

# Quanterness Wind Farm, Orkney Islands

## Scoping Report





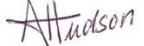


March 2019



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## Quality Management

	Version 1	Version 2	Version 3	Version 4
<b>Date</b>	10 April 2018	26 April 2018	29 March 2019	
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# 1 Introduction

## 1.1 Background and Context

- 1.1.1 The Orkney Islands Council and/or its subsidiary (hereafter referred to as “the Applicant”) intends to apply to Orkney Islands Council (OIC) for consent for the construction and operation of Quanterness Wind Farm (hereafter referred to as the “Proposed Development”), on a site on the Orkney Mainland, Orkney Islands. The site extends to approximately 172 hectares (ha) and is centred on British National Grid (BNG) 341650, 1013600 (refer to Figure 1.1).
- 1.1.2 The Applicant intends to submit an application for the Proposed Development to OIC under The Town and Country Planning Act (Scotland) 1997 as amended by The Planning etc. (Scotland) Act 2006. This application will be supported by an Environmental Impact Assessment (EIA) Report governed by The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. This document forms the Scoping Report presented to OIC in order to request a Scoping Opinion on the EIA of the Proposed Development.
- 1.1.3 The Quanterness site was originally identified as a generation site to provide electricity to a proposed Private Wire Network (PWN) for Kirkwall.
- 1.1.4 The Applicant initiated a process in 2017, seeking to identify potentially suitable sites for wind energy generation within viable distance from Kirkwall. The search began with Council-owned sites but did not identify any which were considered suitable based on an initial review of technical and environmental constraints. A search was undertaken of land within 10 km of Kirkwall and sites were tested against an initial range of technical and environmental parameters. Quanterness was identified as a potentially suitable development site, and further work was undertaken to establish feasibility of development and the potential scale and capacity of potential wind energy generation at the site. Bird surveys were initiated in April 2018, meaning a full year of data will be available from March 2019.
- 1.1.5 Separately, the Council has been reviewing opportunities for renewable energy generation projects which could help to support a needs case being presented to Ofgem, for a new subsea cable linking Orkney to the Scottish mainland. To make the case to Ofgem for the required spending on a new cable, there is a requirement for Scottish Hydro Electric Transmission (SHE-T) to demonstrate that there will be sufficient generation capacity to connect to the new cable, once operational. Ofgem has intimated it’s ‘minded to’ view that generation capacity of 135 MW is required in order to balance the cost of investment with the benefits of renewable energy generation. A final decision by Ofgem on the conditions which must be met to justify a new transmission connection is expected by summer 2019.
- 1.1.6 As the leader of OIC has previously identified, the benefits the investment in a new subsea cable would bring include, *“greater employment opportunities in the county and greener energy supplies for the rest of the UK and greater security of supply for our own electricity needs as a county,”* and, *“building confidence in marine and onshore wind energy projects already based in the county.”*
- 1.1.7 Currently there are no new renewable energy projects consented. Several are either in the planning system or at Scoping stage, but even if those were all consented and progressed, additional capacity would be needed to support the needs case. Therefore, the Council is seeking to identify prospective projects which could realistically be consented and progressed within a short timescale, and which are of sufficient capacity to materially support the needs case. Quanterness, is considered to meet this definition, given the findings of feasibility work undertaken to date, and the availability of a full year of bird survey data.

- 1.1.8 The Proposed Development would consist of up to six wind turbines that would have a maximum blade tip height of 150 m, and a maximum rotor diameter of 136 m. The total capacity for the site would be around 24MW. The turbine co-ordinates are presented in Table 1.1 and the layouts shown in Figure 1.2. The design process of the Proposed Development is in its early stages and only preliminary environmental assessments have been undertaken to date. For this reason, the Applicant cannot be definitive regarding the turbine dimensions and the installed capacity of the Proposed Development. The associated infrastructure will include: site access, access tracks, crane hardstandings, underground cabling, on-site substation and maintenance building, and a temporary construction compound.

**Table 1.1 – Proposed Indicative Turbine Co-ordinates (BNG) – c.24MW Layout**

Turbine	Easting	Northing
1	340530	1013990
2	340951	1013746
3	341395	1013872
4	341949	1013984
5	342473	1013896
6	340670	1013370

## 1.2 Environmental Impact Assessment

- 1.2.1 The Town & Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) require that before consent is granted for certain types of developments, an Environmental Impact Assessment (EIA) is undertaken. The EIA Regulations set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments (Schedule 2 developments) which may require an EIA if they exceed certain thresholds and are likely to give rise to significant environmental effects.
- 1.2.2 The Proposed Development falls within Schedule 2 (a) of the EIA (Scotland) Regulations 2017, as an installation involving 2 or more turbines. The Proposed Development has the potential to have significant environmental effects because of factors such as the characteristics of the Proposed Development, the size and location of the Proposed Development and the nature of the effects as set out in Schedule 3 of the EIA (Scotland) Regulations 2017. Therefore, the Proposed Development qualifies as an “EIA Development” and the Applicant independently proposes that it is subject to an EIA.
- 1.2.3 EIA is an iterative process which identifies the potential environmental effects that in turn inform the eventual design of the proposal. It seeks to avoid, reduce, offset and minimise any adverse environmental effects through mitigation. It takes into account the effects arising during the construction, operation and decommissioning phases. Consultation is an important part of the EIA process and assists in the identification of potential effects and mitigation measures.

## 1.3 The Purpose of the Scoping Report

- 1.3.1 Regulation 17 of the EIA (Scotland) Regulations 2017 provides for potential applicants to ask the planning authority to state in writing the information that ought to be provided within the EIA Report. The ‘Scoping Opinion’ is to be offered following discussion with the consultation bodies.
- 1.3.2 The Applicant recognises the value of the Scoping approach and the purpose of this report is to ensure that relevant issues are identified and to confirm that the assessment process described will meet legislative requirements.

### 1.3.3 This Scoping Report:

- describes the existing site and its context;
- identifies key organisations to be consulted in the EIA process;
- establishes the format of the EIA Report;
- provides baseline information; and
- describes key issues and the proposed assessment methodologies for various technical assessments to be covered in the EIA.

1.3.4 This Scoping Report will be issued to OIC who will consult with other statutory consultees and interested relevant parties. A suggested consultee list is provided in Appendix A.

## 1.4 The EIA Report

1.4.1 The structure of the EIA Report will follow the requirements of EIA (Scotland) Regulations 2017 and other relevant good practice guidance. Essentially, the EIA Report will comprise three main parts:

- a non-technical summary (NTS);
- the main EIA Report text and accompanying figures; and
- the EIA Report technical appendices.

1.4.2 The first part of the main EIA Report text will comprise:

- an introduction;
- a description of the site selection and design iteration process;
- a description of the Proposed Development;
- a description of the site and its context; and
- a summary of relevant planning policy.

1.4.3 The remainder of the EIA Report will present the baseline conditions and potential, residual and cumulative effects on the environmental factors identified in Regulation 4(3) as follows:

- Population and human health – covered by assessment of noise, transport, shadow flicker, aviation, telecommunications, socio-economics, tourism, recreation and visual effects.
- Biodiversity – covered by assessment of ecology and ornithology.
- Land, soil, water, air and climate – covered by assessment of geology, hydrology, hydrogeology and carbon displacement.
- Material assets, cultural heritage and landscape – covered by assessment of cultural heritage and landscape

1.4.4 Finally, a schedule of environmental commitments (mitigation measures) and a set of EIA summary tables will be produced.

## 1.5 Cumulative Effects

1.5.1 The EIA (Scotland) Regulations 2017 state that cumulative effects should be considered as a part of the EIA. Specifically, Schedule 3 Part 1(b) of the EIA Regulations refers to having regard to, “*cumulation with other existing development and/or approved development*”. SNH Guidance on cumulative

assessment (SNH, 2012a) provides the following advice as to which wind farms should be included in cumulative assessment:

- *“existing development, either built or under construction;*
- *approved development, awaiting implementation; and*
- *proposals awaiting determination within the planning process with design information in the public domain. Proposals and design information may be deemed to be in the public domain once an application has been lodged, and the decision-making authority has formally registered the application.”*

1.5.2 It will therefore be important to consider the cumulative effects of the Proposed Development with other developments in the area, including those that are currently operational, consented and in planning. The cumulative assessment will also consider the cumulative effects of different elements of the Proposed Development on environmental media and sensitive receptors, and in particular the cumulative effects of different effects upon individual and groups of receptors.

1.5.3 The methodology to be adopted for assessing the cumulative effects of wind energy developments will be in accordance with the Scottish Natural Heritage (SNH) guidance, ‘Assessing Cumulative Impacts of Onshore Wind Energy Developments’. The scope of the cumulative assessment will be agreed through consultation with OIC and SNH, in particular relating to specific developments in the area which will be included in the assessment.

1.5.4 Figure 1.3 and Table 1.2 show other known operational and proposed medium- to large-scale wind energy developments at the various stages of planning within 35 km of the Proposed Development (from February 2019). It should be noted that this record of wind developments will be updated throughout the EIA process up to the date of submission of the application for consent. We welcome any further information from stakeholders on additional proposed wind farm developments.

**Table 1.2 - Cumulative Wind Energy Developments within a 35 km Radius of the Site**

Name	Status	Distance (km)	Direction
Costa Head	Application	18	N
Burgar Hill	Operational	13	N
Evie Hill	Application	12	N
Hammars Hill	Operational	9	N
Howe Community Wind Turbine	Operational	9	NE
Crowness Buisness Park (Hatston)	Operational	1.3	E
Rennibister	Operational	1.0	W
Rennibister II	Scoping	0.1	W
Upper Stove	Operational	16	ESE
Barns of Ayre	Operational	18	SE
Akla	Approved	8	SW
Work Farm	Approved	5	E
New Holland	Approved	12	SE
Northfield (Burray)	Operational	16	SE
Berriedale	Operational	21	SSE
Hesta Head	Application	25	S
West Hill	Operational	20	SW
Ore Brae Community Turbine	Operational	22	SW



Name	Status	Distance (km)	Direction
Binga Fea Wind Energy Project	Approved	22	SW
Holodyke	Operational	11	NW
Rothiesholm	Operational	21	NE
Ludenhill	Approved	16	NW
Kingarly	Operational	15	N
Sandy Banks	Operational	21	NE
Spurness	Operational	27	NE
Gallowhill	Operational	32	N
Gallowhill	Approved	32	N

## 2 The Proposed Development

### 2.1 Site Description

- 2.1.1 The site lies approximately 3.3 km northwest of Kirkwall on Mainland Orkney within the Orkney Islands.
- 2.1.2 The site comprises pasture farmland, at times used for crops. It is divided into large regular fields, with a network of tracks.
- 2.1.3 The site is generally flat, with Widedford Hill rising steeply to the south of the site area. The site elevation is approximately 20 m above Ordnance Datum (AOD) at the southern edge of the site, falling very gently to approximately 10 m AOD in the central site area, and sea level at the northern site boundary (see Figure 1.2). The site is centred on grid reference (BNG) 341560, 1013640 and occupies an approximate area of 172 hectares.
- 2.1.4 There are no substantial watercourses onsite, although several field drains are marked on 1:10,000 scale Ordnance Survey (OS) mapping and were observed during site reconnaissance. There are several small ponds/lochans in the northwest corner of the site.
- 2.1.5 There are no residential properties within the site boundary. Quanterness farmhouse and cottages are located in close proximity to the site's southern boundary, and there are additional properties at Saverock to the southeast. All properties have been appropriately buffered in terms of proposed turbine siting, to minimise residential amenity impacts.
- 2.1.6 Access to the site would be directly from the A965 on the site's southern boundary, via a new junction designed to meet relevant safety standards.

### 2.2 Infrastructure Description

- 2.2.1 The Proposed Development would consist of the following elements:
- up to 6 wind turbines with a maximum tip height of 150 m;
  - turbine foundations;
  - crane hard-standings;
  - site entrance(s) and access tracks;
  - on-site access tracks between turbines;

- underground cabling between the turbines;
  - on-site substation and maintenance building with welfare facility; and
  - temporary construction compound.
- 2.2.2 It is expected that aggregate for the construction of the development will be imported from a suitable off-site source, therefore no on-site borrow pits are anticipated to be included in the development proposals.
- 2.2.3 The expected operational life of the turbines is 25 years from the date of commissioning. Before the end of this period, a decision would be made as to whether the Proposed Development should be decommissioned and removed, refurbished or re-powered. The assessment reported within the EIA Report will assume that the Proposed Development will be decommissioned.
- 2.2.4 The current layout has up to six turbines with a total capacity of 24MW. Each turbine is anticipated to have a maximum tip height of 150 m with a rotor diameter of up to 136 m.
- 2.2.5 The layout currently presented should be considered indicative at this stage. The parameters of the EIA will be such that an appropriate level of assessment is undertaken for a given hub height and rotor diameter. The turbine locations will evolve in response to the ongoing detailed assessment work, taking consideration of the environmental effects, terrain, current land use, technical and health and safety issues. The parameters of the Proposed Development will be explicitly identified in the EIA Report. The final locations of the turbines will be ‘frozen’ at an appropriate time in order to enable the EIA Report to describe fully the Proposed Development for which planning permission will be sought.

## 3 Planning Policy Context

### 3.1 Introduction

- 3.1.1 A high-level overview of the relevant national and local planning policy context will form the basis against which the EIA will be assessed in the context of The Town and Country Planning Act (Scotland) 1997 as amended by The Planning etc. (Scotland) Act 2006.
- 3.1.2 Appendix B summarises national and local planning policy considerations of relevance to the EIA process. It comprises two parts: Part 1 – National planning policy, with particular reference to National Planning Framework 3 and Scottish Planning Policy; and Part 2 – Local planning policy, with a focus on the Orkney Local Development Plan (Orkney Islands Council, 2017a) and Supplementary Guidance (current and emerging).
- 3.1.3 The Orkney Islands Council Energy Supplementary Guidance (Orkney Islands Council, 2017b), identifies the Proposed Development site as being partly within an area “with potential for wind farm development” where wind energy development is likely to be supported in principle. The eastern part of the site (roughly two-thirds) is identified as an “Area of Significant Protection”. This appears to be due to proximity to the town of Kirkwall, with an approximately 3 km buffer around the edge of the town being evident from the mapping.

### 3.2 Key Issues for the EIA Report

- 3.2.1 The EIA Report will include a comprehensive documentation of the up-to-date planning policy at the time of submission, whilst the application for planning consent will include a Planning Policy Statement which assesses the Proposed Development in the context of relevant policy considerations.

## 4 Noise and Vibration

### 4.1 Introduction

- 4.1.1 This chapter considers the potentially significant effects of noise during the site preparation and construction, operation and decommissioning of the Proposed Development which will require further consideration within the EIA Report.
- 4.1.2 This Scoping chapter sets out the key issues identified and proposes methodology and standards for assessment in the EIA Report.
- 4.1.3 Consultation will be undertaken throughout the Proposed Development's lifecycle with OIC Environmental Health Officer (EHO) to agree both the Noise Sensitive Receptors (NSRs) and the methodology for the noise survey and assessment.

### 4.2 Summary of Baseline Environment

- 4.2.1 The site comprises agricultural farmland with no NSRs within the site boundary. There are a number of NSRs within 2 km of the site boundary, the nearest being properties within the control of the land owner, to the south of the site (Quanterness farmhouse and cottages). The settlement of Kirkwall lies approximately 3.3 km southeast of the site boundary.
- 4.2.2 It is anticipated that typical day and night time ambient noise levels at all the closest identified NSRs will be relatively low, although some noise from the A-road and the sea may be evident.

### 4.3 Key Issues for the EIA Report

- 4.3.1 The following have been identified as key issues to be addressed within the EIA Report and will be agreed through consultation with OIC:
- establish the identity of the closest NSRs for assessment;
  - predict the likely operational noise levels at these locations from the Proposed Development using an appropriate candidate turbine;
  - establish the requirement for baseline noise monitoring to underpin an operational noise assessment compliant with ETSU-R-97 and other recognised guidance;
  - establish acceptable day and night time operational noise limits at the closest identified NSR;
  - predict whether these can be met across all critical wind speeds or if there is a requirement for mitigation;
  - identify cumulative wind energy schemes pertinent to the assessment which may be in planning, consented or operational;
  - establish the cumulative effects of these on the closest identified NSRs in terms of operational noise impacts;
  - predict whether the established acceptable day and night time operational noise limits can be met when considered in the context of relevant cumulative schemes or if there is a requirement for mitigation;
  - predict the potential impacts of construction noise and, if relevant, vibration on the closest identified NSRs and outline mitigation measures where required; and

- state any residual impacts after implementation of recommended mitigation.

## 4.4 Relevant Legislation and Guidance

4.4.1 The following documents will be referenced in the EIA Report chapter:

- The Control of Pollution Act (CoPA) 1974;
- Planning Advice Note (PAN) 1/2011: Planning and Noise;
- The Working Group on Noise from Wind Turbines The Assessment & Rating of Noise from Wind Farms (ETSU-R-97) (1996);
- Institute of Acoustics (IoA) Bulletin Article Volume 34 No. 2, March / April 2009;
- Institute of Acoustics (IoA) (2013) A good practice guide to the application of ETSU-R-97 for wind turbine noise assessment (IoA Good Practice Guide) and associated Supplementary Guidance Notes (SGS); and
- British Standard (BS) 5228 (2009) Part 1: Noise + A1 (2014) Code of practice for noise and vibration control on construction and open sites.

4.4.2 Where OIC has its own noise-related requirements, these will also be taken into account in the EIA Report chapter. We would request that any such requirements should be highlighted in the Scoping response, however based on our experience we understand OIC conforms to guidance provided in ETSU-R-97 and the IoA Good Practice Guide.

## 4.5 Proposed Assessment Methodology

### **Construction**

4.5.1 Construction noise and, where appropriate, vibration impacts will be assessed at the closest identified NSR based on the likely site preparation and construction methodologies and programme. Where appropriate, the assessment of construction noise and vibration will also consider off-site activities such as construction traffic and deliveries, where the necessary information is available.

4.5.2 This assessment will be qualitative in nature unless otherwise required by OIC.

### **Operation**

4.5.3 Consultation will be undertaken with OIC to agree standards and methodology for assessment.

4.5.4 The identity of the closest NSRs will be agreed and any financial involvement established. Any relevant wind energy schemes that should be included in the cumulative assessment, whether in planning, consented or operational, will also be identified and agreed. It is anticipated that this would include the operational Rennibister and Crowness Business Park (Hatston) turbines.

4.5.5 Any requirement for baseline monitoring will be established based on the results of electronic noise modelling, which will be undertaken using suitable software. The electronic noise model will consider both the likely contribution from the Proposed Development as well as the cumulative effects of other relevant schemes.

4.5.6 A candidate turbine will be selected for the Proposed Development, the verified noise emission details of which will be reproduced in the EIA Report chapter (A-weighted and octave band data) for critical wind speeds.

4.5.7 Where the received operational noise level is predicted to exceed 35dB LA90,10min at any of the closest identified NSRs then baseline monitoring will be undertaken, unless existing suitable baseline noise

data can be identified. Appropriate locations and, where relevant, proxies for baseline monitoring will be agreed in advance of the works with the EHO.

- 4.5.8 All baseline noise monitoring will be undertaken in accordance with the IoA Good Practice Guide.
- 4.5.9 Day and night time operational noise limits across the range of critical wind speeds (typically 3 – 12m/s) will be established at the closest identified NSR in accordance with ETSU-R-97 and any specific requirements of OIC.
- 4.5.10 For the purposes of the cumulative assessment (if applicable), the geographical location of each of the wind turbines relative to a given NSR will be considered and acoustic corrections applied as appropriate for prevailing wind directions. This supports the notion that a given NSR is unlikely to be simultaneously downwind of all turbines. Corrections will be derived in accordance with the guidance set out in the IoA Good Practice Guide.
- 4.5.11 Comparison of predicted scheme and cumulative operational noise levels will be undertaken with the established day and night time limits (taking account of financial involvement of any relevant NSRs in the Proposed Development) and where any exceedance at any critical wind speed is noted, mitigation measures will be considered.

### **Sensitivity of Receptors**

- 4.5.12 For the purposes of the assessment, the sensitivity of all domestic NSRs will be considered to be high.

### **Magnitude and Significance of Impact**

- 4.5.13 For the purposes of the assessment of construction noise, works occurring within approximately 100 m of a given NSR will be considered to have the potential to constitute a significant impact. Mitigation measures will be recommended as required.
- 4.5.14 For the purposes of the assessment of operational noise, predicted noise levels within the day and night time limits derived in accordance with ETSU-R-97 will be considered non-significant. As noted above, the derivation of appropriate limits will take into account financial involvement of any NSRs in the Proposed Development, as set out in the ETSU-R-97 guidance.
- 4.5.15 Where predicted levels of operational noise exceed the derived limits at any critical wind speed, then the impact will be considered to be significant and mitigation measures considered as appropriate.

### **Mitigation**

- 4.5.16 It is anticipated that key controls for construction noise such as core hours of works would be exerted through the requirements of the EHO and that such controls would constitute effective mitigation measures.
- 4.5.17 Site-specific mitigation measures will be outlined to reflect the principles of Best Practicable Means, as set out in the Control of Pollution Act (CoPA) 1974. The purpose of these measures will be to reduce construction noise and, where relevant, vibration impacts in so far as is reasonably practicable.
- 4.5.18 Mitigation of operational noise, where required following an iterative design process, may include an alternative selection of turbine, operating certain turbines on low noise modes under certain meteorological conditions, including specific wind speeds and directions or recommendations to move or eliminate turbines from the scheme.

### **Residual Impact**

- 4.5.19 The residual impact after implementation of mitigation will be stated in the chapter.

## 5 Landscape and Visual

### 5.1 Introduction

- 5.1.1 The Landscape and Visual Impact Assessment (LVIA) is intended to establish the potential significant effects on the character and fabric of the landscape, on designated and classified sensitive landscapes, and on the visual amenity of receptors within a Study Area as defined in Section 5.3.2, below. It will also consider potential cumulative effects arising as a result of the introduction of the proposed development when viewed in combination with other wind farm developments in the planning system<sup>1</sup>.
- 5.1.2 The assessment will involve desk study, field work, data processing and analysis as well as interpretation using professional judgment.

### 5.2 Policy and Guidance

- 5.2.1 The baseline appraisal will also consider the planning policy and strategic guidance context for the Proposed Development, including:
- Siting and Designing Wind Farms in the Landscape Version 3a (SNH, 2017);
  - Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2012)
  - Orkney Islands Local Development Plan (Orkney Islands Council, 2017a);
  - Orkney Islands Council Supplementary Guidance: Energy (Orkney Islands Council, 2017b); and
  - Orkney Islands Council Landscape Capacity Study for Windfarms (July 2015).
- 5.2.2 The west area of the development site is located within an “Area with Potential for Wind Farm Development” for wind energy as indicated by the Spatial Strategy Framework. The eastern portion is located within an area identified as requiring “Significant Protection”. This framework is presented in the OIC Energy 2017 Supplementary Guidance.

### 5.3 Baseline

- 5.3.1 The baseline study will identify and analyse the following:
- the physical constituents that contribute to the landscape character of the site and the broader Study Area;
  - landscape designations and classifications within the Study Area that indicate special protection or elevated value;
  - the character and condition of the landscape and seascape environments within the Study Area based on published descriptions and field verification; and
  - the visual context, including key visual elements, view scale, connecting views, focal points and key visual receptors/receptor locations.

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<sup>1</sup> Wind farm developments which are constructed or consented will be considered as part of the baseline.

## Study Area

- 5.3.2 A Study Area equivalent to a 40 km radius of the outer turbines of the Proposed Development is proposed. This is consistent with SNH's 'Visual Representation of Wind Farms' (2017), based on turbines of up to 150 m to maximum blade tip height.
- 5.3.1 Initially, a description of the existing landscape and visual context of the Proposed Development will be prepared to provide a context for the location and design of the Proposed Development, and against which its potential effects will be judged. This will be based on desktop reviews of mapping, aerial photography, baseline database information, and will be verified during field reconnaissance.
- 5.3.2 The Study Area comprises the majority of the Orkney Islands archipelago (see Figure 5.1). The topography of the Orkney Islands is undulating and mainly low-lying, with the exception of some steeply rising sandstone hills on Hoy, Mainland and Rousay and rugged cliffs on some western coasts. The majority of the landform does not rise much above 250 m AOD, with the exception of Hoy where there are a number of higher hills to the north of the island that rise up to 481 m AOD. Small lochs/lochans are a typical feature of the islands. In contrast, watercourses on the islands are limited to small burns which drain the elevated land. The coastlines are mostly formed by cliffs and are indented, with numerous inlets and gullies located along their length. The coastlines are generally more rugged on the western coasts where they meet the Atlantic Ocean. The islands are separated from one another by a number of straits, such as Stronsay Firth, Scapa Flow, Westray Firth and Gairsay Sound.
- 5.3.3 The majority of the Orkney Islands landcover comprises pastoral and arable fields, interspersed with the occasional area of moorland. The exception to this is Hoy and Rousay, where the majority of the landcover comprises moorland. Field boundaries are mainly formed by post and wire fences. The islands are notable for the absence of trees, which is mainly due to the exposed, open nature of the islands.
- 5.3.4 Settlement is relatively dispersed, although occasionally there is a focus around ports where the largest settlements such as Kirkwall and Stromness tend to occur. There is an extensive network of roads present, with a hierarchy of 'A' roads providing access across the Southern Isles and 'B' roads providing access across the Northern Isles, whilst a large number of minor roads connect individual scattered properties. The islands are connected by a network of ferries which operate in the straits between the islands.

## Landscape

- 5.3.5 Landscape receptors comprise elements of the landscape's fabric, and the distinctive landscape character types and seascape units in the Study Area, as well as all designated and classified landscapes<sup>2</sup> which are predicted to be subject to views of the Proposed Development.
- 5.3.6 The Quanterness site lies along a section of coastline to the west of Kirkwall. The site comprises an area of intensively managed pasture land, at times used for crops. It is divided into large regular fields and has a good network of existing tracks. The site is flat with little variation and is backclothed by the steep slopes of Wideford Hill which rises sharply to the south of the site area. The southern extent of the site is bound by the A965.
- 5.3.7 It is a settled landscape, which is already influenced by views of single and groups of turbines. The Kirkwall industrial area (Hatston) lies to the east of the site, at a distance of approximately 1.5km.

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<sup>2</sup> For example, Wild Land Areas

5.3.8 Landscape character types (LCTs) and seascape character types (SCTs) with potential views of the Proposed Development will include character types from the following published character assessments:

- Orkney Landscape Character Assessment (SNH, 1998);
- Orkney Islands Council Landscape Capacity Study for Windfarms (July 2015);
- Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape (SNH 2012); and
- An Assessment of the Sensitivity and Capacity of the Scottish Seascape in Relation to Offshore Windfarms. (SNH Commissioned Report No. 103 2005).

5.3.9 The OIC Landscape Capacity Study for Windfarms (LCSfW) classifies the landscape of the site as the Inclined Coastal Pastures Landscape Character Type (LCT), with small areas of Rolling Hill Fringes LCT in the south (see Figure 5.2). This landscape is of a low level of wildness.

#### **National Landscape Designations**

5.3.10 The Hoy and West Mainland National Scenic Area (NSA) is the only national landscape designation within the Study Area and is located approximately 6.5 km west of the Proposed Development site boundary (see Figure 5.3). The SNH commissioned report on the special qualities of the National Scenic Areas identifies the following special qualities for this NSA:

- *“A palimpsest of geology, topography, archaeology and land use;*
- *An archaeological landscape of World Heritage Status;*
- *The spectacular coastal scenery;*
- *Sandstone and flagstone as an essence of Orkney;*
- *A long-settled and productive land and sea;*
- *The contrast between the fertile farmland and the unimproved moorland;*
- *A landscape of contrasting curves and lines;*
- *Land and water in constantly changing combinations under the open sky;*
- *The high hills of Hoy;*
- *The townscape of Stromness, its setting and its link with the sea; and*
- *The traditional buildings and crofting patterns of Rackwick.”*

5.3.11 The LVIA will investigate the impacts upon the full citation and list of special qualities to determine whether the Proposed Development would alter the integrity of the NSA.

#### **Local Landscape Designations**

5.3.12 There are no local landscape designations identified across the Orkney Islands.

#### **Nationally Important, Landscape Classifications**

##### Wild Land Areas

5.3.13 National Planning Framework 3 (2014) (NPF3) sets out the Scottish Government’s development priorities. NPF3 recognises wild land as a nationally important asset and indicates that Scotland’s wildest landscapes merit strong protection. Scottish Planning Policy (SPP) sets out how this should be



achieved. This includes identifying wild land and how to safeguard it both in development plans and in spatial frameworks for onshore wind farms.

- 5.3.14 Scottish Planning Policy requires that any development proposal on wild land must “*demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation*”.
- 5.3.15 SNH Policy Statement No 02/03 ‘Wildness in Scotland’s Countryside’ recognises the concept of wild land or wildness as land that is sensitive to any form of development and provides psychological benefit to those seeking more challenging forms of outdoor recreation. Within the context of this policy, in 2014, SNH, identified 42 Wild Land Areas (WLAs) considered to represent the most extensive areas of high wildness in Scotland and therefore identified as being of national importance. These WLAs do not constitute designated landscapes but are recognised within Scottish Planning Policy (SPP) as requiring significant protection.
- 5.3.16 The Proposed Development site is located approximately 20km north east of the Hoy WLA, the only WLA situated within the Study Area (see Figure 5.3). Given the Proposed Development’s distance from the WLA, and the limited extent of theoretical visibility within the WLA, a Wild Land Impact Assessment is not considered necessary and is proposed to be **scoped out** of the LVIA.

#### Gardens and Designed Landscapes

- 5.3.17 The Inventory of Gardens and Designed Landscapes (GDL) schedules sites frequently but not exclusively as a setting to historic buildings. There are three GDLs situated within the Study Area, as illustrated in Figure 5.3 and listed below:
- Balfour Castle GDL (GDL ref 00038), approximately 4.5 km northeast of the Proposed Development site boundary;
  - Skail House GDL (GDL ref 00341), approximately 17.5 km northwest of the Proposed Development site boundary; and
  - Melsetter House GDL (GDL ref 00281), approximately 27 km southwest of the Proposed Development site boundary.
- 5.3.18 While the ZTV indicates visibility at all GDLs, at distances of over 15km from the Proposed Development it is considered unlikely that actual views of the Proposed Development would result in significant effects on Skail House or Melsetter House GDLs and therefore it is proposed that these two receptors will be scoped out of the assessment. The LVIA will assess effects on Balfour Castle GDL.

#### **Visual Amenity**

- 5.3.19 Visual receptors will comprise those individuals or groups of people which will experience views of the Proposed Development. The main groups of visual receptors with potential to be affected by the Proposed Development are as follows:
- the community of Kirkwall, and scattered communities found within 10 km of the Proposed Development site where there are potential views of the development;
  - tourists or visitors, including users of outdoor recreational facilities including cycle routes such as National Cycleway Route 1 (NCR1);
  - visitors to locations which have important physical, cultural or historic attributes such as components of the Heart of Neolithic Orkney World Heritage Site on Mainland Orkney;
  - visitors to beauty spots or picnic areas and formal/mapped vantage points;

- walkers / hill walkers, which includes those walking on core paths and unmarked footpaths within 5km of the Proposed Development;
- passengers on the ferries that connect the islands to one another and to mainland Scotland; and
- road users.

5.3.20 It is acknowledged the Proposed Development will be viewed from a number of residential properties within the study area. The LVIA will not include an assessment of effects on private views from individual properties. Assessment will be carried out from the edges of urban areas and from within rural settlements to understand the effect of the overall change in view for residential receptors in respect of ‘community amenity’.

5.3.21 A Residential Visual Amenity Assessment (RVAA) will be included as a separate report to judge the effect of the Proposed Development on living conditions in the context of changes to views and wider aspects of visual amenity from individual dwellings, garden and approaches “in the round”, and conclude whether or not the changes in visual amenity result in “...unacceptable overbearing or oppressive effects on nearby dwellings that would adversely affect the living conditions of occupiers<sup>3</sup>”. There is no published guidance or methodology regarding best practice for assessing of impacts on residential visual amenity of dwellings in the vicinity of developments. Consequently, guidance for this will be sought from previous planning appeals, in particular the decision statements of the North Tawton<sup>4</sup> and Enifer Downs<sup>5</sup> Public Inquiries. The RVAA will consider individual properties within 2km of the Proposed Development, which have theoretical views of the turbines.

5.3.22 Table 5.1, below, outlines the preliminary viewpoint list based on the findings of the preliminary Zone of Theoretical Visibility (ZTV) (see Figure 5.4). The final, more exhaustive, viewpoint list setting out the number and location of representative viewpoints that are to be utilised to verify assessment findings will be agreed with OIC and SNH. The viewpoints comprise locations within settlements, on public footpaths and cycleways, on roads, and at formal vantage points. Each of the identified viewpoints is at a publicly accessible location, and the viewpoints have been selected to represent a range of viewing directions, distances and experiences. This list will be liable to change following design refinements and consequent alterations to the ZTV, and precise locations may be amended based on observations in the field, in order to ensure that viewpoint locations provide visibility of the Proposed Development, representative of the intended receptor. All visualisations forming part of the LVIA will be in accordance with current OIC and SNH guidance. Viewpoints located up to 15 km from the site will be represented with photomontages, although it is proposed that viewpoints from ferries would be represented by a wireline only.

**Table 5.1 - Preliminary Viewpoints**

VP No.	Location	Approximate Co-ordinates		Receptor Type
1	Wideford Hill	341154	1011616	OS Viewpoint, core path and informal recreation hill
2	Kirkwall West	343128	1012841	Nearest settlement edge to Proposed Development
3	A965 to east	336750	1013306	Road receptor facing development, and directly passing
4	Kirkwall Central	345239	1011457	Centre of urban area, residential receptors
5	Kirkwall East	345984	1010258	Core path above wider urban area

<sup>3</sup> Paragraph 215, Appeal decision APP/F2415/A/09/2096369 dated 9 October 2009 for Land to the North East of Swinford.

<sup>4</sup> Paragraph 21, Appeal decision APP/Q/153/A/08/2017162 dated 12 February 2007

<sup>5</sup> Paragraph 66, Appeal decision APP/X22201/A/08/2071880 dated 16 March 2009

VP No.	Location	Approximate Co-ordinates		Receptor Type
6	A966	338185	1018653	A-road receptor providing clear views across Wide Firth to site
7	Gorseness and NCR1	341144	1019460	Scattered settlement and core path with direct view to site area
8	Balfour Castle GDL and ferry terminal	347909	1016350	Garden and Designed Landscape, and Shapinsay ferry terminal
9	Northern Ferry Passage	347376	1021478	Ferry route to the northern Orkney isles

## Cumulative

- 5.3.23 The LVIA baseline appraisal will include any existing wind farms within the Study Area and will also consider any consented (but presently unconstructed) schemes, given that they may be built at any time and must be considered as ‘present’ in the landscape.
- 5.3.24 The cumulative assessment will then take into account any wind farms subject to currently undetermined wind farm applications based on a search area of a 60 km radius of the Proposed Development. Only those developments that will contribute to significant effects upon receptors within the 40 km Study Area will be included in the assessment. The cumulative context will be confirmed with both OIC and SNH approximately two months before the submission of the EIA Report and will form the basis for the cumulative assessment of the Proposed Development, following a review of current cumulative databases held by the consultant, SNH and OIC. An initial table of operational, consented, and proposed wind farms within the study area is presented in Table 1.2 in Section 1.5.

## 5.4 Potential Effects

### Zones of Theoretical Visibility

- 5.4.1 In order to assist in evaluating the potential landscape and visual effects arising from the Proposed Development, blade tip and hub height ZTVs will be generated to identify the potential extent of the Proposed Development’s visibility over the agreed Study Area. It should be noted, however, that these are based on bare ground Digital Terrain Modelling (DTM) and therefore the ZTV represents a worst-case scenario as it does not reflect the screening effect of intervening vegetation or built structures.
- 5.4.2 The ZTVs used in the LVIA will be based on 5m DTM. In order to assist initial consultations, a preliminary ZTV has been produced (Figure 5.1). This ZTV was generated using 50 m DTM and is based on the six turbine layout as given in Table 1.1b. Subsequent ZTVs will reflect the visibility of the optimised scheme and may indicate a reduced viewshed.

### Landscape and Visual

- 5.4.3 The Proposed Development will introduce a number of elements to the landscape which will have an effect on the landscape fabric and character of the application site. These elements include wind turbines, anemometer mast(s), access tracks, borrow pits, a substation and compound and a control room and compound. The scale of these elements also means that they are likely to be visible from a wide area within the surroundings, with consequent potential for effects on the visual amenity and character of the adjoining landscape. The LVIA will therefore address impacts on the Proposed Development area itself and wider Study Area. The LVIA will consider effects on:
- landscape fabric, caused by physical changes to the form of the landscape and/or its landcover/land use elements;

- landscape and seascape character, caused by changes in the pattern of key characteristic elements and perceptual qualities of the landscape, and of landscape designations and classifications; and
  - visual amenity, caused by changes to the composition and quality of views and the visual amenity in general.
- 5.4.4 Based on an initial examination of baseline data, as briefly described above, the key issues for consideration in the LVIA comprise:
- potential effects on the landscape fabric of the site, including permanent loss of moorland and agricultural farmland;
  - the effect of the Proposed Development on the landscape and seascape character of the Study Area;
  - potential effects on Hoy and West Mainland NSA;
  - potential effects on the Balfour Castle GDL; and
  - effects on visual receptors with views of the Proposed Development including the settlement of Kirkwall, users of core paths and NCR1 and of the A-roads that pass throughout the study area.
- 5.4.5 The ZTV indicates that theoretical visibility across the study area would be effectively screened by topography in the west and south of the site, with views contained to site facing slopes of Wideford Hill, Burrien Hill and Mid Tooin. Views are largely contained within Wide Firth and the surrounding landform which faces towards the site. Further afield, in the north, visibility is present but limited to site facing slopes and hilltops at distances of greater than 10km.
- 5.4.6 Due to the low coverage of vegetation across the Orkney Islands, it is unlikely that tree cover will provide much screening, however local undulations in topography not picked up by the digital terrain model may reduce the ZTV coverage, as well as screening afforded by built development. This will be explored as part of the detailed LVIA.

## 5.5 Impact Assessment Methodology

- 5.5.1 The LVIA will be produced to a standard suitable for submission within an EIA Report, in accordance with the EIA (Scotland) Regulations 2017 and the third edition of the Guidelines for Landscape and Visual Impact Assessment (GLVIA) (Landscape Institute and Institute of Environmental Management and Assessment, 2013). In addition to the GLVIA, the assessment will take account of the following:
- Siting and Designing Wind farms in the Landscape Version 3 (Scottish Natural Heritage, 2017a);
  - Visual Representation of Wind Farms – Version 2.2 (Scottish Natural Heritage, 2017b);
  - Advice Note 01/2011: Photography and Photomontage in Landscape and Visual Assessment (the Landscape Institute, 2011);
  - Assessing the Cumulative Impact of Onshore Wind Energy Developments (Scottish Natural Heritage, March 2012);
  - An assessment of the sensitivity and capacity of the Scottish seascape in relation to windfarms (Scottish Natural Heritage, 2005);

- Guidelines on the Environmental Impacts of Wind Farms & Small Scale Hydroelectric Schemes (Scottish Natural Heritage, 2002);
  - Strategic Locational Guidance for Onshore Windfarms in respect of the Natural Heritage, Policy Statement no 02/02 (Scottish Natural Heritage, 2009 as amended); and
  - Orkney Islands Council Energy Supplementary Guidance (Orkney Islands Council, 2017b).
- 5.5.2 The LVIA will consider the landscape, seascape and visual effects on receptors identified in the agreed Study Area during the construction and operational stages of the development. This will include assessment of any planned ancillary elements such as site access, on-site tracks, cabling, and substation.
- 5.5.3 Whilst there is potential for landscape and visual effects during subsequent decommissioning of the Proposed Development, such effects would be similar to those occurring during the construction, would be of relatively short duration, and would be largely reversible. Consequently, it is not proposed to assess decommissioning operations. It is also uncertain how the site will be reinstated at this stage and so any consideration of the effects following the removal of the wind farm would be more appropriately dealt with closer to the end of the life of the Proposed Development.

### **Assessment of Significance of Effects**

- 5.5.4 The level of residual landscape and visual effects is conditioned by a combination of receptor sensitivity (i.e. receptor value and susceptibility) and the magnitude of predicted impacts, which is largely a quantifiable measure of change to baseline elements or conditions.
- 5.5.5 Landscape and visual effects will be assessed as major, moderate, minor, negligible, or none and, dependant on the findings of the assessment, and may include a hybrid of these (i.e. major-moderate). Major and moderate effects are considered to represent significant effects in landscape and visual terms (see Table 5.2 below).

### **Landscape Sensitivity**

- 5.5.6 The sensitivity of landscape receptors to change arising from the type of development proposed is defined as high, medium and low based on professional interpretation, combining judgements of their value attached to the landscape and susceptibility to the type of change or development proposed. Landscape receptors include the different landscape character types or areas which may be affected by the Proposed Development, as well as landscape designations and GDLs within the study area.
- 5.5.7 The value attached to landscape receptors (landscape character) is reflected by landscape designations and the level of importance which they signify. However, landscape designations are not the sole indicator of landscape value. The following factors also are considered to identify valued landscape:
- landscape quality;
  - scenic quality;
  - rarity;
  - representativeness;
  - conservation interest;
  - recreation value;
  - perceptual aspects; and
  - cultural associations.

5.5.8 Susceptibility to change concerns the ability of the landscape receptor to accommodate the Proposed Development without undue consequences for the maintenance of the baseline situation and/or the landscape planning policies and strategies. The susceptibility of landscape character to change is defined as high, medium or low based on an interpretation of a combination of parameters including:

- the scale and pattern of the landscape and its elements/features;
- the simplicity or complexity of the landscape;
- the nature of skylines;
- landscape quality or condition;
- existing land use;
- visual enclosure/openness of views; and
- the scope for mitigation, which would be in character with the existing landscape.

#### **Viewpoint Sensitivity**

5.5.9 The sensitivity of visual receptors is defined as high, medium and low based on professional interpretation, combining judgements of their susceptibility to the type of change or development proposed and the value attached to the particular views. Visual receptors consist of the particular person or group of people likely to be affected at a specific viewpoint, and are assessed in terms of both their susceptibility to change in views and visual amenity and also the value attached to particular views.

5.5.10 The susceptibility of different visual receptors to change in views and visual amenity is mainly a function of:

- the occupation or activity of people experiencing the view at particular locations; and
- the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at that particular location.

5.5.11 In relation to the occupation or activity of people experiencing the view at the viewpoint, visual susceptibility is defined as follows:

- High: Residents of dwellings; users of outdoor recreational facilities including strategic recreational footpaths, cycle routes or rights of way, whose attention is focused on the landscape; visitors to cultural/historic assets, important landscape features with physical, cultural or historic attributes; beauty spots or picnic areas. Travellers on key tourist routes.
- Medium: General road users, commuters and travellers not primarily focused on the landscape.
- Low: People engaged in outdoor sports or recreation (other than appreciation of the landscape), commercial buildings, and other locations where people's attention may be focused on their work or activity, rather than their surroundings.

#### **Magnitude of Change**

5.5.12 The magnitude of change arising from the Proposed Development at any particular viewpoint is described as high, medium, low, barely perceptible or none based on the interpretation of a combination of largely quantifiable parameters, as follows:

- the distance of the receptor from the Proposed Development;
- the extent of existing landscape elements that will be lost or by adding of new ones;

- the proportion of the total extent of the landscape elements that this represents;
- the degree to which aesthetic or perceptual aspects of the landscape would be altered by removal of existing components or with the addition of new elements;
- the context in which the proposed development would be seen (i.e. similar land uses in the vicinity of the development);
- the geographic area over which the loss of landscape elements will be perceived;
- the alteration of the skyline/altering the vertical scale in relation to the existing landscape features;
- the duration of the change; and
- the reversibility of the change.

5.5.13 The criteria utilised in ascribing magnitude of change in respect of visual amenity is as follows:

- the scale of change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed development;
- the degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and textures;
- the nature of the view of the Proposed Development;
- the relative amount of time over which it will be experienced and whether views will be full, partial or glimpsed;
- the angle of view in relation to the main activity of the receptor;
- the distance of the viewpoint from the Proposed Development; and
- the extent of the area over which the changes would be visible.

5.5.14 The varying scales of magnitude of change could be defined as follows:

- **High:** Total loss or considerable alteration to key elements, features or characteristics of the landscape character and/or composition of views. The development is highly prominent or even dominant and could become the defining characteristic of views and landscape character.
- **Medium:** Represents a notable alteration or loss of key elements, features or characteristics of the landscape character and/or composition of views. The development is prominent, but not dominant. In such circumstances the development may become 'a' defining characteristic of the view of landscape, but not 'the' defining characteristic.
- **Low:** Constitutes a partial loss to one or more key characteristics of the landscape or views. Localised effects within an otherwise unaltered landscape or visual context.
- **Negligible:** Represents a barely discernible loss or alteration to one or more key elements, features or characteristics of the baseline conditions. The underlying landscape character or view composition would be essentially unchanged.
- **None:** No aspect of the proposed wind farm would be discernible. The proposed wind farm would result in no appreciable change to the landscape or view.

5.5.15 Cumulative magnitude of change arising from the Proposed Development when considered in conjunction with other similar developments in the vicinity is determined taking account of the above criteria as well as the following:

- the number of existing, consented and proposed wind farms visible;
- the distance to each of the visible developments from the receptor location;
- the direction of each development in relation to the viewpoint;
- the extent of the view occupied by each development;
- the cumulative effect of development upon the fabric or key landscape components; and
- in the case of LCTs, residential areas and transportation/recreational routes: the proportion of the area or route subject to cumulative views.

5.5.16 Cumulative magnitude of impact categories are defined as follows:

- **High:** The proposed development would represent a considerable increase in the influence of energy developments on the character of the landscape and/or the composition of views.
- **Medium:** The proposed development would represent a notable increase in the influence of energy development on the character of the landscape and/or the composition of views. Moderate cumulative change equates to a localised change within an otherwise unaltered context.
- **Low:** The proposed development would represent a minor addition to the influence of energy development on the character of the landscape and/or the composition of views. The change would be discernible, but the original baseline conditions would be largely unaltered.
- **Barely Perceptible:** The proposed development would represent a barely discernible addition to influence of energy development on the character of the landscape and/or the composition of views. The baseline condition of the landscape or view would, for all intents and purposes, be unaffected.
- **None:** No other cumulative development would be apparent.

#### Identification of Significant Effects

5.5.17 The magnitude of change and the sensitivity of the receptor are considered together in order to assess the level of significance. A higher level of significance is generally attributed to changes of a higher magnitude affecting receptors of higher sensitivity. Table 5.2 presents the criteria which will be used to guide the assessment of the levels of significance of impacts and residual effects. They are described as being major, moderate, minor, negligible or none, where major and moderate are considered to be significant.

**Table 5.2 - Levels of Significance of Landscape and Visual Effects**

Significance	Justification
<b>Major Significant</b>	Changes would substantially affect the character or views of the landscape or the defining elements within it. For example, a major effect is likely when a receptor of high sensitivity is affected by a high magnitude of change. An effect of major significance can be positive. Where this is the case, it will be noted in the text.



<b>Significance</b>	<b>Justification</b>
<b>Moderate</b> <i>Significant</i>	Change which affects, to a lesser degree, the character or views of the landscape or the elements within it. For example, a moderate effect is likely when a receptor of medium sensitivity is affected by a medium magnitude of change. An effect of moderate significance can be positive. Where this is the case, it will be noted in the text.
<b>Minor</b> <i>Not significant</i>	Slight change affecting the character or views of the landscape or specific elements within it. For example, a minor effect is likely when a receptor of low sensitivity is affected by a low magnitude of change. An effect of minor significance can be positive. Where this is the case, it will be noted in the text.
<b>Negligible</b> <i>Not significant</i>	An almost imperceptible change affecting the character or views of the landscape or specific elements within it. For example, a negligible effect is likely when a receptor of low sensitivity is affected by a barely perceptible magnitude of change. An effect of negligible significance can be positive. Where this is the case, it will be noted in the text.
<b>None</b> <i>Not significant</i>	No perceptible change, affecting the character or views of the landscape or specific elements within it. This also includes locations where there would be no effects.

5.5.18 The significance criteria in Table 5.2 will be used as a guide only and professional judgement about effects on a particular resource will be made on a case by case basis. There is a gradual transition between levels of significance. If professional judgement considers a landscape to fall across two levels, a balanced significance of effect may be attributed (i.e. moderate-major).

5.5.19 The nature of the effect will be determined as being adverse, neutral or beneficial and the duration of the effects will also be stated, as follows:

- short term - up to 1 year in duration;
- medium term - between 1 and 5 years' duration;
- long term - between 5 and 25 years; and
- permanent.

5.5.20 For the purposes of the LVIA the following definitions will be adopted for 'adverse' and 'beneficial' effects:

Landscape effects:

- Adverse: the Proposed Development will result in the direct loss of physical resources, or will weaken the key characteristics of a landscape or will negatively affect the integrity of (or reason for) a landscape designation; and
- Beneficial: the Proposed Development may replace physical resources through specific mitigation measures or strengthen the landscape characteristics, or improve the quality or condition of the landscape.

Visual effects:

- Adverse: the Proposed Development will result in a loss of visual amenity; and
- Beneficial: visual amenity will be improved by the Proposed Development.

## 6 Ecology and Nature Conservation

### 6.1 Introduction

6.1.1 In the context of the EIA Report, this chapter will assess the potential significant effects associated with ecology and nature conservation during the construction, operation and decommissioning phases of the Proposed Development. The assessment of the ornithological resource will be presented in a separate chapter.

6.1.2 The chapter will present the following:

- A description of international, national and local sites designated for their species and habitats including but not exclusively Special Areas of Conservation (SACs), Special Sites of Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Conservation Sites (LNCSs)
- A description of the existing ecology baseline for the Proposed Development site ('the site') and wider ecological study area up to 250 m from the boundary of the site ('zone of influence') including habitat types and evidence of any protected and priority species (including European Protected Species, and/or Local/ UK Biodiversity Action Plan species).
- An assessment of the potential significant ecological effects of the Proposed Development.
- Proposed mitigation to improve identified potential effects (where appropriate).
- An assessment of the potential residual significant effects following the implementation of mitigation.

6.1.3 This Scoping exercise has been undertaken in accordance with the Guidelines for Baseline Ecological Assessment (Institute of Environmental Assessment, 1995) and the Guidelines for Ecological Impact Assessment in the UK (Chartered Institute of Ecology and Environmental Management (CIEEM), 2016).

### 6.2 Overview of Baseline

6.2.1 The site comprises improved grassland agricultural fields, with the northern site boundary formed by the Wide Firth coastline.

6.2.2 An initial search using publicly available data revealed a number of European and national sites designated for ecological considerations within a 10 km radius from the site. These are detailed in Table 6.1 and can be viewed in Figure 6.1. Where two or more sites comprise a single designation, the nearest site to the Proposed Development has been identified.

**Table 6.1 - Ecological Designations**

Name	Designation	Distance from Proposed Development (km)	Direction from Proposed Development	Reason for Designation
Keelylang Hill and Swartaback Burn	SSSI	1.8	SW	Upland assemblage
West Mainland Moors	SSSI	4.6	WNW	Upland habitat

Name	Designation	Distance from Proposed Development (km)	Direction from Proposed Development	Reason for Designation
Waulkmill	SSSI	6.5	SW	Saltmarsh, maritime cliff, golden-rod case-bearer moth ( <i>Coleophora obscenella</i> )
Orphir and Stenness Hills	SSSI	7.0	SW	Upland assemblage
Lochs of Harray and Stenness	SSSI	9.0	W	Caddisfly ( <i>Ylodes reuteri</i> ), eutrophic loch, freshwater nerite snail ( <i>Theodoxus fluviatilis</i> ), Saline lagoon
Lochs of Stenness	SAC	10	WSW	Marine (including marine mammals)

6.2.3 The coastal edge of the western part of the site is locally designated by OIC as a LNCS, ref. 166, North Mainland Evie/Finstown Coast. This is an extensive linear site, extending along most of the coastal edge of the east Mainland. Special habitats are noted as inter-tidal mudflats, coastal saltmarsh and strandline. Otter is noted as special wildlife found within this LNCS.

## 6.3 Proposed Desk Based Methods

6.3.1 In addition to the statutory and non-statutory consultation process, a desk-based study for the Proposed Development and wider ecological study area will be undertaken to review the local, regional and national planning framework and other sources of information sources/guidance (in line with CIEEM (2006)) including:

- relevant authority and local structure plans;
- UK Biodiversity Action Plan (UK Government, 1992);
- local biodiversity action plans;
- Scottish Planning Policy (Scottish Government, 2014); and
- other relevant nature conservation policies and best practice guidance.

6.3.2 The desk study will additionally seek to identify records of protected or notable species within 2 km of the site from statutory and non-statutory organisations, for example the local biological records centre and other non-statutory groups.

## 6.4 Proposed Survey Methods

### Vegetation

#### Phase 1 Habitat Survey

6.4.1 A Phase 1 Habitat Survey will be undertaken in accordance with JNCC's 'Handbook for Phase 1 Habitat Survey – A Technique for Environmental Audit' (JNCC, 2010) and in line with best practice guidelines (IEEM, 2006). This will establish the ecology baseline of the site and zone of influence and inform the ecological impact assessment. The survey will catalogue habitats and target notes will be taken where applicable and include the abundance of plant species noted using the DAFOR scale. Aerial photographs and OS maps will additionally be consulted where appropriate to identify potential habitats areas of nature conservation importance within the site and zone of influence.

#### **National Vegetation Classification (NVC) Survey**

- 6.4.2 If any localised wetland habitats are identified at the site, then those habitats will be subject to a National Vegetation Classification (NVC) survey, carried out simultaneously with the Phase 1 Habitat Survey. The survey additionally will look to identify Groundwater Dependent Terrestrial Ecosystems (GWDTE).

#### **Protected Species Surveys**

- 6.4.3 Further detailed species specific surveys will be undertaken during the optimal season and in accordance with the following methods.

##### **Otter**

- 6.4.4 All suitable watercourses and water features within the site and 250 m zone of influence (field drains as appropriate, and the coastline along the northern site boundary) will be surveyed on foot by experienced ecologists for signs of otter. Surveys will be conducted from within the channel where possible, along the river bank/coast and on ground within 10 m of watercourses and will focus on identifying the presence of otter signs, which include spraint (droppings) and footprints. Resting sites, for example, holts, couches and hovers, will be identified following 'Ecology of the European Otter: Conserving Natura 2000 Rivers Ecology Series No.10' (Chanin, 2003), in addition to potential signs of otter activity including runs or other well-used access points to watercourses (slides), feeding remains e.g. fish carcasses and sightings, including otter road accident casualties.

##### **Bats**

- 6.4.5 No dedicated bat surveys are proposed, given the nature of the site at an exposed, coastal location with no trees on the site, few trees near the site, and no structures with potential to support bat roosts located within 500 m of any proposed turbines.

##### **Freshwater Fish Surveys**

- 6.4.6 Given the absence of major watercourses on the site, it is considered unlikely that dedicated freshwater fish surveys will be required.

## **6.5 Ecological Impact Assessment**

- 6.5.1 In accordance with the CIEEM (2016) guidance, the Ecology and Nature Conservation chapter for the EIA Report will present a description of the habitats and fauna baseline for the Proposed Development site and wider ecological study area up to 250 m from the boundary of the site (the zone of influence). The findings of the survey work will be analysed and presented (where appropriate) in a technical report providing baseline conditions of the site. Activities during the construction, operational and decommissioning phases and their potential significance on valuable or vulnerable ecological features, such as protected species, will be identified and direct and indirect effects will be described with consideration of the above guidelines and the geographical scale at which they are significant. Potential cumulative ecological effects will also be assessed up to 20 km from the site boundary. The assessment will additionally present mitigation measures, as required, and assess any residual effects.

## **6.6 Mitigation**

- 6.6.1 If it is considered that mitigation is necessary to reduce any adverse ecological effects and/or if there is considered to be potential for incorporating biodiversity enhancement measures into the development, then an integrated mitigation and enhancement package will be proposed. This will address ecological effects and will reflect local objectives in terms of biodiversity and the enhancement of environmental character. During the Proposed Development design and EIA process,

mitigation measures will seek to follow the recognised hierarchy of avoidance, reduction, enhancement, and compensation.

## 6.7 Key Issues for Consideration in the EIA

6.7.1 The key ecology and nature conservation issues to be considered with respect to the Proposed Development are likely to include the following:

- disturbance and direct mortality of fauna during construction, operation and decommissioning;
- behavioural changes of fauna during operation; and
- pollution via road drainage and runoff during all development phases.

6.7.2 Given the absence of important habitats identified at the site (with the possible exception of the coastal fringe where no proposed infrastructure is located), habitat loss is not considered to be a key issue for consideration, however opportunities for habitat enhancement will be explored as appropriate.

# 7 Ornithology

## 7.1 Introduction

7.1.1 The ornithology chapter will assess the potential significant effects on ornithology during the construction, operational and decommissioning phases of the Proposed Development.

7.1.2 The ornithology chapter of the EIA Report will present the following:

- A description of the existing ornithological baseline for the Proposed Development site and wider ecological study area between 500 m and 2 km from the boundary of the site (zone of influence).
- An assessment of the potential significant ornithological impacts of the Proposed Development (including collision risk).
- Proposals for appropriate mitigation to ameliorate identified potential impacts (where appropriate).
- An assessment of the residual potential significant impacts following the implementation of mitigation.

7.1.3 This Scoping exercise has been undertaken in accordance with the 'Guidelines for Baseline Ecological Assessment' (Institute of Environmental Assessment, 1995) and 'Guidelines for Environmental Impact Assessment in the UK' (CIEEM, 2016).

## 7.2 Overview of Baseline

7.2.1 The site lies along a section of coastline to the west of Kirkwall, and comprises an area of intensively managed pasture land, at times used for crops. It is largely flat, with Wideford Hill rising to the south of the site area.

### **Designations and Data Search**

7.2.2 An initial search using publicly available data revealed a number of European and national sites designated for ornithological considerations within 20 km of the site. These are detailed in Table 7.1

and can be viewed in Figure 7.1 (note that SSSIs designated for non-avian interests may be shown on Figure 7.1 as part of the full SSSI dataset however they are not listed in Table 7.1 below). Where two or more sites comprise a single designation, the nearest site to the Proposed Development has been identified.

**Table 7.1 - Ornithological Designations**

Name	Designation	Distance from Proposed Development	Direction from Proposed Development	Reason for Designation
Orkney Mainland Moors	SPA	1.8km	SW	breeding and non-breeding hen harrier ( <i>Circus cyaneus</i> ), breeding red-throated diver ( <i>Gavia stellata</i> ), breeding short-eared owl ( <i>Asio flammeus</i> )
Keelylang Hill and Swartaback Burn	SSSI	1.8km	SW	Breeding hen harrier ( <i>Circus cyaneus</i> ) and breeding bird assemblage
West Mainland Moors	SSSI	4.6km	WNW	Breeding bird assemblage; breeding hen harrier, red throated diver and short-eared owl
Orphir and Stenness Hills	SSSI	7km	SW	Breeding hen harrier ( <i>Circus cyaneus</i> ) and breeding bird assemblage
Lochs of Harray and Stenness	SSSI	9km	W	Non-breeding goldeneye ( <i>Bucephala clangula</i> ), non-breeding pochard ( <i>Aythya ferina</i> ), non-breeding scaup ( <i>Aythya marila</i> ), non-breeding tufted duck ( <i>Aythya fuigula</i> )
Rousay	SPA and SSSI	13.6km	N	SPA Breeding birds: Arctic skua ( <i>Stercorarius parasiticus</i> ), Arctic tern ( <i>Sterna paradisaea</i> ), fulmar ( <i>Fulmarus glacialis</i> ), guillemot ( <i>Uria aalge</i> ), kittiwake ( <i>Rissa tridactyla</i> ), seabird assemblage
Loch of Banks	SSSI	15.4km	NW	Breeding bird assemblage, hen harrier (non-breeding)
Loch of Isbister and the Loons	SSSI	16.9km	NW	Breeding bird assemblage, pintail (breeding)
Hoy	SPA and SSSI	17.3km	SW	SPA Breeding birds: Arctic skua ( <i>Stercorarius parasiticus</i> ), fulmar ( <i>Fulmarus glacialis</i> ), great black-backed gull ( <i>Larus marinus</i> ), guillemot ( <i>Uria aalge</i> ), kittiwake ( <i>Rissa tridactyla</i> ), peregrine ( <i>Falco peregrinus</i> ), puffin ( <i>Fratercula arctica</i> ), red-throated diver ( <i>Gavia stellata</i> ), seabird assemblage.  Additionally designated for SSSI: great skua ( <i>Stercorarius skua</i> ).
Copinsay	SPA and SSSI	17.6km	SE	Breeding birds: fulmar ( <i>Fulmarus glacialis</i> ), great black-backed gull ( <i>Larus marinus</i> ), guillemot ( <i>Uria aalge</i> ), kittiwake ( <i>Rissa tridactyla</i> ), seabird assemblage
North Orkney	Proposed SPA	Adjacent	N	Aggregations of breeding birds (red throated diver) and non-breeding birds (eider, great northern diver, long-tailed duck, red-breasted merganser, shag, slavianian grebe, velvet scoter)

Name	Designation	Distance from Proposed Development	Direction from Proposed Development	Reason for Designation
Scapa Flow	Proposed SPA	5km	SE	Similar aggregations of breeding and non-breeding birds to the North Orkney proposed SPA
Pentland Firth	Proposed SPA	17.3	S	Breeding birds: Arctic skua ( <i>Stercorarius parasiticus</i> ), Arctic tern ( <i>Sterna paradisaea</i> ), guillemot ( <i>Uria aalge</i> ), seabird assemblage

## 7.3 Proposed Desk Study Methods

- 7.3.1 In addition to a statutory and non-statutory consultation process, a desk-based study for the Proposed Development and wider ecological study area will be undertaken to review the local, regional and national planning framework and other sources of information sources/guidance (in line with CIEEM (2016)), as outlined in the Ecology and Nature Conservation section.
- 7.3.2 The desk study will additionally seek to identify records of protected or notable bird species within 2 km of the site (10 km for European protected species) from statutory and non-statutory organisations, for example, local bird groups and other non-statutory groups, including the local raptor study group.
- 7.3.3 In addition, data collected at the site during previous ornithological surveys in 2006/2007 and 2012/2013 will also be provide additional data to inform the EIA.

## 7.4 Proposed Surveys

- 7.4.1 Consultation will be undertaken with OIC and SNH to determine the exact survey requirements and methodology.
- 7.4.2 At this time, it is proposed that the following surveys will be undertaken:
- (1) One full year of vantage point (VP) surveys from one VP; a proposed VP is located on the north face of Wideford Hill approximately 500m south of the site boundary, however confirmation will be subject to ground-truthing to confirm it provides adequate coverage of the site. A minimum of 72 hours of VP survey effort will be undertaken from the confirmed VP location (36 hours during the breeding season and 36 hours during the non-breeding season). Target species for the vantage point surveys are proposed to be, as a minimum: hen harrier, short-eared owl and other raptors as appropriate, and red throated diver. Vantage point surveys should cover the whole breeding season between mid-April and August, appropriately stratified to cover dawn, day and dusk in accordance with the SNH bird survey methods guidance. They should be carried out in a wind of Beaufort force 4 or less where feasible, and in dry weather.
  - (2) A breeding bird walkover (consisting of four site visits during the breeding months), following adapted Brown & Shepherd method and with a survey study area extending 500m beyond the outermost turbine locations.
  - (3) A walkover breeding raptor/scarce breeding bird survey following survey techniques described in Hardey et al., 2009, consisting of four survey visits during the breeding months. The survey study area will extend 2km beyond the outermost turbine locations.

- (4) A winter high tide roost survey following the guidelines outlined in Gilbert *et al.*, 1998, consisting of three survey visits between October and March. The survey study area will extend 500m beyond the outermost turbine locations.

7.4.3 Although SNH guidance recommending a survey period covering a minimum of two years is noted, the study area has been subject to previous survey work and analysis. The SNH guidance refers to the possible suitability of using “other adequate site-specific information collected for other purposes”, and relevant data may be identified which will aid in the assessment of potential impacts from the Proposed Development. The requirement for extending the proposed one-year survey period has been discussed with SNH and OIC based on initial survey findings, and the availability and relevance of previously gathered survey data. SNH has provided a view (27 February 2019, email correspondence) that there would be little added value in undertaking another year of bird surveys at this site.

#### **Survey Summary April 2018 – January 2019**

7.4.4 Ornithology surveys were undertaken at the Proposed Development, commencing in April 2018, with a full year of survey work due to conclude in March 2019. The following is a brief summary of the finding to date:

- The Proposed Development is infrequently used by Schedule 1 raptors and owls, with records of hen harrier and short-eared owl being recorded in the south-west fringes of the Proposed Development. The Proposed Development comprises open grassland fields used for grazing and does not provide suitable habitat for breeding or foraging for these species, which prefer moorland and long grassland.
- The Proposed Development and surrounding area is utilised as a breeding location by a number of wading species, most notably oystercatcher, curlew, lapwing, redshank and ringed plover. The Proposed Development is used infrequently by large groups of wading birds as a winter roosting site, with large numbers of golden plover, curlew, redshank and lapwing all recorded.
- The Proposed Development and airspace over the Proposed Development are used by greylag geese in particular during the winter months. The Proposed Development and pools within the Proposed Development are used by a number of duck species during the winter months.

## **7.5 Ornithological Impact Assessment**

7.5.1 In accordance with the CIEEM 2016 guidance, the Ornithology chapter for the EIA Report will present a description of the ornithological baseline for the Proposed Development site and wider ecological study area up to 2 km from the boundary of the site (the zone of influence). The findings of the survey work will be analysed and presented (where appropriate) in a technical report providing baseline conditions of the site. Activities during the construction, operation and decommissioning phases and their potential significance on valuable or vulnerable ornithological features, such as protected raptor species or breeding divers, will be identified and direct and indirect effects, including collision risk, will be described taking account of the above guidelines and the geographical scale at which they are significant. Potential cumulative ornithological effects will also be agreed through consultation for an area up to 20 km from the site boundary and/or Natural Heritage Zone (where applicable). The assessment will additionally present mitigation measures, as required, and assess any residual effects.

## **7.6 Mitigation**

7.6.1 If it is considered that mitigation is necessary to reduce any adverse environmental effects on bird populations, mitigation will be proposed in the ornithological chapter to reduce the significance of these effects to an acceptable level. During the Proposed Development design process mitigation



measures will seek to follow the recognised hierarchy of avoidance, reduction, enhancement, and compensation.

## 7.7 Collision Risk Modelling

7.7.1 The following steps are proposed to inform the assessment of collision risk that will be undertaken in accordance with SNH's 'Collision Risk Model' (SNH, 2000):

- Review all digitised flight lines and recorded characteristics for target species (species, number of birds, start time of flight, height at 15 second intervals etc.), from the survey work.
- Define a turbine envelope and identify all flights which are at any point within the dimensions of the rotor height and which intersect the boundary of the turbine envelope.
- Calculate the number of transits through the turbine envelope per unit of observation time and extrapolate to determine total predicted transits over the period of interest at risk height.
- Run the collision model with relevant turbine and ornithological parameters, taking as input the total transits calculated previously.

## 7.8 Key Issues for Consideration in the EIA

7.8.1 The key ornithology issues to be considered for the Proposed Development will include the following:

- Potential for Schedule 1 or other notable raptors, and divers, to be displaced by the Proposed Development or suffer direct mortality through collision with turbines.
- Potential for breeding birds (including waders) within or adjacent to the site to be disturbed and/or displaced as a result of the Proposed Development (individuals may also collide with the turbines).

# 8 Archaeology and Cultural Heritage

## 8.1 Introduction

8.1.1 The archaeology and cultural heritage assessment will consider the potential both for direct effects of the development on archaeology and heritage assets within the Proposed Development site and for effects upon the settings of key heritage assets within the wider landscape. The assessment will also identify measures that should be taken to mitigate any predicted significant adverse effects.

8.1.2 Cultural heritage assets relevant in the context of the Proposed Development include:

- World Heritage Site;
- Scheduled Monuments and other archaeological features;
- Listed Buildings and other buildings of historic or architectural importance;
- Conservation Areas; and
- Gardens and Designed Landscapes.

## 8.2 Key Planning Policy and Guidance

8.2.1 The following legislation and policy concerning the protection and conservation of cultural heritage assets will be considered:

- Ancient Monuments and Archaeological Areas Act 1979;
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
- Town and Country Planning (General Development Procedure) (Scotland) Order 1992;
- The National Planning Framework for Scotland (NPF3) (Scottish Government, 2014a);
- Scottish Planning Policy (SPP) (Scottish Government, 2014b);
- Historic Environment Scotland Act 2014 (Scottish Government, 2014c);
- Historic Environment Scotland Policy (Historic Environment Scotland, 2016);
- Our Place in Time. The Historic Environment Strategy for Scotland (Scottish Government, 2014d);
- Planning Advice Note 2/2011 (PAN 2) (Scottish Government, 2011);
- Orkney Islands Council Local Development Plan (OIC, 2017a);
- Orkney Islands Council Energy Supplementary Guidance (2017b);
- Heart of Neolithic Orkney World Heritage Site Supplementary Planning Guidance (Planning Policy Advice) (OIC, 2010); and
- Listed Buildings and the Orkney Local List (2011).

8.2.2 The collation of baseline information will be conducted in accordance with the Institute for Archaeologists' 'Code of Conduct' (IfA 2014) and 'Standard and Guidance for Historic Environment Desk-Based Assessment' (IfA 2012).

## 8.3 Baseline Conditions and Key Issues

### **Proposed Development Site**

8.3.1 There are no Scheduled Monuments within the Proposed Development site boundary.

8.3.2 There are no Listed Buildings within the Proposed Development site or within a 2 km buffer.

### **On-Site Assets**

8.3.3 No archaeological assets with statutory designations have been identified within the site boundary.

8.3.4 Two undesignated assets have been identified within the site boundary, from the online Canmore database:

- A pre-historic funerary site, with a house of unassigned period at the same location, are identified towards the eastern site boundary, approximately 110m from the nearest currently proposed turbine location.
- A settlement of unassigned period (Crossiecrown) is identified by a point on the Canmore mapping system, just to the southwest of the above features and approximately 300m from the nearest currently proposed turbine location. However, Canmore also shows a larger square area associated with the Crossiecrown settlement, approximately 400m x 400m in the eastern part of the Proposed Development site. The northwest extent of this square is very close to the proposed T4 location described in Table 1.1.

## External Receptors

- 8.3.5 Within the wider 10 km study area there are a total of 66 Scheduled Monuments, the nearest being:
- Quanterness chambered cairn and prehistoric house, approximately 320 m south of the site boundary, located within a copse of small trees in the grounds of the Quanterness farm house;
  - A chambered cairn at Wideford Hill 685 m south-southwest of the site;
  - A souterrain at Rennibister, 1 km southwest of the site;
  - St Mary's Chapel at Damsay, 1.5 km west-northwest of the site;
  - Ingashowe broch, 1.7 km southwest of the site; and
  - Burness broch and chapel just over 2 km northwest of the site.
- 8.3.6 There are additionally numerous SMs within Kirkwall between 2.7 km and 4 km southeast of the site. Cuween Cairn SM is over 4 km west of the site however is located in an elevated position some 60 m above the Proposed Development site.
- 8.3.7 There are five A Listed Buildings, 177 B Listed Buildings and 121 C Listed Buildings within the 10 km study area, the majority of which are situated within Kirkwall. The nearest Listed Buildings are 2.4 km northwest (B listed Burness House), 2.7 km southeast (a cluster of B listed buildings at Ayre Road) and 2.4 km southwest (B listed Old Manse of Firth). The nearest A listed buildings are Tankerness House and St Magnus Cathedral and War Memorial, approximately 3.5 km southeast of the site boundary.
- 8.3.8 Analysis of the preliminary Zone of Theoretical Visibility Model (ZTV) indicates that topography to the west and south of the site would provide screening such that views would be largely contained within Wide Firth and the surrounding landform which faces towards the site. Further afield, in the north, visibility is present but limited to site facing slopes and hilltops at distances of greater than 10km.
- 8.3.9 The nearest Listed Buildings to the site, to the northwest and southwest, are predicted to have visibility of the Proposed Development. Those at Ayre Road may not have visibility based on the preliminary ZTV. The Listed Buildings at the western edge of Kirkwall are predicted to have visibility of the Proposed Development; those within the centre and eastern parts of Kirkwall are also shown to have theoretical visibility, however in reality they are likely to have visibility screened by built form.
- 8.3.10 The nearest Scheduled Monuments to the site, as noted above, are predicted to have clear visibility of the Proposed Development. There are numerous additional SMs within 10 km of the site boundary, as shown on Figure 8.1, some of which will have visibility of the development.
- 8.3.11 The Proposed Development lies at the edge of The Heart of Neolithic Orkney (HONO) World Heritage Site "Sensitive Area". The HONO was inscribed by UNESCO in 1999 for the, "outstanding testimony the monuments bear to the cultural achievements of the Neolithic peoples of northern Europe". There are a number of individual monuments, including the Skara Brae settlement, the Maeshowe chambered tomb, the Stones of Stenness circle and henge, and the Ring of Brogdar. The World Heritage Site is identified over three distinct areas, the first being the sites themselves, around which a core 'site boundary' is identified. This core area is further protected by a second area classed as a 'buffer zone'. The site boundary and buffer zone are then further protected by a much greater 'sensitive area'. It is just outside the edge of the outer perimeter of the sensitive area where the Proposed Development lies (refer to Figure 8.1).
- 8.3.12 The monuments within the HONO World Heritage Site are all at least 8 km from the Proposed Development site and none are predicted to have any visibility of the Proposed Development.

- 8.3.13 No Conservation Areas lie within the Proposed Development. The nearest Conservation Area lies within Kirkwall over 3.3 km southeast. The OIC Conservation Area Appraisal for Kirkwall indicates that the key characteristics relate mainly to built form, historic buildings and architecture. Threats are noted as including traffic management and unsympathetic alteration of historic buildings. It is considered unlikely that the Proposed Development would have any significant effect on the character of the Conservation Area.
- 8.3.14 No Gardens and Designed Landscapes lie within the Proposed Development. The nearest Garden and Designed Landscape lies 4.5 km northeast (Balfour Castle), from where there would be clear visibility of the Proposed Development across Wide Firth.

### **Key Issues**

- 8.3.15 The potential effect of the Proposed Development on the settings of the nearby Scheduled Monuments will be carefully reviewed and considered. This will include consideration of the inter-relationship between the various SMs, where they relate to one another.
- 8.3.16 Appropriate visualisations will be provided to help inform assessment of the potential effects upon the setting of these and other heritage assets, in consultation with Historic Environment Scotland and OIC.
- 8.3.17 The important link between cultural heritage and tourism/recreation within Orkney, and the importance of archaeological sites to the islands' tourism industry, will require careful consideration and assessment.

### **Consultation**

- 8.3.18 Historic Environment Scotland and OIC will be consulted to agree the approach to assessment, to obtain professional opinion on the likely effects of the Proposed Development upon cultural heritage assets, and to discuss approaches to mitigation.

## **8.4 Impact Assessment Methodology**

- 8.4.1 The effects of the Proposed Development on cultural heritage assets will be assessed on the basis of their type (direct physical effects, effects on setting, cumulative effects), nature (beneficial, neutral or adverse), and longevity (reversible, short-term or long-term; irreversible, permanent). The assessment will take into account the sensitivity of the receptor and the magnitude of impact. The assessment of sensitivity of cultural heritage assets reflects the relative weight which statute and policy attach to them, principally as published in Scottish Planning Policy (SPP) and Scottish Historic Environment Policy.
- 8.4.2 As noted above, the assessment of effects on cultural heritage assets will be closely linked with the assessment of socio-economic, tourism and recreation effects, recognising that archaeology and cultural heritage are critically important to tourism and recreation in Orkney.

### **Direct Effects**

- 8.4.3 Construction of the Proposed Development has the potential to disturb, damage or destroy features or buried remains of cultural heritage interest. Other construction activities, such as vehicle movements, soil and overburden storage and landscaping also have the potential to cause direct permanent and irreversible effects on the cultural heritage.

### **Desk-based Assessment**

8.4.4 A desk-based assessment will be conducted across the entirety of the site, to identify all known cultural heritage assets, designated or otherwise, and to inform an assessment of the archaeological potential of the site. Sources to be consulted for the collation of data will include:

- The OIC Historic Environment Record (to supplement the search already undertaken of the Canmore database);
- The National Record of the Historic Environment;
- OS maps (principally 1<sup>st</sup> and 2<sup>nd</sup> Edition), and other published historic maps held in the Map Library of the National Library of Scotland;
- Unpublished historic maps held in the National Archives of Scotland;
- Vertical and oblique aerial photographs held by National Record of the Historic Environment;
- Published bibliographic sources, including historical descriptions of the area (Statistical Accounts, Parish Records);
- The Scottish Palaeoecological Database (Coles et al., 1998); and
- The Historic Land-use Assessment Data (HLAMap) for Scotland.

### **Field Survey**

8.4.5 The results of the desk-based assessment will be reviewed to determine the requirement for field survey work, in consultation with OIC and the County Archaeologist.

8.4.6 Intrusive field evaluation is not anticipated to be undertaken as part of the baseline survey, however this will be discussed and agreed with OIC and HES based on findings of the desk study work and site walkover(s).

### **Indirect Effects (Effects on Setting)**

8.4.7 The Proposed Development has the potential to affect the setting of cultural heritage assets within the wider landscape.

### **Desk-based Assessment**

8.4.8 Details will be obtained for cultural heritage assets with statutory and non-statutory designations within 10 km of the Proposed Development.

8.4.9 A ZTV map generated for the site will be used to identify those cultural heritage assets within 10 km of the Proposed Development (and any particularly significant assets outwith 10 km), from which there is theoretical visibility of one or more development component.

8.4.10 The assessment of potential effects on setting will consider: the characteristics of the setting of the asset; the sensitivity of that setting; how the presence of the Proposed Development would affect that setting; and the significance of the effect on the cultural heritage asset's setting.

### **Site Visits**

8.4.11 Heritage assets identified by the desk-based assessment and/or consultation as potentially being subject to significant adverse impacts on their settings will be visited to establish their current baseline setting and their sensitivity to such impacts from the Proposed Development. Where relevant the assessment of effects will include provision of visualisations (photomontages or wireframes).

## **Cumulative Effects**

- 8.4.12 Cumulative effects on cultural heritage assets will be assessed, taking into consideration the impacts of the Proposed Development on the settings of assets with statutory and non-statutory designations within 10 km of the Proposed Development, in addition to the likely impacts of other operational, consented and proposed wind farm developments (at the application stage). The assessment will take into account the relative scales (i.e. size and number of turbines) of the other developments, their distances from the affected assets and the potential degree of visibility to the various developments.

### **Mitigation**

- 8.4.13 Mitigation measures designed to prevent, reduce or offset significant adverse effects will be taken into account. Residual effects will be assessed, taking into consideration the likely effectiveness of the mitigation proposed.

# 9 Hydrology, Hydrogeology and Geology

## 9.1 Introduction

- 9.1.1 This section considers the potential for significant effects on surface water, groundwater, the potential risk of flooding, and the drainage requirements which may result from the Proposed Development. This section also considers the potential effects associated with the ground conditions, including any contamination associated with historic land uses, geological resources, and the ground stability of the site and the surrounding area.

## 9.2 Baseline

### **Hydrology**

#### **Site Description**

- 9.2.1 The site comprises agricultural fields, with the shoreline of Wide Firth forming the northern site boundary. There are no substantial watercourses within the site boundary.

#### **Drainage Catchments**

- 9.2.2 The entire site area is within the Orkney Coastal catchment area. The site is drained by several small drainage ditches which drain into the sea on the northern site boundary.

#### **Groundwater**

- 9.2.3 Groundwater beneath the site is situated within the Orkney groundwater body and is classified by SEPA (2008) as having an overall status of Good.

#### **Flooding**

- 9.2.4 SEPA flood risk mapping shows some highly localised areas of the site being at risk from surface water flooding. Mainly these are very small areas, however a slightly larger area is located at the north end of the access track leading into the eastern part of the site. No part of the site, except the coastal fringe along the northern site boundary, is shown to be at risk of flooding from rivers or the sea (SEPA, 2012a).

#### **Private Water Supply**

- 9.2.5 OS 1:10,000 scale mapping shows no Private Water Supply (PWS) within the Proposed Development site boundary, for example marked springs. Consultation will be undertaken with OIC to confirm this.

## Geology

### Designated Sites

- 9.2.6 There are no SSSIs designated for geological interests, nor Geological Conservation Review (GCR) sites within the site boundary or in the close vicinity.

### Superficial Geology

- 9.2.7 British Geological Survey (BGS) mapping shows that the Proposed Development site is largely underlain by till (diamicton – typically sandy clay with variable amounts of gravel, cobbles and boulders). The northeast corner of the site is shown to have little or no superficial geology overlying bedrock. The coastal fringe in the west of the site is underlain by marine beach deposits (sand, gravel and boulders) (refer to Figure 9.1).

### Solid Geology

- 9.2.8 British Geological Survey (BGS) mapping indicates the bedrock underlying the site and surrounding area comprises the Upper Stromness Flagstone Formation, formed of siltstone, mudstone and sandstone.

### Peat

- 9.2.9 No peat is recorded on BGS mapping within the site boundary, and no evidence of peat was observed during site reconnaissance. Peat is shown on BGS mapping to be present on the slopes of Wideford Hill to the south of the site.

## 9.3 Methodology and Guidance

### Desk-Based Assessment

- 9.3.1 A desk-based assessment will be carried out in order to establish the catchment characteristics and baseline geological and hydrogeological conditions beneath the site.
- 9.3.2 The desk-based review of baseline information will comprise:
- The determination of site geology and hydrogeology from maps published by the BGS, and any site investigation reports that may be available (although considered unlikely).
  - A review of existing sources of data relating to the water regime, including SEPA water quality and flood risk data, Institute of Hydrology hydrometric statistics, discharge consents, abstraction licenses and identification of other water users.
  - A review of risk to potential PWSs, including consultation with OIC.
  - Consideration of the findings of site investigative reports (where available), historical site uses, industrial land use and permits, areas of determined or potential Contaminated Land, soil type and permeability, and contamination status of the site and surrounding area, in order to determine the existing groundwater quality and regime.
  - A review of the Proposed Development proposals and reports from other technical studies being undertaken for the planning application, including ecology surveys, drainage strategy and flood risk assessment.
- 9.3.3 Consultation will be carried out with key organisations including SNH, SEPA and OIC.

### **Site-Based Assessment**

- 9.3.4 A visual survey of watercourses and water bodies will also be undertaken to record key features and characteristics, including, if applicable, potential locations where watercourses (field drains) will require to be crossed by construction traffic.

### **Assessment of Effects**

- 9.3.5 Following the assessment of effects, required mitigation measures will be identified and any subsequent residual effects will be assessed. Specific reference will be made to the SEPA Guidance Note 4 'Planning guidance on wind farm developments' (LUPS-GU4) (2012b) and SEPA 'Guidelines for Water Pollution Prevention from Civil Engineering Contracts' and 'Special Requirements' (2006).

## **9.4 Key Issues for Consideration in the EIA**

### **Surface Water**

- 9.4.1 Management of surface water runoff will need to be considered to ensure that discharge rates to the natural surface water network are regulated to a level appropriate to the receiving system.
- 9.4.2 The quality of any discharge will need to be given consideration to ensure that the receiving water network is not adversely affected by runoff from the site.
- 9.4.3 The assessment will consider the risk of pollution of watercourses during the construction phase.

### **Groundwater**

- 9.4.4 The entire area of groundwater encompassed by the site boundary is classified as a Drinking Water Protected Area. Effects to this will be assessed and appropriate mitigation designed if required.

### **Water Resources**

- 9.4.5 New drainage systems will be designed, as required, to ensure that any discharges are appropriately treated prior to outflow into surface waters.

### **Geology**

- 9.4.6 The site is understood to be underlain by mainly till, which is not considered to be a high sensitivity receptor.

## **10 Aviation and Radar**

### **10.1 Introduction**

- 10.1.1 This section considers potential issues associated with aviation and radar as a result of the Proposed Development during the construction, operation and decommissioning phases.

### **10.2 Baseline**

- 10.2.1 The nearest civil airport is at Kirkwall, approximately 8 km southeast of the Proposed Development site. It is possible that Proposed Development may impact upon obstacle clearance requirements. A preliminary consultation response from Highlands and Islands Airports Authority (HIAL) identified potential concerns with the development, while noting that development on lower ground could potentially be acceptable. Further work is therefore required to establish the risks and identify whether a development of the proposed scale can be workable and/or whether specific mitigation measures are required and can be employed.



10.2.2 The Proposed Development site lies within a low priority, military low flying area.

### **Aviation Screening Assessment**

10.2.3 An initial aviation screening assessment was undertaken in 2018 based on the previous proposed layout, which inferred a maximum tip height of 120m and rotor diameter of up to 90 m. The assessment concluded a low overall risk level.

10.2.4 Based on the highest point of elevation of the assessed layout, it was concluded that the Proposed Development would not be the most significant obstacle in the area, due to the lit comms mast at the peak of Wideford Hill with a total elevation of 259 m. Despite of this, HIAL may request aviation lighting due to the site lying on the approach to Kirkwall Airport runway 14/32.

10.2.5 The Proposed Development is within 1.5 km of Wideford Hill AGA (Air Ground Air) station. However, based on the previous layout and turbine dimensions, no interference is expected due to turbine elevation falling below the safeguarding surfaces. The new layout and turbine tip height is unlikely to cause interference as the tip height will still not exceed the 246 m safeguarding at the range of the turbines.

10.2.6 The assessment showed that the turbines infringe the safeguarding area for the VOR (very high frequency Omni-directional radio range). A detailed impact assessment will be carried out in order to determine the effects of the Proposed Development on the VOR.

10.2.7 The assessed site is not visible to any significant radar.

## **10.3 Methodology and Guidance**

10.3.1 The findings of the aviation screening assessment will feed into the iterative design process, and where possible and appropriate, measures will be identified to mitigate against potentially unacceptable impacts.

10.3.2 Further consultations will be undertaken with Ministry of Defence and HIAL to determine whether these bodies would object to a wind farm development at the site, and, if required, identify any required mitigation for effects on aviation and radar infrastructure.

10.3.3 OIC's Marine Services will also be consulted with respect to any marine/shipping radar installations and the potential for the Proposed Development to create conflicts with any such installations (noting that no response has been received to preliminary consultations in this regard).

## **10.4 Key Issues for Consideration in the EIA**

10.4.1 The EIA will take into consideration any construction or operational effects on radar systems or airspace associated with Kirkwall Airport or other aviation or shipping infrastructure.

# **11 Telecommunications**

## **1.1 Introduction**

11.1.1 This section considers potential issues associated with telecommunication and television reception as a result of the Proposed Development during the construction, operation and decommissioning phases.

## 11.2 Methodology

### Telecommunication

- 11.2.1 Consultation has been undertaken with a number of stakeholders which are identified in Table 11.1, where potential infrastructure impacts are given.

**Table 11.1 - Stakeholder Consultation**

Consultee	Response
Cloudnet	Links identified in the study area. Cloudnet has not confirmed whether or not any conflicts would be expected to arise following several consultations.
Boston Networks	Links identified in the study area, however no objection to the Proposed Development.
Arqiva	Links identified in the study area, however no objection to the Proposed Development.
BT	Links identified in the study area, however no objection to the Proposed Development.
OIC	Links identified in the study area, considered unlikely to result in any conflicts.
MBN/Everything Everywhere	Links identified in the study area, however no objection to the Proposed Development.
Vodafone	Links identified in the study area, however no objection to the Proposed Development.
Airwave Solutions Ltd	Links identified in the study area. Further analysis undertaken via a study to be commissioned by Airwave Solutions Ltd's consultants. Report confirmed no conflicts.
Joint Radio Company (JRC)	Links identified in the study area, with potential for conflicts associated with all turbine locations. Further detailed analysis by JRC will be required to confirm whether conflicts would indeed result from the development, and what mitigation measures may be available.
Atkins	No objection.

- 11.2.2 The Applicant will continue to consult with these operators throughout the design process to avoid and minimise/mitigate against impacts of the Proposed Development on the links.

### Television Reception

- 11.2.3 The closest television transmitter is the Keelylang Hill transmitter. This transmitter has switched to digital transmission only. Currently there is no widely accepted method of determining the potential effects of wind turbines on digital television reception, however digital television signals are better at coping with signal reflections, and do not suffer from ghosting that may occur with analogue signals.
- 11.2.4 To date, there are very few known cases of wind turbine interference with digital television reception post-digital switchover. Given the strength of the digital signal in the area, and the inherently resilient nature of digital television reception at the location of the Proposed Development, there is considered to be a low risk of any interference from a wind energy development at this location on domestic television reception.
- 11.2.5 Due to the low risk of interference with television reception, the requirement to address any reception issues once the Proposed Development were operational, could be conditioned in planning consent. It is not proposed to carry out a detailed assessment of potential effects on television reception and therefore will be scoped out of further assessment.

## 11.3 Key Issues for Consideration in the EIA Report

11.3.1 Impacts on telecommunications links will be considered throughout the design process and the Applicant will continue to consult with the operators. The outcome of this consultation and an assessment of the potential impacts on links will be reported within the EIA Report.

11.3.2 The Applicant proposes to scope out any assessment on television reception.

## 12 Transport and Accessibility

### 12.1 Introduction

1.1.1 This section considers potential issues associated with transport and traffic as a result of the Proposed Development during the construction, operation and decommissioning phases.

1.1.2 A Transportation Assessment (TA) will be completed as part of the EIA and a summary of this will be presented within the EIA Report. The TA will focus on identifying the potential increase in traffic on the surrounding road network, associated impacts and potential mitigation measures. Potential impacts on ferry traffic will also be considered and assessed.

### 12.2 Baseline Conditions

12.2.1 The landing point for the delivery of components and materials will be Hatston pier, which has been used previously for the delivery of wind turbine components. A range of ferries and cruise ships utilise Hatston pier, as well as freight vessels.

12.2.2 From the pier, the site is anticipated to be accessed via Grainshore Road, and onto the A965. Access into the site from the A965 would be via a newly constructed access junction, designed in accordance with relevant safety standards.

12.2.3 The following baseline data would be collected with respect to Hatston pier, and the proposed route to the site entrance:

- observed road traffic flows;
- observed road traffic speeds;
- road accident data; and
- ferry/cruise ship traffic routes and frequencies.

### 12.3 Potential Impacts

12.3.1 It is likely that the main transport impacts will be associated with the delivery of abnormal loads to the site, and the movement of HGVs travelling to and from the site during the construction phase of the project. An estimate of the number of vehicle trips associated with the proposed construction, operation and decommissioning phases of the Proposed Development site will be developed and included within the TA.

12.3.2 Having estimated the number of trips associated with each phase of the development, the potential impact on the study area road network in terms of percentage impact will be determined.

12.3.3 Other potential impacts that will be considered include;

- accidents and safety;

- driver delay;
  - pedestrian amenity;
  - pedestrian delay.
- 12.3.4 There is also potential for the construction phase of the Proposed Development to have an effect on ferry and cruise ship traffic in and out of Kirkwall, for example reducing capacity or disrupting scheduled sailings. Consultation with the harbour authority will be required to assess potential effects and derive appropriate mitigation.

## 12.4 Additional Baseline Information and Collection Methods

- 12.4.1 The details of the proposed abnormal delivery route and construction traffic routes will be the subject of consultation with OIC roads officers. With respect to abnormal loads delivery, swept path analysis of “pinch points” on the route will be undertaken, together with a site visit by an experienced transport consultant, to establish the requirement for any mitigation works (for example to allow blade oversail or over-run by delivery vehicles).
- 12.4.2 Observed traffic on the local road network will be established either from existing traffic count information or new traffic surveys undertaken by automatic traffic counters with the locations agreed with officers once the proposed access route is finalised. Ferry and cruise ship traffic information will be obtained through consultation with OIC harbour authority.
- 12.4.3 The detailed assessment will focus on the proposed access to site for construction traffic and the associated impacts on the surrounding road network and marine traffic.

## 12.5 Impact Prediction and Evaluation

- 12.5.1 In accordance with the Institute of Environmental Management Assessment (IEMA) Guidelines for the Environmental Assessment of Road Traffic, an assessment should be undertaken: -
- Rule 1: On road links where traffic flows are predicted to increase by more than 30% (or where the number of heavy goods vehicles is predicted to increase by more than 30%); and
  - Rule 2: Traffic flows are predicted by 10% or more in any other specifically sensitive areas.
- 12.5.2 Where the predicted growth in traffic flow is below the thresholds, the IEMA guidelines suggest the significance of the effects can be stated to be negligible and further detailed assessment is not warranted.
- 12.5.3 The perception of change in traffic is dependent on a wide range of factors including volume, speed and composition of traffic (i.e. percentage of HGVs). The assessment of environmental effects of traffic requires a number of stages, namely:
- determination of existing and forecast traffic levels and characteristics;
  - determining the time period suitable for assessment;
  - determining the year of assessment; and
  - identifying the geographical boundaries of assessment.
- 12.5.4 Once the environmental effects and the highway links to be included within the analysis have been identified, the next stage of the assessment is to quantify the magnitude of the environmental impact and to identify the level of significance that such changes will make. This requires the definition of both baseline conditions and estimation of conditions for the appropriate year of assessment. Each receptor will have a different value and level of sensitivity to change. Quantification of environmental

effects is easier for some receptors than others. Traffic noise has been extensively researched and methods of measurement developed. Other effects such as severance are more subjective as there are no current proven or reliable techniques for study. Table 12.1 provides descriptions of receptor sensitivity based on DMRB guidelines HA 205/08 'Assessment and Magnitude of Environmental Effects'.

**Table 12.1 – Receptor Sensitivity**

Sensitivity	Description
High	Receptors of high importance and rarity on a national scale with limited potential for substitution. Includes such receptors as large settlements with a high number of community facilities and public services and areas not constructed to accommodate frequent HGV movements.
Medium	Receptors of high or medium importance and rarity on a regional scale with limited potential for substitution. Includes intermediate settlements containing some community facilities and public services and areas suitable to accommodate regular HGV movements such as A and B roads.
Low	Receptors of low or medium importance and rarity on a local scale. Includes very small settlements with few community facilities and public services. Areas with trunk or A class roads constructed to accommodate significant HGV movements.
Negligible	Typically receptors of little importance or rarity. Includes very small settlements and roads with no significant settlements including new strategic trunk roads or motorways that would be little effected by additional traffic and suitable.

12.5.5 The IEMA guidelines identify general thresholds for traffic flow increases of 10% and 30%. The guidelines also suggest that 30%, 60% and 90% changes in traffic levels should be considered as "slight, moderate and substantial" impacts respectively. It is generally considered that traffic flow increases of less than 10% are generally considered to be 'not significant', given that daily variation in background traffic flow may vary by this amount. Based on these rules and perceptions, the magnitude of the impact is classified using the criteria in Table 12.2.

**Table 12.2 – Magnitude of Impact Criteria**

Major	Moderate	Minor	Negligible
>90% increase in traffic	60% - 90% increase in traffic	30% - 60% increase in traffic	0% - 30% increase in traffic

12.5.6 A combination of the sensitivity of the receptor and the magnitude of effect are then used to inform the significance of the effect. For many effects there are no simple rules or formulae which define thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed up by data or quantified information where possible.

## 12.6 Key Issues for Consideration in the EIA

12.6.1 The delivery route for abnormal loads will need to be assessed in detail as part of an Abnormal Loads Route Review, including a site visit and swept path analysis of pinch points. Additional work such as detailed topographical survey and a trial run may be considered appropriate depending on findings of the review.

12.6.2 The potential impact of construction traffic on the local road network will also be assessed in detail as outlined above. Suitable mitigation measures will be established where required and appropriate.

## 13 Socio-economics, Tourism and Recreation

### 13.1 Introduction

13.1.1 The potential for both adverse and positive local impacts will be evaluated in the environmental assessment process. This will involve identification of the existing socio-economic baseline conditions in the surrounding area, and consideration of potential direct or indirect impacts on employment, recreation and tourism and the local population in terms of community benefit. Particular to this project, the potential benefits associated with the Local Authority's potential to gain an income from the site's generation, and to provide support to the needs case for a new subsea cable between Orkney and mainland Scotland, will be taken into account.

### 13.2 Baseline Description

13.2.1 The Orkney Mainland is characterised by a combination of concentrated settlements, in particular Kirkwall and Stromness, in addition to scattered dwellings. The predominant use of the land area is pastoral farming.

13.2.2 Orkney is characterised by:

- a population increase of over 10% in the years 2001 to 2011;
- lower unemployment rates than across the Highlands and Islands and Scotland as a whole;
- a business and employment base that compares closely to that of the Highlands and Islands, but with higher rate of self-employment, and a higher rate of employment in agriculture, forestry and fishing, construction, and transport and storage; and
- a higher share of employment, compared to the Highlands and Islands as a whole, in skilled trades.

13.2.3 Renewable energy is an important facet of the socio-economic baseline of Orkney, with the European Marine Energy Centre (EMEC) based on the Orkney Mainland and the International Centre for Island Technology (ICIT) offering renewable energy related MSc courses. There are several Orkney-based companies providing technical and operational support to the renewable energy industry.

13.2.4 EMEC provides wave and tidal energy developers with full scale grid connected test sites, facilities and technical support. It *"exports its knowledge around the world to stimulate the development of a global marine renewables industry."*<sup>1</sup> However, it has been identified that a key challenge for EMEC is to *"find ways to unblock the restrictions currently placed on renewable energy generation in Orkney by inadequate grid connections to mainland Scotland"*.<sup>6</sup> The unblocking of such restrictions through delivery of a new subsea cable between Orkney and mainland Scotland has potential to provide highly significant economic benefits to Orkney over a long-term period.

13.1.1 With respect to the tourism and recreation baseline, the most popular activities undertaken by visitors are visiting archaeological sites and to enjoy the coastal scenery and beaches. Orkney also receives visits from a growing number of cruise liners throughout the year.

### 13.3 Guidance/Legislation

13.3.1 There is currently no established EIA methodology for the assessment of socio-economic impacts. This chapter of the EIA Report therefore will describe the processes and outcomes of a socio-economic

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<sup>6</sup> [www.emec.org.uk](http://www.emec.org.uk)

impact assessment based on professional experience and EIA good practice. It will also follow the recommendations of the 2008 Scottish Wind Farm Research study and the good practice in the preparation of socio-economic, tourism & recreation impact assessment as set out in the Good Practice Wind guide.

- 13.3.2 Identification and assessment of effects on recreational receptors will also follow SNH guidance 'Outdoor Access Effect Assessment'.

## 13.4 Proposed Scope of Assessment

- 13.4.1 The assessment will consider the likely impacts of the Proposed Development on the economic profile of the area (including employment opportunities and the wider economic impacts of a new subsea export cable), tourism and recreation, and public perception of wind farms. The work will also consider socio-economic impacts within other sections of the EIA Report (i.e. noise, landscape and visual, and traffic). Data will be collected on the socio-economic profile of the area (with specific reference to the importance of tourism). Data will be collected from a variety of sources including the Office of National Statistics (ONS), OIC, Visit Scotland, and other local tourist information/organisations.

## 13.5 Potential Impacts

- 13.5.1 The potential impacts of the Proposed Development therefore may include:
- the generation of employment and business opportunities during manufacturing, construction and operational phases of the Proposed Development;
  - impacts on sporting activity, land values, local tourism and recreational amenity; and
  - indirect and direct economic benefits and dis-benefits from the Proposed Development, including:
    - the economic impacts of the Proposed Development being owned by the Orkney Islands Council and therefore providing direct economic and community benefits to the population of the Orkney Islands; and
    - wider economic benefits to Orkney from the delivery of a new subsea cable to the Scottish mainland, the needs case for which could be supported by the Proposed Development.
- 13.5.2 As discussed in Chapter 8, the importance of archaeology and cultural heritage to Orkney's tourism industry is recognised and the assessment of effects will reflect this association.
- 13.5.3 The assessment will also consider the impacts of the Proposed Development to the renewables industry in Orkney, and Scotland, through the promotion of the renewables industry, skills and experience within the Orkney Islands – particularly given the private wire element which would be unique within Orkney to date.

## 13.6 Cumulative Impacts

- 13.6.1 Cumulative impacts upon tourism, employment opportunities, or local amenity will be considered.

## 13.7 Mitigation

- 13.7.1 Thorough communication will take place throughout the development process and every effort will be made to fully engage the community. Meetings with community councils, ward members and local politicians will be initiated at the very early stages of planning the Proposed Development, and will

continue throughout the design and planning process. Input from local stakeholders will be sought to establish appropriate mitigation and potential community benefits arising from the development.

- 13.7.2 The potential for both adverse and beneficial local effects will be evaluated in the environmental assessment process. This will involve identification of the existing socio-economic baseline conditions in the surrounding area, and consideration of potential direct or indirect effects on employment, recreation and tourism and the local population in terms of community benefit.

## 14 Shadow Flicker

### 14.1 Introduction

- 14.1.1 This section considers shadow flicker, an effect caused by the rotation of the turbine blades when the sun is shining, which can create a flickering or strobe like effect.

### 14.2 Guidance

- 14.2.1 There are at present no formal guidelines available on what exposure would be acceptable in relation to shadow flicker. There is no standard for the assessment of shadow flicker. The specific advice sheet from Scottish Government, Onshore Wind Turbines, a web-based guide (Scottish Government, 2013) sets out the potential geographic area which may fall under assessment: *“Where this (shadow flicker) could be a problem, developers should provide calculations to quantify effect. In most cases however, where separation is provided between wind turbines and nearby dwellings (as a general rule ten rotor diameters), ‘shadow flicker’ should not be a problem.”*
- 14.2.2 Published research by the Department of Energy and Climate Change (DECC), Update of UK Shadow Flicker Evidence Base (DECC, un-dated), evaluates the current international understanding of shadow flicker and confirms an acceptable study area for assessment is ten rotor diameters from each turbine and within 130 degrees either side of north.

### 14.3 Baseline

- 14.3.1 Based on an indicative candidate turbine model at the larger scale being considered, the rotor diameter could indicatively be 136 m. Therefore, the minimum distance from the turbine at which residential property must lie in order to be outwith consideration for shadow flicker effects, is 1.36 km (ten times the rotor diameter). Six properties are located within 1.36 km of the turbines: Quanterness Cottages, Quanterness farmhouse and Harwood, two properties at Saverock to the east of the site and one property at Rennibister to the west. Consultation will be undertaken with OIC EHO following a design freeze on the properties to be included within the assessment.

### 14.4 Methodology

- 14.4.1 The shadow flicker assessment will be undertaken using WindPRO computer modelling software and will be run for a realistic scenario (using, where possible, measured meteorological data and 85% turbine operation) on the potential shadow flicker occurrence for a 1 m x 1 m ground floor window at each identified sensitive receptor location facing directly onto the Proposed Development.
- 14.4.2 The sensitivity of the receptors will be assessed and a significant impact will be noted where a receptor is identified as experiencing greater than 30 hours of flicker a year or more than 30 minutes per day on the worst affected day, which ever if greater (DECC, 2011).



- 14.4.3 The assessment will present clear findings on the estimated number of hours of shadow flicker impact for each receptor, for both scenarios. Where required, potential mitigation measures will be discussed.

## 14.5 Key Issues for Consideration in the EIA

- 14.5.1 The approach and methodology will be confirmed with OIC's Environmental Health Officer and the total number of expected hours of shadow flicker resulting from the Proposed Development calculated for each receptor location.

# 15 Miscellaneous

## 15.1 Carbon Displacement

- 15.1.1 A wind farm has the potential to displace electricity generated from fossil fuels during its operational lifespan and consequently prevent carbon dioxide (CO<sub>2</sub>) from being released. The EIA will provide an estimate of the potential amount of CO<sub>2</sub> savings that can be made, based on assessing the electricity generation mix that the Proposed Development is displacing at any given time.
- 15.1.2 A wind farm constructed on peatland habitat also has the potential to generate CO<sub>2</sub> emissions as a result of the degradation of peat. The current best practice guidance available on the Scottish Government website provides a method to calculate carbon emission savings associated with wind farm developments on Scottish peatlands using a full life cycle analysis approach. The tool was originally published in 2008 and the latest version published in July 2016 (Scottish Government, 2016). The tool compares the carbon costs of wind farm developments with the carbon emissions savings attributable to the Proposed Development. The calculation is summarised as the length of the time (in years) it will take the carbon savings to amount to the carbon costs also referred as the "payback period".
- 15.1.3 No peat has been identified at the Proposed Development site. Therefore, it is proposed to undertake a relatively simple analysis of the development's carbon balance based on estimated carbon used to develop the site (manufacture and transport of components, construction etc.) and the estimated carbon savings through renewable energy generation.

## 15.2 Health and Safety

- 15.2.1 The indicative turbine locations are located outwith the topple height distance from any dwelling. Modern turbines are also fitted with sensors that can shut the turbine down in icing conditions to prevent ice throw from the turbine blades.
- 15.2.2 Health and safety considerations during construction of the Proposed Development would be subject to relevant legislation and best practice, for example, appropriate risk assessments and method statements to be in place for various aspects of the construction and de-commissioning works. The Proposed Development would operate in line with best practice guidelines from Renewable UK 'Guidelines for Health and Safety in the Wind Energy Sector' published in August 2010.
- 15.2.3 The EIA will take into account health and safety considerations relevant to the construction, operation and de-commissioning of the Proposed Development including safety of structures in extreme weather conditions and health and safety procedures during construction. There is no further requirement for an additional assessment of the operational health and safety impacts, so health and safety is scoped out from the EIA.

## 15.3 Air Quality

- 15.3.1 The main source of impact on air quality would be increased traffic flows on local roads during construction and emissions from construction activities including exhaust fumes and dust generated from potential quarrying and from unmade ground in dry conditions. It is not considered that the effects of these activities would be significant, provided mitigation measures including adopting recognised best management practices on site were implemented.
- 15.3.2 There would be no routine emissions to air during operation with the only source being occasional vehicles accessing the site for maintenance purposes. Operation of the Proposed Development would displace alternative sources of power generation, mainly fossil fuels, and therefore would result in reduced emissions of carbon dioxide and other pollutant gases (NO<sub>x</sub> and PM<sub>10</sub> etc.)
- 15.3.3 Air Quality is therefore scoped out from further assessment.

## 16 Consultation

### 16.1 Public Consultation

- 16.1.1 The Applicant is fully committed to engaging with local communities and ensuring that they are informed throughout the EIA process. The Applicant proposes to undertake consultation using various methods, such as meetings with key stakeholders and near site neighbours, leaflets/newsletters and public exhibitions.
- 16.1.2 A project website will also be set up on which information including site location, preliminary layout photomontages, dates of upcoming public exhibitions and scoping reports will be publicised. In addition a direct email address to the Applicant will be provided to allow members of the public to make enquiries.
- 16.1.3 The Applicant will undertake public exhibitions as part of the community engagement process, at which it intends to gather feedback in order to assess public opinion. The consultation exercise provides an opportunity for organisations and any interested parties to raise concerns or issues with regard to the Proposed Development that they would like to see addressed as part of the EIA. The feedback on concerns will ultimately be fed into the iterative design process and recorded in appropriate sections of the EIA Report.

### 16.2 Statutory and Non-statutory Consultees

- 16.2.1 As a part of this Scoping exercise, the Applicant is inviting inputs from both statutory and non-statutory consultees to inform the Proposed Development. Consultees are invited to comment on the content of the EIA Scoping Report and should answer whether the report has missed any potential effects associated with the Proposed Development.
- 16.2.2 A list of consultees who are recommended to be contacted as a part of the Scoping exercise is included in Appendix A.

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## Appendix A – Proposed Consultee List

Airwave Solutions Ltd.	Ministry of Defence
Arqiva	Orkney Harbour Authority
Atkins	Orkney Heritage Society
Boston Networks (telecoms operator)	Orkney Islands Council – relevant departments
British Telecom	Orkney Raptor Study Group
Civil Aviation Authority	Royal Society for the Protection of Birds
Cloudnet (telecoms operator)	Scottish Environment Protection Agency
Firth and Stenness Community Council	Scottish Natural Heritage
Highland and Islands Airports Limited	Scottish Water
Historic Environment Scotland	Spectrum Licensing (Ofcom)
Joint Radio Company	Visit Scotland
Kirkwall and St Ola Community Council	Visit Orkney
MBN/Everything Everywhere	Vodafone

# Appendix B – Planning Policy Context

## Part 1 – National Planning Policy

### National Planning Framework 3 (2014)

Scotland's third National Planning Framework (NPF3) was published by the Scottish Government on 23 June 2014. NPF3 is a long-term strategy for Scotland and is the spatial expression of the Government's Economic Strategy and plans for development and investment in infrastructure. Together, NPF3 and Scottish Planning Policy 2014 (referred to below) applied at the strategic and local levels, are intended to help the planning system deliver the Government's vision and outcomes for Scotland and to contribute to the Government's central objective: sustainable development.

NPF3 sets out the Government's "vision" for Scotland which is referred to as inter alia:-

A successful, sustainable place – *"we have a growing low carbon economy which provides opportunities..."*

A low carbon place - *"we have seized the opportunities arising from our ambition to be a world leader in low carbon generation, both onshore and offshore..."*

A natural resilient place - *"natural and cultural assets are respected; they are improving in condition and represent a sustainable economic, environmental and social resource for the nation..."*

#### A Low Carbon Place

Chapter 3 of NPF3 address 'A Low Carbon Place'. As noted below, this is also a 'subject policy' in Scottish Planning Policy. Paragraph 3.1 explains that planning will play key role in delivering on the commitments set out in 'Low Carbon Scotland': The Scottish Government's Proposals and Policies'. It adds:

*"the priorities identified in this spatial strategy set a clear direction of travel which is consistent with our world leading climate legalisation".*

The introduction to Chapter 3 states that the Government's ambition *"is to achieve at least an 80% reduction of greenhouse gas emissions by 2050"*.

The introductory section acknowledges that at present, the energy sector accounts for a significant share of the country's greenhouse gas emissions and that a planned approach to development has ensured that onshore wind development has widely avoided internationally and nationally protected areas.

Paragraph 3.7 states that whilst there is strong public support for wind energy as part of the renewable energy mix, opinions about onshore wind in particular locations can vary. It adds that the technology is also *"...recognised as an opportunity to improve the long-term resilience of rural communities"*.

Paragraph 3.8 makes reference to targets and states that by 2020, the aim is reduce total energy demand by 12 %. In order to achieve this, and to maintain energy supplies, further diversification of supplies will be required.

### Scottish Planning Policy (2014)

A new Scottish Planning Policy (SPP) was published on 23rd June 2014. The purpose of the SPP is to set out national planning policies which reflect Scottish Government Ministers' priorities for the operation of the planning system and for the development and use of land. The SPP is a statement of Scottish Government policy on how nationally important land use planning matters should be addressed.

Paragraph (iii) states that as a statement of Ministers' priorities, the content of the SPP is a material consideration that carries significant weight, although it is for the decision maker to determine the appropriate weight to be afforded to it in each case.



## Relationship of SPP to National Outcomes

SPP contains two Principal Policies: ‘sustainability’ and ‘place making’. Sustainability is addressed at Page 9. The SPP states:

*“the Scottish Government’s central purpose is to focus Government and public services on creating a more successful country with opportunities for all of Scotland to flourish through increasing sustainable economic growth”.*

Paragraph 25 adds that the Scottish Government’s commitment to the concept of sustainable development is reflected in its Purpose.

Paragraph 27 cross refers to the Government’s Economic Strategy which it states, *“indicates that sustainable economic growth is the key to unlocking Scotland’s potential.... and to achieving a low carbon economy...”* It also makes reference to the need to maintain a high quality environment and to pass on *“a sustainable legacy for future generations”*.

## SPP Subject Policies – A Low Carbon Place

SPP addresses ‘A Low Carbon Place’ as a ‘subject policy’ on page 36 and refers to ‘delivering electricity’. Paragraph 152 refers to the NPF3 context and states that NPF3 is clear that planning must facilitate the transition to a low carbon economy and help to deliver the aims of the Scottish Government. It is stated that Scotland has significant renewable energy resources, both onshore and offshore.

Paragraph 153 states that terrestrial planning ‘facilitates’ development of renewable energy technologies, and guides new infrastructure to appropriate locations. It adds that *“sufficient supply of low carbon and low cost generation of electricity from renewable energy sources are vital to reducing greenhouse gas emissions...”* It explains that renewable energy also presents a significant opportunity for associated development, investment and growth of the related supply chain.

In terms of ‘Policy Principles’, Paragraph 154 states that the planning system should:

- Support the transformational change to a low carbon economy, consistent with national objectives and targets, including deriving:
  - 30 % of overall energy demand from renewable sources by 2020; and
  - the equivalent of 100 % of electricity demand from renewable sources by 2020.
- Support the development of a diverse range of electricity generation from renewable technologies – including the expansion of renewable energy generation capacity.
- Guide development to appropriate locations and advise on the issues that will be taken into account when specific proposals are being assessed.
- SPP also cross refers to ‘key documents’. Those of relevance include:
  - The Electricity Generation Policy Statement;
  - The 2020 Routemap for Renewable Energy in Scotland; and
  - Low Carbon Scotland: Meeting Our Emissions Reductions Targets 2013 – 2027.

## Onshore Wind

Onshore wind is specifically addressed at Paragraphs 161 et seq. of SPP. Detailed guidance is provided for Planning Authorities with regard to the preparation of spatial frameworks for onshore wind development, and it makes it clear that proposals for onshore wind turbine development should continue to be determined whilst

spatial frameworks and local policies are being prepared and updated. It makes it clear at Paragraph 166 that moratoria on onshore wind development are not appropriate.

In terms of spatial framework guidance, a “community separation for consideration of visual impact” is set out as an area not exceeding 2 km around cities, towns and villages identified on the local development plan with an identified settlement envelope or edge.

As with the previous SPP, this separation distance seeks to guide the preparation of spatial frameworks and is not a requirement for a ‘set back’ to settlements for wind farms in terms of development management.

Based on the criteria set out in SPP Table 1: Spatial Frameworks, the Costa Head site falls within Group 3: Areas with potential for wind farm development.

### Development Management for Energy Infrastructure Developments

In terms of development management, Paragraph 169 of SPP set out that “*proposals for energy infrastructure should always take account of spatial frameworks for wind farms and that considerations will vary relative to the scale of proposals and area characteristics but are likely to include a number of matters*”. These are set out as follows:-

- net economic impacts, including local and community socio economic benefits such as employment, associated business and supply chain opportunities;
- the scale of contribution to renewable energy generation targets;
- effects on greenhouse gas emissions;
- cumulative impacts – planning authorities should be clear about the likely cumulative impacts arising from all of the considerations below;
- impacts on communities and individual dwellings, including visual impact, residential amenity and noise and shadow flicker;
- landscape and visual impacts including effects on wild land;
- effects on the natural heritage, including birds;
- impacts on carbon rich soils using the carbon calculator;
- public access, including impact on long distance cycling and walking routes and scenic routes identified in the NPF;
- impacts on the historic environments, including scheduled monuments, listed buildings and their settings;
- impacts on tourism and recreation;
- impacts on aviation and defence interests and seismological recording;
- impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised;
- impacts on road traffic;
- impacts on adjacent trunk roads;
- effects on hydrology, the water environment and flood risk;
- the need for conditions relating to the decommissioning of developments, including ancillary infrastructure and site restoration; and

- the need for a robust planning obligation to ensure that operators achieve site restoration.

Paragraph 170 states that areas identified for wind farms should be suitable for use in perpetuity. It further adds that consents may be time limited, but nevertheless “*wind farms should be sited and designed to ensure impacts are minimised and to protect an acceptable level of amenity for adjacent communities*”.

In terms of the various considerations set out above, SPP also contains detailed policies on a number of the topics referred to: for example cultural heritage and the historic environment, natural heritage and landscape designations.

## National Policy Conclusions

Support for renewable energy development at an appropriate scale and location remains within NPF 3 and SPP, with the 2020 targets being reiterated and the continued support for onshore wind being firmly re-stated. The Proposed Development is entirely consistent with both NPF 3 and SPP and would further the sustainable development and low carbon objectives set out. The site is in a location defined as Group 3: Areas with potential for wind farm development, according to the criteria set out by SPP.

## Part 2 – Local Planning Policy and Guidance

### Orkney Local Development Plan (LDP)

The Orkney LDP was formally adopted in April 2017. Relevant elements of the LDP are summarised in Table B1 below:

**Table B1 - Local Development Plan – Summary of Relevant Policies**

Policy	Name	Summary
	20-Year Vision for Orkney	The introductory “vision” statement states that Orkney is, “ <i>Policy support has been established to ensure that all appropriate energy generation schemes will be supported in the county</i> ”.
1	Criteria for All Development	Refers to supporting development which takes into consideration the location and wider landscape, which is appropriate to its location, which does not prejudicial development or use of the wider area, which preserves the amenity of the surrounding area, which does not create an unacceptable burden on infrastructure or risk to public health and safety, which is resource efficient, which promotes and enhances access to natural heritage and protects and enhances Orkney’s cultural heritage resources.
7C	Energy	Relates to renewable energy developments stating “ <i>the development of renewable and low carbon energy schemes, including the onshore infrastructure and/or buildings required for offshore marine renewable energy developments, and related transmission infrastructure, will be supported where it has been demonstrated that the proposal will not result in significant adverse effects on known constraints, either individually or cumulatively</i> ”.
7C	Energy	Relates to renewable energy development. “ <i>proposals for wind energy developments of all scales, including extensions to existing developments and repowering, will be assessed against the following factors to ensure that there will be no significant adverse individual or cumulative impacts: communities and amenity; landscape and visual impact; natural heritage; historic environment; tourism and recreation; peat and carbon rich soils; water environment; aviation, defence and communications; and construction and decommissioning.</i> ”  “ <i>Applications for any wind farms should take account of the Spatial Strategy Framework for wind farm development</i> ”.
8	Historic Environment & Cultural Heritage	Development which will have an adverse impact on cultural heritage assets will only be permitted where it can be demonstrated that “ <i>measures will be taken to mitigate any loss of this significance and any lost significance which cannot be</i>

Policy	Name	Summary
		<p><i>mitigated is outweighed by the social, economic, environmental or safety benefits of the development</i>".</p> <p>It goes on to state that where a proposed development will have an adverse effect on the integrity of the setting of a scheduled monument, "<i>planning permission will only be granted where: there are exceptional circumstances; there is no practical alternative site; and there are imperative reasons of over-riding public need</i>".</p>
9	Natural Heritage and Landscape	<p>Refers to consideration of internationally, nationally and locally designated natural heritage sites, protected species, geodiversity and wider biodiversity and associated restrictions on development in such sites, or which would significantly affect such sites.</p> <p>It also includes restrictions on development which will impact on peat and soils, water environments (both coastal and inland) and wetlands.</p> <p>It goes on to state that all developments should be designed to minimise adverse impacts on landscapes, townscapes and seascapes.</p>
13	Flood Risk, SuDS & Waste Water Drainage	<p>Refers to the requirement for a flood risk assessment to be undertaken for developments in areas identified as medium to high risk of flooding. It also contains the requirement that development proposals must incorporate SuDS which demonstrates compliance with best practice.</p>

## Supplementary Guidance

### Energy Supplementary Guidance

In March 2017, OIC published their Energy Supplementary Guidance document, which currently forms part of the development plan. This guidance "*seeks to ensure that appropriate development can take place, whilst at the same time seeking to ensure the character and special qualities of Orkney is not adversely affected*".

The Guidance identifies Areas with Potential for Wind Farms where a wind farm is a development with turbines over 50 m. These places represent the areas with the least constraints and within which the Proposed Development site falls.

The Guidance goes on to outline the development criteria for wind energy developments which covers the following:

- communities and amenity (including noise, shadow flicker, electromagnetic interference, construction phase and traffic);
- landscape and visual impact;
- natural heritage;
- historic environment;
- tourism and recreation;
- peat and carbon soils;
- water environment;
- aviation, defence and communications; and
- construction and decommissioning.

## Appendix C – Figures



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