a significant impact on the national status of Priority Marine Features. Where development(s) and/or activities are likely to have an adverse impact on species of regional or local importance to biodiversity, proposals should demonstrate that: the public benefits at a local level clearly outweigh the value of the habitat for biodiversity conservation; the development(s) and/or activities will be sited and designed to minimise adverse impacts on environmental quality, ecological status or viability; and any impact will be suitably mitigated."*

Consultation

18.6.6 As part of their feedback on the pre-application public consultation session, NatureScot requested that site survey footage was obtained and analysed with a focus on identifying the biotope and presence (and, if relevant the extent/quantity) of any PMFs (see Appendix 4.4 for further details).

Assessment Methodology

18.6.7 Seabed sediment sampling was undertaken by Leask Marine Limited on 24 March 2021 to inform the assessment of impacts to marine water and sediment quality from dredging (see Chapter 17). Video footage was obtained as part of the sampling survey, which was analysed by John Bleach of HR Wallingford. John Bleach (MSc, BSc) is a Principle Marine Ecologist Consultant at HR Wallingford,

with over 17 years' experience in the marine and freshwater field, including EIA, marine monitoring and marine policy. Details of the analysis are provided in the Baseline Conditions section below.

18.6.8 A high level desk based assessment of potential impacts of the Proposed Development to benthic habitats has been undertaken by ITPE. Significance of effects has been determined using the methods outlined in Chapter 4; magnitude and sensitivity are defined in Table 18.6 and Table 18.7 respectively.

Table 18.6 – Benthos Impact Magnitude

Level of impact	Definition
High	Total loss or major alteration to key elements/features of the baseline conditions. Impact occurs continuously over the lifetime of the development and is irreversible. Impact occurs over a large spatial extent resulting in widespread, long term or permanent changes in site characteristics or affecting a large proportion of receptor population(s).
Medium	Partial loss or alteration to one or more key elements/features of the baseline conditions. Impact occurs repeatedly over the lifetime of the development but is reversible. Impact occurs over a medium spatial extent resulting in short to medium term change to site characteristics or affecting a moderate proportion of the receptor population(s).
Low	Detectable impact, and may be irreversible, but is localised and temporary. Impact is either of sufficiently small scale or of short-term duration to have no material impact on the receptor population(s).
Negligible	Impact is temporary. Slight change from baseline conditions, and may be irreversible, but either of sufficiently small scale or of short-term duration to have no material impact on the receptor population(s).

Table 18.7 – Benthos Sensitivity

Sensitivity	Description
High	Nationally and internationally designated receptors with high vulnerability and low or no recoverability. High sensitivity, as defined by Marine Scotland's (2013) Feature Activity Sensitivity Tool (FeAST) tool.
Medium	Nationally and internationally important receptors with medium vulnerability and medium recoverability. High to medium sensitivity, as defined FeAST.

Sensitivity	Description
Low	Nationally and internationally important receptors with low vulnerability and high recoverability. Low sensitivity, as defined FeAST.
Negligible	Receptor is not vulnerable to impacts regardless of value/importance. Not sensitive, as defined FeAST.

Baseline Conditions

18.6.13 Video footage along transects of both the proposed new extended slipway and proposed landing jetty was obtained by Leask Marine Limited, this has been analysed by HR Wallingford to identify habitats present.

18.6.14 The seabed predominantly comprises sand; specific sediments and habitats identified are outlined below.

Landing Jetty

18.6.15 Moving from the end of the transect (approximately 100 m offshore) to the shoreline, the following was identified with the survey area:

- a band of seagrass, likely *Zostera marina*, which is a PMF, was identified at least 100 m from shore to approximately 75 m;
- the sediment is then sand from 75 m to approximately 45 m to 50 m from shore;
- a band of kelps (*Laminaria saccharina* and *Laminaria hyperborea*), which is also a PMF, with intermittent sandy patches, is present from 45 m to 50 m to 25 m to 30 m from shore. Coralinus red encrusting on rocks below the kelps were identified;
- from 25 m to 30 m to shore, the seabed is characterised by boulders on sand with kelps (*Laminaria saccharina* and *Laminaria hyperborea*) and fucoids (mostly *Fucus serratus*) followed by patches of greens and filamentous reds.

New Extended Slipway

18.6.16 Moving from the end of the end of the transect (approximately 60 m from the end of the current slipway) to the end of the proposed slipway, the following was identified within the survey area:

- a band of seagrass, likely *Zostera marina*, which is a PMF, was identified at least 60 m from shore to approximately 50 m;
- the sediment is then sand from 50 m to approximately 30 m from shore;
- kelps (*Laminaria saccharina* and *Laminaria hyperborea*), which is also a PMF, with intermittent sandy patches, was identified from 30 m to 20 m from shore. Coralinus red encrusting on rocks below the kelps were identified;
- the area from 20 m from shore to the current slipway is characterised by boulders on sand with kelps (*Laminaria saccharina* and *Laminaria hyperborea*) and fucoids (mostly *Fucus serratus*) followed by patches of greens and filamentous reds.

18.6.17 The survey transects along with broad habitat types identified are shown in Figure 18.1. Example seabed imagery from both transects is provided in Appendix 18.1.

Likely Effects

18.6.18 Table 18.8 outlines the area of seabed disturbance associated with each proposed structure. This is based on the maximum size of the marine infrastructure and associated dredging.

Table 18.8 – Seabed disturbance

Structure	Structure footprint	Dredging area
New extended slipway	Maximum 36 m long and 8 m wide. The existing slipway is 20 m by 3.5 m, resulting in an additional 218 m^2 of seabed disturbance	Up to 600 m^3 of sediment would be dredged at the end of slipway to a maximum of 1 m depth Resulting in up to 600 m^2 of seabed disturbance
Landing jetty	Causeway measuring a maximum of 55 m long by 10 m wide, terminating in a square docking structure measuring a maximum 20 m by 20 m. Resulting in up to 950 m^2 of seabed disturbance	Approximately 2,400m^3 of sediment would be dredged to a maximum of 1m depth, equating to up to 2,400m^2 of seabed. This includes dredging within the footprint of the landing jetty. Thus, dredging would result in up to an additional 1,450m^2 of seabed disturbance
Total	Up to 1,168 m^2	Up to 2,050 m^2

18.6.19 A total of up to 3,218 m^2 would be disturbed, of which 1,168 m^2 would be permanent impacts from the structures, whilst the remaining 2,050 m^2 would be via dredging, therefore the area is expected to recover over time. As such, the magnitude of impact via habitat loss is considered to be low overall. Sandy sediments will recovery quicker than fine clay and silt, and are not of international or national significance, thus sensitivity is considered to be low.

18.6.20 As PMFs, seagrass and kelp are a nationally important species and both features identified by FeAST (Marine Scotland, 2013) as having a relatively high sensitivity to seabed disturbance. The works are not within a site designated for either seabed habitats. However, the works are not within a site designated for either seabed habitats. In addition, there are numerous recordings of both PMFs within the Orkney region (Marine Scotland, 2021; Tyler-Walters et al, 2016).–Furthermore, based on site survey video footage, both habitats are likely to be relatively abundant along the east coast of Faray.

18.6.21 The majority of the disturbance would be outside the band of known seagrass, as shown in Figure 18.1. Based on the available seabed survey video footage and the planned location of the structures, both structures are out with the band of seagrass, thus impacts to seagrass would likely be limited to dredging. It is estimated that an area of approximately 300m^2 of seagrass would be dredged for the landing jetty. The area is expected to recover with time, however, Marine Scotland (2013) note that recoverability will depend on recruitment from other populations. Although *Zostera marina* seed dispersal may occur over large distances, high seedling mortality and seed predation may significantly reduce effective recruitment. Once lost, seagrass beds take considerable time to re-establish, therefore, Marine Scotland (2013) advise that recoverability is very low. Thus, sensitivity of seagrass to seabed disturbance is considered to be high. Given the small area of estimated impact in comparison to available seagrass PMF habitats in the region, magnitude of impact is considered to be low. Thus, effects are considered to be minor and not significant.

18.6.22 In terms of kelp impacts, based on the available survey video footage it is estimated that an area of approximately 300m^2 of kelps, rock, boulders, fucoids, and greens and filamentous reds would be impacted by the slipway (see Figure 18.1). The majority of this would be from dredging, with approximately 100m^2 estimated to be within the permanent footprint of the slipway. A further approximately 1,200m^2 would be within the jetty footprint, of this, approximately 550m^2 would be associated with the permanent footprint of the jetty causeway, with the remainder of the area dredged. According to Marine Scotland (2013) recoverability is medium to high. Thus, sensitivity of kelp to seabed disturbance is considered to be medium. Given the very small area of estimated impact in comparison to available kelp PMF habitats in the region, magnitude of impact is considered to be low. Thus, effects are considered to be **minor and not significant**.

18.6.23 Overall, given the relatively small area of seabed disturbance, effects to benthic species, including PMFs, are considered to be **minor and not significant**.

Mitigation and Residual Effects

18.6.24 The above assessment is based on the worst case footprint, assuming the largest vessels the proposed marine infrastructure can support. Suitable vessels will be determined by the turbine manufacturer. Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the structures and channel dredging requirements. This, in turn, would reduce impacts to benthic communities, including the identified seagrass and kelp PMFs. Thus, residual effects are also considered to be **minor and not significant**.

Cumulative Effects

18.6.25 As no residual effects from the Proposed Development alone are anticipated, the Proposed Development will not have cumulative effects with other developments on benthos.

18.7 Marine Navigation and Radar

Introduction

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

18.7.2 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.

18.7.3 In addition, the installation of the new extended slipway and landing jetty, along with vessel journeys to the island, has the potential to impact marine navigation and radar within the area.

Consultation

18.7.4 OIC's Marine Services and Harbour Authority department, Orkney Ferries Ltd, the Northern Lighthouse Board (NLB) and the Maritime and Coastguard Agency (MCA) have 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 18.9).

Table 18.9 – Consultation Responses

Consultee	Response	Action
Marine Services and Harbour Authority: Orkney Islands Council (Oct 2019)	Marine Services and Harbour Authority stated that Faray is outwith the harbour jurisdiction however there is potential that turbines at Faray could interfere with communications between ferries travelling on the west and east coasts of the islands.	Further consultation to be undertaken with Orkney Ferries Ltd.
Orkney Ferries Ltd (October 2020)	All ONI vessels have confirmed that they do not anticipate that the wind farm will have any effect on vessels at sea.	No action required.
Marine Services and Harbour Authority: Orkney Islands Council (Nov 2020)	Marine Services and Harbour Authority confirmed that they have no further comments.	No action required.
Orkney Ferries Ltd March 2021	Response to letter to consultees detailing the marine licensable activities (provided in Appendix 4.7). Orkney Ferries replied confirming they have no comment on navigational impacts as the scope has not fundamentally changes and the dredged material will be disposed of at a designated site, not further off the shoreline of Faray.	No action required.
Northern Lighthouse Board (NLB) March 2021	NLB attended the marine licence pre-application consultation event on 4 March 2021. Advised they have no objections and requested the following: ▪ Use of disposal plans should be included as part of the Port Management Plan; ▪ Appropriate Marine Safety Information and Notice to Mariners be published prior to and during the works. ▪ The UK Hydrographic Office be notified of the as-built layout of the new slipway and jetty and the revised depths after the dredging campaign has been completed.	To be included in the Port Management Plan (post-consent). Required notifications will be made prior to, during and on completion of the works. This will be included within the CEMP.

Consultee	Response	Action
Maritime and Coastguard Agency (MCA)	No response to letter to consultees detailing the marine licensable activities (provided in Appendix 4.7).	No action required.

Assessment Methodology

18.7.5 The requirement for the Proposed Development to have no significant effects on marine radar is addressed through consultation with all relevant stakeholders within the consenting process to determine whether potential impacts are anticipated. Thus, the potential for impacts was screened out of further assessment.

Baseline

18.7.6 Consultation has been undertaken with Marine Services and Harbour Authority and with Orkney Ferries Ltd which both confirmed that there are no baseline receptors relating to marine radar which would be impacted by the Proposed Development. In addition, during the marine license pre-application consultation event NBL advised that they have no objections to the Proposed Development and provided recommended mitigation measures which have been included below.

Likely Effects

18.7.7 The new extended slipway and landing jetty would be within very close proximity to Faray, a maximum of 110 m below MHWS, which would not interact with the existing Kirkwall – Papa Westray and Hollandstoun (North Ronaldsay) – Kirkwall routes which travel through the bay. The construction works, including localised dredging, will be temporary in nature and contained within the bay. As such the installation and operation of the extended slipway and landing jetty are considered to be **negligible and not significant.**

18.7.8 Marine Services and Harbour Authority and Orkney Ferries Ltd have confirmed that no impacts or potential effects are anticipated on marine radar due the Proposed Development.

Mitigation and Residual Effects

18.7.9 A Port Management Plan will be prepared to manage abnormal load deliveries and other marine traffic at Hatston Pier to ensure that there will be no interruption to existing operations. See Chapter 12 for further details.

18.7.10 As per the NLB's feedback from the marine licence public consultation event (see Appendix 4.4), the appropriate Marine Safety Information and Notice to Mariners will be published prior to, and during, the works. In addition, following completion of the construction works, the UK Hydrographic Office will be notified of the as-built layout of the new slipway and jetty, along with the revised depths as a result of dredging.

18.7.11 Thus, residual effects are also considered to be ***negligible and not significant***.

Cumulative Effects

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

Summary

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

18.7.14 Consultation with stakeholders has identified no impacts or effects caused by the Proposed Development on marine radar.

18.8 Commercial Fisheries

Introduction

18.8.1 The construction of the new extended slipway and landing jetty could result in localised, temporary exclusion of commercial fishing within the area of construction. Although the area of exclusion is relatively minor in comparison to available fishing grounds, a high level impact assessment has been undertaken following consultation with Marine Scotland and Orkney Fisheries,

Legislation, Policy and Guidelines

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

- The Marine (Scotland) Act 2010;
- Scotland's National Marine Plan (NMP) (Scottish Government, 2015); and
- Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016) ("the Plan").

18.8.3 Both the NMP and the Plan acknowledge the potential for development to displace commercial fishing activities. Paragraph 6.24 of the NMP states the following:

"new developments should take into account the intensity of fishing activity in the proposed development area and any likely displacement which the development and associated activity could precipitate, with resultant increased pressure on remaining, often adjacent, fishing grounds" (Scottish Government, 2015).

18.8.4 Sectoral Policy 1: Commercial Fisheries of the Plan notes that impacts could be both temporary permanent, depending on the type of development and degree of disturbance. The Plan also advises that along with fishing data, such as ScotMap, consultation should be undertaken with local fishermen and organisations as activities change over time so that up to date information is essential.

Consultation

18.8.5 The letter to consultees (see Appendix 4.7) detailing the marine licensable activities was issued to the Scottish Fisheries Federation (SFF) and Orkney Fisheries, with Orkney Fisheries attending the marine licence pre-application public consultation event and providing feedback.

18.8.6 As outlined in Appendix 4.4, Orkney Fisheries advised that fishing assessments would be needed for new cable applications, which is not part of this Proposed Development. In addition, feedback from the local fleet confirmed that there is some inshore fishing activity within the area (along the coast from Gangstaiths to Scammalin).

Assessment Methodology

18.8.7 A high level desk based assessment of potential impacts of the Proposed Development to commercial fisheries has been undertaken by ITPE. Significance of effects has been determined using the methods outlined in Chapter 4; magnitude and sensitivity are defined in Table 18.10 and Table 18.11 respectively.

Table 18.10 – Commercial Fisheries Impact Magnitude

Level of impact	Definition
High	Fishing activity excluded from large area of available sea either permanently or over the life of a project.
Medium	Fishing activity temporarily excluded from medium to large area of available sea for a period greater than one year.
Low	Fishing activity temporarily excluded from a small area of available seabed for a period greater than six months.
Negligible	Fishing activity temporarily excluded from a small area of available seabed for a period less than six months.

Table 18.11 – Commercial Fisheries Sensitivity

Sensitivity	Description
High	Very low spatial adaptability due to limited operational range and/or ability to deploy only one gear type. Very limited spatial tolerance due to dependence upon a single ground. Very low recoverability due to inability to mitigate loss of fishing area by operating in alternative areas.
Medium	Limited spatial adaptability due to extent of operational range and/or ability to deploy an alternative gear type. Limited spatial tolerance due to dependence upon a limited number of fishing grounds. Limited recoverability with some ability to mitigate loss of fishing area by operating in alternative areas.
Low	Moderate spatial adaptability due to extensive operational range and/or ability to deploy an alternative gear type. Moderate spatial tolerance due to ability to fish numerous fishing grounds. Moderate recoverability due to ability to mitigate loss of fishing area by operating in a range of alternative areas of the Celtic Sea.
Negligible	Category of fishing receptor with an extensive operational range and high method versatility. Vessel able to exploit a large number of fisheries.

Baseline

ICES Rectangle

18.8.8 Faray is located in International Council for the Exploration of the Sea (ICES) rectangle 47E7. Fish landings data for ICES 47E7 (Marine Scotland, 2020) is provided in Table 18.12. This shows that in 2019, ICES 47E7 represented 2.26% of total landings from all UK ICES rectangles. Landings value from ICES 47E7 has increased in recent years, this is predominantly due to an increase in pelagic

landings. According to the Marine Scotland (2020) landings data, in 2019 £13,739,192 of landings from ICES 47E7 was attributed to herring, representing 79% of total landings from the rectangle. As shown on Marine Scotland's NMP interactive map (NMPi) (Marine Scotland, 2021), pelagic landings value from ICES 47E7 is categorised as moderate in comparison to other ICES rectangles.

18.8.9 It should be noted that each ICES rectangle covers an average of 940 nm^2 (3,224 km^2), therefore fishing activity surrounding the Proposed Development accounts for a small percentage of total landings from ICES 47E7.

18.8.10 The NMPi provides Vessel Monitoring System (VMS) data available from 2009-2013, this shows fishing intensity for vessels >15m in length. VMS data within the Proposed Development was only available for scallop (low intensity), demersal -mobile (low intensity), crab (low intensity) and lobster (high intensity). Data was not available for other species, including pelagic – herring. This is likely due to the coastal location of the Proposed Development. Separate inshore fishing data is available from ScotMap and is discussed below. Although lobster intensity was recorded as relatively high between 2009-2013, 2015-2019 landings statistics show this species accounts for a relatively small percentage of total landings from ICES 47E7. For example, in 2019, lobster accounted for £471,520 of total landings value from ICES 47E7 which equates to approximately 3%.

Table 18.12 – ICES Rectangle 47E7 Landings Value (2015-2019) (Marine Scotland, 2020)

Species		2015	2016	2017	2018	2019
47E7	Demersal	£231,955	£397,171	£274,049	£887,348	£560,185
	Pelagic	£738,659	£6,169,597	£295,527	£8,783,266	£13,924,547
	Shellfish	£2,712,997	£2,918,608	£3,693,369	£3,785,046	£2,835,543
	Total	£3,683,611	£9,485,376	£4,262,944	£13,455,661	£17,320,275
UK Total		£574,430,213	£729,378,317	£724,854,084	£764,993,803	£767,721,934
ICES 47E7 as % of UK total		0.64%	1.30%	0.59%	1.76%	2.26%

ScotMap

18.8.11 ScotMap (Kafas et al, 2014; Marine Scotland, 2018) provides information on fishing activity for fishing vessels <15m in length (i.e. inshore fishing). This data is more representative for the Proposed Development site. The data provided reflects the period of 2007 to 2011. The dataset, as of July 2013, is based on interviews of 1,090 fishermen. Hence, the importance of consultation with Orkney Fisheries to ensure up to date information on activities within the area were captured.

18.8.12 The dataset, as of July 2013, is based on interviews of 1,090 fishermen who collectively identified 2,634 fishing areas or 'polygons'. Each polygon measures approximately 2.8 km by 1.4 km. ScotMap data from the NMPi shows a monetary value from the polygon within which the Proposed Development is located of £9,863 (see Figure 18.2). Of this, £6,404 (65%) was attributable to crab and lobster pots. This is in keeping with the VMS data for lobster vessels within the area (Marine Scotland, 2021).

18.8.13 This is similar to effort within the surrounding area and classed as high in comparison to other areas of the North Sea (Marine Scotland, 2021; Kafas, 2014). Total value landed from Orkney in the study period (2010-2011) was £10.34 million, thus the polygon the Proposed Development is located within equates to a very small percentage (0.1%) of total Orkney landings. In addition, the area of exclusion required for the construction works will only represent a small portion of the total polygon.

18.8.14 Consultation with Orkney Fisheries has confirmed that there currently is inshore fishing activity within the area (along the coast from Gangstaiths to Scammalin).

Likely Effects

18.8.15 The Proposed Development would result in temporary exclusion of inshore fishing activities within the immediate area of the jetty and slipway during the construction phase, including the localised dredging works.

18.8.16 Due to the temporary and localised nature of the works, in combination with the relatively small contribution to Orkney's total inshore fish landings value, both magnitude and sensitivity are considered to be negligible, thus effects to commercial fishing are considered to be **negligible and not significant.**

Mitigation and Residual Effects

18.8.17 Consultation with the local fleet, via Orkney Fisheries, will continue as the design develops to ensure fishermen are aware of any works being undertaken and any potential temporary displacement as a result of the works. Thus, residual effects are also considered to be ***negligible and not significant***.

Cumulative Effects

18.8.18 As no residual effects from the Proposed Development alone are anticipated, the Proposed Development will not have cumulative effects with other developments on commercial fishing.

18.9 Summary

18.9.1 A summary of potential impacts, effects, proposed mitigation and residual effects is provided in Table 18.13.

Table 18.13 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Installation of the new extended slipway and landing jetty interrupting the natural coastal processes within the area	Negligible and not significant	Adverse	Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the infrastructure and channel dredging requirements.	Negligible and not significant	Adverse
Seabed disturbance via the installation of the new extended slipway and landing jetty	Minor and not significant	Adverse	Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the infrastructure and channel dredging requirements.	Minor and not significant	Adverse
Installation of the new extended slipway and landing jetty, including construction vessel movements, interrupting marine navigation	Negligible and not significant	Adverse	Turbine suppliers will be required to formulate a Port Management Plan with the OIC Marine Services (see above). Marine Safety Information and Notice to Mariners will be published prior to, and during, construction works. Following completion of the construction works, the UK Hydrographic Office will be notified of the as-built layout of the new	Negligible and not significant	Adverse

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
			slipway and jetty, along with the revised depths as a result of dredging.		
Construction of the new extended slipway and landing jetty could result in localised, temporary exclusion of commercial fishing within the area of construction	Negligible and not significant	Adverse	Consultation with the local fleet, via Orkney Fisheries, will continue as the design develops to ensure fishermen are aware of any works being undertaken and any potential temporary displacement as a result of the works.	Negligible and not significant	Adverse
Operation					
No operational effects anticipated.					
Decommissioning					
No cumulative effects anticipated.					

18.10 References

BEIS (2020a) UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2018. Available from https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2018

BEIS (2020b) Total Final Energy Consumption at Regional and Local Authority Level 2005-2018. Available at: https://www.gov.uk/government/statistics/total-final-energy-consumption-at-regional-and-local-authority-level-2005-to-2018

Dynamic Coast Scotland (2019). Web Map. Available at: *http://www.dynamiccoast.com/webmap.html*

Council Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive, MSFD). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0056

JNCC (2018). UKSeaMap 2018 Version 2. Available at: https://hub.jncc.gov.uk/assets/202874e5-0446-4ba7-8323-24462077561e. Accessed on: 22 April 2021.

Kafas, A., McLay, A., Chimienti, M., Gubbins, M. (2014). ScotMap Inshore Fisheries Mapping in Scotland: Recording Fishermen's use of the Sea. Scottish Marine and Freshwater Science Volume 5 Number 17. Edinburgh: Scottish Government, 32p. DOI: 10.4789/1554-1. Available at https://data.marine.gov.scot/dataset/scotmap-inshore-fisheries-mapping-scotland-recording-fishermen%E2%80%99s-use-sea. Accessed on: 07 May 2021

Marine Scotland (2013). Feature Activity Sensitivity Tool (FeAST). Available at https://www.marine.scotland.gov.uk/FEAST/

Marine Scotland (2018). ScotMap - Inshore Fisheries Mapping Project in Scotland. Available at http://marine.gov.scot/node/13645. Accessed on: 07 May 2021.

Marine Scotland (2020). 2019 Scottish Sea Fisheries Statistics – Fishing Effort and Quantity and Value of Landings by ICES Rectangles. DOI: 10.7489/12338-1. Available at https://data.marine.gov.scot/dataset/2019-scottish-sea-fisheries-statistics-fishing-effort-and-quantity-and-value-landings-ices. Accessed on: 07 May 2021

Marine Scotland (2021). National Marine Plan interactive (NMPi). Available at: https://marinescotland.atkinsgeospatial.com/nmpi//. Accessed on: 22 April 2021.

Marine Traffic (2021). Vessel Database. Available at: https://www.marinetraffic.com/en/data/?asset_type=vessels&columns=flag,shipname,photo,recognized_next_port,reported_eta,reported_destination,current_port,imo,ship_type,show_on_live_map,time_of_latest_position,lat_of_latest_position,lon_of_latest_position,notes. Accessed pm: 22 April 2021.

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

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 (2019c) Development Management Guidance on Energy (Orkney Islands Council. Available from: https://www.orkney.gov.uk/Service-Directory/D/development-management-guidance-energy.htm

Orkney Islands Council (2017)Sustainable Orkney Energy Strategy 2017-2025, Energy of Orkney; Available from: https://www.orkney.gov.uk/Service-Directory/Performance/council-plan.htm

Orkney Islands Council (2019b) Declaration of a Climate Emergency (Orkney Islands Council, 2019b). Available from https://www.orkney.gov.uk/Files/Committees-and-Agendas/Policy-and-Resources/PR2019/PR24-09-2019/I10_Climate_Emergency_Delivery_Plan_Targets.pdf

Ramsay, D.L. and Brampton, A. H. (2000). Coastal Cells in Scotland: Cell 10 – Orkney. Scottish Natural Heritage Research, Survey and Monitoring Report No 151. Available from http://www.dynamiccoast.com/links.html

Renewable UK (2020). *Wind Farm Statistics Explained*. Available at: https://www.renewableuk.com/page/UKWEDExplained

Scottish Government (2008) Climate Change Act 2008 (2050 Target Amendment) Order 2019. Available at: www.legislation.gov.uk

Scottish Government (2019) the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019. Available at www.legislation.gov.uk

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

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 (2008) Calculating carbon savings from wind farms on Scottish peat lands: a new approach (Nayak *et al,* 2008 and 2010 and Smith et al., 2011). Available from https://www.gov.scot/publications/calculating-carbon-savings-wind-farms-scottish-peat-lands-new-approach/pages/13/

Scottish Government (2015). *Scotland's National Marine Plan. A single framework for managing our seas*. Available at https://www.gov.scot/publications/scotlands-national-marine-plan/ Accessed on: 22 April 2020.

Scottish Government (2016). *Pilot Pentland Firth and Orkney Waters Marine Spatial Plan.* Available at: https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/ Accessed on: 22 April 2020.

Tyler-Walters, H., James, B., Carruthers, M. (eds.), Wilding, C., Durkin, O., Lacey, C., Philpott, E., Adams, L., Chaniotis, P.D., Wilkes, P.T.V., Seeley, R., Neilly, M., Dargie, J. & Crawford-Avis, O.T. (2016). Descriptions of Scottish Priority Marine Features (PMFs). Scottish Natural Heritage Commissioned Report No. 406. Available at: https://www.nature.scot/naturescot-commissioned-report-406-descriptions-scottish-priority-marine-features-pmfs. Accessed 23 April 2021.

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

UK Government (2010). Marine Strategy Regulations 2010. Available at: https://www.legislation.gov.uk/uksi/2010/1627/contents

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