Orkney's Community Wind Farm Project - Faray

Environmental Impact Assessment Report – Volume 1

June 2021

ITPENERGISED
Earth. Smart. Solutions

ORKNEY
ISLANDS COUNCIL

Contents

Volume 1 – Chapters

Abbreviations

Chapter	Title
1	Introduction
2	Design Iteration
3	Proposed Development
4	Approach to EIA
5	Planning Policy
6	Landscape and Visual
7	Ornithology
8	Terrestrial Ecology
9	Noise
10	Cultural Heritage
11	Geology, Hydrology & Hydrogeology
12	Traffic and Transport
13	Socio-economics, Recreation and Tourism
14	Aviation and Radar
15	Shadow Flicker
16	Underwater Noise Assessment
17	Marine Water and Sediment Quality
18	Other Issues
19	Schedule of Environmental Commitments
20	Summary of Residual Effects

Volume 2 – Figures

Volume 3 – LVIA Figures and Cultural Heritage Visualisations

Volume 4 – Technical Appendices

Volume 5 – Confidential Appendices

Abbreviations

Abbreviation	Full
AADT	Annual Average Daily Traffic
ABM	Agent-Based Model
ADD	Acoustic Deterrent Device
AGER	Advisory Group on Economic Recovery
AIL	Abnormal Indivisible Loads
ALs	Marine Scotland Action Levels
AOD	Above Ordnance Datum
AQMA	Air Quality Management Plan
BEIS	Business, Energy and Industrial Strategy
BGS	British Geological Survey
BNG	British National Grid
BoCC	Birds of Conservation Concern
BoP	Balance of Plant
BPEO	Best Practical Environmental Options
CAA	Civil Aviation Authority
CAP	Civil Aviation Publication
CAR	Controlled Activities Regulations
CCC	Committee on Climate Change
CCME	Canadian Council of Ministers of the Environment
CEMP	Construction Environmental Management Plan
CfD	Contract for Difference
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
CLVIA	Cumulative Landscape and Visual Impact Assessment
CNLs	Consented Noise Limits
cSAC	Candidate Special Area of Conservation
CSQGs	Canadian Sediment Quality Guidelines
CTMP	Construction Traffic Management Plan
dB	Decibels (unweighted)
dB(A)	A-weighted decibels
DAS	Design and Access Statement
DECC	Department of Energy and Climate Change
DMRB	Design Manual for Road and Bridges
DS	Drainage Strategy
DSD	Dangerous Substances Directive
DTM	Digital Terrain Model
DWQR	Drinking Water Quality Regulator for Scotland
EcIA	Ecological Impact Assessment
ECoW	Environmental/Ecological Clerk of Works
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EoI	Expression of Interest
EPS	European Protected Species
EQS	Environmental Quality Standards
EUNIS	European Nature Information System
EZoI	Ecological Zone of Influence
FeAST	Feature Activity Sensitivity Tool
GCR	Geological Conservation Review
GDL	Garden and Designed Landscape
GHG	Greenhouse gas
GIS	Geographical Information System

GLVIA	Guidelines for Landscape and Visual Impact Assessment
GPP	Guidance for Pollution Prevention
GVA	Gross Value Added
GWDTE	Groundwater Dependent Terrestrial Ecosystems
ha	hectares
HDV	Heavy Duty Vehicle
HES	Historic Environment Scotland
HGV	Heavy Goods Vehicle
HIAL	Highlands and Islands Airports Ltd
HMP	Habitat Management Plan
HRA	Habitat Regulations Assessment
Hz	Hertz
IAM	Impact Assessment Matrix
IAQM	Institute of Air Quality Management
IBA	Important Bird Area
ICES	International Council for the Exploration of the Sea
IEF	Important Ecological Feature
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organisation
IOA	Institute of Acoustics
IOFs	Important Ornithological Features
IPCC	Intergovernmental Panel on Climate Change
IR	Infra-red
ITPE	ITPEnergised
JNCC	Joint Nature Conservation Committee
km	kilometres
kWh	kilowatts hours
LBAP	Local Biodiversity Action Plan
LBS	Local Biodiversity Site
LCAs	Landscape Character Assessments
LCAWEO	Landscape Capacity Assessment for Wind Energy in Orkney
LCCA	Local Coastal Character Areas
LCT	Landscape Character Type
LCU	Landscape Character Units
LDP	Local Development Plan
LDV	Light Duty Vehicle
LNCS	Local Nature Conservation Site
LNR	Local Nature Reserve
LOD	Level of Detection
LVIA	Landscape and Visual Impact Assessment
m	metres
MARPOL	The International Convention for the Prevention of Pollution from Ships
MCA	Maritime and Coastguard Agency
MHWS	Mean High Water Spring
MLW	Mean Low Water
MMO	Marine Mammal Observer
MoD	Ministry of Defence
MPA	Marine Protection Area
MPS	Marine Policy Statement
MS-LOT	Marine Scotland Licensing Operations Team
MW	Megawatts
NC MPA	Nature Conservation Marine Conservation Area
NCR	National Cycle Routes
NHZ	Natural Heritage Zone
NLB	Northern Lighthouse Board
NMP	National Marine Plan

NNR	National Nature Reserve
NOAA	National Oceanic and Atmospheric Administration
NPF3	National Planning Framework
NRTF	National Road Traffic Forecasts
NRW	Natural Resources Wales
NS	NatureScot
NSA	National Scenic Area
NSE	National Society for Epilepsy
NSR	Noise Sensitive Receptors
NTS	Non-Technical Summary
NVC	National Vegetation Classification
NWG	Noise Working Group
OEMP	Operational Environmental Management Plan
OIC	Orkney Islands Council
OLDP	Orkney Local Development Plan
ONC	Orkney and North Caithness
ONL	Overall Noise Limit
OPEN	Optimised Environments Ltd
OS	Ordnance Survey
OSMP	Operational Site Management Plan
OWIRC	Orkney Wildlife Information and Records Centre
Pa	Pascal
PAC	Pre-Application Consultation
PAHs	Polyaromatic Hydrocarbons
PAM	Passive Acoustic Monitoring
PAN	Planning Advice Note
PCBs	Polychlorinated Biphenyls
PELs	Probable Effect Levels
PMF	Priority Marine Features
PPG	Pollution Prevention Guidelines
PSA	Particle Size Analysis
PSD	Priority Substances Directive
pSPA	Proposed Special Protection Area
PTS	Permanent Threshold Shift
PVRs	Principal Visual Receptors
PWS	Private Water Supply
RAM	Range dependent Acoustic Model
RBMP	River Basin Management Planning
RCCA	Regional Coastal Character Areas
RL	Received Level
RMS	Root Mean Square
RNL	Residual Noise Limit
RVAA	Residential Visual Amenity Assessment
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SBs	Summary boxes
SCOS	Special Committee on Seals
SEL	Sound Exposure Level
SEL_{cum}	Cumulative Sound Exposure Level
SEPA	Scottish Environmental Protection Agency
SES	The Scottish Energy Strategy
SFF	Scottish Fisheries Federation
SGN	Supplementary Guidance Note
SHCS	Scottish House Condition Survey
SHE-T	Scottish Hydro Electric Transmission
SHQS	Scottish Housing Quality Standard

SL	Source Level
SLMs	Sound Level Meters
SNH	Scottish Natural Heritage
SOES	Sustainable Orkney Energy Strategy
SOPEP	Shipboard Oil Pollution Emergency Plan
SPA	Special Protection Area
SPL	Sound Pressure Level
SPP	Scottish Planning Policy
SQE	Suitably Qualified Ecologist
SRP	Site Restoration Plan
SSSI	Site of Special Scientific Interest
STAG	Scottish Transport Appraisal Guidance
SuDS	Sustainable Drainage Systems
SWT	Scottish Wildlife Trust
TA	Transport Assessment
TAN	Technical Advice Note
TEL	Temporary Effect Level
TELs	Threshold Effect Levels
TL	Transmission Loss
TS	Transport Scotland
TTS	Temporary Threshold Shift
VMS	Vessel Monitoring System
VP	Vantage Point (Chp 7. Ornithology)
VP	Viewpoint (Chp 6. LVIA)
WCA	The Wildlife and Countryside Act 1981 (as amended)
WFD	Water Framework Directive
WLA	Wild Land Area
WSI	Written Scheme of Investigation
ZTV	Zone of Theoretic Visibility

1 Introduction

Contents

1.1	Executive Summary	1-1
1.2	Background	1-1
1.3	The Applicant	1-3
1.4	Purpose of the EIA Report	1-4
1.5	Structure of the EIA Report	1-4
1.6	EIA Project Team	1-5
1.7	Availability of the EIA Report	1-8
1.8	Representations to the Application	1-8
1.9	References	1-8

This page is intentionally blank.

1 Introduction

1.1 Executive Summary

1.1.1 This chapter sets out the background to the Proposed Development and information as to the purpose of the Environmental Impact Assessment (EIA) Report and where the EIA Report can be viewed.

1.2 Background

1.2.1 The Orkney Islands Council (hereafter referred to as "the Applicant") intends to apply to Orkney Islands Council (OIC) for planning permission to construct and operate Orkney's Community Wind Farm Project – Faray (hereafter referred to as the "Proposed Development"), on a site on the Island of Faray, Orkney Islands.

1.2.2 The Applicant will submit the following applications for the Proposed Development:

- A planning application to OIC under The Town and Country Planning Act (Scotland) 1997 (as amended) for all works above Mean Low Water Springs (MLWS), i.e. the onshore wind turbines and associated onshore infrastructure; and
- Marine licence applications to Marine Scotland's Licencing Operations Team (MS-LOT), which act on behalf of the Scottish Minsters, for works below Mean High Water Springs (MHWS), i.e. the installation of improved access to Faray via construction of a new extended slipway and landing jetty. Two marine licences are required, one for construction works and one for dredging operations.

1.2.3 Both applications require EIA under their respective regulations, the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended). This EIA Report has been prepared to support both consent applications in accordance with the respective EIA Regulations.

Site Description

1.2.4 The site comprises the island of Faray, an uninhabited island to the north and west of Eday and south-east of Westray in the Orkney Islands. A smaller island Holm of Faray is immediately to the north. Faray is approximately 17 km north-east of Orkney Mainland, and approximately 25 km from Kirkwall. The island extends to approximately 168 hectares (ha) and is centred on British National Grid (BNG) 353112, 1036752 (refer to Figure 1.1).

1.2.5 The topography of the island comprises two low hills. The southern of the two forms approximately the central point of the island, rising to 32 m Above Ordnance Datum (AOD). Approximately 700 m to the north a second hill rises to 31 m AOD. The ground level falls away fairly gently from the two hills, the steepest slope being near the coast to the west of the southern hill. The coastline is generally defined by rocky cliffs with geos and caves, except on the west coast near the north of the island and on the far south-east coast, where there are stretches of beach.

1.2.6 The island comprises open fields of improved pasture, a number of abandoned buildings and a slipway. The current land use is sheep farming.

1.2.7 There are no major surface watercourses on the island. There are however, two springs located near the centre of the island from which a small stream flows west towards the sea.

1.2.8 There are no residential properties within the site boundary. The closest dwelling is North Guith c.1.6 km east of the nearest proposed turbine.

The Proposed Development

1.2.9 The Proposed Development would consist of six wind turbines of up to a maximum of 149.9 m height from ground to blade tip when vertical. The overall capacity of Proposed Development would be approximately 28.8 MW[1]. A number of ancillary elements are also proposed, including access tracks, crane hardstandings, underground cabling, possible external transformers, on-site substation and maintenance building, temporary construction compounds, borrow pits, permanent meteorological mast, a new extended slipway and a landing jetty. The proposed site layout is shown in Figure 1.2.

1.2.10 The proposed locations of the turbines have been identified in order to enable the EIA to assess fully the Proposed Development for which permission is being sought. The British National Grid coordinates denoting where each of the turbines are proposed to be located are listed in Table 3.1 of Chapter 3 (Proposed Development).

1.2.11 Whilst the location of the infrastructure described above has been determined through an iterative environmental based design process, there is the potential for these exact locations to be altered through micro-siting allowances prior to construction. A micro-siting allowance of up to 50 m in all directions is being sought in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify unsuitable ground conditions or environmental constraints that could be avoided. No micro-siting will be undertaken that results in an increase in the significance of adverse effects. It is proposed that the micro-siting of all infrastructure will be subject to an appropriately worded planning condition.

1.2.12 The total power output of the Proposed Development would be approximately 28.8 MW[2]. Based on BEIS Renewable Energy Statistics the average capacity factor for wind farms in Orkney was 38.3 % in 2018 (BEIS, 2019). This figure does not take account of curtailment of generators in Orkney so can be viewed as conservative. Using these figures the annual indicative total power output for the site would be around 96,626 MW hours per annum[3], indicating the Proposed Development would generate enough electricity to power approximately 27,006[4] average UK households (based on average annual electricity consumption per household in the UK quoted by BEIS (2019), of 3.578 MW hours). Using RenewableUK (2020) methodology this equates to a reduction in carbon emissions of 43,482 tonnes per year[5]. The Proposed Development would therefore make a substantive contribution towards international and national targets for the generation of renewable energy and reduction in greenhouse gas emissions.

1.2.13 The Proposed Development is one of three under development by the Applicant under 'Orkney's Community Wind Farm Project'. The aims of this project are threefold; to generate income to be used for the benefit of the people of Orkney, to aid towards a meaningful response to the Climate Emergency and the urgent need to further decarbonise, and to build the case for a new transmission connection for Orkney unlocking wider benefits to the energy sector in Orkney.

---

[1] 28.8 MW is an indicative capacity. Actual installed capacity may be greater or less dependent on turbine model selection but will not be greater than 50 MW (i.e. will not breach the 50 MW threshold that would require the application to be determined under Section 36 of the Electricity Act 1989 (as amended)).

[2] 28.8 MW an indicative capacity. Actual installed capacity may be greater or less dependent on turbine model selection.

[3] This has been calculated by multiplying the annual capacity of the Proposed Development (28.8 MW) by the hours in a year (8760) by the conservative capacity factor estimate (38.3%) (Renewable UK, 2020).

[4] This has been calculated by dividing the annual power output (96,626 MWh) by annual UK average household consumption (3.578 MWh) (Renewable UK, 2020).

[5] This has been calculated by multiplying the GWh pa of the Proposed Development (96.626 GWh) by the number of tonnes of carbon which fossil fuels would have produced to generate the same amount of electricity (450 tonnes of carbon dioxide per GWh of electricity) (Renewable UK, 2020).

1.2.14 In September 2019 the electricity market regulator Ofgem published its final decision on the needs case for a transmission connection linking Orkney to the Scottish Mainland. It determined that there is a need for a cable. To justify 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 agreed that in order to trigger a new 220 MW connection, 135 MW of new generation is required to have obtained planning permission, signed up to a grid connection agreement, and passed a financial audit before the end of 2021. Currently less than 40 MW of new wind has gained planning permission. Noting that there are a number of other private projects at different stages of development, it is clear that, without the Proposed Development and the Orkney Community Wind Farm Project, it is unlikely the threshold will be met, and a new interconnector will not be built.

1.3 The Applicant

1.3.1 The Applicant is looking to develop three wind farms within the Orkney Islands, of which the Proposed Development is one. 'Orkney's Community Wind Farm Project' could generate significant income and community benefit for Orkney. All profit would stay in the islands, enabling the Applicant to preserve and enhance key services that local people value and depend upon and providing a foundation for communities to drive transformational projects of their own.

1.3.2 A Local Authority taking the decision to become a developer of wind energy projects is unusual, but it is felt vital that the Applicant now takes an active 'developer approach' to energy projects in Orkney. Not only does this allow the Applicant to maximise the resources available to them in the islands to support services and projects for local people at a time of significant central funding reductions, but it also allows them to contribute significantly and in a meaningful way to allow Orkney's world-renowned local energy industry to survive and thrive through a new grid connection.

1.3.3 Public feedback following the launch of Orkney's Community Wind Farm Project highlighted a desire for the community to understand more clearly how the project would deliver community benefits through profit generation. In response to this OIC unanimously agreed to a set of guiding principles for community benefit related to the project at a meeting of the Policy and Resources Committee on 24 September 2019.

1.3.4 Specifically, the Council accepted the recommendation that the following guiding principles be adhered to in delivery of community benefit by 'Orkney's Community Wind Farm Project', if developed to operation:

- The key purpose of the Orkney Community Wind Farm Project is to generate profit to be used for the benefit of the people of Orkney.
- Community benefit from the project will be delivered via a 'Community Fund' with funding distributed in accordance with the principles of Section 69 (e) of the Orkney County Council Act 1974 (which states that any fund provided under this section may be applied for any purpose which in the opinion of the Council is solely in the interests of the county or its inhabitants).
- Financing of the project will be structured to achieve a profit which can be used for community benefit as soon as reasonably practicable in the project lifecycle, noting that any wind farm constructed must pay-off its own construction costs and provide a return on capital invested.
- Profit may be retained for the purpose of extending the life of the 'Community Fund', such as through developing new projects, or repowering existing projects.
- The Orkney Community Wind Farm Project is for the benefit of the whole community with benefit delivered through the distribution of funds. It will not be possible for private individuals to take a shareholding in any project.
- Communities located closest to projects will be impacted most by developments. It is therefore considered appropriate to provide these communities with a 'location-specific community benefit payment'.

- In determining the level and geographic extent of any 'location-specific community benefit payment', the principles outlined by the Scottish Government in Community benefits from onshore renewable energy developments: Guidance on good practice principles for communities, businesses, local authorities and others (2019) will be used. This commits the Council to undertaking community consultation on the geographic extent of 'location-specific community benefit payments' as well as on delivery mechanisms for such payments.
- Receipt of a 'location-specific community benefit payment' by any area will not impact on the likelihood of an area receiving further community benefits from the 'Community Fund'.

1.3.5 The Applicant initiated a process in 2017, seeking to identify potentially suitable sites for wind energy generation. 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 alongside an 'expressions of interest' process and sites were tested against an initial range of technical and environmental parameters. Faray 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 (further details of the site identification and design of the Proposed Development can be found in Chapter 2).

1.4 Purpose of the EIA Report

1.4.1 ITPEnergised (ITPE) was appointed by the Applicant to undertake an Environmental Impact Assessment (EIA) of the Proposed Development in accordance with The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the EIA Regulations') and the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended). The EIA process is the systematic process of identifying, predicting and evaluating the environmental impacts of a proposed development. The EIA process is reported in this EIA Report, which identifies the methodologies used to assess the environmental effects predicted to result from the construction, operation and decommissioning of the Proposed Development. Where appropriate, it also sets out mitigation measures designed to prevent, reduce and, if at all possible, offset potential significant adverse environmental impacts. An assessment of residual effects, those expected to remain following implementation of mitigation measures, is also presented.

1.4.2 The main findings and conclusions of this EIA Report are summarised in a Non-Technical Summary (NTS), as required by the EIA Regulations. The NTS, provided as a stand-alone document, summarises the key findings of the EIA in easily accessible, non-technical language, ensuring everyone with an interest in the project can understand and access information on its predicted environmental effects.

1.4.3 The EIA Report and NTS accompany the application being submitted to OIC for consideration.

1.5 Structure of the EIA Report

1.5.1 The EIA Report is split into five volumes, with the NTS forming a separate document. Volume 1 of this EIA Report is structured as follows:

- Chapter 1 provides an introduction to the Applicant, the Proposed Development and the EIA;
- Chapter 2 provides a description of the design iteration process, detailing how the Proposed Development evolved through the course of the assessment process and the elimination of alternative development options;
- Chapter 3 provides a description of the existing site, details of the Proposed Development, the construction, operation and maintenance processes, decommissioning process, need for the development and carbon considerations;
- Chapter 4 is the methodology of the EIA process including the scope of the process, justification for topics scoped out of the EIA, and details of the Public Consultation process;

- Chapter 5 is the planning policy context;
- Chapters 6 to 17 assess the likely significant effects on a range of receptors. These include: landscape and visual amenity; ornithology; terrestrial ecology; noise; cultural heritage; geology, hydrology, and hydrogeology; traffic and transport; socio-economics, tourism and recreation; aviation and radar; shadow flicker; underwater noise; and marine water and sediment quality.
- Chapter 18 reports on other issues arising, namely telecommunication, air quality, carbon savings and marine radar;
- Chapter 19 is the Schedule of Environmental Commitments, which summarises all of the mitigation measures presented in this EIA Report; and
- Chapter 20 provides summary tables of all predicted residual effects.

1.5.2 Volume 2 contains the non-landscape and visual figures that inform the EIA Report.

1.5.3 Volume 3 contains the landscape and visual figures and visualisations and cultural heritage visualisations.

1.5.4 Volume 4 contains supporting information and appendices for each of these technical chapters, and additional studies that have been prepared to inform the relevant assessments as reported in the EIA Report.

1.5.5 Volume 5 contains confidential technical appendices.

1.5.6 Additional supporting documents which form part of the planning application submission include a Non-Technical Summary of the EIA Report, a Planning Statement, a Pre-Application Consultation (PAC) Report and a Design and Access Statement (DAS). Similarly, a separate PAC Report has also been prepared to support the marine licence applications.

1.6 EIA Project Team

1.6.1 The assessment was undertaken by the ITPEnergised (ITPE) environmental team supported by external consultants as shown in Table 1.1 below.

Table 1.1 – EIA Team

Person	Role	Expertise	Qualifications
Roy Ferguson (ITPE)	EIA Project Manager	Over 14 years' experience leading and undertaking EIAs for energy generation projects across the UK.	BSc (Hons.), MSc
Rebecca Todd (ITPE)	EIA Project Manager	Over 12 years' experience leading and undertaking EIAs across a range of sectors, including wind farms across Scotland.	BSc (Hons), PIEMA
Jenny Hazzard (ITPE)	EIA Project Director	Over 19 years' experience leading and undertaking EIAs for energy generation projects across the UK.	BSc, MSc, PIEMA

Person	Role	Expertise	Qualifications
Gemma Tait (ITPE)	Marine EIA lead	11 years' experience leading and undertaking EIAs for energy and infrastructure projects across the UK, including offshore energy.	MSc, MA, IEMA Affiliate
Steven Black (JLL)	Planning and consenting lead	Planner with over 22 years of experience across the UK within both local authority and private sectors.	MRTPI, MSc
Deirdre Thom (JLL)	Author of Planning Statement	Planner with over 9 years of experience across the UK.	MRTPI
Jo Phillips (OPEN)	Landscape and visual lead	Chartered landscape architect with over 14 years' experience across multiple wind farm sites.	BA (Hons), Dip UD, MLI
Richard King (ITPE)	Ornithology lead	Over 13 years of experience having undertaken ornithology chapters for over 15 EIAs for onshore wind, marine renewables, aquaculture and other energy infrastructure developments. Also undertaken or project managed ornithological survey work for these and numerous other developments.	BSc (Hons) Zoology, MRes Environmental Biology
Allan Taylor (ITPE)	Lead author - ornithology	Ecologist with over 6 years of experience.	BSc (Hons), MSc, ACIEEM
Mikael Forup (ITPE)	Ecology lead	14 years of experience as an ecological project manager and advisor, undertaking assessments for over 15 wind farms.	BSc (Hons), PhD Restoration Ecology; CEnv, FCIEEM
Mark Berry (ITPE)	Lead author - ecology	Over 19 years of combined consultancy, research and environmental education experience. Involved in the development process of 33	BSc (Hons), MSc, MSc, MSc, MCIEEM, PIEMA

Person	Role	Expertise	Qualifications
		wind farms, from initial ecological site survey, through EcIA assessor, to post-consent ECoW supervision.	
Jenny Hazzard (ITPE)	Geology, hydrology and hydrogeology	Over 19 years of consulting experience in geology, peat, hydrogeology and water resources.	BSc, MSc, PIEMA
Lynne Roy (AOC Archaeology)	Cultural heritage lead	A Project Manager and has 14 years of knowledge and experience in the historic environment, with a specialism in preparing Environmental Impact Assessments.	BA (Hons), MSc, MCIfA, FSA Scot
Gordon Buchan (Pell Frischmann)	Traffic and transport lead	Transport planner with over 23 years' experience and has worked on over 400 wind farm projects across the UK, Ireland and Northern Europe.	BEng (Hons), MSc, CMILT, MCIHT
Scott McGarva (Pell Frischmann)	Engineering Lead	Civil Engineer and Project Manager with over 20 years' experience working on onshore renewable energy schemes within the UK and Ireland from pre-planning through to onsite delivery.	HNC Civil Engineering , MCIHT, CMILT
Simon Waddell (ITPE)	Noise and vibration lead	Principal Noise Consultant with over 9 years' experience as a technical specialist in environmental noise.	BSc, MIOA, PGDip
Graeme Blackett (BiGGAR Economics)	Socio-economic support	Economist with over 25 years' experience, specialising in the wind sector.	BA (Hons), MEDAS, MIED
Ian Fletcher (WBS)	Aviation lead	Wind Energy consultant, specialising in aviation impacts advising government and industry for 21 years	BEng (Hons), IMechE

Person	Role	Expertise	Qualifications
Rebecca Todd (ITPE)	Shadow Flicker Lead	7 years' experience undertaking shadow flicker assessments for wind farms.	BSc (Hons), PIEMA
Tom Benson (HR Wallingford)	Underwater noise lead	15 years' experience as a physical oceanographer, specialising in underwater acoustics, hydrodynamics and agent-based modelling of marine species.	MRes, PhD
John Bleach (HR Wallingford)	Marine water and sediment quality lead	A marine ecologist consultant with over 17 years' experience in the marine and freshwater field, including EIA, marine monitoring and marine policy.	BSc, MSc
Colin W Innes (Shepherd and Wedderburn LLP)	Legal review of EIA	Solicitor with over 27 years of experience specialising in planning and environmental law.	LLB (Hons), DLIP, LLM (Environmental Law), LARTPI and Accredited by The Law Society of Scotland as a specialist in Planning Law.

1.7 Availability of the EIA Report

1.7.1 In line with the Town and Country Planning (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020 and The Marine Works and Marine Licensing (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020, hard copies may not be available for inspection at public locations. Electronic copies will however be available online. In addition, all documents are available (as a PDF for screen viewing only) on a USB for £15.00 or as a hard copy for £1,600.00 (including printing and distribution).

1.8 Representations to the Application

1.8.1 Any representations to the Town and Country Planning application should be made directly to OIC Development Management at planning@orkney.gov.uk. Whilst any representations with respect to the marine licence applications should be made directly to MS-LOT at ms.marinelicensing@gov.scot.

1.9 References

BEIS (2019). Renewable electricity by Local Authority. Available at: https://www.gov.uk/government/statistics/regional-renewable-statistics

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

Scottish Executive (1997). Town and Country Planning Act (Scotland) 1997. Available at: https://www.legislation.gov.uk/ukpga/1997/8/contents

Scottish Executive (2006). The Planning etc. (Scotland) Act 2006. Available at: http://www.legislation.gov.uk/asp/2006/17/contents

Scottish Government (2017). The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: http://www.legislation.gov.uk/ssi/2017/102/contents/made

Scottish Government (2017). The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended). Available at: https://www.legislation.gov.uk/ssi/2017/115/contents/made

This page is intentionally blank

2 Design Iteration

Contents

2.1	Executive Summary	2-1
2.2	Introduction	2-1
2.3	Background and Needs Case Considerations	2-1
2.4	Site Selection	2-2
2.5	Opportunities and Constraints	2-3
2.6	Design Principles	2-6
2.7	Proposed Development Design Iterations	2-7
2.8	Do-Nothing Scenario	2-10
2.9	Summary	2-10
2.10	References	2-10

This page is intentionally blank.

2 Design Iteration

2.1 Executive Summary

2.1.1 This chapter describes the site identification and design iteration process which has been undertaken by the Applicant to determine both the location of the site and the design of the Proposed Development.

2.1.2 Throughout the process the Applicant has considered key environmental receptors and has aimed to remove and reduce environmental effects through design.

2.2 Introduction

2.2.1 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 state that the EIA Report must include "*A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects*" (Schedule 4.2) (Scottish Government, 2017). This requirement is similarly stated under Regulation 6 of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).

2.2.2 This chapter provides a description of the site selection process and design iterations that were undertaken prior to arriving at the final design of the Proposed Development, which is described in detail in Chapter 3 (Proposed Development).

2.2.3 It should be noted that different potential wind farm sites are not alternatives in the context of a policy position which is not capped and that key alternatives (as set out within this Chapter) relate to the options for developing the site.

2.3 Background and Needs Case Considerations

2.3.1 The Proposed Development is one of three under development by the Applicant under Orkney's Community Wind Farm Project. The aims of this project are threefold:

- to generate income to be used for the benefit of the people of Orkney;
- to aid towards a meaningful response to the Climate Emergency and the urgent need to further decarbonise; and
- to build the case for a new transmission connection for Orkney and unlocking wider benefits to the energy sector in Orkney.

2.3.2 In addressing these aims the scale of development is a critical issue. At present, Orkney is not served by a transmission grid connection and the distribution network is at capacity such that there has been a moratorium on new grid connections since 2012 and many operational wind energy projects are experiencing substantial constraint through an Active Network Management system. Whilst the moratorium was technically lifted in September 2020 there is no material change to the overall level of constraint in Orkney and it is not considered that any substantial project will be able to secure a grid connection with acceptable curtailment levels. The lack of grid capacity has driven some innovation locally, but the overall impact has been to heavily impede development of the energy industry.

2.3.3 In September 2019 the electricity market regulator Ofgem published its final decision on the Needs Case for a transmission connection linking Orkney to the Scottish Mainland. It determined that there is a need for a cable. To justify 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 agreed that in order to trigger a new

220 MW connection, 135 MW of new generation is required to have obtained planning permission, signed up to a grid connection agreement, and passed a financial audit before the end of 2021. Currently less than 40 MW of new wind has gained planning permission. Noting that there are a number of other private projects at different stages of development, it is clear that, without the Proposed Development and the other two wind farms within 'Orkney's Community Wind Farm Project', it is unlikely that the threshold will be met, and a new interconnector will not be built.

2.3.4 Furthermore, there is a need to increase the proportion of energy generated through renewable sources in order to meet the Orkney Sustainable Energy Strategy 2017 – 2025 which strives for 'a secure, sustainable, low carbon economy'. The provision of a minimum level of power generation in order to trigger the new 220 MW connection will allow for greater flexibility to further develop renewable energy technologies within Orkney, including the world leading marine energy sector.

2.3.5 Developing all available renewable energy generation sites with a realistic chance of contributing towards the Needs Case for a new cable to their realistic maximum capacity is viewed as the best way of ensuring that the aims outlined above are achieved.

Orkney Islands Council as a Developer of Onshore Wind Farms in Orkney

2.3.6 Orkney Islands Council (OIC) has therefore taken a number of choices leading to the decision to become a developer of onshore wind farms in Orkney:

- As early as September 2013 OIC endorsed the principle of the council itself establishing, developing or investing in an onshore wind farm project.
- At the OIC Policy and Resources committee meeting of 21st June 2016 OIC approved the principle of the council assuming the role of a project developer of onshore wind farm projects in Orkney.
- At the general meeting on 4th July 2017 OIC resolved that a process should be undertaken to identify property owners in Orkney with large sites able to accommodate scale wind generation who would wish to sell or lease land for the purpose of a wind development.
- At the OIC Policy and Resources committee meeting of 28th November 2017 it was recommended that OIC proceed to planning consent stage with development of a project on Hoy, at a maximum scale of approximately 108 MW. However, following further assessment, it was considered that a single development of that scale was unlikely to be achievable in Orkney.
- At the general meeting of the OIC of 5th March 2019 it was agreed that OIC should focus on developing all sites which have a realistic chance of contributing to the Needs Case for a new grid connection to Orkney, namely Hoy, Faray, and Quanterness.

2.3.7 In terms of delivering community benefit to the people of Orkney there are currently substantial challenges around funding service provision in the area which Orkney's Community Wind Farm Project may be able to address provided income from the Project is of the scale required.

2.3.8 In order to maximise the local benefit from the proposed 220 MW cable, it is also considered desirable to ensure that as much of the generation as possible is taken into local or public ownership, thereby ensuring that profits stay within Orkney.

2.4 Site Selection

Broad Site Identification and Selection

2.4.1 In response to the OIC decision to seek landowners with an interest in selling or renting land for wind farm development, an Expressions of Interest (EoI) process was undertaken in August and September 2017 requesting landowners to get in touch with OIC. A number of responses were received, and each was assessed against defined criteria and compared against other sites received, and sites within OIC ownership.

2.4.2 The outcome of this process was the decision to focus on development of a project of up to 108 MW on Hoy.

2.4.3 Initial baseline survey work at a potential large-scale site which would potentially deliver the entire 108 MW capacity was undertaken in 2018 however based on preliminary findings it was considered that a single development of that scale was unlikely to be achievable in Orkney. A process was therefore undertaken in late 2018 to assess the whole of Orkney for the potential for onshore wind farm development at a smaller scale, which could, in combination, provide the required capacity to support the Needs Case.

2.4.4 This was done by buffering address point data and plotting international designated sites on a map and identifying those areas which were of sufficient size to host a wind farm and were not constrained by either of those limitations. Each site was then investigated in further detail to identify any additional potential constraints. A short list of sites was drawn up and a full assessment of suitability was undertaken, the results of which were used to inform a report to OIC.

Faray Specific Site Identification

2.4.5 The island of Faray (refer to Figure 1.1) 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.

2.4.6 The Faray site was therefore considered alongside responses from the 2017 EoI process (refer to paragraph 2.4.1) and subsequent wider work was undertaken in 2018 to identify suitable sites for development.

2.4.7 In conjunction with the OIC decision on 5th March 2019, to focus on developing all projects which have a realistic chance of contributing to the Needs Case for a new grid connection to Orkney, Faray was selected for progression towards an application for planning permission, alongside sites at Quanterness and Hoy.

2.4.8 Numerous surveys were undertaken on-site which have contributed to the various design iterations presented below culminating in the design detailed in Chapter 3 (Proposed Development).

2.5 Opportunities and Constraints

2.5.1 All wind farm sites have a range of environmental opportunities and constraints which need to be taken into consideration through the design process. At times receptors may be both an opportunity and a constraint depending on their location.

Opportunities

2.5.2 The Proposed Development site has a number of attributes providing a good opportunity for a wind farm site, as discussed below under the following headings:

- planning policy;
- wind resource and topography;
- geological designations;
- ecological and ornithological statutory designations;
- cultural heritage;
- residential receptors;
- landscape sensitivity;
- land ownership and use; and
- peat, private water supplies and watercourses.

Planning Policy

2.5.3 The majority of the Proposed Development site falls within Group 3, an 'Area with Potential for Wind Farm Development' as defined by the Orkney Local Development Plan 2017 (OIC, 2017). Small parts of the site lie within Group 2 'Area of Significant Protection' which relates to the Faray and Holm Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). Group 2 areas "*may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation*."

2.5.4 As detailed below, the Applicant has undertaken a number of surveys and design iterations to demonstrate that the Proposed Development site is appropriate and the reasons for the allocation of the site in Group 2 and 3 can be substantially overcome by siting, design and mitigation.

2.5.5 The Proposed Development is **not** within any areas that have been defined within the Spatial Strategy Framework as *"Areas where wind farms are not acceptable"*.

Wind Resource and Topography

2.5.6 The Orkney Islands are one of the windiest places in the United Kingdom (Met Office, 2019). The average wind speed across the development footprint is c.8.5 m/s[1] at 45 m elevation (DECC, undated). This is substantially above the UK average of 6.8 m/s (DECC, undated).

2.5.7 The site is flat, raising gradually from 0 m Above Ordinance Datum (AOD) on the shore to two small summits of 31 m AOD and 32 m AOD respectively.

Geological Designations

2.5.8 There are no geological designations within the development footprint (refer to Figure 2.1).

2.5.9 The closest designations are as follows:

- Greenan Nev Coast site of Geological Conservation Review (GCR) (approximately 1.4 km east of the development footprint); and
- South Fersness Bay site of GCR (approximately 1.2 km south of the development footprint).

Ecological and Ornithological Statutory Designations (including Marine)

2.5.10 There are no terrestrial ecological designations within the site boundary.

2.5.11 The closest ornithological designation is the Calf of Eday Special Protection Area (SPA), approximately 2.7 km to the north-east and designated for breeding seabirds. The closest Marine Protection Area (MPA) is Wyre and Rousay Sounds MPA approximately 6.3 km to the south-west. This MPA is designated for seaweed communities and marine geomorphology (refer to Figure 2.1).

Cultural Heritage

2.5.12 The site is outwith the Heart of Neolithic Orkney World Heritage Site Sensitive Area and Buffer Zone (refer to Figures 6.3).

2.5.13 There are no listed buildings, battlefields or Conservation Areas within the Proposed Development site boundary (refer to Figure 2.1). There are however listed buildings on the neighbouring islands of Westray, Eday and Rusk Holm.

2.5.14 The closest Garden and Designed Landscape is Balfour Castle on the island of Shapinsay.

[1] The DECC dataset has been used for ease of comparison. The average mean wind speed onsite based on 6 months of monitoring is 9.7 m/s at 79 m.

Residential Receptors

2.5.15 There are no residential properties within the site boundary, or indeed on the island of Faray. The closest dwelling is North Guith c.1.6 km east of the nearest proposed turbine on the island of Eday. (refer to Figure 2.2).

2.5.16 All residential properties are outwith the standard study area for shadow flicker of ten times the turbine rotor diameter.

Landscape Sensitivity

2.5.17 There are no landscape designations within the Proposed Development site boundary. The closest designations are the Hoy and West Mainland National Scenic Area (NSA) (c.29 km) and the Hoy Wild Land Area (WLA) (c.44 km) (refer to Figure 6.3).

Land Ownership and Use

2.5.18 The Proposed Development site is owned by the Applicant and currently used for sheep farming by a tenant farmer. The loss of land to the Proposed Development footprint would not impact upon the agricultural requirements of the landowner or tenant and the new extended slipway would provide improved access.

Peat, Private Water Supplies and Watercourses

2.5.19 The Proposed Development site contains no areas of peat.

2.5.20 Although there are a number of private water supplies marked on the Ordnance Survey (OS) mapping within the site boundary none of these are operational (refer to Figure 2.2).

2.5.21 There are no major surface watercourses within the site boundary (as classified by SEPA).

Constraints

2.5.22 It is important to note that the identification of a constraint does not necessarily result in the exclusion of that area from the potential development envelope; rather it means that careful thought and attention was paid to the constraint and the design altered appropriately. The key constraints which were considered during the design process included:

- cultural heritage;
- landscape and visual;
- marine ecology;
- ornithology;
- noise and residential amenity;
- transport; and
- hydrology.

Cultural Heritage

2.5.23 The setting of a number of Scheduled Monuments and Listed Buildings on Eday and Westray may be impacted by the Proposed Development (refer to Figure 2.1).

2.5.24 There is one scheduled monument within the site boundary at the northern end of Faray, a Chambered Cairn, 280m NW of Quoy (hereafter 'Quoy Chambered Cairn') (refer to Figure 2.2). There are also numerous non-designated archaeological sites across the island of Faray (refer to Figure 2.2).

2.5.25 The Proposed Development has been designed where possible to avoid direct impacts upon known heritage assets through careful siting of infrastructure. Where possible, impacts upon the setting of heritage assets have been avoided or minimised during the iterative design process.

2.5.26 A full assessment of cultural heritage effects is presented in Chapter 10.

Landscape and Visual

2.5.27 Due to the open nature of the Proposed Development site there is potential for landscape and visual effects on a number of landscape and visual receptors on the surrounding islands and intervening seascape.

2.5.28 The incremental measure of the movements to the turbines during the iterative design process has meant that changes in the appearance of the Proposed Development from the key landscape and visual receptors surrounding the site, have also been incremental. In the development of each layout, consideration has been given to keeping the proposed turbines sufficiently inset so as not to encroach on the coastal edge and appear contained on the island. The iterative design process has ensured that the proposed turbines have been set at consistent elevations and spaced evenly, to produce a compact and legible layout from the key viewpoints on the surrounding islands.A full assessment of landscape and visual effects is presented in Chapter 6.

Marine Ecology

2.5.29 The coastline of Faray is designated as both a Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) for grey seals. The Proposed Development infrastructure, with the exception of the access points have been positioned outwith these areas of designation.

2.5.30 A full assessment of underwater noise and marine water and sediment quality impacts from the marine infrastructure is presented in Chapters 16 and 17 of the EIA Report. With assessments of coastal processes and benthos presented in Chapter 18.

Ornithology

2.5.31 The island of Faray is home to a number of ground-nesting seabirds. The layout has been optimised as far as possible to minimise potential effects and provide appropriate separation and mitigation.

2.5.32 A full assessment of effects on ornithology is presented in Chapter 7.

Noise and Residential Amenity

2.5.33 The remote location of the Proposed Development site means that the number of residential receptors that would potentially be subject to impacts is limited (refer to Figure 2.2). There are no residential properties on Faray however the noise impacts on neighbouring islands has been considered in the design of the Proposed Development.

2.5.34 A full assessment of noise is presented in Chapter 9.

Transport

2.5.35 The current slipway on Faray is significantly deteriorated and a new extended slipway and landing jetty will be required to access the Proposed Development site.

2.5.36 The potential impacts of the new extended slipway and landing jetty have been factored into the design and are assessed in the technical chapters (Chapters 6-18) where relevant.

Hydrology

2.5.37 A number of drainage ditches cross the Proposed Development site, these will be buffered and avoided where possible. There are also two springs located on site (although it should be noted that these do not provide private water supplies).

2.5.38 A full assessment of hydrology is provided in Chapter 11.

2.6 Design Principles

2.6.1 Taking into consideration the above constraints and opportunities, the following principles were adopted where possible during the design iterations undertaken by the Applicant to ensure that the final design of the Proposed Development was the most suitable for the site:

- maximising wind yield and maintaining adequate spacing between turbines;
- avoiding inconsistent turbine spacing, such as relatively large gaps, outliers or excessive overlapping of turbines to minimise visual confusion and ensure a balance / compact array from key views;
- keeping the proposed turbines sufficiently inset so as not to encroach on the coastal edge and to ensure turbines appear contained on the island;
- minimising works within the SAC and SSSI and minimising potential effects;
- maintaining a suitable distance from the Scheduled Monument;
- maintaining a suitable distance from the seabird nest buffers;
- minimising impacts in respect of noise and the visual amenity of residential properties;
- minimising impacts on the non-designated cultural heritage assets; and
- maintaining a suitable distance from the drainage ditches and springs.

2.7 Proposed Development Design Iterations

2.7.1 The Applicant has undertaken multiple design iterations of all aspects of the Proposed Development including the turbine layout and the infrastructure layout. This section describes the principal design iterations that have been undertaken as the Applicant has sought to maximise the number of turbines on the site, whilst minimising the environmental effects as identified above.

Turbine Layout

Layout A (EIA Scoping Report)

2.7.2 Layout A aimed to maximise the number of turbines on site. The layout aimed to ensure that all turbines were located outwith the SAC and SSSI boundaries and identified potential for eight turbines (refer to Figure 2.3).

Layout B

2.7.3 Layout B followed from Layout A, maintaining a tip height of 149.9 m, but considered a greater spacing between turbines following initial wind monitoring results. It moved turbines T1 and T2 slightly south and T3 slightly north. This meant that T4 moved from the east of the island to the west near Langie Geos. As T4 had moved this allowed T5 and T7 to also move further north. There was no longer space for T6 of Layout A and therefore T8 of Layout A became T6 of Layout B, and the total number of turbines reduced from eight to seven (refer to Figure 2.3).

Layout C

2.7.4 To ensure that the turbine blades did not oversail the SAC and SSSI a 68 m buffer was placed around the SAC boundary and turbines moved outwith this[2]. A 100 m buffer was also placed around the known locations of ground-nesting protected seabirds. Details relating to protected species are provided in Confidential Appendix 7.3 and Confidential Figure 7.11.

2.7.5 The addition of these constraints meant that T2 and T3 were moved south-east and south respectively to position them outwith the SAC buffer and T1 was moved south into the space that this created.

[2] It should be noted that the boundary of the SSSI and SAC, although designated for the same receptor are not identical.

2.7.6 T4, T6 and T7 were moved slightly to ensure that they are outwith of the SAC buffer. Their movement, and that of T2 meant that T5 was required to move to the centre of the island to ensure appropriate spacing between the turbines (refer to Figure 2.4).

Layout D

2.7.7 In advance of detailed wind monitoring an assumption was made that the pre-dominant wind direction would be south-westerly, this resulted in the removal of an additional turbine in Layout D, decreasing the number of turbines from seven to six (refer to Figure 2.4).

2.7.8 In order to achieve this spacing turbine T1 moved north again, to where it had been located in Layout B, allowing T2 and T3 to move northwards (whilst still respecting the constraints outlined for Layout C). Turbine T4 moved to the centre of the island, while T5 moved to south-east coast. Turbine T6 remained in almost the same position as Layout C and T7 was removed entirely (refer to Figure 2.4).

Layout E

2.7.9 Following advice from the project archaeologist the Applicant placed a 500 m buffer around the Scheduled Quoy Chambered Cairn in the north of the island. This buffer meant that turbine T1 of Layout D was no longer feasible. It therefore moved south and replaced turbine T3 of Layout D. Turbine T3 moved to the central-western boundary of the site near Blue Geo, which pushed turbine T4 eastwards towards Ringie Geo. Turbine T5 moved slightly south to both increase the separation distance between it and a non-designated archaeological site and to accommodate appropriate separation distance between T5 and T4. Turbine T6 did not alter position (refer to Figure 2.5).

Layout F

2.7.10 Following the further analysis of wind data from the monitoring it was determined that the island of Faray does not have a pre-dominant wind direction and therefore the spacing between turbines is required to be circular rather than elliptical.

2.7.11 This led to minor adjustments in the layout to accommodate the correct spacing, with the movement of turbines T2, T4 and T5 to the south (refer to Figure 2.5).

2.7.12 This final Layout F is the turbine layout which is described in Chapter 3 of this EIA Report and for which the Applicant is applying for consent.

Terrestrial Infrastructure Layout

2.7.13 Following confirmation of the turbine locations in Layout F, the design of the accompanying infrastructure was considered. This included hardstandings, substation, borrow pit search areas, temporary construction compounds and access tracks.

Layout 1

2.7.14 The principal access track for the site was developed to follow the existing track down the centre of the island. This then had spurs leading to the existing jetty, turbines, T3, T4, T5 and T6 and then terminated in a loop connecting turbines T1 and T2.

2.7.15 The construction compound was placed in the centre of the site to the north of the access track spur leading to turbine T3, with the substation adjacent (refer to Figure 2.6).

Layout 2

2.7.16 Following advice from the project ornithologists the loop connecting T2 to the principal access track was removed. A turning head was therefore added to the hardstanding of turbine T2 to allow vehicles to return to the construction compound via turbine T1.

2.7.17 The access track leading to, and the orientation of the hardstanding of turbine T6 were altered to minimise impacts to ornithology and the non-designated archaeological assets at this location.

2.7.18 The temporary construction compound was moved south closer to the location of the new extended slipway and landing jetty, while the substation was moved to the land adjacent to the new extended slipway and landing jetty to improve access to the expected position of the sub-sea cable.

2.7.19 In order to minimise the volume of aggregate required to be transported to the island a borrow pit search area was identified to the west of Hamar on the access track leading to turbine T1 (refer to Figure 2.6).

Layout 3

2.7.20 Following Layout 2 it was identified that the boundary of the borrow pit search area and the hardstanding and access track of turbine T3 entered the boundary of the SSSI. These two pieces of infrastructure were therefore slightly moved east and south respectively to avoid the SSSI (refer to Figure 2.7).

2.7.21 The substation was similarly moved to locate it outwith the SAC and SSSI boundary.

2.7.22 A second construction compound was added adjacent to the access track leading from the new extended slipway and landing jetty to the principle construction compound, to facilitate the construction of the new extended slipway and landing jetty (refer to Figure 2.7).

Layout 4

2.7.23 The northern borrow pit search area boundary was reduced to avoid some areas identified as groundwater dependent terrestrial ecosystems. While a southern borrow pit search area was added to the east of turbine T5 at the site of a previous borrow pit.

2.7.24 The construction compound for the new extended slipway and landing jetty was moved outwith the SAC and SSSI boundary to the location of the substation which would be built following the completion of the new extended slipway and landing jetty (and therefore no longer in use as a construction compound).

2.7.25 Due to changes in the design of the marine infrastructure the access track from the new extended slipway and landing jetty to both the principal construction compound and the principal access track was altered which increased the distances between this section of track and ornithological and non-designated archaeological assets (refer to Figure 2.7).

2.7.26 A permanent met mast was located near Holland at the centre of the island (although it should be noted that this location is indicative). Areas of hardstanding which could be removed and restored post-construction were identified.

Marine Infrastructure

2.7.27 The marine infrastructure consists of the new extended slipway and landing jetty and the tracks that connect to the onshore infrastructure. The layout (refer to Figure 3.3) has been optimised as far as possible to minimise works within the SAC/SSSI and to minimise potential effects. The key factors that fed into the design evolution were:

- the new extended slipway has been positioned on the footprint of the existing slipway in a location identified as preferable under typical sea conditions;
- the landing jetty was moved north (from initial design location) so as to reduce the amount of infill between the marine elements and the shore (in turn reducing the infrastructure footprint on the existing beach); and
- the orientation of the marine infrastructure was optimised to:
  - ensure the shortest practical route to deep water (in turn minimising the extent of the marine infrastructure);
  - minimise the amount of infrastructure beyond Mean Low Water Spring (MLWS) (in turn ensuring the bulk of construction works can be undertaken outwith the water); and

- minimise the extent of onshore infrastructure and avoid direct impacts on a non-designated archaeological site (Ness boat shed).

Conclusion

2.7.28 Turbine Layout F and infrastructure Layout 4 is the layout that has been taken forward as the design for the Proposed Development within this EIA Report. Further design work may be required following the detailed ground investigations which will take place post-consent. In this regard, there will be a micro-siting allowance of up to 50 m in all directions in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify unsuitable ground conditions or environmental constraints that could be avoided. No micro-siting will be undertaken that results in an increase in the significance of adverse effects.

2.8 Do-Nothing Scenario

2.8.1 Should the Proposed Development as described in Chapter 3 (Proposed Development) not be consented (the "do-nothing scenario"), it is anticipated that the Proposed Development site will not alter from the current baseline described above and in Chapters 6-17.

2.9 Summary

2.9.1 The final layout has been informed by a robust environmental assessment and design iteration process, taking into account physical constraints, potential environmental, landscape and visual impacts and their effects. The information used to inform the design iteration process included consultation responses received, baseline data and the impact assessment undertaken.

2.9.2 The final layout comprises six turbines, and their associated infrastructure, including hardstanding, access tracks, substation, met mast, temporary construction compounds, borrow pits, new extended slipway and landing jetty as shown in Figure 1.2.

2.9.3 The Proposed Development layout is considered to represent the most appropriate design, taking into account potential environmental impacts and physical constraints, while maximising the renewable energy generating capability of the site.

2.10 References

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

Scottish Government (2017) *Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended).* Available at: http://www.legislation.gov.uk/ssi/2017/102/contents/made

3 Proposed Development

Contents

3.1	Executive Summary	3-1
3.2	Introduction	3-1
3.3	Site Status and Context	3-1
3.4	Description of the Proposed Development	3-2
3.5	Construction	3-7
3.6	Operation and Maintenance	3-11
3.7	Decommissioning	3-11
3.8	References	3-12

This page is intentionally blank.

3 Proposed Development

3.1 Executive Summary

3.1.1 The Proposed Development consists of six turbines, up to 149.9 m to tip. A number of ancillary elements are also proposed, including access tracks, crane hardstandings, underground cabling, possible external transformers, on-site substation and maintenance building, temporary construction compounds, borrow pits, a permanent meteorological mast, a new extended slipway and landing jetty.

3.1.2 Construction will take approximately 24 months and environmental impacts will be controlled, mitigated and monitored through the implementation of a Construction Environmental Management Plan (CEMP).

3.1.3 It is predicted that during the normal operation of the site there would be up to two vehicle movements per week to Kirkwall Harbour (the likely start and end point for boat trips to and from Faray) for maintenance purposes.

3.1.4 The Applicant is seeking in-perpetuity consent for the Proposed Development. However, should the Proposed Development be decommissioned it is expected that decommissioning would take approximately eight months. The environmental effects of decommissioning are considered to be no greater than construction effects but experienced over a much shorter time period. All turbine components will be carefully removed, and foundations removed to 1 m below ground level. Hardstandings will be removed and/or grassed over, however it is likely that the access junction and sections of access track may be left in situ to assist with agricultural access. Likewise, it is likely that the marine infrastructure may be left in place to allow continued access to the island.

3.2 Introduction

3.2.1 This chapter provides a description of the site and its geographical context and presents a description of the Proposed Development.

3.2.2 The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (Scottish Government, 2017) require that the EIA Report must *include "a description of the location of the development; and a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases"* Schedule 4, 1 (a) and (b).

3.2.3 Similarly, the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) require that the EIA Report must include "*a description of the works, including…a description of the location of the works, the physical characteristics of the whole works, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases, the main characteristics of the operational phase of the works, and an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases"* Schedule 4, 1 (a) – (d).

3.3 Site Status and Context

3.3.1 The site comprises the island of Faray, an uninhabited island to the north and west of Eday and south-east of Westray in the Orkney Islands. A smaller uninhabited island Holm of Faray is immediately to the north and can be reached from Faray on foot at low tide. Faray is approximately 17 km north-east of Orkney Mainland, and approximately 25 km from Kirkwall. The island extends to approximately 168 hectares (ha) and is centred on British National Grid (BNG) 353112, 1036752 (refer to Figure 1.1).

3.3.2 The topography of the island comprises two low hills. The southern of the two forms approximately the central point of the island, rising to 32 m Above Ordnance Datum (AOD). Approximately 700 m

to the north a second hill rises to 31 m AOD. The ground level falls away fairly gently from the two hills, the steepest slope being near the coast to the west of the southern hill. The coastline is generally defined by rocky cliffs with geos and caves, except on the west coast near the north of the island and on the far south-east coast, where there are stretches of beach.

3.3.3 The island comprises open fields of improved pasture, a number of abandoned buildings and a slipway. The current land use is sheep farming.

3.3.4 There are no major surface watercourses on the island. There are however, two springs located near the centre of the island from which a small stream flows west towards the sea.

3.3.5 There are no residential properties within the site boundary. The closest dwelling is North Guith c.1.6 km east of the nearest proposed turbine.

3.4 Description of the Proposed Development

3.4.1 The Proposed Development would consist of six wind turbines of up to a maximum of 149.9 m height from ground to blade tip when vertical. The likely installed capacity of the Proposed Development will be approximately 28.8 MW[1]. The actual installed capacity may be greater or less dependent on turbine model selection but will not be greater than 50 MW. A number of ancillary elements are also proposed, including access tracks, crane hardstandings, underground cabling, possible external transformers, on-site substation and maintenance building, temporary construction compounds, borrow pits, permanent meteorological mast, a new extended slipway and a landing jetty. The proposed site layout is shown in Figure 1.2.

3.4.2 Whilst the location of the infrastructure described below has been determined through an iterative environmental based design process, there is the potential for these exact locations to be further optimised through micro-siting allowances prior to construction. In this regard, there will be a micro-siting allowance of up to 50 m in all directions in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify unsuitable ground conditions or environmental constraints that could be avoided.

3.4.3 The assessments within this EIA report have included the considerations of this 50 m micro-siting and it does not alter the conclusions formed as to likely effects.

Turbines and Turbine Foundation

3.4.4 The Proposed Development will comprise a maximum of six wind turbines with a maximum height from ground to blade tip, when vertical, of 149.9 m (refer to Figure 3.1). The total generating capacity is anticipated to be approximately 28.8 MW; however, this will depend on turbine models which are available at the time of confirming a turbine supply contract, and which fit within the physical parameters used for the purposes of this EIA. In any case, the total generating capacity will not exceed 50 MW.

3.4.5 The proposed locations of the turbines have been defined in order to enable the EIA to describe fully the Proposed Development for which permission is being sought. The British National Grid coordinates denoting where each of the turbines are proposed to be located, along with their approximate height above ordnance datum (AOD) are listed in Table 3.1 below.

[1] 28.8 MW is an indicative capacity. Actual installed capacity may be greater or less dependent on turbine model selection but will not be greater than 50 MW (i.e. will not breach the 50 MW threshold that would require the application to be determined under Section 36 of the Electricity Act 1989 (as amended)).

Table 3.1 – Wind Turbine Coordinates (British National Grid)

Turbine	Easting	Northing	AOD (m)
T1	352884	1037440	17
T2	353193	1037075	17
T3	352836	1036575	15
T4	353379	1036155	21
T5	353333	1036155	13
T6	352973	1035840	9

3.4.6 Each of the turbines comprises the following components:

- blades;
- tower;
- nacelle;
- hub; and
- transformer.

3.4.7 Each turbine will consist of a tapered tubular steel tower and a nacelle containing the gearbox or direct drive, generator and associated equipment, to which are attached a hub and rotor assembly including three blades. At the base, the turbine will be approximately 5 m in diameter.

3.4.8 The turbines will not require night-time lighting as they are below the 150 m threshold stipulated in Civil Aviation Authority Guidance. Each turbine will however be fitted with medium intensity fixed red LED obstruction lights (2000 cd) for daylight hours only. The intensity can be reduced in conditions of high visibility. If the horizontal meteorological visibility in all directions from every wind turbine generator is more than 5 km, the intensity for the light may be reduced to not less than 10 % of the minimum peak intensity; i.e. 200 cd. This can be achieved automatically with turbine mounted sensors, measuring both visibility and light levels for daylight hours use only. In addition to the reduction of intensity under conditions of good visibility, the intensity also reduces sharply when observed from beneath the light, with reference to the horizontal. At -1 degree the intensity recommended by the CAA (via ICOA Annex 14 Volume 1 to the Chicago Convention) should not exceed 56 % of the maximum intensity, falling to 4 % at -10 degrees. Aviation and radar are covered in further detail in Chapter 14.

3.4.9 An elevation drawing of a typical turbine is illustrated in Figure 3.1. The turbines will be of a typical modern, three-blade, horizontal axis design in semi-matt white or light grey with no external advertising or lettering except for statutory notices. The specific turbine manufacturer and model has not yet been selected as this will be subject to a tendering exercise and will be confirmed post consent. Therefore, for the purposes of the EIA likely turbine dimensions and operational attributes have been established as a maximum development scenario.

3.4.10 A transformer will be sited either within the base of each tower or externally sited a few metres from the turbine tower. For the purpose of the EIA it has been assumed that the transformers would be external and have the approximate dimensions of 6 m long by 3 m wide by 2.5 m high.

3.4.11 The turbine foundations are anticipated to be an inverted “T” in section consisting of a reinforced central concrete pedestal with a reinforced concrete slab. The tower is proposed to be attached to the foundations via an anchor cage which is then tension anchored to the tower. Until detailed

ground investigations have been undertaken the exact size and depth of foundations required cannot be determined. Therefore, for the purposes of this EIA Report, the following approximate dimensions have been used:

- reinforced concrete slab approximately 12 m -15 m in diameter; and
- depth of the foundations approximately 3 m – 3.5 m.

3.4.12 An illustration of a typical turbine foundation is provided in Figure 3.2. The actual foundation design will be specific to the site conditions as verified during detailed site investigations undertaken before construction commences. In the unlikely event that ground conditions are unsuitable for the standard foundation design described above, a piled foundation design may be required, involving the installation of a series of concrete piles per turbine, with each pile being bored or driven until the underlying bedrock is reached.

Crane Hardstandings

3.4.13 To enable the construction of the turbines, a crane hardstanding area will be required to accommodate assembly cranes and construction vehicles. This will comprise a crushed stone hardstanding area measuring, approximately 3,685 m^2, with a typical thickness of approximately 600 mm, but subject to the specifications required by the selected crane operator and following detailed ground investigations prior to construction. The crane hardstandings will remain in place during the lifetime of the Proposed Development to facilitate maintenance works.

3.4.14 In addition to the permanent crane hardstanding, a temporary turbine laydown area and a turning circle will be constructed adjacent to each turbine. This will consist of crushed stone hardstanding approximately 300 mm in depth covering an area of 1,320 m^2 per turbine. This will be removed and completely reinstated following construction.

3.4.15 The crane hardstandings are illustrated as part of the site layout on Figure 1.2.

Access to the Proposed Development Site

3.4.16 The Proposed Development will be accessed from new marine access points to be constructed on the south of the island. The new access will comprise of:

- a new extended slipway to replace the existing facility, which would need to be replaced regardless of the Proposed Development as the current slipway is badly damaged and access to the island is still required for agricultural purposes. The extant slipway is c.20 m long by 3.5 m wide, though this was originally longer. This would be upgraded to a maximum 36 m long and 8 m wide. The design of the slipway would be sufficient to enable access by larger vessels with the bow or stern gate and would be built to a standard design for the Orkney Islands to allow access for local vessels*;* and
- a new landing jetty to accommodate abnormal loads. The jetty would comprise a causeway up to 55 m long and 10 m wide, terminating in square structure for docking measuring up to 20 m by 20 m. The square docking structure would likely be constructed on site from sheet piles. The causeway would be in-filled and capped-off with concrete batched on-site.

3.4.17 The underwater noise assessment and the marine water and sediment quality chapters (refer to chapters 16 and 17 respectively) provide further details with respect to the new extended slipway and landing jetty and Figure 3.3 illustrates their anticipated location and extent.

3.4.18 A Transport Assessment (refer to Chapter 12 and Appendix 12.1) has been prepared in support of the application for the Proposed Development and this provides greater detail on access routes to the site for construction vehicles. Chapter 12 (Traffic and Transport) includes a review of the proposed route, construction traffic impacts, and an abnormal load route review.

3.4.19 Prior to construction, appropriate highway safety measures for the roads on The Mainland of Orkney will be agreed with Orkney Island Council (OIC), with necessary signage or traffic control measures implemented throughout the construction phase on the agreed basis.

On-Site Access Tracks

3.4.20 The access tracks within the site boundary will generally be c.4.5 m wide, although will be wider on some bends and where passing places will be installed. It is anticipated that approximately 500 m of existing tracks would be upgraded and approximately 4057 m of new access tracks constructed.

3.4.21 Construction of the access tracks will require stripping existing unsuitable material to a suitable bearing or the designed formation and placing a filter membrane and or geotextile reinforcement membrane (depending on site conditions) on the ground. Aggregate will then be layered, with the access track capped with a layer of Type 1 or similar material.

3.4.22 The proposed layout of access tracks within the site is shown on Figure 1.2 and illustration of a typical access track is provided in Figure 3.4.

Drainage

3.4.23 A detailed drainage design will be developed and provided to SEPA and OIC prior to construction.

3.4.24 The detailed drainage design will largely be based on good practice and the following guidance:

- The Construction Industry Research and Information Association (CIRIA), 'Environmental Good Practice on Site (C650)' (2005);
- CIRIA, 'Control of Water Pollution from Construction Sites (C532)' (2001); and
- SEPA flood mapping.

3.4.25 It will take into account activities during the construction and operational phases of the Proposed Development, including:

- access roads;
- turbine foundations; and
- hardstanding areas and buildings (including crane hardstandings, construction compound, substation compound, and associated infrastructure).

3.4.26 Illustration of a typical drainage design is provided in Figure 3.5

Electrical Connection

3.4.27 The electrical power produced by the individual turbines will be fed to an on-site substation within the site via underground cables. The proposed location for the on-site substation is shown in Figure 1.2.

3.4.28 On-site cables installed by the Applicant within the site will be laid in trenches, typically up to a maximum of 0.5 m deep and 1 m wide. The trenches will also carry earthing and communication cables for the operation of the Proposed Development. Cabling will be located mainly adjacent to the access tracks. The cables will be laid on a sand bed and the trenches backfilled using suitably graded material.

3.4.29 The on-site substation compound will measure approximately 30 m by 60 m and will accommodate all the equipment necessary for automatic remote control and monitoring of the Proposed Development, in addition to the electrical switchgear, fault protection and metering equipment required to connect the Proposed Development to the electricity transmission network, and a hardstanding area for vehicle parking constructed from crushed stone to a depth of approximately 600 mm. The substation building will measure approximately 25 m by 15 m with an approximate height of 7.6 m. This may reduce in scale subject to the final detailed design of the substation. Indicative elevation drawings of the on-site substation are provided in Figure 3.6. It will be

constructed and finished in accordance with details to be approved by OIC through an appropriately worded condition.

3.4.30 The Proposed Development would contribute to the investment required for the delivery of an electricity interconnector between Orkney and the Scottish Mainland. The interconnector is a nationally important infrastructure project (identified in NPF3) that could lead to considerable economic benefits enabling the construction and operation of wind farms and infrastructure to help a constrained marine sector, and downstream benefits to other parts of the local energy industry.

3.4.31 Connection of the Proposed Development to the grid will be subject to a separate consenting process.

Meteorological Monitoring Mast

3.4.32 A permanent on-site meteorological monitoring mast will be required to monitor wind speeds for the operational life of the Proposed Development. It is expected that the mast will be of a height of up to 90 m and will be situated on a reinforced concrete foundation of approximately 5 m by 5 m (refer to Figure 3.7).

3.4.33 The final location and height of the meteorological mast will be determined in consultation with the confirmed wind turbine manufacturer prior to construction of the Proposed Development. It is proposed that these details and any requirements for aviation lighting will be addressed through an appropriately worded condition.

Temporary Construction Compounds

3.4.34 A secure, temporary construction and material storage compound will be required during the construction period. The location of the compound is shown in Figure 1.2 and measures 100 m by 100 m.

3.4.35 The compound will house temporary portable cabin structures to be used as the main site office and welfare facilities, including toilets, clothes drying and kitchen, and provision for sealed waste storage and removal. This area will also be used for the storage and assembly of turbine components, parking for vehicles, containerised storage for tools and small parts, and oil and fuel storage.

3.4.36 A smaller temporary construction compound (50 m by 50 m), located in the vicinity of the access point (Figure 1.2) will be required for the construction of the new extended slipway and landing jetty.

3.4.37 The compounds will be constructed using the same methodologies as for the site access tracks and will be removed[2] and the land will be restored following completion of the construction phase.

3.4.38 The detailed location, size and engineering properties of the construction compounds will be confirmed prior to the start of construction, after the turbine supplier and model have been confirmed.

Borrow Pits

3.4.39 A borrow pit is an area where material is excavated for use at another location.

3.4.40 To minimise the volume of imported material brought onto the site and any associated environmental impact, on-site borrow pits will be utilised where practical.

3.4.41 Potential temporary, borrow pit search areas have been identified and it is proposed that the actual borrow pits would be located within these search areas. The locations of the search areas are shown on Figure 1.2.

3.4.42 Detailed site investigations will be carried out prior to construction to confirm the rock type, rock characteristics and suitability, as well potential volumes to be extracted from the search areas. The

[2] With the exception of the area that will house the substation.

final borrow pits identified during the geotechnical evaluation will be defined within the Construction Environmental Management Plan (CEMP). The pollution control measures to be implemented during usage of the borrow pits and its reinstatement will also be covered within the CEMP.

3.4.43 Environmental considerations have influenced the location of the borrow pit search areas to minimise the effect on ecology, hydrology and landscape, and to allow successful reinstatement measures to be put in place as appropriate.

3.5 Construction

3.5.1 The construction period of the Proposed Development will occur outwith the breeding season for grey seals. i.e. unless otherwise agreed with OIC and NatureScot, construction will not take place between the 15th of September and 31st of December inclusive.

3.5.2 Wherever possible, all vegetation clearance will occur outside the bird breeding season (i.e. between December – March, inclusive), to ensure that no active nests are damaged or destroyed by the proposed works. If work is required after March 31st, the Suitably Qualified Ecologist (SQE) will search areas of clearance in advance of works and buffer active nests as appropriate.

3.5.3 The estimated construction period for the Proposed Development is approximately two years and includes a programme to reinstate all temporary working areas. It is anticipated that once ecological and weather constraints have been applied, activity will largely be focussed on 17 months of the two year period. Given the remote location of the Proposed Development, it is proposed that construction hours will be 07:00 – 20:00, seven days a week. The Environmental Health Officer (EHO) stated the following when consulted on working hours *"Given the unique location and probability that weather could have a major impact on scheduling deliveries to site I have no objection in principle to an application for 7 day a week working."*

3.5.4 Details of the construction programme will be provided to OIC in the CEMP prior to the commencement of construction and secured via an appropriately worded condition.

3.5.5 Any construction out with these hours, due to weather windows and/or health and safety requirements will be in line with the noise limits as assessed in Chapter 9 (Noise) and advance warning of any works out with the agreed working hours will be provided to OIC EHO and local residents.

3.5.6 An indicative construction programme is shown below:

Table 3.2 – Indicative Construction Programme

Activity	Mar	April	May	June	July	Aug		Mar	April	May	June	July	Aug
Site Establishment													
Emergency Access Works													
Slipway Fill Materials													
Slipway Concrete Material Imports													
Landing Jetty Sheet Piles													
Landing Jetty Fill Materials													
Landing Jetty Concrete Materials													
General Site Deliveries													

Activity	Mar	April	May	June	July	Aug		Mar	April	May	June	July	Aug
Access Track & Compound Material Imports													
Reinforcement													
Concrete Aggregate & Cement Deliveries													
Cable Deliveries													
Cabling Sand													
Geotextile / Duct Deliveries													
Substation Deliveries													
Cranage													
AIL Deliveries													
Commissioning													
Reinstatement Works													

3.5.7 The main materials likely to be required in part or total for the construction of the track, turbine, new extended slipway and landing jetty and control building foundations, hardstanding areas and cable trenches are described below:

- crushed stone;
- precast concrete pipes or uPVC twin wall pipes for culverts;
- geotextile;
- ready mixed concrete;
- sand;
- steel reinforcement;
- electrical cable;
- sheet piles/blunt end;
- tie rods;
- precast concrete or cofferdams for slipway construction; and
- bulk fill material and gabion material/riprap.

3.5.8 It is envisaged that concrete will be batched on-site, with supplies coming from sources on Orkney.

3.5.9 Should surface water run-off or groundwater enter the excavation during construction, appropriate pumping measures to divert the run-off will be taken to ensure the works are safely carried out and the excavation is sufficiently dry to allow concrete placement. Once the concrete is cast, the excavated material will be used for backfill and compacted to the required design density. Once this backfill is completed, the hardstanding areas will be constructed.

3.5.10 The proposed method for constructing the wind turbines is as follows. The turbines will be erected using a large mobile crane or crawler crane, positioned on the hardstanding adjacent to the turbine base. A smaller tail crane will be positioned adjacent to the delivery position of the turbine components. The two cranes will lift the tower sections and blades into their assembly positions, and the main crane will lift the tower sections, nacelle and blades into their operational positions.

3.5.11 As soon as practical, once installation is complete, the immediate construction area will be restored to its original profile, although the crane hardstandings will be retained for future maintenance. The topsoil will be replaced and reseeded where appropriate and as advised by an on-site Environmental Clerk of Works (ECoW). The ECoW will be responsible for pre-construction surveys and will be on-site through construction and post-construction as required. Further details of their role will be provided in the CEMP.

Traffic and Transportation

3.5.12 A detailed Transport Assessment is provided within Chapter 12 (Traffic and Transport) of this EIA Report.

3.5.13 Construction traffic associated with the construction and maintenance of the Proposed Development falls into two categories, namely Abnormal Indivisible Loads (AIL) and Construction/Maintenance Loads. Details of both types of vehicles are as follows:

- AILs:
  - wind turbine blade transporter;
  - nacelle/tower section transporter;
  - assembly crane; and
  - transformer transporter.
- Construction/Maintenance Loads:
  - 4-axle large tipper Heavy Goods Vehicle (HGV);
  - standard low-loader; and
  - Land Rover/Transit vans, general personnel transport.

3.5.14 Preferred access routes are detailed in Chapter 12 (Traffic and Transport).

3.5.15 The abnormal loads are those that will require an escort, either by private contractor or by police escort. Construction/maintenance loads are those that do not require any special escort or permissions and are only influenced by normal traffic regulations.

3.5.16 Delivery of materials to the island of Faray are considered within chapter 12 (Traffic and Transport).

3.5.17 The Applicant will ensure that the vehicles will be routed as agreed with OIC, to minimise disruption and disturbance to local residents. Further details regarding transport and access can be found in Chapter 12 (Traffic and Transport) of this EIA Report and controlled by the Construction Traffic Management Plan.

Pollution Prevention and Health & Safety

3.5.18 Prior to commencement of construction activities, a pollution prevention strategy, contained within a CEMP, will be agreed with SEPA to ensure that appropriate measures are put in place to protect watercourses and the surrounding environment. Further details regarding the contents of the CEMP are provided later in this chapter.

3.5.19 As with any development, during the construction stage there is the potential for threats to the quality of the water environment. These mostly arise from poor site practice so careful attention will be paid to the appropriate guidance and policies to reduce the potential for these to occur (refer to Chapter 11 (Geology, Hydrology & Hydrogeology) for further details).

3.5.20 Any fuel or oil held on-site will only be of an amount sufficient for the plant required. This will be stored in a bunded area to prevent pollution in the event of a spillage. There will be no long term storage of lubricants or petrochemical products on-site at the Proposed Development.

3.5.21 High standards of health and safety will be established and maintained. At all times, all activities will be undertaken in a manner compliant with applicable health and safety legislation and with relevant good practice as defined under applicable statutory approved codes of practice and guidance.

3.5.22 Further details of site specific storage and management of fuel and oil and protection of watercourses during construction are presented in Chapter 11 (Geology, Hydrology & Hydrogeology).

3.5.23 In terms of marine construction, all vessels will be MARPOL compliant to manage emissions to air and water and have Shipboard Oil Pollution Emergency Plan (SOPEPs) in place.

Construction Environmental Management Plan (CEMP)

3.5.24 As part of the construction contract, the Applicant will produce, and adhere to, a CEMP. The CEMP shall be developed in accordance with the joint Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Environment Scotland guidance on Good Practice During Windfarm Construction (2019).

3.5.25 The CEMP shall describe how the Applicant will ensure suitable management of, but not limited to, the following environmental issues during construction of the Proposed Development:

- noise and vibration;
- dust and air pollution;
- surface and ground water;
- ecology (including protection of habitats and species);
- agriculture (including protection of livestock and land);
- cultural heritage;
- waste (construction and domestic);
- underwater noise;
- dredging operations and disposal;
- pollution incidence response (for both land and water); and
- site operations (including maintenance of the construction compound, working hours and safety of the public).

3.5.26 The Applicant shall provide the following for integration within the CEMP:

- details of the environmental mitigation which is described within this EIA Report (refer to Chapter 19 (Schedule of Environmental Commitments)) that is required during construction of the Proposed Development, and of how the Applicant will implement this mitigation and monitor its implementation and effectiveness;
- details of how the Applicant will abide by the local and national legislative requirements e.g. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (amended 2013);
- details of how the Applicant will implement and monitor construction best practice techniques e.g. the control of noise and dust;
- details of how the Applicant will implement the Joint Nature Conservation Committee (JNCC) piling protocol to minimise potential impacts to marine mammals from underwater noise associated with piling of the new landing jetty;
- details of any additional underwater noise mitigation measures, specifically the use of a bubble curtain;

- details of a Waste Management Plan which will include opportunities to reduce and re-use waste on-site, recycling of waste which cannot be reused and disposal of waste to landfill;
- details of dredging operations and dredging disposal plans; and
- details on how the Applicant will liaise with the public and local landowners and how they will respond to any queries and/or complaints.

3.5.27 The Applicant shall consult with NatureScot, SEPA, Historic Environment Scotland and OIC on the relevant aspects of the CEMP. The Applicant shall amend and update the CEMP as required throughout the construction and decommissioning period.

3.5.28 The CEMP shall, where applicable, cross-reference and correspond with the Construction Traffic Management Plan (CTMP). The CTMP will detail the management of traffic to and from site, including abnormal loads and daily workers commute. It shall also include mitigation for impacts to public transport, local private access and public foot paths. The Applicant shall amend and update the CTMP as required throughout the construction and decommissioning period.

3.5.29 Specific requirements of the CEMP for each of the environmental topics assessed in the EIA are provided in the relevant EIA Report chapters and an outline CEMP is provided in Appendix 3.1.

3.6 Operation and Maintenance

3.6.1 It is predicted that during the operation of the site there would be up to two vehicle movements per week to Kirkwall Harbour (the likely start and end point for boat trips to and from Faray) for maintenance purposes.

3.6.2 Any diesel or oil stored on-site will be held within an appropriately bunded location within the on-site substation building.

3.6.3 Health and safety will also be controlled as in the construction phase, as set out above in 3.5.21.

3.6.4 In the event that a major turbine component requires replacement, vehicles delivering the components will use the new extended slipway and landing jetty, new access tracks and crane pads, utilising the same route as delivery of components during construction.

Operation Environmental Management Plan

3.6.5 The Applicant will implement an Operation Environmental Management Plan (OEMP). Similar to CEMP the OEMP will set out how the Applicant will manage and monitor environmental effects throughout operation. The OEMP will be developed in consultation with NatureScot, SEPA and OIC and will include but not be limited to:

- details on the track and turbine maintenance;
- the control and monitoring of noise;
- the control and monitoring of surface and groundwater;
- a pollution prevention plan and a pollution incidence response plan (for both land and water);
- details of how the Applicant will abide by the local and national legislative requirements e.g. The Water Environment (Controlled Activities) (Scotland) Regulations 2011; and
- a Habitat Management Plan (if required) and relevant protected species management plans (discussed further in Chapter 8).

3.7 Decommissioning

3.7.1 The Applicant is seeking in-perpetuity consent for the Proposed Development. However, should the Proposed Development be decommissioned it is expected that decommissioning would take approximately eight months. The environmental effects of decommissioning are considered to be no greater than construction effects but experienced over a much shorter time period.

3.7.2 In the event of decommissioning, vehicles would access the site by the same routes used for delivery and construction.

3.7.3 Either the restored temporary construction compound would be re-established or a new construction compound would be developed as agreed with OIC at the appropriate time, to temporarily store decommissioned plant and equipment. The nacelles (including hubs) and blades would be removed using cranes situated on the crane pads as previously constructed. The towers would then be dismantled.

3.7.4 All components would be removed from the site for disposal and/or recycling as appropriate and in accordance with regulations in place at that time.

3.7.5 It is likely that exposed parts of the concrete foundations would be ground down to below 1 m below the surface and the remaining volume of the foundations would remain in situ. It is considered that leaving in situ will cause less environmental impact than that of complete removal.

3.7.6 Hardstandings will be removed and/or grassed over, however it is likely that sections of access track may be left in situ to assist with agricultural access. Likewise, it is likely that the marine infrastructure may be left in place to allow continued access to the island. The CEMP will be updated prior to decommissioning by the Principal Contractor to reflect current legislation and policy and will be agreed with OIC, NatureScot, SEPA and Historic Environment Scotland.

3.8 References

Specification for Highway Works (2016). Volume 1, Series 0800: Road Pavements – Unbound, Cement and other Hydraulically Bound Mixtures. Available at: http://www.standardsforhighways.co.uk/ha/standards/mchw/vol1/pdfs/MCHW%20800.pdf

Scottish Government (2011). The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available at: http://www.legislation.gov.uk/ssi/2011/209/contents/made

Scottish Government (2014). Scottish Planning Policy. Available at: http://www.gov.scot/Publications/2014/06/5823

Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Environment Scotland (2019). *Good Practice During Windfarm Construction*. Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction

4 Approach to EIA

Contents

4.1	Executive Summary	4-1
4.2	Introduction	4-1
4.3	Legislation, Policy and Guidelines	4-2
4.4	The EIA Process	4-3
4.5	Scope of the EIA	4-9
4.6	EIA Report	4-11
4.7	Consultation	4-19
4.8	Consideration of Alternatives	4-20
4.9	Assumptions, Limitations and Uncertainty	4-20
4.10	Summary	4-21
4.11	References	4-21

This page is intentionally blank.

4 Approach to EIA

4.1 Executive Summary

4.1.1 This chapter of the EIA Report sets out the broad approach taken to produce the Environmental Impact Assessment (EIA) for the Proposed Development. It also includes details of the consultation undertaken.

4.2 Introduction

4.2.1 The EIA process assists the consenting authority in its determination of the application by identifying where significant environmental effects are predicted. This assessment has been completed in conjunction with consultation with statutory consultees, interested parties and the general public.

4.2.2 This EIA Report supports the following consent applications:

- A planning application to OIC under The Town and Country Planning Act (Scotland) 1997 (as amended) for all works above Mean Low Water Springs (MLWS), i.e. the onshore wind turbines and associated infrastructure above MLWS; and
- Marine Licence applications to Marine Scotland's Licencing Operations Team (MS-LOT), which act on behalf of the Scottish Minsters, for works below Mean High Water Springs (MHWS), i.e. the installation of improved access to Faray via construction of a new extended slipway and landing jetty. Two marine licences are required, one for construction works and one for dredging operations.

4.2.3 It should be noted that parts of the improved access fall both above MLWS and below MHWS (i.e. in the intertidal zone). In such instances, both of the aforementioned consenting processes (paragraph 4.2.2) are applicable.

4.2.4 The structure of the EIA Report follows the requirements of the following EIA regulations relevant to the two consent applications, as well as other relevant good practice guidance:

- Schedule 4 of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (hereafter referred to as the 'EIA Regulations') (Scottish Government, 2017a), and the associated emergency COVID-19 emergency regulations; The Town and Country Planning (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020; and
- Schedule 4 of the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) (hereafter referred to as the "Marine EIA Regulations) (Scottish Government, 2017b), and the associated emergency COVID-19 emergency regulations, The Marine Works and Marine Licensing (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020.

4.2.5 The EIA Report comprises two main components – a Non-Technical Summary (NTS) and the main EIA Report text, figures and technical appendices.

4.2.6 This chapter is structured as follows:

- overview of the relevant legislation, policy and guidance;
- an outline of the EIA process utilised;
- the scope of the assessment completed;
- details of the assessment of potential effects;

- mitigation measures;
- enhancement; and
- the assumptions made, limitations encountered and uncertainty.

4.2.7 This chapter is linked to the following appendices:

- Appendix 4.1: EIA Scoping Report (March 2019);
- Appendix 4.2: OIC EIA Scoping Opinion (Aril 2019);
- Appendix 4.3: Summary of how the EIA Scoping Opinion has been addressed;
- Appendix 4.4: Additional EIA Consultation Responses;
- Appendix 4.5: Disasters and Accidents;
- Appendix 4.6: Proposal of Application Notice (June 2020); and
- Appendix 4.7: Marine Licensable activities letter to consultees (February 2021).

4.3 Legislation, Policy and Guidelines

4.3.1 During the EIA, a number of legislative and best practice documents have informed the process.

4.3.2 In respect to the EIA Regulations (i.e. for works above MLWS), the Proposed Development meets *Schedule 2, Category (j)* criteria of the EIA Regulations, by nature of it being classed as an '*Installation for harnessing of wind power for energy production (wind farms)'* which has more than 2 turbines and a hub height of over 15 m. The criteria for considering whether a Schedule 2 development requires the preparation of an EIA is set out in Schedule 3 of the EIA Regulations, and the Applicant has voluntarily accepted that an EIA is required. Regulation 4 of the EIA Regulations details the EIA process while Regulations 4, 5 and Schedule 4 of the EIA Regulations provides details of the information to be included within the EIA Report.

4.3.3 In respect to the Marine EIA Regulations (i.e. for works below MHWS), the Proposed Development meets *Schedule 1, 8(2)* criteria of the Marine EIA Regulations as the jetty is classed as a *"trading ports, piers for loading and unloading connected to land and outside ports (excluding ferry piers) which can take vessels of over 1,350 tonnes"*. As such an EIA is mandatory for this aspect of the Proposed Development.

4.3.4 In addition to the EIA Regulations the Government legislation, regulations and best practice guidance which have been followed to undertake the EIA are referred to below:

- The Town and Country Planning Act (Scotland) 1997;
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended), Planning Circular 1/2017 (Scottish Government, 2017c);
- Scottish Planning Policy (Scottish Government, 2020);
- Planning Advice Note (PAN) 1/2013 Environmental Impact Assessment (Scottish Government, 2017d);
- General Pre-Application and Scoping Advice for Onshore Windfarms, (NatureScot, 2020)
- Guidelines for Environmental Impact Assessment, Institute of Environmental Management and Assessment (IEMA, 2006);
- Good Practice during Wind Farm Construction Version 4 (SNH, SEPA, Scottish Renewables, FCS, HES, MSS, 2019);
- A Handbook on Environmental Impact Assessment Version 5 (SNH, 2018);

- Assessing the Cumulative Impact of Onshore Wind Energy Developments, (SNH, 2012);
- Guidance for Marine Licence Applications (Marine Scotland, 2015a); and
- Guidance on Marine Licensable Activities subject to Pre-Application Consultation (Marine Scotland, 2015b).

4.4 The EIA Process

Overall EIA Process

4.4.1 In order for the EIA process to be as effective as possible it should be used as an iterative process throughout the design stage, rather than a single assessment performed once the design is finalised.

4.4.2 The findings of the EIA are presented in this EIA Report, which has been prepared in accordance with the relevant EIA Regulations.

4.4.3 The broad approach which has been followed in undertaking the EIA is presented in this chapter and an overview of the methodology adopted for each technical study is provided within the respective EIA Report technical chapters (Chapters 6 to 17).

Screening

4.4.4 Screening is the process by which it is determined whether or not an EIA should be conducted for the Proposed Development.

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)

4.4.5 As set out in paragraph 4.3.2 the Proposed Development falls within Schedule 2 of the EIA Regulations. Schedule 3 of the EIA Regulations sets out the criteria that should be considered in determining whether a Schedule 2 development is likely to have significant environmental effects and hence require a formal EIA. These criteria are:

- the characteristics of the development (e.g. its size, cumulation with other developments, use of natural resources, resultant pollution, waste generated);
- the environmental sensitivity of the location; and
- the characteristics of the potential impacts (including extent, magnitude, probability and duration).

4.4.6 A formal Screening Opinion was not sought, as the Applicant has voluntarily accepted that an EIA is required.

The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)

4.4.7 As set out in paragraph 4.3.3, the proposed landing jetty falls within Schedule 1 of the Marine EIA Regulations. Thus, a screening opinion for the works below MHWS was not sought from MS-LOT as an EIA for these activities is mandatory.

Scoping

4.4.8 The EIA scoping process is undertaken to identify the potentially significant environmental impacts that should be considered when assessing the potential effects of the Proposed Development. An EIA Scoping Opinion may be obtained from the consenting authority, which sets out the matters that should be considered through the EIA.

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)

4.4.9 The Applicant requested an EIA Scoping Opinion from OIC in March 2019 through the submission of an EIA Scoping Report (refer to Appendix 4.1), as prepared by the EIA Project Team. This EIA Scoping Report contained details of the site baseline and the Proposed Development. It also proposed which

environmental impacts would be assessed in the EIA, and the assessment methodologies that would be used.

4.4.10 OIC consulted with a variety of statutory and non-statutory consultees before providing an EIA Scoping Opinion in April 2019 (refer to Appendix 4.2).

4.4.11 Direct consultation has also been undertaken with consultees, to confirm and agree the approach and scope of technical surveys and assessments on a topic by topic basis. Details of relevant consultations are included in each technical chapter as relevant, and copies of additional consultee correspondence are provided in Appendix 4.4.

The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended)

4.4.12 The scope of works below MHWS was not available in sufficient detail at the time of requesting the Town and Country Planning EIA Scoping Opinion. As such, individual consultation was undertaken to discuss the scope of the assessment of the marine licensable activities, as outlined in Section 4.7.

4.4.13 This included correspondence and discussions with MS-LOT and NatureScot, along with a letter that was issued to all consultees (see Appendix 4.7) and a pre-application consultation session on the 4th of March 2021.

4.4.14 The scope of the assessment of the marine licensable activities, informed by the individual consultations, is provided in Section 4.5.

EIA

4.4.15 EIA is the systematic process of compiling, assessing and presenting all the significant environmental effects of a proposed development. The assessment is designed to inform the decision-making process by way of setting out the likely environmental profile of a project. Identification of potentially significant adverse environmental effects then leads to the design and incorporation of appropriate mitigation measures into both the design of the scheme and the way in which it is constructed.

4.4.16 The main steps in the EIA assessment process for the Proposed Development have been:

- Baseline surveys (where appropriate and where possible) to provide information on the existing environmental character of the proposed site and the surrounding area.
- Consideration given to the possible interactions between the Proposed Development and the existing and predicted future site conditions. These interactions or effects are assessed using stated criteria based on accepted guidance and best practice.
- Using the design parameters for the Proposed Development, prediction of the likely environmental effects, including direct effects and any indirect, secondary, short, medium and long-term, permanent and temporary, positive and negative effects.
- Identification of mitigation measures designed to avoid, reduce or offset adverse effects as well as enhancement measures that could result in beneficial effects. Assessment of alterations to the design and the reassessment of previously proposed mitigation to establish suitable mitigation for the Proposed Development.
- Assessment of the significance of any residual effects after mitigation, in relation to the sensitivity of the feature impacted upon and the magnitude of the effect predicted, in line with the methodology identified below (refer to Section 4.7).
- Identification of any uncertainties inherent in the methods used, the predictions made, and the conclusions drawn during the course of the assessment process.
- Reporting of the results of the EIA in this EIA Report.

4.4.17 The EIA process is an iterative process where its findings have informed the design evolution of the project.

Assessment of Effects

4.4.18 Throughout the assessment, a distinction has been made between the term 'impact' and 'effect'. The EIA Regulations refer to the requirement to report the significance of ‘effects’. An ‘impact’ is defined as the likely change to the characteristics/nature of the receiving environment as a result of the Proposed Development (e.g. noise from turbines), whereas the 'effect' relates to the significance of the impact (e.g. a significant residual noise effect on residential properties). These terms have been adopted throughout this EIA to present a consistent approach to the assessment and evaluation of effects and their significance.

4.4.19 The exception to this is the Landscape and Visual Impact Assessment which classifies the level of physical and perceptual change to the receiving environment as the ‘magnitude of change’ in line with the recommendations of the Guidelines for Landscape and Visual Impact Assessment third edition (GLVIA3). However, this terminology should be considered interchangeable with ‘magnitude of impact’.

4.4.20 Within the EIA Report, the assessment of effects for each environmental topic takes into account the environmental impacts of both the construction/decommissioning and operational phases of the Proposed Development and the environmental impacts should the Proposed Development not be consented (the do-nothing scenario).

4.4.21 In order to determine whether or not the potential effects of the Proposed Development are likely to be ‘significant’, a number of criteria are used. These significance criteria vary between topics but generally include:

- international, national and local designations or standards;
- relationship with planning policy;
- sensitivity of the receiving environment;
- magnitude of impact;
- reversibility and duration of the effect; and
- inter-relationship between effects.

4.4.22 Effects that are considered to be significant, prior to mitigation but following the implementation of best practice, are identified within the EIA Report. The significance attributed to the resultant effect is informed by professional judgement, as to the sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes/impacts. For example, a major adverse change/impact on a feature or site of low importance will have an effect of lesser significance than the same impact on a feature or site of high importance.Table 4.1 below is used as a guide to the relationship between the sensitivity of the identified receptor and the anticipated magnitude of an impact/change. Professional judgement is however equally important in establishing the suitability of this guiding ‘formula’ to the assessment of the significance of each individual effect.

Table 4.1 - Guide to the Inter-Relationship between Magnitude of Impact and Sensitivity of Receptor

		Sensitivity of Receptor / Receiving Environment to Change			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Impact/Change	**High**	major	moderate to major	minor to moderate	negligible
	Medium	moderate to major	moderate	minor	negligible

		Sensitivity of Receptor / Receiving Environment to Change			
		High	**Medium**	**Low**	**Negligible**
	Low	minor to moderate	minor	negligible to minor	negligible
	Negligible	negligible	negligible	negligible	negligible

4.4.23 The following terms are used in the EIA Report, unless otherwise stated, to determine the level of effects predicted to occur:

- **major** beneficial or adverse effect – where the Proposed Development would result in a significant improvement (or deterioration) to the existing environment;
- **moderate** beneficial or adverse effect – where the Proposed Development would result in a noticeable improvement (or deterioration) to the existing environment;
- **minor** beneficial or adverse effect – where the Proposed Development would result in a small improvement (or deterioration) to the existing environment; and
- **negligible** – where the Proposed Development would result in no discernible improvement (or deterioration) to the existing environment.

4.4.24 This is a well-tested and well-established methodology and means of describing the level of effects.

4.4.25 Using professional judgement and with reference to the Guidelines for Environmental Impact Assessment (IEMA, 2004), the majority of the assessments within this EIA Report consider effects of moderate and greater significance to be significant. Those of minor significance and less are considered to be non-significant. If there are deviations from this these will be clearly stated within the individual technical chapters.

4.4.26 Synergistic/in-combination effects are carried forward into the full assessment where appropriate (i.e. where multiple significant residual effects have been identified for individual receptors).

4.4.27 Summary tables that outline the predicted effects associated with an environmental issue, the appropriate mitigation measures required to address these effects, and subsequent overall residual effects are provided at the end of each technical chapter of the EIA Report. Distinction has also been made between direct and indirect, short and long term, permanent and temporary, beneficial and adverse effects.

Cumulative Effects

4.4.28 Part 5 of Schedule 4 of The EIA Regulations sets out the matters that require to be incorporated within EIA Reports. The EIA Regulations state that EIA Reports should include an assessment of "*the cumulation of effects with other existing and/or approved development, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources".*

4.4.29 Cumulative effects are those which result from incremental changes caused by past, present or reasonably foreseeable future actions resulting from the introduction of the Proposed Development. These cumulative effects cover the combined effect of individual impacts from the Proposed Development and combined impacts of several developments, as noted within the guidance provided by SNH in the document "Assessing the Cumulative Impact of Onshore Wind Energy Developments" (2012). Developments considered in addition to the Proposed Development are existing and other proposals, covering all developments, including other wind farms (SNH, 2012).

4.4.30 Table 4.2 and Figure 6.11 show application stage, consented and operational wind farm developments of over 50 m within a 40 km radius of the Proposed Development.

Table 4.2 - Cumulative Wind Energy Developments

Name	Status	Number of turbines	Blade tip height in m	Distance in km / Direction
Sandy Banks	Operational	1	77	4.34 / S
Spurness Point	Operational	5	100	6.93 / SE
Newark	Operational	1	59.7	7.46 / NNW
Kingarly Hill	Operational	1	67	11.41 / SW
Gallowhill	Operational	1	67	12.47 / NW
Westray Dev. Trust	Operational	1	77	12.72 / NW
Stronsay Dev. Trust	Operational	1	67	16.41 / SSE
Howe, Shapinsay	Operational	1	67	19.00 / S
Hammars Hill	Operational	5	67	19.50 / SW
Burgar Hill	Operational	6	Up to 116	20.99 / SW
Crowness Business Park	Operational	1	67	24.91 / SSW
Rennibister	Operational	1	67	26.50 / SSW
Holodykes	Operational	1	80	25.37 / SW
Upper Stove, Deerness	Operational	1	67	28.56 / SSE
Barnes of Ayre	Operational	3	67	32.16 / SSE
Northfield, Burray	Operational	1	70	37.82 / S
Work Farm	Consented	2	67	23.57 / S
Akla	Consented	1	67	33.72 / SSW
Costa Head	Consented	4	125	23.04 / WSW
Hammars Hill Extension	Application	2	150	20.11 / SW
Orkney's Community Wind Farm Project – Quanterness	Application	6	149.9	24.28 / SSW

4.4.31 In terms of marine licensable activities, due to the localised nature of the works, none of the windfarm developments shown in Table 4.2 have the potential to result in cumulative impacts. A search on Marine Scotland's marine licence application database (Marine Scotland, 2021a) has been undertaken, Table 4.3 outlines applications within 10 km of the Proposed Development. Given the

distances and localised nature of the marine licensable activities, cumulative impacts as a result of the installation and operation of the new extended slipway and landing jetty are not considered likely.

Table 4.3 – Cumulative marine developments

Name	Description	Status	Distance in km / Direction
Orbital | O2.2 Tidal Turbine	Installation, operation and decommissioning of a commercial demonstrator tidal turbine, the O2.2, at Berth 6 at the EMEC Fall of Warness tidal test site in Eday, Orkney.	Application	5 / S
Scottish Sea Farms Ltd Marine Farm	Fish farm deposit licence renewal at Eday Sound, Orkney.	Consented	7 / SE
Magallanes ATIR	Construction and operation of tidal energy convertor at EMEC, Fall of Warness, Orkney.	Consented	7.5 / S
Cooke Aquaculture Scotland Ltd Marine Farm	Fish farm deposit licence renewal at Bay of Ham, Orkney.	Consented	9 / W
Scottish Sea Farms Ltd Marine Farm	Discharge of Treatment Agents from a Wellboat at Eday, Orkney.	Application	7 / SE

4.4.32 Further detailed discussion on the approach to cumulative assessment is presented in each technical assessment chapter as relevant.

Mitigation and Monitoring Measures

4.4.33 The EIA Regulations require the EIA to present a description of the measures proposed to avoid, reduce and, if possible, offset significant adverse effects. Wherever reasonably practicable, mitigation measures are proposed for each significant environmental effect predicted, and can take various forms including:

- changes to the scheme design;
- physical measures applied on site; and
- measures to control particular aspects of the construction or operation of the scheme.

4.4.34 Where none of the above are deemed practicable, the detailed Proposed Development design will be required to include measures to offset any significant adverse effects. Monitoring measures are designed to examine the mitigation measures to ensure that they have the desired outcomes.

4.4.35 Mitigation measures and monitoring requirements are presented as commitments in order to ensure a level of certainty as to the environmental effects of the Proposed Development. There are various ways in which a level of certainty can be ensured, such as through the use of planning conditions. Therefore, notwithstanding any statutory mechanisms to ensure implementation, the Applicant and therefore the Contractors will be committed to implementing all mitigation measures

and monitoring requirements identified in this EIA Report relating to construction of the Proposed Development.

4.4.36 A schedule of all of the mitigation measures and monitoring requirements proposed in this EIA Report is presented in Chapter 18.

Enhancement

4.4.37 Similar to the reporting of mitigation measures, where opportunities for environmental enhancement are proposed, these have been included in the summary of environmental commitments reported at the end of each technical chapter, and in Chapter 18.

4.5 Scope of the EIA

Technical Scope

4.5.1 The technical scope of the assessment will cover all the impacts agreed through the EIA Scoping and consultation process.

4.5.2 As discussed in paragraph 4.4.12, the scope of works below MHWS was not available in sufficient detail at the time of requesting the EIA Scoping Opinion from OIC. As such, individual consultation was undertaken to inform the scope of the assessment of the marine licensable activities.

4.5.3 Detailed discussions were held with MS-LOT and NatureScot on the scope of the assessment (see Appendix 4.4). In addition, a letter was issued to the following consultees for comment on the 24th of February 2021. A copy of the letter is provided in Appendix 4.7, with responses detailed in Appendix 4.4:

- Shipping and Navigation: OIC Marine Services, Orkney Ferries, Maritime and Coastguard Agency (MCA), Northern Lighthouse Board (NLB).
- Fishing: Scottish Fisheries Federation (SFF), Orkney Fisheries
- Cultural Heritage: Historic Environment Scotland (HES)
- Ecology and Ornithology: NatureScot

4.5.4 As part of the letter, all consultees were invited to the marine licence pre-application public consultation event on the 4th of March 2021. Feedback from the event on the scope of the EIA has been accounted for in the EIA (see Appendix 4.4). Full details of the consultation event are provided in the Marine Licence Pre-Application Consultation (PAC) report which will accompany the marine licence applications.

4.5.5 Due to the ongoing cyberattack issues at the time of writing, SEPA were not available for consultation with respect to marine licensable activities.

4.5.6 Based on all consultation feedback, detailed assessments of the impacts associated with underwater noise and dredging have been undertaken, these are provided in Chapter 16 and 17 respectively. No significant effects are envisaged for the following topics and as such detailed assessments were not undertaken: benthos, coastal processes, navigation and commercial fisheries. Further details on these topics are provided in Chapter 18: Other Issues.

4.5.7 Finally, the following technical areas have been scoped out of the EIA (further details are provided in Appendices 4.4 and 4.7):

Television

4.5.8 Due to the low risk of interference with television reception (Chapter 18), a detailed assessment of potential effects has been scoped out of the EIA.

Health and Safety

4.5.9 No significant health and safety effects have been identified with respect to construction and operation of the Proposed Development, which would not be appropriately mitigated through good practice in construction and adherence to relevant legislation and guidance, as noted in Sections 3.5

and 3.6 of this EIA Report. There are no properties located on the island. Therefore, further assessment of health and safety effects has been scoped out of the EIA.

Fish Surveys

4.5.10 There is an absence of major watercourses on the site, and as such, no dedicated freshwater fish or macroinvertebrate surveys were undertaken.

4.5.11 Given the localised area of impact associated with the installation of the new extended slipway and landing jetty, significant impacts to fish species are not anticipated and have been scoped out of the EIA.

Accidents and Disasters

4.5.12 An assessment of accidents and disasters has been scoped out as detailed in Appendix 4.5.

Air Quality

4.5.13 There would be emissions from the construction vessels used for the installation of the new extended slipway and landing jetty. This would be localised and temporary and all vessels would be MARPOL compliant. As such, atmospheric emissions from marine activities are not considered to present a significant impact and have been scoped out of the EIA.

Marine Archaeology and Cultural Heritage

4.5.14 In terms of marine archaeology, there are no recorded wrecks, including Historic Marine Protected Areas (HMPAs) within the area (PastMap, 2020). In addition, the area of slipway and jetty construction works, including dredging, is very small in comparison to the surrounding available seabed. As such, the Proposed Development is not considered to present a significant impact to marine archaeology and has been scoped out of the EIA. This was confirmed by Historic Environment Scotland (HES) via their response to the consultee letter (see Appendix 4.4).

Defence

4.5.15 There are no known Ministry of Defence (MoD) exercise or disposal areas near the site (Marine Scotland, 2021b). In addition, the site is out with historic areas, such as World War II training sites (ORDEK, 2020), thus the risk of unexploded ordnance (UXO) is low. As such, significant impacts to defence from marine activities are not expected and it has been scoped out of the EIA.

Spatial Scope

4.5.16 The spatial scope of the EIA, in other words the geographical coverage of the assessment undertaken, has taken account of a number of factors, in particular:

- the extent of the Proposed Development (refer to Figure 1.2);
- the nature of the baseline environment, sensitive receptors and the likely impacts that could arise; and
- the distance over which predicted effects are likely to remain significant and in particular the existence of pathways which could result in the transfer of effects to a wider geographical area than the extent of proposed physical works.

Temporal Scope

4.5.17 The baseline years used for the assessment of environmental effects are 2019 and 2021 as these are the years in which the assessment work was undertaken. The relevant baseline year (s) will be noted in each technical assessment.

4.5.18 For the purposes of the EIA, construction is anticipated to commence in c.2025 and expected to last for a period of 24 months. For construction effects, the assessment also takes into account the time of day that works are likely to be undertaken, for example if any night-time working is required to minimise disruption to road users.

4.5.19 No decommissioning date is anticipated for the Proposed Development, consent in perpetuity is being applied for. However, if the Proposed Development is decommissioned in the future then it is anticipated that the decommissioning effects will be similar to or less than the construction effects.

4.6 EIA Report

4.6.1 The information provided in this EIA Report has been prepared in line with the specific requirements of the relevant EIA Regulations, specifically Regulations 4 and 5 and Schedule 4 of the EIA Regulations and Regulations 5 and 6 and Schedule 4 of the Marine EIA Regulations, as summarised in Table 4.4.

Table 4.4 – Information Required in the EIA Report

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
Regulation 4 of the EIA Regulations / Regulation 5 of Marine EIA Regulations	(2) The environmental impact assessment must identify, describe and assess in an appropriate manner, in light of the circumstances relating to the proposed development, the direct and indirect significant effects of the proposed development (including, where the proposed development will have operational effects, such operational effects) on the factors specified in paragraph (3) and the interaction between those factors.	The EIA Report includes an assessment of the direct and indirect effects of the Proposed Development during construction and operation (refer to Chapters 6 -18).
	(3) The factors are— (a)population and human health; (b)biodiversity, and in particular species and habitats protected under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora(1) and Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds(2); (c)land, soil, water, air and climate; and (d)material assets, cultural heritage and the landscape	The receptors potentially affected by the Proposed Development are detailed within each of the technical chapters. Effects on population and human health are assessed in relation to visual impacts, socio-economics, recreation, tourism, traffic, noise and shadow flicker. Biodiversity is covered in the terrestrial ecology, underwater noise, ornithology chapters and other impacts chapter. Impacts on the water environment are covered in the geology, hydrology and hydrogeology and

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
		chapter and the marine water and sediment quality chapter. Material assets are addressed through the assessment of cultural heritage effects and other chapters as appropriate.
	(4) The effects to be identified, described and assessed under paragraph (2) include the expected effects deriving from the vulnerability of the development/works to risks, so far as relevant to the development, of major accidents and disasters.	Appendix 4.5 assesses the vulnerability of the Proposed Development to major accidents and disasters.
Regulation 5 of the EIA Regulations / Regulations 6 of the Marine EIA Regulations	(2) An EIA report is a report prepared in accordance with this regulation by the developer/applicant which includes (at least)— (a) a description of the development/works comprising information on the site, design, size and other relevant features of the development; (b) a description of the likely significant effects of the development/works on the environment; (c) a description of the features of the development/works and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment; (d) a description of the reasonable alternatives studied by the developer/applicant, which are relevant to the development and its specific characteristics, and an indication of the main reasons for the option chosen,	Chapter 3 of the EIA Report contains a description of the Proposed Development. Chapters 6-18 of the EIA Report contain a description of the likely significant effects and the measures envisaged in order to avoid, prevent, reduce or offset significant adverse effects. Chapter 2 contains a description of the reasonable alternatives studied by the Applicant. A Non-Technical Summary has been included with the application.

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
	taking into account the effects of the development/works on the environment; (e) a non-technical summary of the information referred to in sub-paragraphs (a) to (d); and (f) any other information specified in schedule 4 relevant to the specific characteristics of the development/works and to the environmental features likely to be affected.	
	(3) Where a scoping opinion (or scoping direction) is issued/adopted, the EIA report must be based on that scoping opinion (or scoping direction, as the case may be), and must include the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the development/works on the environment, taking into account current knowledge and methods of assessment.	The EIA and EIA Report is based on the Scoping Opinion. Where changes to the scope of any surveys or assessments were considered to be reasonable, this was discussed and agreed with the relevant technical consultees. Details of relevant consultations are included in each technical chapter, and copies of additional consultee correspondence are provided in Appendix 4.4.
	(5) In order to ensure the completeness and quality of the EIA report— (a) the developer/applicant must ensure that the EIA report is prepared by competent experts; and (b) the EIA report must be accompanied by a statement from the developer/applicant outlining the relevant expertise or qualifications of such experts.	Chapter 1 contains details of the expertise and qualifications of the competent experts.
Schedule 4 of the EIA Regulations / Schedule 4 of the	1. A description of the development/works, including in particular: (a) a description of the location of the development/works; (b) a description of the physical characteristics of the whole development/works, including, where	The Proposed Development is described in Chapter 3 of the EIA Report, including consideration of anticipated construction methods and the operation of the Proposed Development.

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
Marine EIA Regulations	relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; (c) a description of the main characteristics of the operational phase of the development/works (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases.	The land use requirements during construction and operational phases are also described in Chapter 3. Expected residues and emissions are addressed, where relevant, in the appropriate technical chapters of this EIA Report.
	2. A description of the reasonable alternatives (for example in terms of development/project design, technology, location, size and scale) studied by the developer/applicant, which are relevant to the proposed development/works and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.	Chapter 2 of the EIA Report describes the design iteration process and details how the Proposed Development site was chosen, and the environmental constraints taken into consideration.
	3. A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge.	A description of the existing (baseline) environment is provided within each technical chapter.

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
	4. A description of the factors specified in regulation 4(3)/5(3) likely to be significantly affected by the development/works: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.	The receptors potentially affected by the Proposed Development are detailed within each of the technical chapters. Effects on population and human health are assessed in relation to visual impacts, socio-economics, recreation, tourism, traffic, noise and shadow flicker. Biodiversity is covered in the ecology, ornithology chapters and other issues chapter. Impacts on the water environment are covered in the geology, hydrology and hydrogeology chapter and the marine water and sediment quality chapter. Material assets are addressed through the assessment of cultural heritage effects and other chapters as appropriate.
Schedule 4 of the EIA Regulations	5. A description of the likely significant effects of the development on the environment resulting from, inter alia: (a) the construction and existence of the development, including, where relevant, demolition works; (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;	The predicted significant effects of the Proposed Development are reported after best-practice mitigation measures have been applied to an identified effect, in each of the technical chapters of the EIA Report. Effects have been predicted in relation to the construction and, operational phases of the Proposed Development, including the nature of these effects and their duration. The overall approach and methods used in the assessment of environmental impacts are discussed in this chapter of the EIA Report. Prediction methods are discussed in

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
	(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); (e) the cumulation of effects with other existing and/or approved development, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; (f) the impact of the development on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the development to climate change; (g) the technologies and the substances used. The description of the likely significant effects on the factors specified in regulation 4(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the development. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the development including in particular those established under Council Directive 92/43/EEC3 and Directive 2009/147/EC.	detail within each relevant technical chapter of the EIA Report.
Schedule 4 of the Marine EIA Regulations	5. As per Schedule 4(5)(a) to (g) of the EIA Regulations.	
	6. The description of the likely significant effects on the factors specified in regulation 5(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term,	

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
	medium-term and long-term, permanent and temporary, positive and negative effects of the works. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the works including in particular those established under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora(1) and Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds(2).	
Schedule 4 of the EIA Regulations	6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.	An overview of the methodology of the assessment is provided within Chapter 4 while the individual technical chapters provide details of each technical assessment.
Schedule 4 of the Marine EIA Regulations	7. As per Schedule 4(6) of the EIA Regulations (with development referred to as works)	
Schedule 4 of the EIA Regulations	7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should	Specific mitigation measures and where appropriate monitoring arrangements are reported in each relevant technical section of the EIA Report and in the schedule of committed mitigation measures presented in Chapter 19.

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
	cover both the construction and operational phases.	
Schedule 4 of the Marine EIA Regulations	8. As per Schedule 4(7) of the EIA Regulations (with development referred to as works)	
Schedule 4 of the EIA Regulations	8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to legislation of the European Union such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.	An assessment of major accidents and/or disasters has been scoped out as detailed in Appendix 4.5.
Schedule 4 of the Marine EIA Regulations	9. As per Schedule 4(8) of the EIA Regulations (with development referred to as works)	
Schedule 4 of the EIA Regulations	9. A non-technical summary of the information provided under points 1 to 8.	A Non-Technical Summary is presented as a stand-alone document.

EIA Regulations / Marine EIA Regulations	Required Information (EIA Regulations)	Relevant Reference within this EIA Report
Schedule 4 of the Marine EIA Regulations	10. As per Schedule 4(9) of the EIA Regulations (with development referred to as works)	
Schedule 4 of the EIA Regulations	10. A reference list detailing the sources used for the descriptions and assessments included in the EIA report.	References are provided at the end of each chapter of the EIA Report.
Schedule 4 of the Marine EIA Regulations	11. As per Schedule 4(10) of the EIA Regulations (with development referred to as works)	

4.6.2 The EIA Report is split into five volumes, with the NTS forming a separate document. Volume 1 of this EIA Report contains the introductory, concluding and technical chapters. Volume 2 contains the figures that inform the EIA Report. Volume 3 contains the landscape and visual figures and visualisations and cultural heritage visualisations. Volume 4 contains supporting information and appendices for each of these technical chapters, and additional studies that have been prepared to inform the relevant assessments as reported in the EIA Report. Volume 5 contains confidential technical appendices.

4.7 Consultation

4.7.1 Consultation is a key component of the EIA process. Consultation with statutory and non-statutory consultees has been undertaken by the Applicant since the feasibility stages of the Proposed Development.

4.7.2 The Applicant has continually engaged through both formal consultation (such as the request for an EIA Scoping Opinion) and informally through meetings, calls and emails. Details of the additional consultation undertaken outwith EIA Scoping with consultees can be found in Appendix 4.4 and within each technical chapter.

4.7.3 The Applicant has also consulted with the general public throughout the development of the Proposed Development. The Applicant submitted a Proposal of Application Notice (PAN) in June 2020 (refer to Appendix 4.6). In line with good practice for the consenting stage of major development projects as set out within the Planning Circular 3/2013 'Development Management Procedures', a programme of pre-application community engagement has been undertaken by the Applicant.

4.7.4 Stand-alone Pre-Application Consultation (PAC) Reports have been prepared to support the planning and marine licence applications. Both reports provide details of the pre-application consultation which has taken place with the communities closest to the Proposed Development site. The Reports also summarise the technical consultation undertaken as part of the EIA.

4.7.5 The Applicant is grateful to residents and local representatives for their input into the pre-application community engagement process.

4.7.6 The scope of the EIA and the design of the Proposed Development has been influenced by all consultation, as described in the PAC Report.

4.8 Consideration of Alternatives

4.8.1 EIA legislation requires the consideration of alternatives and an indication of the reasons for selecting the site advanced, except, as noted in Planning Advice Note (PAN) 58, where limited by constraints of commercial confidentiality.

4.8.2 The Proposed Development site has been demonstrated to be a viable and a productive site for wind energy generation. The Proposed Development is one of three sites under development by the Applicant under Orkney's Community Wind Farm Project. The Proposed Development is likely to be essential in meeting the conditions set down by Ofgem to justify and trigger a transmission connection from Orkney to the Scottish mainland.

4.8.3 The Applicant considered a number of alternative layouts and different scales of turbine for the Proposed Development, to arrive at the design for which consent is sought. A full description of the site identification and design iteration process is given in Chapter 2.

4.9 Assumptions, Limitations and Uncertainty

4.9.1 The EIA process is designed to enable informed decision-making based on the best available information about the environmental implications of a proposed development. However, there will always be some uncertainty inherent in the scale and nature of the predicted environmental effects as a result of the level of detailed information available at the time of assessment, data reliability or uncertainty, the potential for minor alterations to the Proposed Development following completion of the EIA Report and/or the limitations of the prediction processes.

4.9.2 A number of assumptions were made during the EIA process and are described below:

- The principal land uses adjacent to the site remain unchanged during the course of the Proposed Development's lifetime (with the exception of proposed and consented wind energy projects which are discussed as part of cumulative impact assessments described in each technical chapter).
- Information provided by third parties, including publicly available information and databases are correct at the time of submission.

4.9.3 Specific assumptions may also be made with regards to the individual technical disciplines, which are detailed within each chapter.

4.9.4 The main limitation to the assessment has been that while the baseline conditions have been assumed to be accurate at the time of surveying, due to the dynamic nature of the environment, these conditions may change during site preparation, construction and operation.

4.9.5 There is also the potential for a degree of uncertainty as certain aspects of the Proposed Development may be subject to change until a detailed design has been finalised. This uncertainty can come in the forms of:

- turbine selection;
- foundation and infrastructure design; and
- micro-siting of the turbines and infrastructure which may change due to investigation findings or implementation of mitigation measures.

4.9.6 Any limitations to the EIA are summarised in each technical chapter, where relevant, together with the means proposed to mitigate these.

4.9.7 Figures for land take and habitat loss should be considered as approximate and could vary slightly once the detailed design is developed.

4.9.8 Information on the Proposed Development construction has been developed by the project team based on professional judgement and outline design works, on the most likely methods of construction, plant, access and working areas etc. for the purposes of the EIA. The final choice on construction methods will rest with the contractors and may differ from those used in this assessment.

4.10 Summary

4.10.1 This chapter has detailed the methodology used to conduct the EIA and produce the EIA Report for the Proposed Development. An overview of the relevant legislation and guidance documents has been provided with the main legislative document being The Town and Country (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) and the associated Town and Country Planning (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020. Following this, the EIA process and the scope of the assessment are detailed. General assumptions, limitations and uncertainties are also stated.

4.11 References

IEMA (2006). Guidelines for Environmental Impact Assessment, Institute of Environmental Management and Assessment.

Marine Scotland (2015a). Guidance for Marine Licence Applicants. Version 2 – June 2015. Available at: https://www.gov.scot/publications/marine-licensing-applications-and-guidance/

Marine Scotland (2015b). Guidance on Marine Licensable Activities subject to Pre-Application Consultation. Available at: https://www.gov.scot/publications/marine-licensing-applications-and-guidance/

Marine Scotland (2021a). Marine Licence Applications. Available at: https://marine.gov.scot/marine-licence-applications. Accessed on: 18/03/2021

Marine Scotland (2021b). National Marine Plan interactive (NMPi). Available at: https://marinescotland.atkinsgeospatial.com/nmpi//. Accessed on: 22/04/2021

ORDEK (2020). Mine Map. Available online at: https://www.ordtek.com/mine-map/. Accessed on: 1/12/2020.

Pastmap (2020). Available online at https://pastmap.org.uk/map

Scottish Executive (1997). The Town and Country Planning Act (Scotland) 1997. Available at: https://www.legislation.gov.uk/ukpga/1997/8/contents

Scottish Government (2020). Scottish Planning Policy. Available at: https://www.gov.scot/publications/scottish-planning-policy/

Scottish Government (2017a). The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: http://www.legislation.gov.uk/ssi/2017/102/contents/made

Scottish Government (2017b). The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended). Available at https://www.legislation.gov.uk/ssi/2017/115/contents/made

Scottish Government (2017c). The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended), Planning Circular 1/2017. Available at: https://www.gov.scot/publications/planning-circular-1-2017-environmental-impact-assessment-regulations-2017/

Scottish Government (2017d). Planning Advice Note (PAN) 1/2013 Environmental Impact Assessment. Available at: https://www.gov.scot/publications/planning-advice-note-1-2013-environmental-impact-assessment/

Scottish Government (2020a). The Town and Country Planning (Miscellaneous Temporary Modifications) (Coronavirus) (Scotland) Regulations 2020. Available at: http://www.legislation.gov.uk/ssi/2020/124/made

Scottish Government (2020b). Coronavirus (COVID-19): planning guidance on pre-application consultations for public events. Available at: https://www.gov.scot/publications/coronavirus-covid-19-planning-guidance-on-pre-application-consultations-for-public-events/

SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments. Available at: https://www.nature.scot/guidance-assessing-cumulative-impact-onshore-wind-energy-developments

SNH (2018). A Handbook on Environmental Impact Assessment Version 5. Available at: https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf

SNH (2019). Standing Advice for Planning Consultation - Protected Species: Bats. Available at https://www.nature.scot/sites/default/files/2019-10/Species%20Planning%20Advice%20-%20bats.pdf

SNH, SEPA, Scottish Renewables, FCS, HES, MSS (2019) Good Practice during Wind Farm Construction Version 4. Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction

NatureScot, General Pre-Application and Scoping Advice to Developers of onshore wind farms, (2020), https://www.nature.scot/general-pre-application-and-scoping-advice-onshore-wind-farms

5 Planning Policy

Contents

5.1	Introduction	5-1
5.2	The Statutory Development Plan	5-1
5.3	Material Considerations	5-16
5.4	Summary	5-33
5.5	References	5-34

This page is intentionally blank.

5 Planning Policy

5.1 Introduction

5.1.1 This chapter sets out the policy context relevant to the Proposed Development. The approach focuses upon the policies from the Statutory Development Plan, national planning policy and guidance including the marine policy framework and other material considerations, which are of most relevance to the EIA process.

5.1.2 A detailed examination of policy and the development's accordance with the relevant policy framework is provided within the "Planning Statement", which is submitted with the planning application but does not form part of this EIA Report.

5.2 The Statutory Development Plan

5.2.1 Under the terms of the Planning Acts and associated regulations, Councils are required to prepare, and keep up to date, a Statutory Development Plan. The Development Plan provides the land use planning policy framework for the Council's administrative areas. For the Proposed Development, at the time of writing, this comprises the Orkney Local Development Plan 2017 (The LDP), which was adopted in April 2017, and adopted Supplementary Guidance. The LDP provides the land use policy framework and relevant development assessment policies.

5.2.2 Orkney Islands Council (OIC) has adopted five pieces of Supplementary Guidance and those documents of relevance to the Proposed Development are:

- Energy (Adopted March 2017);
- Natural Environment (Adopted March 2017);
- Historic Environment and Cultural Heritage (Adopted March 2017).

5.2.3 There is no live Structure or Strategic Development Plan that forms part of the statutory Development Plan for OIC.

5.2.4 The Proposed Development footprint (i.e. turbines, access tracks and associated infrastructure) lies outwith all statutory natural and cultural heritage land use designations, this is with the exception of the proposed new extended slipway and landing jetty and small sections of track leading to it which fall within the Faray and Holm of Faray Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). There is one Scheduled Monument within the north-west extent of the Proposed Development site boundary, Quoy broch (SM11440). The site boundary, along the eastern extent, takes in a small part of the Faray and Holm of Faray SAC and SSSI.

5.2.5 The majority of the site is located within SP1: 'Area with Potential for Wind Farm Development' as defined by the Spatial Strategy Framework for Wind Farm Development within the Energy SG (2017), where wind energy development is likely to be supported in principle. This is illustrated in Figure 5.1 of the EIA Report. Small parts of the site lie within SP2: 'Area of Significant Protection', which relates to the Faray and Holm of Faray SAC and SSSI. As noted above only the new extended slipway and landing jetty infrastructure and small sections of track leading to it are located within the SP2 area.

5.2.6 The approved LDP 2017 sets out a vision and spatial strategy for the development of land over the next ten to twenty years. In Chapter 1, paragraph VS.1, page 1, it states:

"The Local Development Plan for Orkney seeks to ensure that effective planning policies are in place to strengthen and support Orkney's communities by enabling those developments which will have a positive and sustainable socio-economic impact, and utilise locally-available resources, whilst striving to preserve and enhance the rich natural and cultural heritage assets upon which Orkney's economy and society depends" (Orkney Islands Council, 2017).

5.2.7 With regards to energy, paragraph VS.5, page 1 of the vision states:

"Policy support has been established to ensure that all appropriate energy generation schemes will be supported in the county and that local solutions to storing energy for alternative uses are encouraged where there is not an opportunity to distribute energy through more traditional routes."

5.2.8 Energy is specifically referenced in Chapter 7, page 25 of the LDP 2017, where it is stated that:

"Orkney Islands Council supports the use of renewable and low carbon technologies to heat and power our homes, work places and community facilities and seeks to facilitate appropriate developments associated with a variety of types of renewable energy generation" (Orkney Islands Council, 2017).

5.2.9 Paragraph 7.3 goes on to state:

"The Plan seeks to ensure that Orkney's full potential for electricity and heat from renewable sources is achieved, whilst ensuring that there are no unacceptable impacts on relevant environmental and community considerations…" (Orkney Islands Council, 2017).

5.2.10 The most relevant LDP policies, which have been considered during the EIA, are:

Table 5.1 – Relevant LDP Policies

Policy Topic	Policy
Policy 7 Energy **Extract**	**C All Renewables and Low Carbon Energy Developments** **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. Sufficient supporting information must be submitted with any planning application to enable a full assessment to be made of the likely effects of the development. **ii.** Conflict with adjoining uses must be avoided and developments may not compromise the viability of any existing land use allocation or approved land use proposal in the surrounding area. **iii.** The net-economic impacts of a proposal, including local and community socio-economic benefits such as employment, associated businesses and supply chain opportunities, will be taken into consideration and any demonstrable benefits will be balanced against any identified adverse impacts on known constraints. **D Onshore Wind 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: a. Communities and Amenity b. Landscape and Visual Impact c. Natural Heritage d. Historic Environment e. Tourism and Recreation f. Peat and Carbon Rich Soils

Policy Topic	Policy
	g. Water Environment h. Aviation, Defence and Communications i. Construction and Decommissioning **ii.** Appropriately sited single small wind energy developments (<20m to blade tip) will be supported in principle where there is a clear visual link, at an appropriate scale, between the wind energy development and the building(s) to which it relates. **iii.** Applications for any windfarms should take account of the Spatial Strategy Framework for windfarm development: a. Areas with potential capacity to accommodate wind farms have been identified as 'Areas with Potential for Wind Farm Development'; representing the areas of least constraint to wind energy development. Wind energy development is likely to be supported in principle within these areas, subject to proposals complying with the Development Criteria from Supplementary Guidance: Energy and any other material planning consideration. b. Within the 'Areas of Significant Protection' wind farm development may be supported when a proposal complies with the Development Criteria from Supplementary Guidance: Energy and where it can be demonstrated by the applicant that any significant effects on the qualities of these areas can be overcome by siting, design or other mitigation. c. Wind farm developments will not be supported within the National Scenic Area. **iv.** Throughout the lifetime of the Plan, OIC will investigate potential 'Strategic Wind Energy Development Areas' within which the principle of wind farm developments will be supported. Any such areas will be subject to appropriate assessment and full public consultation before being adopted within Supplementary Guidance: Energy. **v.** Consent for wind energy developments may be granted for a maximum period (usually 25 years)[1] from final commissioning/the date that the device commences energy generation. Planning conditions and, where required, a financial bond, letter of credit and/or Legal Agreement will be attached in relation to the removal of the development and to the restoration of the site at the point when the planning permission expires or when the project ceases to operate for a specified period of time. **vi.** Applications for the erection of monitoring equipment, anemometer masts etc., in relation to proposed wind farm projects in advance of a

5.1.1

[1] *The Applicant is applying for planning permission for the Proposed Development in perpetuity. There are currently no statutory or legislative limits to the duration of consent for a proposed development, as noted in the Scottish Government's Onshore Wind Policy Statement (2017). The Applicant respectfully requests that no time limit is placed on the planning permission should Orkney Islands Council be minded to grant the application.*

Policy Topic	Policy
	full application being submitted will be supported subject to other development plan policies and any other material considerations. Any planning permission for monitoring/survey equipment will normally be limited to a maximum period of 2 years unless the need for a longer monitoring period can be demonstrated. Consideration should be given to using digital monitoring equipment, especially to mitigate impacts in sensitive locations.
Policy 1 Criteria for All Development	**Development will be supported where:** **i.** It is sited and designed taking into consideration the location and the wider townscape, landscape and coastal character; **ii.** The proposed density of the development is appropriate to the location; **iii.** It is not prejudicial to the effective development of, or existing use of, the wider area; **iv.** The amenity of the surrounding area is preserved and there are no unacceptable adverse impacts on the amenity of adjacent and nearby properties/users; **v**. It would not create an unacceptable burden on existing infrastructure and services that cannot be resolved; **vi.** It does not result in an unacceptable level of risk to public health and safety; **vii**. It is resource efficient and utilises sustainable construction technologies, techniques and materials and, where practicable, low and zero carbon generating technologies are installed; **viii**. It facilitates the prevention, reuse, recycling, energy recovery and disposal of waste, including where relevant, the use of Site Waste Management Plans; **ix.** It protects and where possible enhances and promotes access to natural heritage, including green infrastructure, landscape and the wider environment; and **x.** It protects and where possible enhances Orkney's cultural heritage resources.
Policy 8 Historic Environment & Cultural Heritage **Relevant Extract**	**A All Development** Development which preserves or enhances the archaeological, architectural, artistic, commemorative or historic significance of cultural heritage assets, including their settings, will be supported. Development which would have an adverse impact on this significance will only be permitted where it can be demonstrated that: **i.** measures will be taken to mitigate any loss of this significance; and **ii.** any lost significance which cannot be mitigated is outweighed by the social, economic, environmental or safety benefits of the development. **B Specific Policy Considerations**

Policy Topic	Policy
	i. Heart of Neolithic Orkney World Heritage Site Development within the Inner Sensitive Zones will only be permitted where it is demonstrated that the development would not have a significant negative impact on the Outstanding Universal Value of the World Heritage Site or its setting. Development will not be permitted where it breaks the skyline at the sensitive ridgelines of the World Heritage Site when viewed from any of its component parts, or where it will be sited in any location where there is the potential to impact upon the World Heritage Site, unless it is demonstrated that the development will not have a significant negative impact on either the Outstanding Universal Value or the setting of the World Heritage Site. **ii. Listed Buildings** Change to a listed building must be managed to protect its special interest while enabling it to remain in/return to active use. Applications for development must have regard to the importance of preserving and enhancing the building, its setting and any features of special architectural or historic interest. Enabling development may be acceptable where it can be clearly shown to be the only means of preventing the loss of the asset and securing its long term future. Any development must be the minimum necessary to achieve these aims and the resultant development should be designed and sited carefully to preserve or enhance the character and setting of the historic asset. **iv. Scheduled Monuments** Where there is potential for a proposed development to have an adverse effect on the integrity of the setting of a scheduled monument, 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. **v. Inventory Gardens and Designed Landscapes** Development which preserves or enhances the character and features of inventory gardens and designed landscapes and their setting, will be supported. Development that would have a significant negative impact upon the character of their areas will not be permitted. The conservation, maintenance and restoration, including the restoration of layout and features, will be supported where this is appropriate and based on historical research. **vi. Investigation & Recording** a. Where there is the potential for historic environment assets to exist in particularly sensitive areas, such as the Inner Sensitive Zone of the

Policy Topic	Policy
	World Heritage Site or the historic core of Kirkwall, applicants may be required to undertake 'Cultural Heritage Impact Assessments' to ensure that there will be no unacceptable effects on any known or potential historic environment assets. b. Where development, which has the potential to impact on areas known or suspected to contain archaeological deposits is permitted, planning conditions will be attached to ensure the effective assessment, analysis, archiving and publication of any archaeological remains to an agreed timeframe. c. Where a historic environment asset, or a significant element thereof, will be lost as a result of a development, it may be necessary to record the site to an agreed level prior to the commencement of development/ demolition.
Policy 9 **Natural Heritage & Landscape**	**A. Natural Heritage Designations** **1. Internationally Designated Sites** **i.** Development likely to have a significant effect on a site designated or proposed as a Special Protection Area (SPA) or Special Area of Conservation (SAC), collectively known as Natura 2000 sites, individually or cumulatively and not directly connected with, or necessary to the conservation management of that site must be subject to an Appropriate Assessment in order to assess the implication s for the site's conservation objectives. **ii.** Development will only be permitted where the Assessment ascertains that: a) it would not adversely affect the objectives of the designation or the integrity of the site; or b) there is no alternative solution; and c) there are imperative reasons of over-riding public interest, including those of a social or economic nature. **iii.** A derogation is available where there are no alternative solutions; there are imperative reasons of overriding public interests, including those of a social or economic nature; and compensatory measures are provided to ensure that the overall coherence of the Natura network is protected. **iv.** The international importance of Ramsar sites should also be appropriately protected. **2. Nationally Designated Sites** **i.** Development that negatively affects a Site of Special Scientific Interest (SSSI) will only be permitted where: a) the objectives of the designation and the overall integrity of the area will not be compromised; or

Policy Topic	Policy
	b) any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance. **ii**. Development capable of affecting a Nature Conservation Marine Protected Area (NC MPA) will only be permitted where it can be demonstrated that: a) there is no significant risk of hindering the achievement of the conservation objectives of the NC MPA; or b) there is no alternative that would have a substantially lower risk of hindering the achievement of the conservation objectives of the NC MPA; and c) the public benefit outweighs the risk of damage to the environment. **3. Locally Important Sites** **i.** Development likely to negatively affect a Local Nature Conservation Site (LNCS), Local Nature Reserve (LNR) or unnotified Geological Conservation Review (GCR) site will only be permitted where there is no feasible alternative location; and a) mitigative measures will be satisfactorily implemented to ensure that it will not affect the integrity of the area or the qualities for which it has been designated; or b) any such effects are clearly outweighed by social, environmental or economic benefits. *Details of Local Nature Conservation Sites are contained in Supplementary Guidance: Natural Environment.* **B. Protected Species** **i.** Development likely to have an adverse effect on any protected species will not be permitted unless it can be justified in accordance with the relevant protected species legislation. **ii.** Where there is evidence to indicate that a protected species may be present on, or adjacent to, a development site and could be affected by the proposal, the Planning Authority may require an ecological survey and/or mitigation plan to be submitted with the planning application. **C. Wider Biodiversity and Geodiversity** **i.** All development proposals must seek to avoid damage to, or loss of, biodiversity and geodiversity, and should enable the maintenance of healthy ecosystems, as well as natural features and processes which provide important services to communities e.g. coastal protection, flood risk mitigation or carbon storage. **ii.** All development proposals should have due regard for priority habitats and species identified in the UK Biodiversity Action Plan, the Scottish Biodiversity List, the list of Priority Marine Features and the Orkney Local Biodiversity Action Plan. Where possible, new

Policy Topic	Policy
	development should incorporate benefits for biodiversity, and avoid further fragmentation or isolation of habitats. **iii.** Where there is evidence to indicate that a priority habitat or species may be present on, or adjacent to, a development site and could be affected by the proposal, the Planning Authority may require an ecological survey and/or mitigation plan to be submitted with the planning application. **D. The Water Environment** **i.** In accordance with the River Basin Management Plan for Scotland River Basin District 2015/2027, development proposals should seek to protect and, where possible, improve the water environment (river streams, lochs, groundwater, estuaries, coastal waters (to 3 nautical miles) and wetlands including Groundwater Terrestrial Ecosystems). Where this is not possible, it must be clearly demonstrated that the development: a) will avoid causing deterioration in the water quality or overall status of water bodies and, for any water body currently not achieving good status, will not prevent it from being able to achieve good status in the future. b) includes the management and/or enhancement of existing habitats and, if appropriate, the creation of new habitats. c) will not significantly affect water quality, flows and sediment transport, either during construction or after completion. Where a development proposal is located adjacent to the water environment, and a bank-side (waterside) location is not essential to the proposal, an appropriate buffer zone between the development and the water body should be included, within which development should be avoided. **ii.** There is a presumption against unnecessary culverting and engineering activities in the water environment. **E. Peat and Soils** **i.** Development on areas of peat or carbon-rich soils will only be permitted where: a) it has been clearly demonstrated that there is no viable alternative; b) an acceptance assessment of the likely effects of the development on carbon dioxide emissions has been undertaken and submitted; and c) the economic and social benefits of the development clearly outweigh any potential detrimental effects on the environment, including likely carbon dioxide emissions. **ii.** Where development on peat or carbon-rich soil is permitted, the Council may ask for a peatland management plan to be submitted which is supported by an appropriate peat survey and clearly

Policy Topic	Policy
	demonstrates how the unnecessary disturbance, degradation and erosion of peat and soils will be avoided and, where this is not possible, minimised and mitigated. **iii.** New areas of commercial peat extraction will only be permitted where it can be demonstrated that: a) it is an area of degraded peatland which has been damaged by human activity and has low conservation value and, as a result, restoration is not possible. **iv.** The applicant must submit a method statement, and where necessary a soil management plan, in support of any application. **F. Trees and Woodland** **i.** Development that would result in the loss of, or damage to, one or more trees protected by a Tree Preservation Order; or lead to the loss of, or damage to, individual trees or woodlands of significant ecological, landscape, shelter or recreational value will not be permitted unless: a) it would achieve significant and clearly defined benefits that outweigh any potential loss; b) an evaluation, to the appropriate British Standard (or a suitable standard to be agreed with the Planning Authority) of the ecological, landscape, shelter and recreational value of the tree(s) has been undertaken and it is concluded that the loss would be acceptable; and c) an additional or equivalent number of new trees are planted on, or near the site to an agreed standard and specification (species and maturity). **ii.** Works to trees must not result in any unnecessary fragmentation of a green network. **G. Landscape** **i.** All development proposals must be sited and designed to minimise negative impacts on the landscape, townscape and seascape characteristics and landscape sensitivities that are identified in the Orkney Landscape Character Assessment, and should be sympathetic to locally important natural and/or historic features within the landscape. **ii.** Consideration should be given to the siting, scale and design of the proposal, as well as the potential for cumulative effects with other developments. **iii.** Development that affects the National Scenic Area (NSA) will only be permitted where it is demonstrated that: a) the proposal will not have a significant effect on the overall integrity of the area or the qualities for which it has been designated; or b) any such adverse effects are clearly outweighed by social, environmental or economic benefits of national importance.

Policy Topic	Policy
	iv. Development proposals affecting the area of wild land on Hoy will be only be permitted where it has been demonstrated that any significant effects on the character and qualities of this area can be substantially overcome by siting, design or other mitigation.
Policy 12 Coastal Development	**A. Criteria for all Coastal Development** Development in the coastal zone (above Mean Low Water Mark of Ordinary Spring Tides) will be supported where it can be demonstrated that: **i.** the scale, location, siting and design of the development will not have a significant adverse effect, either individually or cumulatively, on the landscape/coastal character, seascape or townscape, taking account of all relevant national studies and guidance; **ii.** there will be no significant adverse effects, either individually or cumulatively, on natural, built and/or cultural heritage resources; **iii.** the integrity of coastal and marine ecosystems, as well as geomorphological features, has been safeguarded, to demonstrate how any significant disturbance and degradation has been avoided or appropriately mitigated; **iv.** there will be no significant adverse effects on other coastal and/or marine users; and **v.** public access to and along the coast will be maintained and enhanced wherever possible. Development that would result in significant adverse effects under criteria i to v, that cannot be appropriately mitigated, will only be permitted when it can be demonstrated that any such effects are clearly outweighed by significant socioeconomic benefits. **B Coastal Change** **i.** New development will not generally be supported in areas that are vulnerable to adverse effects of coastal erosion and/or wider coastal change as identified in the National Coastal Change Assessment*. Where new development is adaptive to anticipated coastal change, and therefore avoids the need for intervention over its lifetime, the development may be permitted. **ii.** When there is clear justification for a departure from the general policy to avoid new development in areas that are vulnerable to adverse effects of coastal erosion and/or wider coastal change, development proposals will be required to demonstrate that appropriate resilience and adaptation strategies have been incorporated over the lifetime of the development. *Relevant outputs from the National Coastal Change Assessment are anticipated during 2016. **C Locational Considerations**

Policy Topic	Policy
	i. Development that requires a location on, or directly adjacent to, the coast within settlement boundaries will be supported. When it can be demonstrated that such a coastal development cannot be accommodated within a settlement for locational and/or operational reasons, or other appropriate reasons by agreement with the planning authority, the proposals will be required to comply with Sections A and B of this policy. **ii.** Development that does not have a locational and/or operational requirement for a waterfront location may be refused if the development site has strategic value for marine related industries or community use. **[Part D Aquaculture is not relevant as it relates to finfish and shellfish farming developments]** **E Ports & Harbours** **i.** Development which requires a pier and/or harbour location, including for fishing, renewables, aquaculture or marine leisure and recreational purposes, will be supported within areas identified for harbour and pier uses where; a) the proposal requires a harbour-side location or is ancillary to activities taking place within the harbour area; b) the proposal would not adversely affect the commercial viability or efficient working of the harbour or pier for commercial marine related uses; c) the design, scale and siting of new development would not have a significant adverse effect on the local coastal character and visual amenity; and d) the proposal complies with the requirements of the HSE where the pier or harbour is covered by an HSE Consultation Zone. **ii.** The enhancement and upgrading of piers, landing facilities and other facilities associated with the industries which require a pier and/or harbour location will be supported.
Policy 13 Flood Risk, SuDS & Waste Water Drainage	**A. Flood Risk** **i.** A Flood Risk Assessment must be undertaken in accordance with SEPA technical guidance where development proposals are in areas identified as being of medium to high risk of flooding and, in certain circumstances described in the SPP Flood Risk Framework, may also be required in the low to medium risk category. **ii.** Where built development in the medium to high risk category is permitted, measures to protect against, or manage, flood risk will be required and any loss of flood storage capacity must be mitigated to achieve a neutral or better outcome. Water-resistant materials and construction should be used where appropriate. **iii.** Where development is proposed within an area that is, or is planned to be, behind a formal flood protection scheme, it must be an

Policy Topic	Policy
	acceptable land use for the location and designed to be resilient. Permission for the development to commence may be withheld until the flood protection scheme is operational. **iv.** Development will not be permitted in locations where it would increase the probability of flooding elsewhere and the piecemeal reduction of functional floodplains should be avoided. Land with potential to contribute to managing flood risk, for example through natural flood management or green infrastructure creation, will be safeguarded. **B. Sustainable Drainage Systems (SuDS)** **i.** Development proposals must incorporate Sustainable Drainage Systems (SuDS) in accordance with current national guidance, e.g. Designing Streets, the CIRIA SuDS Manual and, where the scheme is to be adopted by Scottish Water, the Sewers for Scotland Manual. **ii.** Planning applications must include a drainage design which demonstrates compliance with best practice and provides the following details: a) the types of measures to be used and location; b) evidence of sub-soil porosity and suitability for use of infiltration SuDS; c) where required, pre- and post-development run-off calculations to determine the scale of SuDS required; d) proposals for integrating the drainage system into the landscape or required open space provision; e) demonstration of good ecological practice including habitat enhancement, where necessary; and f) land take requirements for different drainage options based on initial calculations carried out to size any significant drainage structures. **iii.** Depending on the scale / type of development proposed, a number of different types of SuDS facilities may be required in sequence, each of which provides a different form of water quality treatment. **iv.** In developments that involve a change of use and / or redevelopment, opportunities should be sought to retrofit SuDS wherever possible. **C. Waste Water Drainage** **i.** All new development within or adjacent to settlements must connect to the public sewer as defined in the Sewerage (Scotland) Act 1968, unless: a) The proposed development is in a settlement where there is no, or a limited collection system, or

Policy Topic	Policy
	b) The proposed development is in a village or town where there are infrastructure constraints that prevent connection and a temporary private system is proposed. **ii.** In these cases a private system may be permitted where it does not pose a risk of detrimental effect, including cumulative effect, to the natural or built environment, cultural heritage or surrounding uses. **iii.** Where private drainage arrangements are proposed, the developer should consult the Scottish Environment Protection Agency (SEPA) in relation to authorisations of discharges of sewerage effluent to land or water.
Policy 14 Transport, Travel & Road Network Infrastructure **EXTRACT**	**A. Transport Infrastructure** **i.** Development that would prejudice the present or future operations of Orkney's inter-Island transport routes (ferry and air) or transport connections to the Scottish Mainland (ferry and air) will not be permitted. **ii.** Proposals for the maintenance, improvements or expansion of transport infrastructure, or for the provision of new transport infrastructure, will be supported where justification is provided through a Local, Regional or National Transport Strategy, by a Scottish Transport Appraisal Guidance (STAG), or by a development brief. **C. Road Network Infrastructure** Development will only be permitted where due regard has been paid to Designing Streets and the proposal demonstrates that: **i.** It is well connected to the existing network of roads, paths and cycleways and will not create a barrier to future development; **ii.** It can be safely and conveniently accessed by service, delivery and other goods vehicles, as appropriate to the development; **iii.** Any new access, or upgrades to an existing access, linking to the adopted road network has been designed to an adoptable standard as defined by the National Roads Development Guide (new accesses should be resource efficient, safe for all road users, and convenient for sustainable travel modes); **iv.** It is designed to cause minimal impact on the character of the site and the surrounding area; and **v.** There are satisfactory arrangements to ensure that there is provision for the long term maintenance.

Supplementary Guidance: Energy

5.2.11 Supplementary Guidance: Energy, hereinafter referred to as "SG Energy" was adopted by OIC on 9th March 2017 prior to the adoption of the LDP and forms statutory Supplementary Guidance. The SG Energy contains several statements with respect to OIC's encouragement of renewable energy generation and contains a Spatial Strategy Framework for wind farm development. The application

site lies primarily within an 'Area With Potential for Wind Farms'. Relevant sections of the SG Energy, include:

5.2.12 Chapter 1, Page 4, paragraph 1.01 of the SG Energy refers to the Scottish Governments targets for *"100% of Scotland's electricity and 11% of heat demand to be generated from renewable sources by 2020"* and that *"a modal shift towards renewable and low carbon forms of energy is a major contributory factor in enabling a reduction in emissions*" (Orkney Islands Council, 2017).

5.2.13 At paragraph 1.02, page 4, it is recognised within the SG Energy that "*the renewable energy sector is a growth sector for the both Scottish and the Orkney economies, providing employment and bringing investment*" (Orkney Islands Council, 2017).

5.2.14 Chapter 2, of the SG Energy "*Balancing the Impacts of Development*" sets out the relevant considerations in balancing "*the potential benefits of a proposal and any anticipated adverse impacts on known constraints*" (Orkney Islands Council, 2017).

5.2.15 Chapter 4 of the SG Energy is specific to Wind Energy and references *"a Spatial Framework for wind farm developments and a series of Development Criteria against which all applications for wind energy developments will be assessed" (Orkney Islands Council, 2017).*

5.2.16 Paragraph 4.12 of the SG Energy, makes further reference to the Spatial Strategy where it is stated that "*Developers of 'wind farms'* are generally directed to *'Areas with Potential for Wind Farms' where there are the lowest levels of potential constraints to wind energy developments*" (Orkney Islands Council, 2017).

5.2.17 Paragraph 1.04 of the SG Energy, states that the SG Energy will accompany Policy 7 of the LDP *"which seeks to support appropriate renewable energy development."*

5.2.18 The Spatial Policy SP1: sets out the Spatial Policy on 'Areas with Potential for Wind Farms'. It states:

"Areas with potential capacity to accommodate wind farms have been identified as 'Areas With Potential for Wind Farms' and are shown in Figure 1. These places represent the areas of least constraint to wind energy development. Wind energy development is likely to be supported in principle within the areas subject to proposals complying with the Development Criteria and any other material planning consideration" (Orkney Islands Council, 2017).

5.2.19 The Proposed Development lies primarily within an area detailed as "Areas with Potential for Wind Farm Development" as identified by Figure 1 Spatial Strategy Map on Page 17 of the SG Energy and Figure 5.1 of the EIA Report. This is with the exception of infrastructure relating to the new extended slipway and landing jetty and the small sections of track leading to it which are located within 'SP2: Areas of Significant Protection' relating to the Faray and Holm of Faray SAC and SSSI.

5.2.20 Paragraph 4.14 of the SG Energy states, *"The existence of an identified constraint does not in itself lead to a blanket restriction on wind farm development. Justification, along with potential mitigation, will have to be provided in support of a planning application to demonstrate that the proposal is acceptable"* (Orkney Islands Council, 2017).

5.2.21 In June 2019 OIC approved the adoption of Development Management Guidance on Energy which was prepared to provide additional clarity to the material factors outlined within the SG Energy document and to assist in the assessment of planning applications. The Guidance was adopted in response to OIC's declaration of a climate change emergency on 14th May 2019 and in response to recent appeal decisions made by Reporters in relation to the scale of wind energy developments in Orkney.

5.2.22 Section 2 states that, "*Where there will be adverse effects on local-level constraints, such as landscape impacts outwith the National Scenic Area or impacts on sites that are not subject to a national or international level designation, significant weight will be given to any cogent argument that demonstrates that the proposal will have a meaningful positive impact on the factors outlined within Section 1"* (Orkney Islands Council, 2019). These factors include net economic impact, the scale of contribution towards renewable energy targets and the effects on greenhouse gas emissions.

5.2.23 As noted above, OIC are committed towards delivering a carbon neutral economy whilst tackling climate change. In considering the weight of positive impacts of developments, Section 1 also notes, *"It is acknowledged that community and publicly owned energy developments naturally have greater socio-economic benefits at the local level than private schemes."* (Orkney Islands Council, 2019).

5.2.24 With regard to landscape effects at Section 3, reference is made to the Orkney Landscape Capacity Assessment (2014), adopted by the Council in 2015, which considers the capacity of the Orkney landscape to accommodate onshore wind energy development. It states that *"The study represents a strategic-level starting point to assist planners and developers to shape proposals … The weight which should be attached to this guidance should therefore be considered in that context"* (Orkney Island Council, 2019). The importance of site-specific Landscape and Visual Impact Assessment is relevant in this context.

5.2.25 Section 3 continues, *"Therefore, outwith the Hoy and West Mainland National Scenic Area, notwithstanding other constraints, it may be possible for a developer to make a strong argument regarding how the positive effects of the proposal outweigh the identified negative impacts on the landscape"* (Orkney Islands Council, 2019).

5.2.26 The guidance also updates the SG Energy document's position on tip heights and states that turbines of over 125 m should be considered and accepts that for the most part, wind energy developments of the future will be of a larger scale with turbines in excess of 125 m.

5.2.27 Section 4 provides an update with respect the Scale of Wind Energy Development recognising that Table 1 of the SG Energy only includes turbines up to a maximum height of 125 m. It then goes on to state, *"For the avoidance of doubt, whilst 'Very Large' turbines are defined as being 80 to 125 metres in height [in the SG Energy], turbines exceeding this height will be assessed in accordance with the Spatial Strategy and Development Criteria set out within the document, this banding does not automatically preclude the consideration of proposals of devices in excess of 125 metres"* (Orkney Islands Council, 2019).

5.2.28 It continues by acknowledging that for the most part new wind energy development will be of this scale and based on turbines which are in excess of 125 m and provides an update to Table 1 which includes turbines over 125 m.

5.2.29 With regards to proposals over 125 m, it acknowledges that it is likely that there will be significant landscape and visual impacts and it is then up to the developer to communicate the nature of the positive impacts of their proposal, as described at Section 1 above, and for the Committee to consider the level of weight which should be attached to each consideration on a case by case basis.

5.2.30 Section 5 notes that recent appeal decisions have placed significant material weight on the contribution of renewable energy projects towards the needs case for the Orkney interconnector. Page 3 of the Guidance states, *"In future, significant material weight will be placed upon any meaningful contributions toward realising this National Development. For the avoidance of doubt, any single energy generation project greater than 10MW…will be considered to make a meaningful contribution toward the interconnector needs case"* (Orkney Islands Council, 2019).

Supplementary Guidance: Historic Environment and Cultural Heritage

5.2.31 Supplementary Guidance: Historic Environment and Cultural Heritage hereafter referred to as SG Heritage is statutory Supplementary Guidance which aims to bring together information on how OIC will administer Policy 8: Historic Environment and Cultural Heritage Local Development Plan. It includes details of:

- Relevant legislation.
- Legally protected sites, and specific policies relating to them.
- The consent process for developments which may affect the historic environment.
- Notes providing further information on certain points of the text.

- A glossary of key terms.

5.2.32 The policy document is structured around five key qualities/types of receptors: archaeological, architectural, artistic, commemorative and historic.

Supplementary Guidance: Natural Environment

5.2.33 Supplementary Guidance: Natural Environment is statutory Supplementary Guidance which sets out additional information on natural heritage to that contained in Policy 9 Natural Heritage and Environment of the LDP. It provides information specifically on natural heritage designations, protected species, wider biodiversity, geodiversity, the water environment, peat and soils.

5.2.34 The aim of the document is to assist stakeholders in fully considering the wildlife and environmental implications of development proposals.

5.3 Material Considerations

5.3.1 The following material considerations are deemed relevant to the assessment and consideration of the Proposed Development:

- The National Planning Framework 3 and emerging National Planning Framework 4;
- Scottish Planning Policy;
- UK Marine Policy Statement (2010);
- Scotland's National Marine Plan 2015;
- Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (2016);
- Planning Advice Notes;
- Landscape Capacity Assessment for Wind Energy in Orkney (2014), adopted by OIC 2015;
- UK and Scottish Government Declaration of a Climate Emergency (2019);
- OIC Council Plan 2018-2023;
- OIC's Declaration of a Climate Emergency (2019);
- Sustainable Orkney Energy Strategy 2017-2025;
- The Renewable Energy Policy Framework.

5.3.2 Those of particular relevance are referenced in this section below and a full review and assessment of each is provided in the accompanying Planning Statement.

The National Planning Framework 3

5.3.3 Scotland's third National Planning Framework (NPF3) was published by the Scottish Government on 23rd 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 (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 purpose.

5.3.4 NPF3 identifies a series of key actions to help deliver the aims of the spatial strategy for Scotland. Action 17 on page 68 states:

"We will support a co-ordinated approach to planning for energy-related and other key development in the five areas of co-ordinated action on: Peterhead, Cockenzie, Grangemouth, Hunterston and the ***Pentland Firth and Orkney Waters****. We believe that these locations have a nationally-significant role to play in delivering our spatial strategy."*

5.3.5 NPF3 sets out a vision for Scotland. One of the key messages is the opportunity of achieving a low carbon place and this is addressed in Chapter 3. This is also a "subject policy" in Scottish Planning Policy. Paragraph 3.1 explains that planning will play a key role in delivering on the commitments set out in delivering '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*".

5.3.6 NPF3 notes the Government's ambition "to achieve at least an 80 % reduction of greenhouse gas emissions by 2020". Paragraph 3.8 also sets out an overall aim to meet at least 30 % of overall energy demand from renewables by 2020 which includes generating the equivalent of a least 100 % of gross electricity consumption from renewables.

5.3.7 NPF3 highlights the need for an enhanced high voltage energy transmission network to facilitate renewable electricity development and its export. Coordinated action is required to deliver the enhanced grid connection which will support the potential of the Pentland Firth and Orkney Waters area.

5.3.8 Orkney is identified as a key connection where improvements to the network are required. Paragraph 3.40 states, *"Interconnectors to the Western Isles, Orkney and Shetland and onshore connections for offshore renewables on other parts of the coast are all required to fully realise the potential for diverse and widely distributed renewable energy development*." Large scale renewable energy generation forms part of the business case for delivery of this new infrastructure. In this regard the Proposed Development raises matters of national importance in the context of expectations set out in NPF3 and the need for an enhanced high voltage energy transmission network in Orkney. The Proposed Development can draw significant support from the NPF3 and plays a key role in helping to meet its objectives.

National Planning Framework 4

5.3.9 The Scottish Government is in the process of preparing National Planning Framework 4 which will incorporate Scottish Planning Policy. The Scottish Government expect to lay the draft NPF4 in the Scottish Parliament in Autumn 2021 and will consult publicly on fuller proposals at that stage.

5.3.10 Once finalised NPF4 will have the status of the development plan for planning purposes. This is a change to the current position and will mean that its policies will have a stronger role in informing day to day decision making.

5.3.11 In advance of the draft NPF4, and to provide a current view of the Scottish Government's thinking, an Interim Position Statement has been published. The 'Position Statement for the National Planning Framework 4' (hereafter referred to as 'NPF4 Position Statement') was published in November 2020 and sets out the current position and strategy for the NPF4 alongside wider Scottish Government commitments and seeks to begin to set a new course for planning in Scotland for 2050.

5.3.12 A key theme within the Position Statement is the Scottish Government's ambitious target of meeting net zero emissions by 2045. Page 2 of the document states that the planning system will have to be rebalanced to prioritise climate change in all plans and at all levels of decision making. Furthermore Page 2 states that. *"We will need to focus our efforts on actively encouraging all developments that help to reduce emissions".*

5.3.13 Key opportunities to achieve net zero carbon targets are set out on Pages 2 and 3 and include,

"Supporting renewable energy developments, including the re-powering and extension of existing wind farms, new and replacement grid infrastructure, carbon capture and storage and hydrogen networks."

5.3.14 NPF4 is anticipated to focus on four key outcomes:

- Net Zero Emissions
- A Wellbeing Economy

- Resilient Communities, and
- Better, Greener Place

5.3.15 The long-term strategy will be driven by the overarching goal of addressing climate change and the Scottish Government recognises that we must play our full part in tackling the global climate emergency.

5.3.16 In relation to Net-Zero Emissions, it notes that development that will help meet our emission reduction targets will be prioritised. To achieve a net zero Scotland by 2045 and meet the interim emissions reduction targets of 75 % by 2030 and 90 % by 2040, the Position Statement states that *"an urgent and radical shift in our spatial plan and policies is required."*

5.3.17 The Position Statement notes that Scotland's updated Climate Change Plan is due to be published in 2020, (the updated Climate Change Plan was published in December 2020), setting a course for achieving the targets in the Climate Change (Emissions Reductions Targets) (Scotland) Act 2019 and NPF4 will take forward proposals and policies to support it.

5.3.18 In seeking to achieve reduced emission is it noted that there are opportunities for planning to support a transition to a lower carbon economy in areas that include the Firth of Forth, the North East and island communities.

5.3.19 The document sets out a new spatial strategy to achieve this outcome, which will seek to 'Deliver infrastructure to reduce emissions' amongst other aims. This section recognises Scotland as a net exporter of electricity and states that significant further investment will be needed to continue to advance this sector, including to support electricity grid capacity (including subsea links to the islands). To deliver this infrastructure it states, *"We expect that NPF4 will confirm our view that the Global Climate Emergency should be a material consideration in considering applications for appropriately located renewable energy developments".* (Page 9)

5.3.20 Page 9 goes on,

"As a priority, our strategy will need to facilitate the roll-out of renewable electricity and renewable and zero emissions heat technologies. We will need to switch to low and zero carbon fuel sources, and support the delivery of associated infrastructure, such as grid networks..."

5.3.21 There is a further commitment to ensure that NPF4 helps to deliver on the wider energy strategies including the Scottish Energy Strategy (including any updates).

5.3.22 Consideration will be given as to whether proposed national developments can help to deliver on the New Zero vision, proposals for national developments include on and offshore renewable energy generation and networks.

5.3.23 Page 10 identifies potential policy changes to support a spatial strategy for net-zero emissions including:

- *Facilitating development that is highly energy efficient and which meets greenhouse gas emissions standards, including making provision for zero carbon energy generation.*
- *Strengthening our support for re-powering and expanding existing wind farms.*
- *Updating the current spatial framework for onshore wind to continue to protect National Parks and National Scenic Areas, whilst allowing development outwith these areas where they are demonstrated to be acceptable on the basis of site specific assessments.*

5.3.24 The NPF4 Position Statement also recognises island communities and ensuring greater support for them to achieve better outcomes. As part of the 'Better, Greener Places outcome, the Position Statement refers to the National Islands Plan which *"identifies how we can improve outcomes for our island communities and our approach will be informed by an island communities impact assessment."*

5.3.25 It goes on to state that *"We are currently exploring significant changes to our policies on rural and island development, to support prosperous and sustainable communities and businesses whilst*

protecting our unique natural assets. Our rural areas and islands are one of our greatest assets and our strategy will reflect our ambition to build low carbon rural communities where the quality of life is exceptional. We will identify opportunities to build the long term sustainability of our more fragile areas by highlighting infrastructure requirements and facilitating development that strengthens their future." (page 33)

5.3.26 The NPF4 Position Statement is not approved policy and is not a formal part of the NPF process; nor is it a draft NPF4. It does not have any formal status in the planning process. Therefore, NPF3 remains in force until NPF4 is formally adopted by Scottish Ministers, which is expected in 2022.

Scottish Planning Policy

5.3.27 Scottish Planning Policy (SPP) was published on 23rd June 2014, with a revised version published in December 2020 as a result of changes to paragraphs 28, 29, 30, 32, 33 and 125 of SPP. The changes relate to references to sustainable development and housing land supply.

5.3.28 'Scottish Planning Policy' (SPP) is a statement of Scottish Government policy on how nationally important land use planning matters should be addressed and is a material consideration.

5.3.29 The SPP refers to 'Outcomes' as they relate to the Scottish Government's 'Purpose' "*of creating a more successful country, with opportunities for all of Scotland to flourish through increasing sustainable economic growth….".*

5.3.30 The SPP "*introduces a presumption in favour of sustainable development"* and states at paragraph 28 that *"the planning system should support economically, environmentally and socially sustainable places by enabling development that balances the costs and benefits of a proposal over the longer term. The aim is to achieve the right development in the right place; it is not to allow development at any cost".*

5.3.31 Paragraph 29 states that *'Planning policies and decisions should support sustainable development.'* and goes on to identify the principles which should be taken into account in assessing whether a proposal supports sustainable development. These are considered in detail in the accompanying Planning Statement.

SPP Subject Policies – A Low Carbon Place

5.3.32 SPP addresses 'A Low Carbon Place' as a 'subject policy' on page 36 and refers to 'delivering electricity'. Paragraph 152 refers to the NPF 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.

5.3.33 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;*
- *The equivalent of 100 % of electricity demand from renewable sources by 2020.*

Support the development of a diverse range of electricity generation from renewable energy 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."

Onshore Wind

5.3.34 Onshore wind is specifically addressed at Paragraph 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 determining onshore wind development are not appropriate.

5.3.35 SPP also highlights that grid capacity should not be used as a reason to constrain the areas identified for wind farm development or decisions on individual applications for wind farms and that it is for wind farm developers to discuss connections to the grid with the relevant transmission network operator.

Development Management for Energy Infrastructure Developments

5.3.36 In terms of development management, paragraph 169 of SPP set out that: "*proposals for energy infrastructure developments should always take account of spatial frameworks for wind farms*" and that considerations will vary relative to the scale of the proposal and area characteristics but are likely to include a number of matters. These are set out at Table 1 within the SPP (page 39) (as replicated below).

5.3.37 The application site is located primarily within a Group 3 area. SPP notes specifically with respect to Group 3 'Areas with potential for wind farm development' that *"wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria"* (Scottish Government, 2014). A small part of the site boundary lies within Group 2 'Areas of Significant Protection' relating to the Faray and Holm of Faray SAC and SSSI. The only infrastructure associated with the Proposed Development located within these areas is the new extended slipway and landing jetty infrastructure and the small sections of track leading to it. In these areas, wind farms may be appropriate in some circumstances.

5.3.38 Paragraph 170 states that wind farms should be, *"sited and designed to ensure impacts are minimised and to protect an acceptable level of amenity for adjacent communities"* (Scottish Government, 2014).

Table 1: Spatial Frameworks

Group 1: Areas where wind farms will not be acceptable: National Parks and National Scenic Areas.		
Group 2: Areas of significant protection: Recognising the need for significant protection, in these areas wind farms may be appropriate in some circumstances. Further consideration will be required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation.		
National and international designations: • World Heritage Sites; • Natura 2000 and Ramsar sites; • Sites of Special Scientific Interest; • National Nature Reserves; • Sites identified in the Inventory of Gardens and Designed Landscapes; • Sites identified in the Inventory of Historic Battlefields.	**Other nationally important mapped environmental interests:** • areas of wild land as shown on the 2014 SNH map of wild land areas; • carbon rich soils, deep peat and priority peatland habitat.	**Community separation for consideration of visual impact:** • an area not exceeding 2km around cities, towns and villages identified on the local development plan with an identified settlement envelope or edge. The extent of the area will be determined by the planning authority based on landform and other features which restrict views out from the settlement.
Group 3: Areas with potential for wind farm development: Beyond groups 1 and 2, wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria.		

UK Marine Policy Statement (2010)

5.3.39 The UK Marine Policy Statement (MPS) was published jointly by all the UK Administrations in March 2011. It sets a vision for the whole UK marine area and provides a framework for preparing marine plans, including economic, social and environmental considerations which need to be taken into account and strategic policy objectives for key marine sectors. The Marine Policy Statement sets out a presumption in favour of sustainable development in the marine planning area. The Scottish National Marine Plan and any subsequent Scottish regional marine plans must accord with the Statement.

5.3.40 The MPS does not provide specific guidance on every activity which will take place in, or otherwise affect, UK waters. The MPS provides a framework for development of Marine Plans to ensure necessary consistency in policy goals, principles and considerations that must be taken into account, including in decision making.

5.3.41 It is noted that the MPS and marine planning systems will sit alongside and interact with existing planning regimes across the UK. These include town and country planning and other legislation, guidance and development plans. In particular it recognises the national development priorities set out in the National Planning Framework.

5.3.42 Chapter 2 of the MPS outlines the vision for the UK marine area, for a *'clean, healthy, safe, productive and biologically diverse oceans and seas'*; the high-level approach to marine planning; and general principles for decision making that will contribute to achieving the vision. The chapter notes that decisions on activities in the UK marine area will be plan led once Marine Plans are in place. As such, Scotland's National Marine Plan, considered below is the key document for decisions relating to works within the marine environment.

5.3.43 The MPS identifies areas for considerations in providing Marine Plans including Marine ecology and biodiversity; Air quality; Ecological and chemical water quality and resources; Seascape; Historic environment; Climate change adaptation and mitigation; and Coastal change and flooding.

5.3.44 Chapter 3 identifies the policy objectives for the key activities that take place in the marine environment. Section 3.3 refers to Energy production and infrastructure development and recognises the contribution the marine environment will make to the provision of the UK's energy supply and distribution. This contribution includes a growing contribution from renewable energy and from other forms of low carbon energy supply in response to the challenges of tackling climate change and energy security. While the element of the Proposed Development subject to the marine licence applications do not relate to energy generation, they are important components in delivery of an onshore renewable energy project. In this regard the MPS sets out issues for consideration by decision makers in examining and determining applications for energy infrastructure including national level of need for energy infrastructure; positive wider environmental, societal and economic benefits of low carbon electricity generation; and the fact that renewable energy resources can only be developed where the resource exists and where economically feasible.

Scotland's National Marine Plan (2015)

5.3.45 The National Marine Plan (NMP) sets out strategic policies for the sustainable use of Scotland's marine resources out to 200 nautical miles and conforms with the overarching direction provided by the MPS. A marine plan for Scottish inshore waters and a marine plan covering Scottish offshore waters is published in one document, the 'National Marine Plan', however, it is recognised that the NMP is still comprised of two plans made under two separate pieces of legislation.

5.3.46 Scotland's National Marine Plan, Scottish Planning Policy and National Planning Framework 3 have been developed in a consistent manner to provide an integrated policy framework across land and sea.

5.3.47 The NMP sets out the Scottish Government's vision for the marine environment, which is *'Clean, healthy, safe, productive and diverse seas; managed to meet the long term needs of nature and people'.*

5.3.48 The vision for the marine environment is underpinned by a series of strategic objectives which apply to both inshore and offshore waters. The strategic objectives seek to integrate both the ecosystem approach and the guiding principles of sustainable development to deliver a robust approach to managing human impact on Scotland's seas.

5.3.49 The NMP stipulates a set of core General Policies which apply across all existing and future development and use of the marine environment. The polices apply to both inshore (out to 12 nautical miles) and offshore waters (12-200 nautical miles). At the heart of these is the general planning principles is a commitment to sustainable development (GEN 1) and it is noted that this is relevant to key growth sectors such as renewable energy activities.

5.3.50 Other key general polices of relevant to the Proposed Development include:

- GEN 5 Climate change: Marine planners and decision makers must act in the way best calculated to mitigate, and adapt to, climate change;
- GEN 7 Landscape/seascape: Marine planners and decision makers should ensure that development and use of the marine environment take seascape, landscape and visual impacts into account;
- GEN 8 Coastal process and flooding: Developments and activities in the marine environment should be resilient to coastal change and flooding, and not have unacceptable adverse impact on coastal processes or contribute to coastal flooding;
- GEN 9 Natural heritage: Development and use of the marine environment must: (a) Comply with legal requirements for protected areas and protected species. (b) Not result in significant impact on the national status of Priority Marine Features. (c) Protect and, where appropriate, enhance the health of the marine area.
- GEN 12 Water quality and resource: Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, Marine Strategy Framework Directive or other related Directives apply.
- GEN 18 Engagement: Early and effective engagement should be undertaken with the general public and all interested stakeholders to facilitate planning and consenting processes.
- GEN 21 Cumulative impacts: Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation.

5.3.51 Chapter 5 of the NMP sets out sector specific polices which address the key issues for marine planning where these are not already covered by the General Policies but should be read alongside the general polices. The majority of the sectoral polices are not relevant to the Proposed Development given its nature and limited extent of development that will affect the marine environment. Those of limited relevant include:

- Chapter 11 Offshore Wind and Marine Renewable Energy: this policy relates to offshore renewables primarily however its objectives include alignment of marine and terrestrial planning and efficient consenting and licensing processes as well as to contribute to achieving the renewables target to generate electricity equivalent to 100 % of Scotland's gross annual electricity consumption from renewable sources by 2020 and to contribute to achieving the decarbonisation targets.
- Chapter 13 Shipping, Ports, Harbours and Ferries in so far as it relates to the new elements of infrastructure to access the island - the extended slipway and landing jetty. Objectives of this policy are focused around protecting the existing ports, harbours and ferries and transport routes from inappropriate marine development. It is also noted in terms of policy that 'Maintenance, repair and sustainable development of port and harbour facilities in support of other sectors should be supported in marine planning and decision making.' While the

infrastructure proposed is required to serve access and construction of the Proposed Development, and is not related to an existing port or harbour, the intention is that the infrastructure will be built to a standard design for Orkney Islands to allow access for local vessels and will remain in perpetuity, potentially benefiting other sectors. In terms of dredging activities, the chapter notes that dredging is an essential activity to establish safe approaches to new ports and that dredged material may be disposed of at a licenced marine disposal site or used for alternative purposes such as land reclamation or coastal nourishment, if suitable, to minimise seabed disposal. It also notes that dredging and material disposals may impact other sea users and can cause damage to habitats and species and exposure of buried remains. As per the NMP, dredging are licensable activities and, therefore, their environmental impacts will be assessed through licensing procedure.

5.3.52 The NMP is relevant to the consideration of those elements of the Proposed Development that are located within the intertidal zone and will be considered under the marine licence applications.

Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (2016)

5.3.53 The Pentland Firth and Orkney Waters was chosen to pilot the development of a marine spatial plan to support sustainable management of the area's seas. It aims to balance the needs of local communities and marine economic activities whilst protecting the environment on which they depend. The pilot Pentland Firth and Orkney Waters Marine Spatial Plan (pilot Plan) was developed by a working group including Marine Scotland, Orkney Islands Council and Highland Council.

5.3.54 It aims to put in place a planning policy framework in advance of statutory regional marine planning to support sustainable decision making on marine use and management. It is anticipated that the pilot Marine Spatial Plan will establish a basis for the preparation of the two separate regional marine plans for Orkney and the North Coast Scottish Marine Regions.

5.3.55 The marine environment is used for a wide variety of different purposes and the pilot Plan aims to set out a coherent strategic vision, objectives and policies to further the achievement of sustainable development. This includes the protection and, where appropriate, enhancement of the marine environment within the Plan area. As a non-statutory Plan, it complements and supports existing ambitions and responsibilities.

5.3.56 The pilot Plan is being used by the Marine Scotland Licensing Operations Team (MS-LOT) as a material consideration in the determination of marine licensing and section 36 consent applications within the Pentland Firth and Orkney Waters area. Orkney Islands Council have adopted the final pilot Plan as non-statutory planning guidance, acknowledging the status of the Plan as a material consideration in the determination of relevant planning applications.

5.3.57 The pilot Plan includes a number of General Policies that may be relevant to the determination of any development or activity by any sector and these follow a similar theme to those set out in the NMP. Those which may be of relevance to those elements of the Proposed Development in the intertidal zone include; Sustainable development; Safeguarding the marine ecosystem; Climate change; Nature conservation designations; Protected species; Wider biodiversity; Landscape and seascape; Geodiversity; Water environment; Integrating coastal and marine development; and noise.

5.3.58 General Policy 7: Integrated coastal and marine development is relevant to the consideration of the Proposed Development insofar as those elements (the new extended slipway and landing jetty) that overlap in the inter tidal zone. It states:

"For development(s) and/or activities that require multiple licences, permissions and/or consents, applicants should undertake early preapplication engagement with the consenting authorities and relevant stakeholders.

For development(s) and/or activities that require an Environmental Impact Assessment and multiple licences, permissions and/or consents, applicants should produce a Consultation Strategy at the scoping stage.

Where appropriate, proposals for construction projects should be supported by a construction environmental management plan which covers both the terrestrial and marine environment.

MS-LOT and other relevant consenting authorities should consult one another at an early stage to improve the efficiency of the consenting process and, where appropriate, coordinate and streamline the various consenting requirements."

5.3.59 The pilot Plan also includes Sectoral Policies which are those that are specifically relevant to the determination of an authorisation or enforcement decision for a particular type of development or activity.

5.3.60 Proposed developments and activities must comply with legal requirements and should adhere to all of the general policies, be cognisant of all the sectoral policies and consider the likely cumulative impacts.

5.3.61 Sectoral Policy 4: Renewable Energy Generation relates to offshore wind and marine renewable energy development and therefore has limited relevant to the Proposed Development.

5.3.62 Sectoral Policy 7: Ports Harbours and Dredging notes that *"Ports, harbours, marinas, piers and slipways (collectively referred to as ports and harbours hereafter), provide essential infrastructure to support the transportation, employment and recreational needs of local communities and the wider economy."* (Page 178) The Policy relates to the sustainable growth of the ports and harbours within the Plan area, particularly those existing, which will be supported where:

- *"access to ports and harbours is not restricted*
- *safety considerations are primary*
- *navigational routes are not compromised*

Dredging within the Pentland Firth and Orkney Waters area will be supported by the Plan where:

- *dredged material is recycled or disposed of in appropriate locations"*

5.3.63 The pilot Plan under 'Sectoral Policy 8: Pipelines, Electricity and Telecommunications Infrastructure' acknowledges the opportunity and requirement for electricity grid reinforcement. It states *"Intergovernmental work began in 2012 to progress Scottish island renewables deployment and grid connections and led to additional support for the islands being announced in December 2013. This work has resulted in a Scottish Islands Renewables Delivery Forum being established to develop a series of actions to support the delivery of island renewables, one of which is to convene a working group to pursue research funding to support Orkney grid reinforcement."*

5.3.64 Reference is made to consultation by Scottish and Southern Energy Power Distribution regarding the electricity network on Orkney. The Plan goes on to highlight that there are a number of *"technical options for Orkney grid reinforcement such as transmission reinforcement for contracted developers, distribution reinforcement for general use, nominated developers or marine research and development of a private wire".* A new interconnector between Orkney and the Scottish mainland has been identified within NPF3 as being essential to fully realise the potential for diverse and widely distributed renewable energy development. Whilst not part of the Proposed Development, the Proposed Development would contribute to the investment required for the delivery of the electricity interconnector.

5.3.65 The pilot Plan is relevant to the consideration of those elements of the Proposed Development that are located within the intertidal zone and will be considered under the marine licence applications.

Planning Advice Notes

5.3.66 Table 5.2 identifies and summarises the Planning Advice Notes (PANs) of relevance to the Proposed Development.

Table 5.2 – Relevant Planning Advice Notes

Guidance	Title	Summary
PAN 2/2011	Planning and Archaeology	Provides advice to planning authorities and developers on dealing with archaeological remains. But it does so with a fresh emphasis which is proportionate to the relative value of the remains and of the developments under consideration.
PAN 1/2011	Planning and Noise	Sets out the role of the planning system in preventing and limiting the adverse effects of noise.
PAN 1/2013	Environmental Impact Assessment (2013)	Explains the role of individual planning authorities and that of the Consultation Bodies in EIA, as well as providing guidance on the ways in which EIA can be integrated into the overall development management process.
PAN 60	Planning for Natural Heritage (2000)	Gives basic advice in relation to development and natural heritage. It reiterates the Government's Commitment to the protection and enhancement of the natural heritage.
PAN 61	Planning and Sustainable Urban Drainage Systems (2001)	Provides good practice advice for planners and the development industry complementing the Sustainable Urban drainage Systems Design Manual for Scotland and Northern Ireland (2000).
PAN 69	Planning & Building Standards Advice on Flooding (2004)	Supports national planning policy on flooding. Contains advice on addressing flood risk in development plans and in dealing with planning applications.
PAN 75	Planning for Transport (2005)	Provides advice on the requirement to link transport strategies and development plans and the need to take into account accessibility, location, modal split, parking and design.
PAN 3/2010	Community Engagement	Advice to Planning Authorities and developers on how communities should be properly engaged in the planning process.

Landscape Capacity Assessment for Wind Energy in Orkney

5.3.67 The Landscape Capacity Assessment for Wind Energy (2014) was adopted by OIC in July 2015. The study "*considered the capacity of the Orkney landscape to accommodate onshore wind energy development. The landscape capacity assessment is based on an assessment of landscape sensitivity and value of the different landscape character types and areas of Orkney together with the evolving wind energy scenario*."

5.3.68 The landscape capacity assessment was adopted by the Council on 7 July 2015 and is stated to be "*a material consideration for planning decisions within the County.*"

5.3.69 It is noted that the capacity study is strategic in nature and not a substitute for development specific landscape and visual impact assessments to be undertaken. The 2019 update to Development Management Guidance on Wind Energy acknowledges this and has noted that the level of weight given to the study should be considered accordingly. A landscape and visual impact assessment has been undertaken as part of the EIA.

UK and Scottish Climate Emergency Context

5.3.70 The Committee on Climate Change (CCC) published its landmark report entitled 'Net Zero – UK's Contribution to Stopping Global Warming' in May 2019. The report responds to requests from the Governments of the UK, Wales and Scotland, asking the CCC to reassess the UK's long-term carbon emissions targets and resulted in both the Scottish and UK Government declaring a climate emergency.

5.3.71 The report made recommendations for the UK economy including:

- UK overall: a new tougher emissions target of net zero greenhouse gases (GHG) by 2050, ending the UK's contribution to global warming within 30 years. This would replace the previous target of an 80 % reduction by 2050 from a 1990 baseline.
- Scotland: a target of net-zero GHG economy by 2045, reflecting Scotland's greater relative capacity to remove emissions than the UK as a whole.
- A net zero GHG target for 2050 would deliver on the commitment that the UK made by signing the Paris Agreement.

5.3.72 Since its publication there have been a series of Progress updates by the CCC to both the UK and Scottish Parliaments. The detail of these is considered further in the supporting Planning Statement in the context of the Proposed Development.

OIC Council Plan and Delivery Plan 2018-2023

5.3.73 OIC's Council Plan 2018-2023 and Council Delivery Plan 2018-2023 identify key priorities and targets, along with details of the individual projects and activities that OIC aim to complete within budget over the period of 2019 to 2023.

5.3.74 A target outcome of the Council Plan is, making Orkney, "*A vibrant carbon neutral economy which supports local businesses and stimulates investment in all our communities.".* A top priority related to this outcome is to, *"Continue to develop strategic projects, particularly to capitalise on the renewable sector.* In addition, a future aspiration of the Plan is to *"Achieve a carbon neutral economy within Orkney"* (Orkney Islands Council 2018).

5.3.75 The Council Delivery Plan also outlines a number of plans which aim to capitalise and boost the renewable sector in Orkney including developing Orkney as a Low Carbon Energy Systems Innovation Hub and strategic investment in various sustainable projects.

OIC's Declaration of a Climate Emergency

5.3.76 In May 2019 OIC declared a climate emergency. The declaration was agreed in a Special General Meeting of the Council as a means of both reaffirming the Council's existing commitment to a vibrant carbon neutral economy, and publicly expressing concern about climate change. This was detailed in a Report by the Chief Executive.

5.3.77 Consequently, in September 2019, OIC published a report which outlined next steps in developing and progressing Council Delivery Plan targets in response to the declaration of a Climate Emergency.

5.3.78 The Report states that OIC is committed to continuing to lead the world on low carbon and renewable project activity. The Council is developing strategic projects to capitalise on the renewable sector and is progressing a portfolio of carbon reduction initiatives such as community wind farm projects, hydrogen strategy, shore power for ferries etc.

5.3.79 An update on the progress of developing the delivery plan targets in response to the climate emergency was presented to the Policy and Resources Committee in February 2020. It outlined current project activity and actions that will contribute to mitigating and adapting to climate change and the opportunity through the impending mid-term review of the Council Plan to embed climate change as a new Council priority, with associated actions.

Sustainable Orkney Energy Strategy 2017 - 2025

5.3.80 The Sustainable Orkney Energy Strategy 2017-2025 (SOES) is a community document endorsed by the Council which sets out the community's aims relevant to its energy strategy with the overarching vision to achieve:

"A secure, sustainable low carbon island economy driven uniquely by innovation and collaboration, enabling the community to achieve ambitious carbon reduction targets, address fuel poverty and provide energy systems solutions to the world." (Page 7)

5.3.81 Following this vision, it is stated on page 7 that:

"Realising this vision will deliver the following strategic outcomes:

- *The achievement of ambitious carbon reduction targets.*
- *The reduction and eradication of fuel poverty in Orkney.*
- *Position Orkney as the globally recognised innovation region for energy.*
- *Ensure a secure energy supply during transition to a low carbon future."*

5.3.82 To achieve these outcomes the strategy defines an "activity framework based around five key thematic pillars:

- Maximum local value and efficiency (from local resources).
- Smart low carbon transport and heat.
- Secure transition to renewable and low carbon energy systems.
- Smart, supportive infrastructure investment.
- Develop and influence policy: delivering access to energy markets."

5.3.83 Section 5 on page 20 of the SOES details the constraint imposed by *"inadequate electrical grid infrastructure*" and the crosscutting nature of this issue. In the second paragraph of Section 5 it is stated that:

"In order to deliver and significantly contribute towards the low carbon ambitions of the Scottish and UK governments, Orkney needs significant investment in grid connectivity to export and trade in the energy markets and will continue to seek political support and appropriate investment in upgrades. In recent years the negative impact of constraint and curtailment has cost the economy and the community dearly and these barriers to delivering a low carbon economy still need to be influenced and addressed.

Orkney will therefore continue to influence the regulatory frameworks that will determine and support the necessary transformation of the energy industry that is required to tackle climate change."

5.3.84 Orkney's constraint on renewable energy capacity is further defined on page 27:

"It is well established that Orkney is both rich in ambition and rich in renewable energy sources of wind, wave and tide and that there is recognised opportunity for Orkney to build on its lead as a net exporter of renewable energy to be a major renewable energy producer."

"Having recently demonstrated generation of 120.5 % of the islands' annual electricity needs from renewable energy, the original goal to maximise production and profit and sell into export markets in the UK and beyond, remains, despite ongoing electrical grid constraint."

Renewable Energy Policy Framework

5.3.85 The renewable energy policy framework at the international and national level applies to renewable electricity generation and related climate change action and is an important material consideration.

5.3.86 The supporting Planning Statement that accompanies this EIA Report examines the most relevant policy documents in detail and sets out the hierarchy of EU, UK and Scottish Government renewable energy policy.

5.3.87 In terms of the relevant policy framework at the International, European and UK level, the following key documents are of relevance:

- International Agreements and Obligations – The COP21 UN Paris Agreement; and
- EU Renewable Energy Progress Report – April 2019.

5.3.88 In terms of UK renewable energy policy, the following documents are of relevance:

- The UK Renewable Energy Strategy (2009);
- The UK Renewable Energy Roadmap Updates (2013);
- The UK Clean Growth Strategy (2017);
- The UK Industrial Strategy (2017);
- The UK Government's Ten Point Plan for a Green Industrial Revolution; and
- The UK Government's Energy White Paper Powering our Net Zero Future (2020).

5.3.89 The following Scottish Government documents relating to renewable energy are of also of relevance:

- The 2020 Routemap for Renewable Energy in Scotland (2011);
- The Electricity Generation Policy Statement (2013);
- The 2020 Routemap for Renewable Energy in Scotland – Update (2013 & 2015);
- The Scottish Energy Strategy: The Future of Energy in Scotland (2017);
- Onshore Wind Policy Statement (2017);
- Scottish Government Web Based Renewables Guidance (2014);
- Climate Change Plan, The Third Report on Proposals and Policies 2018-2032 (2018);
- Update to the Climate Change Plan 2018 – 2032, Securing a Green Recovery on a Path to Net Zero (2020);
- Climate Change (Emissions Reduction Targets) (Scotland) Act (2019);
- Vision for Scotland's Electricity and Gas Networks (2019);
- Islands (Scotland) Act 2018; and
- The National Islands Plan (2019).

5.3.90 Key aspects of these policy documents are set out in the supporting Planning Statement but generally they demonstrate the continued focus and commitment by UK and Scottish Governments towards a net zero carbon agenda. Particular policy and legislation of note with respect to the Proposed Development include:

Scottish Energy Strategy: The Future of Energy in Scotland December 2017

5.3.91 The Scottish Energy Strategy (SES) sets a 2020 vision for energy in Scotland as "*a flourishing, competitive local and national energy sector, delivering secure, affordable, clean energy for Scotland's households, communities and businesses*". The vision is guided by three core principles namely:

- a whole system view;

- an inclusive energy transition; and
- a smarter local energy model.

5.3.92 The 2050 vision is expressed around six priorities including: "*Renewable and low carbon solutions - continued actions to explore the potential of Scotland's renewable energy resource and its ability to meet local and national heat, transport and electricity needs – assisting the achievement of ambitious emissions reduction targets*."

5.3.93 The strategy also contains whole system targets for 2030 as follows:

- the equivalent of 50 % of the energy for Scotland's heat, transport and electricity consumption to be supplied from renewable sources; and
- an increase by 30 % in the productivity of energy use across the Scottish economy.

5.3.94 The SES refers to "*renewable and low carbon solutions*" as a strategic priority (page 41) and states *"we will continue to champion and explore the potential of Scotland's huge renewable energy resource, its ability to meet our local and national heat, transport and electricity needs – helping to achieve our ambitious emissions reduction targets".*

5.3.95 At page 43 it is stated that "*onshore wind is now amongst the lowest cost forms of power generation of any kind, and is a vital component of the huge industrial opportunity that renewables create for Scotland."* It is further stated at page 43, that "*we [Scottish Government] will push for UK wide policy support for onshore wind, and take action of our own to prioritise and deliver a route to market – combined with a land use planning approach which continues to support development while protecting our landscapes".*

5.3.96 The SES sets out the Government's clear position on onshore wind namely:

"our energy and climate change goals mean that onshore wind must continue to play a vital role in Scotland's future – helping to decarbonise our electricity, heat and transport systems, boosting our economy, and meeting local and national demand.

That means continuing to support development in the right places, and – increasing the extension and replacement of existing sites with new and larger turbines, all based on an appropriate, case by case assessment of their effects and impacts….and it means developers and communities working together and continuing to strike the right balance between environmental impacts, local support, benefits, and – where possible economic benefits driving from community ownership".

5.3.97 With respect to island wind, at page 46 the Scottish Government expresses "*full support for the emerging proposal to provide Scotland's island wind a route to market – offering a new opportunity for our island communities to participate in the energy transition."*

5.3.98 The opportunity set out on page 46 specifically recognises Orkney and the opportunity to bid for long term contracts through the governments CfD process and the importance of providing certainty and acting quickly in getting details and design right:

"The Scottish Government and our partners have pressed the UK Government consistently for a long period over the need to support remote island wind. That means providing a distinct and meaningful opportunity for large wind developments on the Western Isles, Shetland and Orkney to compete for long-term contracts, through the UK Government's Contracts for Difference (CfD) process.

We have welcomed the UK Government's recent confirmation that it will provide this access as part of the next CfD auction round, subject to consultation. But that means getting the details and the design right, and providing confirmation and certainty as quickly as possible. We will continue to work with our partners, and with the UK Government, to ensure that this is the case."

5.3.99 The Scottish Government have committed to an update of the Energy Strategy in 2021 which will set out in detail the role that electricity generation will have in the wider energy system.

The Climate Change Plan (2018) and Update to the Climate Change Plan 2018 – 2032, Securing a Green Recovery on a Path to Net Zero (2020)

5.3.100 The Climate Change Plan was published in February 2018 (hereafter referred to as the CCP). An update to the CCP, 'Update to the Climate Change Plan 2018 – 2032, Securing a Green Recovery on a Path to Net Zero' (2020 Update), was published in December 2020. The 2020 Update notes that many elements of the 2018 Plan still stand and that the 2020 Update should be read alongside the CCP. As such, both documents have been considered here.

5.3.101 At this stage the update is a draft Plan, which will be subject to Parliamentary scrutiny, following which a final version will be published responding to recommendations and conclusions from the scrutiny process. The 2020 Update notes that the next full climate change plan will be delivered by early 2025.

5.3.102 The 2020 Update sets out the Scottish Government's pathway to new and ambitious targets set by the Climate Change Act 2019. It is also noted as a *'key strategic document in the green recovery from COVID-19'*. In delivering the Green Recovery the 2020 Update acknowledges the need for increased investment in renewable energy, particularly onshore and offshore wind. The update also highlights the importance of harnessing Scotland's potential making the most of the vast wind and marine resources which are available.

5.3.103 Within the introduction of the CCP (2018) at page 9 it is noted that:

"Climate change is one of the greatest global threats we face. Scotland must play its part to achieve the ambitions set out in the Paris Agreement, which mandates concerted, global action to deal with the threat."

5.3.104 At page 25 of the CCP, the contribution of onshore wind to electricity generation is recognised alongside its role in driving innovation.

"In 2016, 42.9 % of our electricity was generated by renewables, predominantly onshore wind. The expansion in onshore wind is comparable to the rollout of hydro power in the post-war period, which transformed for the better the lives of so many. This growth continues to drive innovation and adaptation in the management and control of power on the grid. This innovation, both technological and regulatory, will play a crucial role in accommodating the continuing growth of embedded generation, and a wider transformation in how we use the grid to heat and cool our buildings and power our transport systems."

5.3.105 The 2020 Update highlights that Scotland is widely recognised as a world leader in renewable energy, with an abundance of renewable resources, and the targets and achievements reflect that. The Update notes that more than 83 % of the electricity generated in Scotland during 2018 came from renewable or low carbon sources. The 2020 Update sets out a Pathway to Net Zero to 2032 and sets out polices to achieve this.

5.3.106 By 2032, the ambition is that *"Our electricity system will have deepened its transformation for the better, with over 100% of Scotland's electricity demand being met by renewable sources. More and more households, vehicles, businesses and industrial processes will be powered by renewable electricity, combined with green hydrogen production. There will also be a substantial increase in renewable generation, particularly through new offshore and onshore wind capacity."* It is noted that renewable generation in 2019 accounted for the equivalent of more than 90 % of electricity demand.

5.3.107 The final paragraph of page 34 of the CCP (2018) details the continued need to find room for large scale infrastructure.

"Where we get our low emission energy from is also critical and we will continue to need to find room for large scale infrastructure such as wind and solar farms, as well as more locally based equipment, such as heat networks and energy centres."

5.3.108 The CCP states the Scottish Government's Ambitions in the Electricity Sector on page 68 where island wind is specifically identified as being one of the range of technologies that will contribute to the ambition of having a largely decarbonised electricity system by 2032.

"A range of renewable technologies will deliver clean, affordable electricity, including onshore, offshore and island wind, hydro, solar, marine and bioenergy."

5.3.109 Page 68 of the CCP further identifies the importance of viable grid connection and states that *"Scotland's lead in electricity network innovation will continue, allowing our networks to evolve and meet new demands in a way that delivers value for consumers. The integration of storage, smart technologies and innovative approaches to network management at scale will enable our energy assets to be used effectively, and ensure we get the greatest benefit from our generation and network infrastructure."*

5.3.110 The 2020 Update highlights a commitment to continue efforts to ensure a sustainable security of electricity supply, and in 2021 the Scottish Government will launch a call for evidence and views on technologies including energy storage, smart grid technologies and technologies to deliver sustainable security of supply.

5.3.111 The commitment to decarbonisation of the electricity system continues in the 2020 Update and highlights the importance of continuing this decarbonisation in order to achieve the transition to net zero. Its states at page 76, *"The decarbonisation of Scotland's electricity sector has been driven by our rich natural resources, a supportive approach to planning, a drive to involve local communities in decisions that affect them, supportive market frameworks, and rapidly declining prices of renewable technology globally - with wind and solar now the lowest cost forms of new generation."* It continues *"As Scotland transitions to net zero, a growing and increasingly decarbonised electricity sector is critical to enabling other parts of our economy to decarbonise – notably transport, buildings and industry."*

5.3.112 The CCP (2018) cross references, The UK Government's Clean Growth Strategy (October 2017) at page 78, and the commitment of *"up to £557 million for further Pot 2 CfD auctions from 2019."* This is stated to provide an opportunity to support deployment of less established renewable technologies in Scotland including island wind:

"This [the CfD auctions fund] will provide an opportunity to support the deployment of less established renewable technologies in Scotland. These include offshore wind, island wind (subject to State Aid approval), marine technologies, advanced conversion technologies, anaerobic digestion and biomass with combined heat and power, although the Scottish Government knows that minimal ring fenced funds could have been set aside for marine and other less well established technologies that may struggle to compete with offshore wind."

5.3.113 The 2020 Update welcomes the reforms by the UK Government of the CfD mechanism such as the reintroduction of eligibility for onshore wind. At page 87 it states, *"The UK Government's recent response to its CfD consultation contains some welcome elements, notably the separation of offshore wind from floating and remote island wind, which we believe will make the latter technologies more competitive in future allocation rounds."* However, the update calls for further reform, including changes to the CfD which strengthen the requirement to use Scottish and UK supply chains.

5.3.114 The CCP (2018) identified a number of polices and proposals to deliver the plan. The 2020 Update maintains these policies and proposals and identifies those that will be updated by 'boosting' or accelerating actions, and also what new policies have been added. The sector chapters in Part 3 set out the detail of the new policy package and Annex A provides a complete list of the policies.

5.3.115 Policy Outcome 1, relating to Electricity, of the CCP on page 69 states:

"Policy outcome1: From 2020 onwards, Scotland's electricity grid intensity will be below 50 grams of carbon dioxide per kilowatt hour. The system will be powered by a high penetration of renewables, aided by a range of flexible and responsive technologies.

There are two policies, five policy development milestones and five proposals from the Energy Strategy which will contribute to the delivery of policy outcome 1."

5.3.116 Policy Outcome 1 is carried forward in the 2020 Update and provides an update on progress stating that *"there is currently around 12 GW of renewable generation capacity installed across the country, while the carbon intensity of electricity generated in Scotland has fallen to less than 50 g CO¬2 /kWh in both 2018 and 2019."*

5.3.117 It goes on to note that delivering this policy outcome will be further boosted through the publishing of a revised and updated Energy Strategy, reflecting the commitment to net zero.

5.3.118 In terms of Proposals to support this Policy Outcome 1, there is a commitment to *"continue to review our energy consenting processes, making further improvements and efficiencies where possible, and seeking to reduce determination timescales for complex electricity generation and network infrastructure applications"*. In addition, there is a proposal to review and publish an updated Electricity Generation Policy Statement ahead of the next Climate Change Plan, and by 2022.

5.3.119 Under Policy development milestone 1, on page 72,it is stated that *"the Scottish Government will continue to make the case to the UK Government for a stable, supportive regulatory regime that provides appropriate support for investment in renewable energy. This will include the need for a route to market for lowest cost renewable technologies, including onshore wind."*

5.3.120 Under Policy Milestone 2, on page 72 of the CCP, it is stated that *"the Scottish Government will work with the UK Government, industry, local authority partners and communities to maximise the support available to Pot 2 renewable technologies in Scotland*."

5.3.121 The second annual monitoring report of the CCP was published in December 2019. With respect to electricity it notes that Greenhouse gas emissions from the electricity sector have already been reduced by 92 %.

5.3.122 It states that: *"Renewable electricity generation capacity in Scotland has more than trebled in the last ten years; as of June 2019, there was 11.6 GW of installed capacity across the country. Consequently, renewables' contribution towards the total volume of electricity generated has grown from 18.5 % in 2008 to 51.7 % in 2017".* This figure is updated on the Scottish Energy Statistics Hub and it is noted that *"the growth of renewables drove the increase in low carbon generation, rising from 19.0% of all generation in 2010 to 61.1% in 2019[2]"*.

5.3.123 As of September 2020, *"Scotland has 11.8 GW of installed capacity operational with 13.9 GW in the pipeline* [4.4GW of this is in planning*]. How quickly these projects become operational, how favourable the climate is for renewable electricity generation and the extent to which gross consumption falls in the next year could determine if the 100% target is reached"* [3].

5.3.124 Despite this significant pipeline, the 2019 update advises that it is unlikely that all projects consented in the pipeline will progress to commissioning, and that grid intensity and renewable electricity ambitions remain challenging.

5.3.125 This statement highlights how onshore wind will form an important contributor to reducing the emission levels further as more projects with planning or in the system come on line.

5.3.126 Returning to the 2020 Update, the Scottish Government's vision for 2032 and 2045 is that *"renewable generation will increase substantially between now and 2032, and we expect to see the development of between 11 and 16 GW of capacity during this period, helping to decarbonise our transport and heating energy demand."* (page 81)

5.3.127 Actions in this period that the Scottish Government are taking to support onshore wind are set out in the 2020 Update. These include *"Continuing to review our energy consenting processes, making further improvements and efficiencies where possible, and seeking to reduce determination timescales for complex electricity generation and network infrastructure applications. Faster determinations will enable any projects awarded consent to develop more quickly, which will benefit onshore wind in particular."* (Page 84)

5.3.128 In addition, it is acknowledged that the interaction of wind turbines with aviation radar can sometimes present a barrier to development. The Scottish Government will work with aviation, energy and other stakeholders, exploring best practice for collaboration through our Aviation 2030

5.1.1

[2] *Scottish Government (2020) Scottish Energy Statistics Hub https://scotland.shinyapps.io/sg-energy/?Section=RenLowCarbon&Subsection=RenElec&Chart=ElecGen*

[3] *Ibid*

Vision Taskforce to reach a solution which will ensure that all radars are wind turbine tolerant/neutral, freeing up more capacity for development.

5.3.129 The 2020 Update provides an update to the monitoring framework from the 2018 Plan, which will now be used for annual, sector by sector, reporting on progress from May 2021 onwards. Annex B of the 2020 Update sets out the proposed Monitoring Framework which is structured on three levels: **greenhouse gas emissions statistics** provide the highest level measure of progress at an economywide and sectoral level; **a suite of policy outcome indicators** measure the success of policies in achieving the changes that are needed; and **a policy tracker** monitoring implementation of specific policies and proposals.

5.3.130 The 2020 Update reaffirms and strengthens the Scottish Government commitment to net zero and acknowledges the contribution that growth in renewable energy and in particular onshore wind will play in meeting this target.

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019

5.3.131 On 31 October 2019 The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 received Royal Ascent and became an Act of parliament. It amends the Climate Change (Scotland) Act 2009 ("2009 Act") and requires that *"The Scottish Ministers must ensure that the net Scottish emissions account for the net-zero emissions target year is at least 100 % lower than the baseline (the target is known as the "net-zero emissions target)."* The target year is 2045 and the Act also sets out challenging interim minimum targets. It requires that:

"The Scottish Ministers must ensure that the net Scottish emissions account for the year—

(a) 2020 is at least 56 % lower than the baseline,

(b) 2030 is at least 75 % lower than the baseline, and

(c) 2040 is at least 90 % lower than the baseline."

5.3.132 The effect of these target changes requires a doubling of response over the period from 2020 to 2030. The need for action set out above is further reinforced by the annual targets required by Section 3.

5.3.133 The targets within the Act legally bind the Scottish Ministers and set the revised framework for Scotland's response to the climate change emergency and will require a revised Climate Change Plan to be consulted upon and approved. The publication of the 'Update of the Climate Change Plan' in December 2020, and referred to above, fulfils this objective. There is a commitment to producing the next full climate change plan by early 2025. Duties have been placed on public bodies through section 44 of the 2009 Act to exercise functions to contribute to meeting targets and deliver the Climate Change Plan. The Monitoring Framework within the 2020 Update to the CCP is vital to ensuring progress is made towards meeting these emissions reduction targets.

5.3.134 Section 35B of the Climate Change (Scotland) Act 2009 (as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019) places annual progress reporting on a statutory footing, with reports for each sector to be produced and laid in Parliament from May 2021 onwards.

5.4 Summary

5.4.1 This chapter has described the relevant planning and renewable energy policy framework that has informed the EIA. As explained above, the supporting Planning Statement provides an assessment of the Proposed Development against the policy context set out in this chapter.

5.5 References

Department of Energy and Climate Change (2013). UK Renewable Energy Roadmap Update. November 2013. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/255182/UK_Renewable_Energy_Roadmap_-_5_November_-_FINAL_DOCUMENT_FOR_PUBLICATIO___.pdf. Accessed on 4 December 2020.

European Commission (2019). EU Renewable Energy Progress Report. April 2019. Available at: https://ec.europa.eu/commission/sites/beta-political/files/report-progress-renewable-energy-april2019_en.pdf. Accessed on 4 December 2020.

Orkney Islands Council (2015). Landscape Capacity for Wind Energy in Orkney. July 2015. Available at https://www.orkney.gov.uk/Service-Directory/R/landscape-capacity-study-for-wind-energy-in-orkney.htm. Accessed on 4 December 2020.

Orkney Islands Council (2017). Orkney Local Development Plan. April 2017. Available at: http://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Local-Plan/OLDP_2017/Orkney_Local_Development_Plan_2017_2022.pdf. Accessed 4 December 2020.

Orkney Islands Council (2017). Orkney Sustainable Energy Strategy 2017-2025 (2017). Available at: http://www.oref.co.uk/wp-content/uploads/2017/10/Orkney-Sustainable-Energy-Strategy-2017-2025-1.pdf. Accessed 4 December 2020.

Orkney Islands Council (2017). Supplementary Guidance: Energy. March 2017. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Adopted_PPA_and_SG/Guidance_for_the_Plan/Energy_Supplementary_Guidance.pdf Accessed on 7 December 2019.

Orkney Islands Council (2017). Supplementary Guidance: Historic Environment and Cultural Heritage. March 2017. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Adopted_PPA_and_SG/Historic_Environment_SG/Hist_Env_SG.pdf. Accessed on 4 December 2020.

Orkney Islands Council (2017). Supplementary Guidance: Natural Environment. March 2017. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Adopted_PPA_and_SG/Natural_Environment_SG/Nat_Env_SG.pdf. Accessed on 4 December 2020.

Orkney Islands Council (2018). Council Delivery Plan 2018-2023. Available at: https://www.orkney.gov.uk/Files/Council/Council-Plans/OIC_Delivery_Plan_2018_2023.pdf. Accessed on: 4 December 2020.

Orkney Islands Council (2018). The Council Plan 2018-2023. Available at: https://www.orkney.gov.uk/Files/Council/Council-Plans/Council_Plan_2018_2023_Accessible.pdf. Accessed on: 4 December 2020.

Orkney Islands Council (2019) Development Management Guidance: Energy. June 2019. Available at: https://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/DM_Guidance/Energy.pdf Accessed on 7 December 2020.

Orkney Islands Council (2019) Policy and Resources Committee Report on Climate Emergency: Council Delivery Plan – Targets. 24 September 2019. Available at: https://www.orkney.gov.uk/Files/Committees-and-Agendas/Policy-and-Resources/PR2019/PR24-09-2019/I10_Climate_Emergency_Delivery_Plan_Targets.pdf Accessed on 4 December 2020

Orkney Islands Council (2019). Report by Chief Executive on Declaration of a Climate Emergency. 14 May 2019. Available at: https://www.orkney.gov.uk/Files/Committees-and-Agendas/Council-Meetings/GM2019/SGM14-05-2019/Urgent_Item_Declaration_Climate_Emergency.pdf. Accessed on: 4 December 2020.

Orkney Islands Council (2020). Policy and Resources Committee Report on Climate Change. 18 February 2020. Available at: https://www.orkney.gov.uk/Files/Committees-and-Agendas/Policy-and-Resources/PR2020/PR18-02-2020/I10__Climate_Change.pdf Accessed on: 4 December 2020.

Scottish Government (2009). The Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009. 12 February 2009. Available at: http://www.legislation.gov.uk/ssi/2009/51/pdfs/ssi_20090051_en.pdf . Accessed on 4 December 2020.

Scottish Government (2011). 2020 Routemap for Renewable Energy in Scotland. July 2011. Available at: https://www2.gov.scot/Resource/Doc/917/0118802.pdf. Accessed on 4 December 2020.

Scottish Government (2013). 2020 Routemap for Renewable Energy in Scotland – Update. December 2013. Available at: http://www.districtheatingscotland.com/wp-content/uploads/2015/12/2020RoutemapForRenewableEnergyInScotland.pdf. Accessed on 4 December 2020.

Scottish Government (2013). Electricity Generation Policy Statement. 28 June 2013. Available at https://www.gov.scot/publications/electricity-generation-policy-statement-2013/. Accessed on 4 December 2020.

Scottish Government (2014). Scottish Planning Policy. Available at: http://www.gov.scot/Resource/0045/00453827.pdf Accessed on 4 December 2020.

Scottish Government (2014). The National Planning Framework 3. Available at: http://www.gov.scot/Resource/0045/00453683.pdf Accessed on 4 December 2020.

Scottish Government (2020) Scotland's Fourth National Planning Framework Position Statement. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/progress-report/2020/11/scotlands-fourth-national-planning-framework-position-statement/documents/scotlands-fourth-national-planning-framework-position-statement/scotlands-fourth-national-planning-framework-position-statement/govscot%3Adocument/scotlands-fourth-national-planning-framework-position-statement.pdf?forceDownload=true Accessed 7 December 2020

Scottish Government (2015). 2020 Routemap for Renewable Energy in Scotland – Update. September 2015. Available at: https://www2.gov.scot/Resource/0048/00485407.pdf. Accessed on 4 December 2020.

Scottish Government (2015) Scotland's National Marine Plan. Available at: https://www.gov.scot/publications/scotlands-national-marine-plan/ Accessed on: 4 December 2020

Scottish Government (2016). Pilot Pentland Firth and Orkney Waters Marine Spatial Plan. Available at: https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/ Accessed on 4 December 2020

Scottish Government (2017). Onshore Wind: Policy Statement. 20 December 2017. Available at: https://www.gov.scot/publications/onshore-wind-policy-statement-9781788515283/. Accessed on 4 December 2020.

Scottish Government (2017). The Scottish Energy Strategy: The future of energy in Scotland. December 2017. Available at: http://www.gov.scot/Resource/0052/00529523.pdf. Accessed on 4 December 2020.

Scottish Government (2018). Islands (Scotland) Act 2018. 6 July 2018. Available at: http://www.legislation.gov.uk/asp/2018/12/contents Accessed 4 December 2020

Scottish Government (2018). The Climate Change Plan, The Third Report on Proposals and Policies 2018-2032. February 2018. Available at: http://www.gov.scot/Resource/0053/00532096.pdf/ Accessed on 4 December 2020

Scottish Government (2020) Update to the Climate Change Plan 2018 – 2032 Securing a Green Recovery on a Path to Net Zero. Available at: https://www.gov.scot/publications/securing-green-recovery-path-net-zero-update-climate-change-plan-20182032/ Accessed on 11 January 2021

Scottish Government (2019). Scottish Government Online Renewables Advice. Available at: http://www.gov.scot/Topics/Built-Environment/planning/Policy/Subject-Policies/Utilities/Delivering-heat-electricity/renewables-advice. Accessed on 4 December 2020.

Scottish Government (2019). A Vision for Scotland's Electricity and Gas Networks 2019 – 2030. March 2019. Available at: https://www.gov.scot/publications/vision-scotlands-electricity-gas-networks-2030/pages/3/ Accessed on: 4 December 2020.

Scottish Government (2019). Climate Change Plan: monitoring report 2019. 17 December 2019. Available at: https://www.gov.scot/publications/climate-change-plan-monitoring-report-2019/pages/3/ . Accessed on 4 December 2020.

Scottish Government (2019). Planning Advice Notes (PANs). Available at: https://www.gov.scot/collections/planning-advice-notes-pans/. Accessed on: 4 December 2020.

Scottish Government (2019). The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. 31 October 2019. Available at: http://www.legislation.gov.uk/asp/2019/15/enacted . Accessed on 4 December 2020.

Scottish Government (2019). The National Islands Plan. December 2019. Available at: https://www.gov.scot/publications/national-plan-scotlands-islands/ Accessed on: 4 December 2020.

UK Government (2009) The UK Renewable Energy Strategy. July 2009. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/228866/7686.pdf. Accessed on 4 December 2020.

UK Government (2011) UK Marine Policy Statement. Available at: https://www.gov.uk/government/publications/uk-marine-policy-statement Accessed on: 3 December 2020.

UK Government (2017). Industrial Strategy. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf. Accessed on 4 December 2020.

UK Government (2017). The Clean Growth Strategy. October 2017. Available on: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf. Accessed on 4 December 2020.

UK Government (2020) The ten point plan for a green industrial revolution. November 2020. Available at: https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution Accessed on: 11 January 2021.

UK Government (2020) Energy white paper: Powering our net zero future. December 2020. Available at: https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future Accessed 11 January 2021.

United Nations (2015). The COP21 UN Paris Agreement. Available at: http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf. Accessed on 4 December 2020.

6 Landscape and Visual

Contents

6.1	*Executive Summary*	*6-3*
6.2	*Introduction*	*6-6*
6.3	*Legislation, Policy and Guidelines*	*6-6*
6.4	*Consultation*	*6-11*
6.5	*Assessment Methodology and Significance Criteria*	*6-14*
6.6	*Baseline Conditions*	*6-21*
6.7	*Receptors Brought Forward for Assessment*	*6-30*
6.8	*Standard Mitigation*	*6-32*
6.9	*Likely Effects*	*6-33*
6.10	*Additional Mitigation*	*6-35*
6.11	*Residual Effects on Landscape Elements*	*6-35*
6.12	*Residual Effects on Landscape and Coastal Character*	*6-36*
6.13	*Residual Effects on Visual Receptors*	*6-73*
6.14	*Summary*	*6-105*
6.15	*References*	*6-116*

This page is intentionally blank.

6 *Landscape and Visual*

6.1 Executive Summary

6.1.1 The assessment of landscape and visual effects has been carried out to identify the significant effects that are likely to arise as a result of the Proposed Development. It has considered the effects on landscape and visual receptors, as well as the cumulative effect of the Proposed Development in addition to other wind farm developments. The process involved identifying those receptors with potential to be significantly affected and assessing the potential impacts that the construction and operation of the Proposed Development will give rise to. The significance of the effects has been assessed through combining the sensitivity of each receptor with a prediction of the magnitude of change that will occur as a result of the Proposed Development.

6.1.2 The Proposed Development comprises the construction of the six proposed turbines, each 149.9m to blade tip, and associated infrastructure, including access tracks, crane hardstandings, underground cabling, possible external transformers, on-site substation and maintenance building, temporary construction compounds, possible borrow pits, permanent meteorological mast, a new extended slipway and landing jetty. The proposed turbines will not be lit with visible night-time lighting but will be lit with daytime aviation lighting. The site layout is shown in Figure 2.1.

6.1.3 The site is situated on the island of Faray in the Northern Isles of the Orkney Islands. Faray is a small uninhabited whale-back island, set to the west of the island of Eday and the south-east of the island of Westray. The island is used for sheep farming and comprises open fields of improved pasture. There is no development on the island other than the abandoned cottages of the former crofters and the temporary lidar associated with the Proposed Development.

6.1.4 There are relatively few operational wind farms in the study area. The most notable is Spurness Point Wind Farm which comprises five turbines set on the southern tip of the island of Sanday. There are also medium and small-scale turbines on Eday, Rousay and Westray, with a small group of two turbines also on Westray.

6.1.5 The study area for the Proposed Development covers a radius of 40 km and within this area, those receptors with the potential to be significantly affected have been assessed in detail. This has included one landscape element, 14 Landscape Character Units (LCU), nine Regional Coastal Character Areas (RCCAs) or Local Coastal Character Areas (LCCAs), 11 viewpoints and eight principal visual receptors. Photomontages have been prepared for all 11 viewpoints. The figures also include a wireline of the Proposed Development on its own and wirelines with all other cumulative developments. These visualisations have helped assist in the assessment process. Figures 6.1 to 6.18 show plans of the study area, landscape receptors, visual receptors and and Zone of Theoretical Visibility models (ZTVs) of the Proposed Development on its own and in combination with other cumulative wind farms, while Figures 6.19 to 6.29 show the photographs, wirelines and photomontages from the representative viewpoints.

6.1.6 In respect of the physical effects on landscape elements, the assessment found that the direct effect on the agricultural land as a result of the construction of the Proposed Development will be not significant. The losses will comprise only a small proportion of a much wider landscape resource, with improved pasture occurring in abundance across the Orkney Islands. Furthermore, improved pasture will be relatively easy to re-establish post-construction.

6.1.7 In respect of effects on landscape character, the assessment found there will be significant effects within a 6 km to 7 km radius of the Proposed Development, with significant effects occurring wholly in respect of five of the LCUs, and partly in respect of a further four LCUs. These LCUs are either close to the site or occur around the Westray Firth from where a strong association arises with the island of Faray, where the Proposed Development will be located. All LCUs beyond this radius will undergo no significant effects.

6.1.8 In terms of coastal character, the assessment found there will be significant effects within a 4 km to 5 km radius of the Proposed Development, with significant effects occurring wholly in respect of

three of the RCCAs/LCCAs and partly in respect of a further two RCCAs/LCCAs. These RCCAs/LCCAs are either close to the site or occur around the Westray Firth from where a strong association arises with the island of Faray, where the Proposed Development will be located. All RCCAs/LCCAs beyond this radius will undergo no significant effects.

6.1.9 In respect of landscape designations, the assessment found that there will be no significant effects in respect of national and regional landscape designations within the study area. This finding relates principally to the fact that there are no regionally designated landscapes on the Orkney Islands and that the closest nationally designated landscapes are Balfour Castle Gardens and Designed Landscapes (GDL), at a minimum distance of approximately 19 km, and West Mainland and Hoy National Scenic Area (NSA), at a minimum distance of approximately 29 km, with very limited extents and levels of visibility occurring from both these designated areas.

6.1.10 In respect of effects on visual amenity, of the 11 viewpoints assessed, the assessment found that there will be significant effects on seven viewpoints during the construction and operational phases of the Proposed Development. These viewpoints are all located within an approximate 12 km radius of the Proposed Development. The viewpoints will mostly be affected owing to either their close proximity to the construction works and operation of the Proposed Development, or their greater sensitivity. All viewpoints beyond this 12 km range will not be significantly affected as a result of the Proposed Development, owing largely to their greater separation distance, as well as the wider natural and human influences which define their contextual character.

6.1.11 In terms of the Principal Visual Receptors (PVRs) assessed, the assessment found there will be significant effects within a 12 km radius of the Proposed Development, with significant effects occurring wholly in respect of five of the PVRs, and partly in respect of a further three PVRs. It was found that there would be significant effects on ferry passengers travelling between the Mainland of Orkney and the Northern Isles of Westray, Papa Westray and North Ronaldsay out to approximately 12 km south, 8 km north-west and 7 km north-east. There would also be significant effects on road-users of the B9066 on Westray over an approximate 2.5 km section from the south-coast out to 7 km and on road-users of the B9063 on Eday over an approximate 5.3 km section from the north-coast out to 4.5 km. In respect of Core Paths, there would be significant effects on the three close range paths on Eday, and the closest paths on Westray and Rousay. The remainder of these routes, and all other routes, will not be significantly affected during both the construction and operational phases. There will be no significant effects on settlements. There will, however, be significant effects on local residents, with these effects being covered by the representative viewpoints.

6.1.12 The most relevant wind farms to the cumulative assessment are operational and these form part of the baseline situation. The assessment of the Proposed Development in addition to the cumulative situation is covered by the main assessment as this takes into account all the operational wind farms, including Spurness Point Wind Farm and the single turbines at Sandy Banks on Eday, Kingarly Hill on Rousay and Newark on Westray. The cumulative assessment considers the effects of the Proposed Development in addition to consented and application stage wind farms, the most relevant to this assessment being consented Costa Head Wind Farm and the application stage Orkney's Community Wind Farm Project – Quanterness.

6.1.13 There will be no significant cumulative effects largely owing to the relatively small scale of the cumulative wind farms, both in terms of the number of turbines and their size, and / or their distance from the Proposed Development, which prevents wind farms becoming the prevailing characteristic of landscape character or visual amenity. This assessment applies to both consideration of the cumulative effects of the Proposed Development in conjunction and in combination with the other cumulative wind farms.

6.1.14 The RVAA in Appendix 6.2 has considered the impact of the Proposed Development on the visual amenity of residents within a 2 km radius. There are five properties on the west coast of Eday which lie between 1.64 km and 2.01 km from the nearest proposed turbine. While all five of these properties will undergo a medium-high magnitude of change and a significant effect, none will reach the Residential Visual Amenity Threshold which would otherwise indicate that the effects could potentially be overbearing.

6.1.15 In summary, the Proposed Development will give rise to significant effects on landscape and coastal character during the construction and operation of the Proposed Development, albeit contained within the localised extent of approximately 6 km to 7 km. It will give rise to significant effects on visual amenity out to approximately 12 km during the construction and operation of the Proposed Development. While landscape and visual receptors beyond these ranges may be affected by the influence of the Proposed Development, these effects will not be significant. There will be no significant cumulative effects.

6.1.16 All effects during the construction of the Development will be short-term and reversible and all effects during the operation of the Development will be long-term and reversible. All effects will be adverse in nature.

6.2 Introduction

6.2.1 This chapter of the Environmental Impact Assessment Report (EIA Report) evaluates the effects of the Proposed Development on the landscape and visual resource. The Proposed Development comprises six wind turbines and associated infrastructure on the island of Faray in the Northern Isles of the Orkney Islands. This assessment was undertaken by Optimised Environments Ltd (OPEN), with the LVIA authored by Jo Phillips and reviewed by Lynda Thomson, both of whom have BA Honours in Landscape Architecture and are Chartered Members of the Landscape Institute. This chapter of the EIA Report is supported by the following Technical Appendix documents provided in Volume 4: Appendices:

- 6.1: Landscape and Visual Impact Assessment Methodology; and
- 6.2: Residential Visual Amenity Assessment (RVAA).

6.2.2 This chapter includes the following elements:

- Legislation, policy and guidance;
- Consultation;
- Assessment methodology and significance criteria;
- Baseline conditions;
- Receptors brought forward for assessment;
- Standard mitigation;
- Likely effects;
- Additional mitigation;
- Residual effects on landscape receptors;
- Residual effects on visual receptors;
- Summary; and
- References.

6.3 Legislation, Policy and Guidelines

6.3.1 Presented below are details of relevant legislation, policy and guidelines that have been taken into consideration during the Landscape and Visual Impact Assessment.

Legislation

6.3.2 Relevant legislation documents have been reviewed and taken into account as part of this LVIA. Of particular relevance to the LVIA is The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations).

Planning Policy

European Landscape Convention (ELC)

6.3.3 The ELC is devoted exclusively to the protection, management and planning of all landscapes in Europe. Landscape is described as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors*" (ELC, 2000). The definition applies to all urban and peri-urban landscapes, towns, villages, rural areas, the coast and inland areas. In addition, it applies to ordinary or even degraded landscape as well as those areas that are of outstanding value or protected.

6.3.4 The ELC became binding in the UK from 1 March 2007. As a signatory, the UK government has therefore undertaken to adopt general policies and measures to protect, manage and plan landscapes as follows:

- to recognise landscapes in law as an essential component of people's surroundings, an expression of the diversity of their shared cultural and natural heritage, and a foundation of their identity;
- to establish and implement landscape policies aimed at landscape protection, management and planning through the adoption of the specific measures. These include awareness-raising, training and education, identification and assessment of landscapes, definition of landscape quality objectives and the implementation of landscape policies;
- to establish procedures for the participation of the general public, local and regional authorities, and other parties with an interest in the definition and implementation of the landscape policies mentioned in the bullet above; and
- to integrate landscape into regional and town planning policies and in cultural, environmental, agricultural, social and economic policies, as well as in any other policies with possible direct or indirect impact on landscape.

6.3.5 The ELC provides a framework for NatureScot's (formerly Scottish Natural Heritage (SNH)) work for Scotland's landscapes based on the following five guiding principles:

- Our landscape - people, from all cultures and communities, lie at the heart of efforts for landscape, as we all share an interest in, and responsibility for, its well-being;
- All landscapes - the landscape is important everywhere, not just in special places and whether beautiful or degraded;
- Changing landscapes - landscapes will continue to evolve in response to our needs, but this change needs to be managed;
- Understanding landscapes - better awareness and understanding of our landscapes and the benefits they provide is required; and
- Tomorrow's landscapes - an inclusive, integrated and forward-looking approach to managing the landscapes we have inherited, and in shaping new ones, is required.

6.3.6 Given the UK's adoption of the ELC and its aims, the ELC gives an appropriate basis for the importance placed on the Scottish landscape.

Scottish Planning Policy (SPP)

6.3.7 The key national policy document in relation to land use planning is Scottish Planning Policy (SPP) (Scottish Government, 2014). As part of Scotland's commitment to sustainable economic growth it is recognised in Paragraph 2 that the planning system should *"…take a positive approach to enabling high-quality development and making efficient use of land to deliver long-term benefits for the public while protecting and enhancing natural and cultural resources".*

6.3.8 In Table 1: Spatial Framework, SPP sets out the basis for a spatial framework in relation to wind farm development in which a hierarchy of suitability is defined, in order to guide Local Authorities in the identification of suitable areas of search for wind farm development. Group 1 areas are defined as 'Areas where wind farms will not be acceptable' and are based on National Parks and National Scenic Areas. Group 2 areas are defined as 'Areas of Significant Protection' and are based on the following criteria: a range of national designations, other nationally important environmental interests, such as Wild Land Areas or carbon rich soils, deep peat and priority peatland habitat, and community separation of 2 km from cities, towns and villages identified on the Local Development Plan. Group 3 areas are defined as 'Areas with potential for wind farm development', with the guidance in SPP

stating; "…*wind farms are likely to be acceptable subject to detailed consideration against identified policy criteria*."

6.3.9 The Spatial Framework for the Orkney Islands shows that almost all of the development footprint sits within a Group 3 area, that is 'areas with potential for wind farm development'. Group 2 areas that occur on Faray appear to relate to the Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC) which wrap around the coastline with small areas extending onto the island in the northern and southern extents and further small pockets on the west, south-west and south-east coast. The Proposed Development has been designed, such that all proposed turbines and infrastructure lie outwith this Group 2 area, with the exception of the new extended slipway and landing jetty infrastructure and a small section of track leading to them, in the south-east of the island.

National Scenic Areas

6.3.10 Paragraph 212 of SPP sets out the following policy in respect of National Scenic Areas:

6.3.11 "*Development that affects a National Park, National Scenic Area, Site of Special Scientific Interest or a National Nature Reserve should only be permitted where:*

- *the objectives of designation and the overall integrity of the area will not be compromised; or*
- *any significant adverse effects on the qualities for which the area has been designated are clearly outweighed by social, environmental or economic benefits of national importance'."*

Gardens and Designed Landscapes

6.3.12 In Paragraph 148 of SPP, protection is given to Gardens and Designed Landscapes as follows: *"Planning authorities should protect and, where appropriate, seek to enhance gardens and designed landscapes included in the Inventory of Gardens and Designed Landscapes and designed landscapes of regional and local importance."*

Orkney Local Development Plan Policy

6.3.13 The Orkney Local Development Plan (OLDP) was adopted in April 2017. The OLDP is considered to be a relevant and currently up to date Local Development Plan.

Policy 7D – Onshore Wind Energy Development

6.3.14 The Wind Energy Policy is considered to be the most relevant OLDP Policy to the Proposed Development. The OLDP Wind Energy Policy 7D sets out the following requirements for wind farm development.

6.3.15 *"iii. Applications for any windfarms should take account of the Spatial Strategy Framework for windfarm development:*

a. Areas with potential capacity to accommodate wind farms have been identified as 'Areas with Potential for Wind Farm Development'; representing the areas of least constraint to wind energy development. Wind energy development is likely to be supported in principle within these areas, subject to proposals complying with the Development Criteria from Supplementary Guidance: Energy and any other material planning consideration.

b. Within the 'Areas of Significant Protection' wind farm development may be supported when a proposal complies with the Development Criteria from Supplementary Guidance: Energy and where it can be demonstrated by the applicant that any significant effects on the qualities of these areas can be overcome by siting, design or other mitigation.

c. Wind farm developments will not be supported within the National Scenic Area.

iv. Throughout the lifetime of the Plan, OIC will investigate potential 'Strategic Wind Energy Development Areas' within which the principle of wind farm developments will be supported. Any such areas will be subject to appropriate assessment and full public consultation before being adopted within Supplementary Guidance: Energy."

6.3.16 The Spatial Strategy Framework presented in the OLDP shows all the proposed turbines and most of the associated infrastructure are located within an 'Area with Potential for Wind Farm Development' with the new extended slipway and landing jetty infrastructure and short section of the access track within an 'Area of Significant Protection'. No parts of the site are classified as 'Areas where Wind Farms are not Acceptable.' The Group 2 areas relate to nature conservation designations and not landscape related planning designations, which would otherwise denote a special landscape value.

Policy 8B Part V – Gardens and Designed Landscapes

6.3.17 The OLDP presents Policy 8B Part V which aims to protect Gardens and Designed Landscapes (GDLs) from harmful development.

6.3.18 *"Development which preserves or enhances the character and features of inventory gardens and designed landscapes and their setting, will be supported. Development that would have a significant negative impact upon the character of their areas will not be permitted. The conservation, maintenance and restoration, including the restoration of layout and features, will be supported where this is appropriate and based on historical research."*

6.3.19 The GDLs in the study area are described in Section 6.6 and their relevance to the assessment is presented in Section 6.7.

Policy 9G - Landscape

6.3.20 The OLDP presents Policy 9G to protect all landscapes including National Scenic Areas (NSA). The site does not lie within an NSA and is approximately 29 km from the boundary of the Hoy and West Mainland NSA. There are no regionally designated landscapes on Orkney. The assessment of effects on landscape character is presented in Section 6.12 with reference to the Orkney Landscape Character Assessment, along with the assessment of effects on the Orkney – Hoy and West Mainland NSA. The policy states:

6.3.21 *"i All development proposals must be sited and designed to minimise negative impacts on the landscape, townscape and seascape characteristics and landscape sensitivities that are identified in the Orkney Landscape Character Assessment and should be sympathetic to locally important natural and/or historic features within the landscape.*

ii. Consideration should be given to the siting, scale and design of the proposal, as well as the potential for cumulative effects with other developments.

iii. Development that affects the National Scenic Area (NSA) will only be permitted where it is demonstrated that:

a) the proposal will not have a significant effect on the overall integrity of the area or the qualities for which it has been designated; or

b) any such adverse effects are clearly outweighed by social, environmental or economic benefits of national importance.

iv. Development proposals affecting the area of wild land on Hoy will be only be permitted where it has been demonstrated that any significant effects on the character and qualities of this area can be substantially overcome by siting, design or other mitigation."

Guidance

6.3.22 The LVIA follows OPEN's methodology devised specifically for the assessment of wind farm developments as presented in Technical Appendix 6.1. This generally accords with 'Guidelines for Landscape and Visual Impact Assessment: Third Edition' ('GLVIA3'), the key source of guidance for LVIA.

6.3.23 Other sources of guidance used and referenced in the LVIA include the following:

- Visual Representation of Wind Farms Version 2.2 (Scottish Natural Heritage, February 2017);

- Technical Guidance Note 06/19: Visual Representation of Development Proposals (Landscape Institute, 2019);
- Assessing the Cumulative Impact of Onshore Wind Energy Proposed Developments (SNH, 2012);
- Landscape Character Assessment Guidance for England and Scotland (SNH and TCA, 2002);
- SNH (2017). Guidance on Coastal Character Assessment Prepared by Carol Anderson Landscape Associates;
- Scottish Natural Heritage draft guidance: Assessing the impacts on Special Landscape Qualities (SNH 2018);
- Assessing impacts on Wild Land Areas - Technical Guidance. NatureScot (2020);
- Technical Guidance Note 2/19: Residential Visual Amenity Assessment (RVAA) (Landscape Institute 2019); and
- Siting and Designing of Wind Farms in the Landscape: Version 3a (SNH, August 2017).

Orkney Islands Council Supplementary Guidance: Energy (2017)

6.3.24 The Supplementary Guidance: Energy (2017) document outlines the Spatial Framework for wind energy development across the Orkney Islands. This Spatial Framework identifies areas which have potential for wind farm development, those which do not, and those which require significant protection. The Proposed Development lies mostly in an area which has potential for wind farm development, with the smaller scale components of the new extended slipway and landing jetty infrastructure and a short section of access track leading to this infrastructure located in an area of significant protection. In addition to this, the Supplementary Guidance refers to the Orkney Islands Council Landscape Capacity Assessment for Wind Energy (2014) which provides advice on landscape sensitivities, capacity thresholds, the selection of viewpoints and cumulative issues amongst other things. The supplementary guidance highlights the Orkney - Hoy and West Mainland NSA and Hoy WLA as being especially sensitive to wind farm developments. It also emphasises the sensitivity of residential properties and settlements in terms of visual amenity.

Landscape Capacity Study for Wind Energy in Orkney (2014)

6.3.25 The Landscape Capacity Assessment for Wind Energy in Orkney (LCAWEO) was published in 2014 and adopted by OIC as Supplementary Guidance in 2015. It attempts to determine the capacity of the Orkney landscape in terms of its ability to accommodate onshore wind energy development and is based on an assessment of landscape sensitivity and the value of Orkney's different Landscape Character Types (LCTs), whilst also taking into account the influence of cumulative wind farm developments.

6.3.26 The overall conclusion of this assessment states, "*There are no areas of Orkney with underlying capacity for the scale of multi-turbine wind farms found in parts of mainland Scotland; there are no locations where single wind energy developments greater than 20 MW could be accommodated without exceeding the underlying landscape capacity*." The estimated generating capacity of the Proposed Development would be 28.8 MW. In respect of Faray, where the Proposed Development would be located, the LCAWEO determines that *"These islands should be maintained free of wind turbines to retain their undeveloped character"* but without any further information to substantiate this position. Faray is not covered by any national or local landscape designations which would otherwise denote a special landscape value and it is uninhabited.

6.3.27 In respect of the relevance of capacity studies to this assessment, GLVIA 3 makes the following statement at Paragraph 5.41, "*The assessment may take place in situations where there are existing landscape sensitivity and capacity studies, which have become increasingly common. They may deal with the general type of development that is proposed, in which case they may provide useful preliminary background information for the assessment. But they cannot provide a substitute for the individual assessment of the susceptibility of the receptors in relation to change arising from the specific development proposal.*"

6.3.28 In the Appeal Decision Notice for the proposed Costa Head Wind Farm, dated 18th April 2019 and produced by The Scottish Government's Planning and Environment Appeals Division, this position is supported in the following statement "…*whilst strategic studies provide useful guidance, especially for developers' areas of search, all schemes require to be assessed by detailed landscape and visual impact assessments as the Environmental Statement Addendum has done."* The Reporter also states; "…*I have some reservation about the council's two landscape assessment studies…"* listing the concerns cited by the Appellants in this appeal and agreeing with the reservations expressed.

6.3.29 In the LCAWEO, the following caveats regarding the weight that should be applied to the study are presented as follows; "*It is emphasised that this is a strategic level landscape and visual study, providing a context for consideration of capacity for, and the cumulative effects of, existing and potential future wind turbine developments in Orkney. No site specific conclusions should be drawn from it in relation to current, proposed or future wind turbines and windfarms. As a strategic landscape and visual study this does not address specific localised impacts such as effects on individual residential receptors or other sensitive receptors. All wind energy proposals should be considered on their own unique locational and design characteristics as well as their strategic context. All proposals should be subject to landscape, visual and cumulative impact assessment including (if required) a full environmental assessment."*

Orkney Islands Council: Development Management Guidance: Energy

6.3.30 In June 2019 OIC approved the adoption of Development Management Guidance on Energy which was prepared to provide additional clarity to the material factors outlined within the SG Energy document and to assist in the assessment of planning applications. The Guidance was adopted in response to OIC's declaration of a climate change emergency on 14th May 2019 and in response to recent appeal decisions made by Reporters in relation to the scale of wind energy developments in Orkney.

6.3.31 In respect of LVIA the following comment is made; "*Scottish Planning Policy is clear that the only areas where wind farms are fundamentally unacceptable in terms of landscape impact are Scotland's National Scenic Areas and National Parks. Therefore, outwith the Hoy and West Mainland National Scenic Area, notwithstanding other constraints, it may be possible for a developer to make a strong argument regarding how the positive effects of the proposal outweigh the identified negative impacts on the landscape."*

6.3.32 Section 5 of the report notes that recent appeal decisions have placed significant material weight on the contribution of renewable energy projects towards the needs case for the Orkney interconnector. Page 3 of the Guidance states, "*In future, significant material weight will be placed upon any meaningful contributions toward realising this National Development. For the avoidance of doubt, any single energy generation project greater than 10MW…will be considered to make a meaningful contribution toward the interconnector needs case."* (Orkney Islands Council, 2019).

6.4 Consultation

6.4.1 A request for a Scoping Opinion was submitted to the Statutory Consultees in April 2019. Additional consultation materials were circulated to OIC and NatureScot in January 2020. Key information provided by consultees relevant to this LVIA assessment is presented in Table 6.1.

Table 6.1 – Consultation on LVIA matters

Consultee name and date	Consultee Comment	Consultant Comments / Actions
NatureScot Scoping Opinion 15/05/2019	*"Turbines with a tip height of 150m or taller would require visible lighting for aviation safety, and some turbines of less than 150m may also require lights*	No night time aviation lighting is required. Day time aviation lighting is required (refer to

Consultee name and date	Consultee Comment	Consultant Comments / Actions
	depending on the proximity to civil and military aviation interests".	Chapter 13 Aviation and Radar).
Orkney Island Council Scoping Opinion 21/06/2019	*"The ZTV requires to provide additional information to inform the LVIA and CLVIA from that indicated. ZTVs should be provided for both:* *• Blade tip ZTV; and* *• Hub height (or nacelle) ZTV.* *The following information should also be included:* *• how many of the wind turbines are likely to be visible;* *• how much of the wind turbines is theoretically visible (if separate ZTVs are produced showing theoretical visibility to blade tip height, and also theoretical visibility of the hub or nacelle); and* *• the theoretical visibility of different numbers of wind turbines (within a single development, or between different wind farms within a cumulative ZTV)* *The above information will aid selecting the visual receptors to be used in the assessment, these should be selected beforehand to reflect these receptors and with agreement from the HES, the Council and SNH. The preliminary viewpoints suggested are inadequate and further consultation on these requires to be undertaken".*	ZTVs have been produced including the information specified and have been used to inform the selection of representative viewpoints. Further consultation on viewpoint selection has been undertaken with OIC (see below). Cultural Heritage viewpoints were also agreed with Historic Environment Scotland (HES) (See Chapter 10 Cultural Heritage).
	"Notwithstanding the fact that the scale of the development exceeds current maximum parameters, mindful of the draft Development Management Guidance 'Energy' noted in 5.2.2. and Landscape Assessment which specifies that Faray should be retained free of turbines, were the project to be progressed further, the Council agrees with the findings of the Scoping Request Statement that a full Landscape and Visual Impact Assessment (LVIA) and Cumulative Landscape and Visual Impact Assessment (CLVIA) shall be required".	A full LVIA and CLVIA has been prepared for the Proposed Development.
	"The LVIA must accord with best practice and current guidance at time of application, with the Guidance for Landscape and Visual Impact Assessment (3rd edition) being the current standard and as supported by SNH. Final representative	The LVIA accords with GLVIA 3rd Edition. NatureScot have provided useful feedback on

Consultee name and date	Consultee Comment	Consultant Comments / Actions
	viewpoints (VP's) shall be subject to agreement in advance of preparation of the LVIA. The main sensitive visual and landscape receptors, informed by forecast ZTV, desk-based research, site survey and 3D modelling, shall include, but not be limited to, residential properties and settlements, views from recognised viewpoints, main routes (land & sea), visitor attractions and sites of historic interest. The requirement to consider receptors including sea borne routes owing to regular ferry traffic and cruise ships. Consideration of the likely visual effects of the proposed development on tourism and recreation features and facilities, noting in particular core paths and the cruise ships should also be used to identify suitable VPs".	viewpoint selection.
	"It is agreed that a Residential Visual Amenity Assessment should be included as a separate report as indicated within the submitted Scoping Report and that such will focus, although not necessarily be confined to, properties within 2 km of the proposed development given the very large scale of the of wind turbines as indicated".	A Residential Visual Amenity Assessment is presented in Appendix 6.2. This is based on a 2 km study area as set out in the Landscape Institute's RVAA Technical Guidance Note (02/2019)
Orkney Island Council Pre-application consultation 09/03/2020	*"It is noted that the proposed viewpoints selected when the applicant pursued a scoping opinion has been altered to include Point. No. 12 Spur Ness, Sanday and VP. No.13 B9068 North Bay, Sanday. It does not appear that any of the other identified sites have been altered or subject to reconsideration, excepting the possible deletion of VP. 6 Noltland Castle and 7 (Broughtown, Sanday). It is also noted that no information in relation to LVIA in consideration of cumulative impacts of wind energy developments has been provided at this stage for further comment".*	Viewpoint selection has been carefully considered in respect of ensuring the cumulative context is well represented.
	"I would note that that grid references are approximate and great care should be taken to ensure that the selected viewpoints, subject to ground truthing can be achieved in full accordance with the SNH guidance on 'Visual Representation of	No location specific advice was presented in the OIC Scoping Opinion. The exact

Consultee name and date	Consultee Comment	Consultant Comments / Actions
	Wind Farms'. It is noted that the originally suggested viewpoints remain as being pursued by the applicant, potentially at variance to the Scoping Advice provided previously by the Planning Authority. It is however welcomed that additional VP's are under consideration and that a potentially significant number of additional VP's and wireframes from a Historic Environment perspective are to be pursued".	location of each viewpoint has been considered on site to ensure the optimum 'worst case scenario' is represented. Additional viewpoints have been included on Faray and from other Cultural Heritage interests on Eday and Westray (refer to Chapter 10 Cultural Heritage).
Orkney Island Council Pre-application consultation 11/11/2020	The viewpoint list was discussed in a presentation to OIC Development Management.	No issues were raised. Viewpoints have been considered within this chapter.

6.5 Assessment Methodology and Significance Criteria

Study Area

6.5.1 The initial step in the LVIA is the establishment of the study area for the assessment. Guidance developed by NatureScot (Visual Representation of Wind Farms Version 2.2, February 2017) indicates that an area with a radius of 40 km from the nearest turbine is appropriate for turbines of the size proposed (149.9 m). This study area is shown in Figure 6.1. Zone of Theoretical Visibility (ZTV) analysis has been carried out for this area, as has mapping of landscape character, landscape related designations, Wild Land Areas and principal visual receptors.

6.5.2 The study area is not intended to provide a boundary beyond which the Proposed Development will not be seen, but rather to define the area within which it may have a significant landscape or visual effect. A significant effect is, in reality, very unlikely to occur towards the edges of the study area.

6.5.3 The cumulative landscape and visual assessment covers a study area of 40 km from the nearest turbine in the Proposed Development, as shown in Figure 6.11. While SNH's 'Assessing the Cumulative Impact of Onshore Wind Energy Proposed Developments, 2012', suggests a 60 km radius cumulative study area, a preliminary assessment found that cumulative wind farms beyond 40 km were unlikely to be relevant to the assessment.

Desk Study

6.5.4 The assessment is initiated through a desk study of the site and the 40 km radius study area. This study identifies aspects of the landscape and visual resource that may need to be considered in the landscape and visual assessment, including landscape-related planning designations, landscape

character typology, Wild Land Areas, operational and potential cumulative wind farms, and views from settlements and routes, including roads, railway lines, National Cycle Routes, long-distance walking routes and recreational sailing routes.

6.5.5 The desk study also utilises Geographic Information System (GIS) and Resoft Windfarm software to explore the potential visibility of the Proposed Development. The resultant Zone of Theoretical Visibility (ZTV) diagrams and wirelines provide an indication of which landscape and visual receptors are likely to be key in the assessment.

Site Visit

6.5.6 Field surveys have been carried out across the 40 km radius study area, although the focus has been on the closer range areas shown on the ZTV to gain theoretical visibility of the Proposed Development. The baseline field survey has four broad stages:

- A preliminary familiarisation around the study area in order to visit the aspects of the landscape and visual resource that have been identified through the desk study and verify their existence and importance. Important features and characteristics that have not become apparent through the desk study are also identified, and particularly sensitive receptors are noted in order to inform the design process.
- A visit onto the site, in order to establish the potential of the site for wind farm development and identify the most suitable areas for the Proposed Development in landscape and visual terms, along with any constraints that may restrict the developable area.
- Further field survey around the study area, concurrent with the design process for the Proposed Development, to identify those receptors that are likely to be particularly important in the assessment and inform the layout design, possible turbine height, and the extent of the Proposed Development.
- The identification of representative viewpoints to include in the landscape and visual assessment, including a wide range of receptors, landscape character, and directions and distances from the Proposed Development.

Methodology for the Assessment of Effects

6.5.7 The significance of the potential effects of the Proposed Development has been assessed through professional consideration of the sensitivity of the receptor and the magnitude of the potential effect. This section summarises the methodology and guidance used to carry out the LVIA, which is described in full in Appendix 6.1.

Categories of Effects

6.5.8 The LVIA is intended to determine the effects that the Proposed Development will have on the landscape and visual resource. For the purpose of assessment, the potential effects on the landscape and visual resource are grouped into the following four categories:

- **Effects on landscape elements** are restricted to the area within the site boundary and are the direct effects on the existing fabric of the site, such as alteration to ground cover. This category of effects considers landscape elements, which are the components of the landscape, such as agricultural land, that may be directly and physically affected by the Proposed Development.
- **Effects on landscape character**, in which landscape character is the distinct and recognisable pattern of elements that occur consistently in a particular type of landscape, and the way that this pattern is perceived. Effects on landscape character arise either through the introduction of new elements that physically alter this pattern of elements, or through visibility of the Proposed Development, which may alter the way in which the pattern of elements is perceived.

This category of effects is made up of landscape character receptors, which fall into two groups; landscape character types and landscape-related designated areas.

- **Effects on views,** in which the assessment of effects on views considers how the introduction of the Proposed Development, including the presence and movement of the wind turbines, will affect views throughout the study area. The assessment of effects on views is carried out in two parts:
  - An assessment of the effects that the Proposed Development will have on a series of representative viewpoints around the study area; and
  - An assessment of the effects that the Proposed Development will have on views from principal visual receptors, which are the people in the relevant settlements and travelling on routes found throughout the study area. The effects on these receptors is included alongside the most relevant representative viewpoints.
- **Cumulative effects** arise where two or more wind farms overlap so that both of the wind farms or developments are experienced at a proximity where they may have a greater incremental effect, or where wind farms or other developments may combine to have a sequential effect. In accordance with guidance (SNH, 2012), the LVIA assesses the effect arising from the addition of the Proposed Development to the cumulative situation.

Assessment of Effects

6.5.9 The broad principles used in the assessment of significance of the various categories of effects are the same and are described below. The detailed methodology for the assessment of significance does, however, vary, and the specific criteria used are described in Appendix 6.1.

6.5.10 The objective of the assessment of the Proposed Development is to predict the likely significant effects on the landscape and visual resource. In accordance with the EIA Regulations, the LVIA effects are assessed to be either significant or not significant. The LVIA does not define intermediate levels of significance as the EIA Regulations do not provide for these.

6.5.11 The significance of effects is assessed through a combination of two considerations; the sensitivity of the landscape receptor or view and the magnitude of change that will result as a consequence of the addition of the Proposed Development.

Sensitivity

6.5.12 Sensitivity is an expression of the ability of a landscape or visual receptor to accommodate the likely effects arising as a result of the Proposed Development. Sensitivity is determined through a combination of the value of the receptor and its susceptibility to the Proposed Development. The factors that determine these criteria are described in Appendix 6.1.

6.5.13 Levels of sensitivity; high, medium-high, medium, medium-low and low; are applied in order that the judgement used in the process of assessment is apparent.

Magnitude of Change

6.5.14 Magnitude of change is an expression of the extent of the effect on landscape and visual receptors that will result from the introduction of the Proposed Development. The magnitude of change is assessed in terms of a number of variables, including the size and scale of the impact and the extent of the affected area. The factors that determine these criteria are described in Appendix 6.1.

6.5.15 Levels of magnitude of change; high, medium-high, medium, medium-low, low and negligible or no change; are applied in order that the judgement used in the process of assessment is apparent.

Assessment of Significance

6.5.16 The significance of effects is assessed through a combination of the sensitivity of the landscape or visual receptor and the magnitude of change that will result from the addition of the Proposed

Development. While this methodology is not reliant on the use of a matrix to determine a significant or not significant effect, a matrix is included in Table 6.2 below to illustrate how combinations of sensitivity and magnitude of change ratings can give rise to significant effects. The matrix also gives an understanding of the threshold at which significant effects may arise.

Table 6.2 – Assessment of significance matrix

Magnitude: **Sensitivity:**	**High**	**Medium -- high**	**Medium**	**Medium - low**	**Low**	**Negligible or no change**
High	Significant	Significant	Significant	Significant or not significant	Not significant	Not significant
Medium - high	Significant	Significant	Significant or not significant	Significant or not significant	Not significant	Not significant
Medium	Significant	Significant or not significant	Significant or not significant	Not significant	Not significant	Not significant
Medium - low	Significant or not significant	Significant or not significant	Not significant	Not significant	Not significant	Not significant
Low	Significant or not significant	Not significant	Not significant	Not significant	Not significant	Not significant

6.5.17 Effects within the dark grey boxes in the matrix are considered to be significant. Effects within the light grey boxes may be significant or not significant, depending on the specific relevant factors that arise at a particular landscape or visual receptor. Effects within the white boxes are considered to be not significant. In accordance with GLVIA3, experienced professional judgement is applied to the assessment of all effects and reasoned justification is presented in respect of the findings of each case.

6.5.18 A significant effect occurs where the Proposed Development will provide a defining influence on a landscape element, landscape character receptor or view, albeit that it may be one of a number of defining characteristics. A not significant effect occurs where the effect of the Proposed Development is not material, and the baseline characteristics of the landscape element, landscape character receptor, view or visual receptor continue to provide the definitive influence. In this instance, the Proposed Development may have an influence, but this influence will not be definitive.

6.5.19 OPEN has chosen to keep these the consideration of the size or scale of the effect, its geographical extent and its duration and reversibility separate, by basing the magnitude of change on size or scale to determine where significant and not significant effects occur, and then describing the geographical extents of these effects and their duration and reversibility separately. Duration and reversibility are therefore stated separately in relation to the assessed effects, for example as short, medium or long-term, and temporary or permanent. Duration and reversibility are considered as part of drawing conclusions about significance, combining with other judgements on sensitivity and magnitude, to allow a final judgement to be made on whether each effect is significant or not significant.

Cumulative Assessment

6.5.20 Significant cumulative landscape and visual effects arise where the addition of the Proposed Development to, or in combination with, other wind farms and/or other major developments leads to wind farms becoming a prevailing landscape and visual characteristic, albeit that it may become one of a number of prevailing characteristics.

6.5.21 Baseline operational and under construction cumulative wind farms are taken into consideration in the main assessment of the Proposed Development. Consented and application-stage wind farms are considered only in the cumulative assessment.

Cumulative Guidance

6.5.22 SNH's guidance, 'Assessing the Cumulative Impact of Onshore Wind Energy Proposed Developments' (SNH 2012) is widely used across Scotland to inform the specific assessment of the cumulative effects of wind farms. This guidance provides the basis for the methodology for the cumulative assessment.

6.5.23 *"The purpose of the Cumulative Landscape and Visual Impact Assessment (CLVIA) is to describe, visually represent and assess the ways in which a proposed windfarm would have additional impacts when considered in addition to other existing, under construction, consented or proposed windfarms. It should identify the significant cumulative effects arising from the proposed windfarm."* (SNH, 2012).

6.5.24 The guidance defines the following types of cumulative effects:

- Cumulative landscape effects are those effects that '*can impact on either the physical fabric or character of the landscape, or any special values attached to it'* (SNH, 2012, p10);
- Cumulative visual effects are those effects that can be caused by combined visibility, which '*occurs where the observer is able to see two or more Proposed Developments from one 'viewpoint' and/or sequential effects which 'occur when the observer has to move to another viewpoint to see different Proposed Developments'* (SNH, 2012, p11); and
- Perceived cumulative effects are those which may arise '*where two or more Proposed Developments are present but one or more is never seen by the observer'* (SNH, 2012, p11).

6.5.25 The degree to which cumulative effects occur, or may occur, as a result of more than one wind farm being constructed or becoming operational are a result of:

- the distance between individual wind farms and/or relevant other developments;
- the interrelationship between their Zones of Theoretical Visibility (ZTV) and how they may appear together in views;
- the overall character of the landscape and its sensitivity to wind farms and/or other relevant developments;
- the siting, scale and design of the wind farms and/or other relevant developments themselves; and
- the way in which the landscape is experienced.

6.5.26 The aim of the Cumulative Landscape and Visual Impact Assessment (CLVIA) is to focus on and determine the likely significant cumulative landscape and visual effects. Significant cumulative landscape and visual effects are likely to arise where wind farm developments become a prevailing landscape and visual characteristic as a result of the additional effects of the Proposed Development, albeit that they may become one of a number of prevailing characteristics.

6.5.27 To assist the decision maker, the assessment also presents below an overview of the likely combined cumulative effects of the Proposed Development in-combination with relevant operational, under construction, consented and application stage wind farms. The purpose of this is to consider

whether the resulting pattern of development, including the Proposed Development, will result in the redefinition of landscape character or visual receptors. For example, if the existing landscape character displays a 'landscape with wind farms' characteristic, where wind farms are one of a number of defining characteristics, the assessment will consider whether this may be redefined as a 'wind farm landscape' when the Proposed Development is added in to the overall pattern, where wind turbines become the most prevalent defining characteristic of the landscape. Combined cumulative effects are linked closely to landscape and visual capacity and the assessment has regard to factors such as the relationship of the combination of wind farms to landscape character types and the overall influence of the ZTV, in reaching an informed opinion as to the extent and nature of any combined cumulative effects.

Nature of Effects

6.5.28 The 'nature of effects' relates to whether the effects of the Proposed Development are positive/beneficial or negative/adverse. Guidance provided in GLVIA3 states that "*thought must be given to whether the likely significant landscape and visual effects are judged to be positive (beneficial) or negative (adverse) in their consequences for landscape or for views and visual amenity*" but does not provide an indication as to how that may be established in practice. The nature of effects is therefore one that requires interpretation and reasoned professional opinion.

6.5.29 In relation to many forms of development, the EIA will identify beneficial and adverse effects under the term nature of effect. The landscape and visual effects of wind farms are difficult to categorise in either of these brackets as, unlike other disciplines, there are no definitive criteria by which these effects can be measured as being categorically beneficial or adverse. For example, in disciplines such as noise or ecology it is possible to identify the nature of the effect of a wind farm by objectively quantifying its effect and assessing the nature of that effect in prescriptive terms. However, this is not the case with landscape and visual effects, where the approach combines quantitative and qualitative assessment.

6.5.30 In this assessment, beneficial, neutral and adverse effects are defined as follows:

- **Beneficial effects** contribute to the landscape and visual resource through the enhancement of desirable characteristics or the introduction of new, beneficial attributes. The removal of undesirable existing elements or characteristics can also be beneficial, as can their replacement with more appropriate components;
- **Neutral effects** occur where the Proposed Development neither contributes to nor detracts from the landscape and visual resource and is accommodated with neither beneficial nor adverse effects, or where the effects are so limited that the change is hardly noticeable. A change to the landscape and visual resource is not considered to be adverse simply because it constitutes an alteration to the existing situation; and
- **Adverse effects** are those that detract from or weaken the landscape and visual resource through the introduction of elements that contrast, in a detrimental way, with the existing characteristics of the landscape and visual resource, or through the removal of elements that are key in its characterisation.

6.5.31 In this assessment, landscape and visual effects are considered to be adverse unless otherwise stated.

Duration and Reversibility of Effects

6.5.32 The effects of the Proposed Development are of variable duration, and are assessed as short-term or long-term, and permanent or reversible. The construction effects include consideration of the construction compound, machinery, ground modifications, materials and cranes.

6.5.33 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction. Decommissioning would be undertaken

in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan. The turbines, site access tracks, substation compound, permanent met mast, borrow pits, new extended slipway and landing jetty will be apparent in-perpetuity, and these effects are therefore considered to be long-term and potentially in-perpetuity although they will also be largely reversible if required.

6.5.34 Other infrastructure and operations such as the construction processes and plant, including tall cranes for turbine erection, and construction and storage compounds will be apparent only during the, approximate, 24 month construction period of the Proposed Development and are considered to be short-term effects. The tall cranes will be apparent intermittently and over a shorter duration.

6.5.35 The reversibility of effects is variable. The most apparent effects on the landscape and visual resource, which arise from the presence and movement of the turbines, will ultimately be reversible as the turbines will be removed on decommissioning. The effects of the tall cranes and heavy machinery used during the construction and decommissioning periods are also reversible.

6.5.36 Should the site ever be decommissioned it should be noted that elements of the Proposed Development, such as access tracks, slipway and landing jetty may be retained, while turbine foundations and underground cabling are likely to be left in-situ below ground with no residual landscape and visual effects.

6.5.37 In order to avoid repetition, the duration and reversibility of effects are not reiterated throughout the assessment.

Graphic Production

6.5.38 The written LVIA is accompanied by a set of graphics contained in Volume 3 Reference is made throughout the written text to these graphics, as they are an integral part of the overall assessment and of importance in illustrating specific matters. They should be viewed in accompaniment to the written text.

6.5.39 The graphics can be divided into two categories; maps and visualisations. The maps are largely based on the 40 km study area around the Proposed Development and present data of relevance to the assessment, such as the location and extent of landscape designations and Wild Land Areas. Zone of Theoretical Visibility ('ZTV') maps are also included. These digitally calculate the extent and level of theoretical visibility across a given area, using Ordnance Survey Terrain 5 mapping as the basis for the calculations. As this terrain model is based only on the 'bare earth', it does not take account of potential screening by vegetation or buildings, and this is why it is referred to as theoretical and not actual visibility.

6.5.40 The visualisations are based on the 11 viewpoint locations, which are representative of the visual amenity of visual receptors in the area surrounding the Proposed Development. For each viewpoint there is baseline photography and cumulative wirelines illustrating the Proposed Development and the 'bare earth' landform for the same extent as shown in the photography. In accordance with NatureScot's's visualisation guidance, all 11 of the viewpoints also have accompanying photomontages. These use the baseline photography and add onto this a computer-generated model of the Proposed Development. More detailed information on graphic production is included in the Assessment Methodology in Appendix 6.1.

Limitations to Assessment

6.5.41 Photographs and other graphic material such as wirelines and photomontages used in the assessment are for illustrative purposes only and, whilst useful tools in the assessment, are not considered to be completely representative of what will be apparent to the human eye. The assessment itself is carried out from observations in the field and therefore may include elements that are not visible in the photographs.

Zone of Theoretical Visibility (ZTV)

6.5.42 There are limitations in the theoretical production of ZTVs, and these should be borne in mind in their consideration and use:

- Ordnance Survey Terrain 5 DTM has been used to generate the ZTV's within the study area. The analysis is based on visibility at points on a 5m grid and does not take into account local, small-scale landform changes in analysing theoretical visibility.
- The ZTVs illustrate the 'bare ground' situation, and do not take into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility.
- The ZTVs do not indicate the reduction in visibility that occurs with increased distance from the Proposed Development. The nature of what is visible from 3 km away will differ markedly from what is visible from 10 km away, although both are indicated on the ZTVs as having the same level of visibility.
- It is important to remember that there is a wide range of variation within the visibility shown on the ZTV. For example, an area shown on the blade tip ZTV as having visibility of all of the turbines may gain views of the smallest extremity of blade tips, or of full turbines. This can make a considerable difference in the effects of the Proposed Development on that area.

6.5.43 These limitations mean that while the ZTVs are used as a starting point in the assessment, providing an indication of where the Proposed Development will theoretically be visible, the information drawn from the ZTVs is not completely relied upon to accurately represent visibility of the Proposed Development and is verified by wirelines and fieldwork.

Visualisations

6.5.44 The visualisations are based on theoretical visibility from 1.5 metres above ground level. There are limitations in these theoretical productions, and these should be borne in mind in the consideration and use of the wireline images. Firstly, the wireline illustrates the 'bare ground' situation, not taking into account the screening effects of vegetation, buildings, or other local features that may prevent or reduce visibility. Secondly, the wireline is based on OS Terrain 5 DTM, so there may be local, small-scale landform variations that are not reflected in the wireline but may alter the actual visibility of the Proposed Development, either by screening theoretical visibility or revealing parts of the Proposed Development that are not theoretically visible. Thirdly planning conditions are likely to allow the locations of the turbines to be horizontally micro-sited to a small degree and the levels of the turbine bases have not yet been established in detail as this will be determined through site investigations and engineering design. Both of these factors may alter the base and therefore the tip heights of the turbines above ground level from those that are assumed in the assessment and shown in figures. Such variation may also affect ZTVs.

6.5.45 Where descriptions within the assessment identify the numbers of turbines visible this refers to the theoretical illustrations generated and therefore the reality may differ to a degree from these impressions. These factors are unlikely to make a material difference to the outcome of the assessment.

6.5.46 Not all areas of the study area are publicly accessible, and this has limited the specific assessment of views from residential and other properties, for example. Not all parts of the study area have been visited due to time and accessibility constraints, for example the Wide Firth other than the public ferry routes. Notwithstanding these limitations, the assessors consider that there is sufficient information available, from publicly accessible viewpoints, to form a competent assessment of the likely landscape and visual amenity effects.

6.6 Baseline Conditions

6.6.1 The baseline section of the LVIA records the existing conditions of the study area. Establishing a baseline helps to gain an understanding of what makes the landscape distinctive and what its important components or characteristics are. The baseline is instrumental in the identification of the landscape character receptors, visual receptors and viewpoints that are included in the assessment. This section is presented under the following headings:

- The site;

- Landscape character;
- Coastal character;
- Landscape planning designations;
- Viewpoints;
- Principal visual receptors;
- Trends and projected future baseline; and
- Cumulative wind farm developments.

The Site

6.6.2 The site is located on the island of Faray, a small island set to the west of the island of Eday and south-east of the island of Westray. Faray is a narrow whale-back island, with a distinct north to south alignment. It measures only 3 km in length and less than 1 km at its widest section. Holm of Faray lies to the immediate north, separated by the narrow Lavey Sound and measuring only 1.5 km in length. The landform of the island gently rounds to a high point of 32 m, south of the centre and a high point of 31 m, north of the centre, with a gentle dip between. Holm of Faray rises only to 19 m.

6.6.3 The coastline of Faray is mostly rocky with small bays of white sandy shores occurring only in the north-east and south-west. The low cliffs and skerries form a distinctive edge around the island. While the coastline is relatively low, there are many small caves and geos cutting into the cliff edge, and a small arch on the north-west coast. A similarly rocky coastline outlines Holm of Faray, albeit without any sandy bays.

6.6.4 Despite the island being uninhabited by people since 1947, it continues to be inhabited by sheep. Fields of semi-improved pasture cover the island, with sheep grazing ensuring a low and homogenous landcover. The remnants of human occupation are evident in the single road extending down the spine of the island, and the ruined cottages and abandoned crofts which sit either side. These ruins and the old stone walls, although small and low, afford some enclosure and shelter to the livestock on this open and exposed island.

6.6.5 Faray is one of the Northern Isles, set to the north of the Mainland of Orkney. While Faray sits to the east of the Westray Firth, the closer waters are named Rapness Sound to the west and Sound of Faray to the east. While the western side of the island is largely open to the Westray Firth, the small Rusk Holm lies approximately 1.3 km to the south-west and the southern peninsula of Westray lies approximately 2.7 km to the north-west. The island of Eday lies on the close-range, opposing shore to the east of Faray, at a minimum distance of approximately 1.4 km. These surrounding islands present a sense of containment and a strong contextual character.

6.6.6 There is an existing influence on landscape character from operational wind farms located on Westray, Sanday and Stronsay, as well as operational single turbines on Eday, Westray and Rousay and many more small scale domestic turbines across most of the islands, although not Faray.

Landscape Character

6.6.7 Landscape character information produced by, or prepared on behalf of NatureScot forms the basis of much of the characterisation of the study area. The original LCA, which covers the study area, is SNH Review 100: Orkney Landscape Character Assessment.

6.6.1 NatureScot has recently reviewed and updated the 30 original Landscape Character Assessments (LCAs), produced to cover the whole of Scotland during the 1990s, by creating a single data set in a digital version. This has been based on the original LCAs and updated to ensure greater consistency in the approach and structure, to reduce cross boundary discrepancies and to make the mapping more accessible and readily legible. This information is contained in the NatureScot Landscape Character Assessment GIS dataset. In respect of the study area, the Landscape Character Types

(LCTs) have not been noticeably changed between the original Orkney Landscape Character Assessment and the updated dataset.

6.6.2 The guidance on the NatureScot web page, advises that, where available, capacity studies should take precedence over NatureScot's LCAs, and where relevant to specific types of development, such as wind farms. The study that has been considered in this assessment is the Landscape Capacity Assessment for Wind Energy in Orkney (LCAWEO) written by Ironside Farrar in 2014 and adopted by OIC in 2015. The LCAWEO uses the LCTs presented in the original SNH LCA. As this is very similar to NatureScot's updated data set, the updated mapping and information is used as the basis of this assessment.

6.6.3 NatureScot's LCAs and datasets, and local authority capacity studies, divide the landscape into areas of distinctive character which are generally referred to as LCTs. Many of these LCTs are extensive, sometimes covering several areas that are geographically separate. In order to distinguish between different areas of the same LCT and identify these areas in respect of their specific location, a sub classification of Landscape Character Units (LCUs) has been applied.

6.6.4 The distribution and extent of the LCTs within the 40 km study area is shown in Figure 6.2a. LCTs and their LCUs within a 15 km study area, and in conjunction with the ZTV, are shown in Figure 6.7a. Section 6.7 sets out those LCTs / LCUs which have potential to undergo significant effects and Section 6.12 presents the detailed assessments. The potential to undergo significant effects relates to the proximity of the LCTs / LCUs to the Proposed Development, their association with the Faray LCU of the Whaleback Island LCT, where the Proposed Development would be located, and other human influences that already form part of the baseline character, including wind farm developments and single turbines.

Coastal Character

6.6.5 In addition to the assessment of effects on landscape character, this LVIA also considers the effects on coastal character. The basis of this assessment is SNH's 2016 publication entitled 'Coastal Character Assessment: Orkney and North Caithness, which presents classification descriptions for regional and local coastal character areas around all the Orkney and North Caithness coastlines. Regional Coastal Character Areas (RCCAs) form the broader classification, while Local Coastal Character Areas (LCCAs) form the more detailed sub-areas of the RCCAs. Not all of the RCCAs have been subdivided into LCCAs.

6.6.6 The distribution and extent of the RCCAs within the 40 km study area is shown in Figure 6.2b. RCCAs and their LCCAs within a 15 km study area and in conjunction with the ZTV are shown in Figure 6.7b. Section 6.7 sets out those RCCAs / LCCAs which have potential to undergo significant effects and Section 6.12 presents the detailed assessments. The potential to undergo significant effects relates to the proximity of the RCCAs / LCCAs to the Proposed Development, their association with the Faray LCU of the Whaleback Island LCT, where the Proposed Development would be located, and other human influences that already form part of the baseline character.

Landscape Planning Designations

6.6.7 There are three ways in which landscape planning designations are relevant to the LVIA:

- the presence of a designation can give an indication of a recognised value that may increase the sensitivity of a landscape character receptor, viewpoint or visual receptor, and may therefore affect the significance of the effect on that receptor;
- the presence of a relevant designation can lead to the selection of a representative viewpoint within the designated area, as the viewpoint will provide a representative outlook from that area; and
- designated areas may be included as landscape character receptors so that the effects of the Proposed Development on these features of the landscape that have been accorded particular value can be specifically assessed.

6.6.8 A number of areas have been attributed a landscape planning designation within the 40 km study area, as shown in Figure 6.3 and in conjunction with the ZTV in Figure 6.8. These include a nationally important National Scenic Area (NSA) and a number of Gardens and Designed Landscapes (GDLs). There are no regionally designated landscapes on Orkney. The site itself is not subject to any national landscape designations intended to protect landscape quality or scenery considered to be of national importance.

National Scenic Areas

6.6.9 NSAs are areas of land considered to be important on a national level and are designated by NatureScot. The site is not covered by any national landscape designations intended to protect landscape quality as shown in Figure 6.3. The only NSA in the study area is the Hoy and West Mainland NSA which lies approximately 29 km to the south-west of the Proposed Development. The ZTV in Figure 6.8 shows that visibility would be very limited in extent, with visibility occurring only as very small patches across higher north-facing slopes beyond 32 km. The Proposed Development would not give rise to significant effects and the Hoy and West Mainland NSA is, therefore, not considered further in this assessment.

Gardens and Designed Landscapes

6.6.10 Historic Environment Scotland is responsible for designating Gardens and Designed Landscapes (GDLs). These are contained in an Inventory which can be accessed at http://www.historic-scotland.gov.uk/gardens. The descriptions contained in the Inventory identify the special qualities which merit the designation of each GDL.

6.6.11 There are two nationally important Inventory Gardens and Designed Landscapes (GDL) within the study area as shown in Figure 6.3. This includes Balfour Castle at approximately 19 km to the south and Skaill House at approximately 36 km to the south-west. The ZTV in Figure 6.8 shows that there will be no visibility of the Proposed Development from Skaill House GDL and very limited visibility from Balfour Castle, such that there will be a very limited effect. The effects of the Proposed Development on the GDLs are, therefore, not considered further in this assessment.

Viewpoints

6.6.12 The LVIA is informed by a series of 11 viewpoints which are selected to represent visibility from landscape character types, landscape planning designations and principal visual receptors around the study area. These include points of specific importance such as recognised viewpoints, designated landscapes, settled areas, important routes and attractions. The viewpoints also attempt to represent visibility from a range of different directions and distances, whilst also highlighting those areas with greatest potential for significant effects to arise. It should be noted that while the majority of the viewpoints are chosen to represent receptors that have potential to undergo a significant effect, this is not always the case, and some viewpoints that are included demonstrate a lower level of visibility from certain locations.

Viewpoint selection

6.6.13 The viewpoint assessment is used to inform and illustrate the assessment of effects on landscape character as well as the assessment of effects on views and principal visual receptors. The viewpoints used in the assessment are set out in Table 6.3, and detailed assessment for each of these is presented in Section 6.13. The viewpoint locations are shown in conjunction with the blade tip ZTV in Figures 6.5a (40 km), 6.5b (15 km @A3) and 6.5c (15 km @AO) and the hub height ZTV on 6.6a (40 km) and 6.6b (15 km).

6.6.14 The process of identifying viewpoints involves extensive investigation to ensure that the final viewpoints are representative of the highest levels of visibility and most sensitive receptors around the study area, and that they clearly illustrate the predicted visibility of the Proposed Development.

Table 6.3 - Representative Viewpoints

ID	Viewpoint name	Grid ref.		Dist. nearest turbine (km)	Receptors represented
1	Guith, Eday	355311	1036751	1.93 km E	Residential receptors, road-users
2	Vinquoy Hill, Eday	356011	1038103	3.00 km ENE	Formalised viewpoint, recreational receptors, core path users
3	Sands of Mussetter, Eday	355011	1033466	3.13 km SSE	Recreational receptor, core path users
4	Westray Ferry Terminal	350871	1040517	3.68 km NNW	Ferry users, road-users, residential receptors, recreational receptors
5	Ness of Tuquoy, Westray	346023	1043292	9.02 km NW	Core path users, recreational receptors
6	Spur Ness, Sanday	360509	1034235	7.43 km ESE	Road-users, ferry-users
7	Burness, Sanday	366428	1043580	14.75 km ESE	Residential receptors, road-users, walkers
8	John's Hill, Stronsay	363530	1028760	12.60 km SE	Residential receptors, road-users, walkers
9	Kierfea Hill, Rousay	342319	1032116	11.29 km WSW	Residential receptors, road-users, walkers
10	Hatston, Kirkwall	343165	1012884	24.96 km S	Residential receptors, road-users
11	Westray Ferry	351731	1034215	2.05 km SSW	Ferry users, tourism/recreational receptors

Principal Visual Receptors

6.6.15 A number of visual receptors are considered in the assessment as views from them may be affected by the Proposed Development. It is not possible to consider every potential visual receptor in the study area due to the extent of ground that it covers. The assessment, therefore, concentrates on the key visual receptors that may gain visibility of the Proposed Development, such as people in settlements and on routes. Principal visual receptors are shown in Figure 6.4 and in conjunction with the blade tip ZTV in Figure 6.9.

Settlements and Residents

6.6.16 The small and relatively remote nature of the islands and the predominance of water compared to land, means that there is a very limited and sparse population within the study area. The settlement

pattern comprises mostly dispersed properties, reflecting the historic pattern of crofting on these islands.

6.6.17 The Orkney Local Development Plan identifies areas which it regards as 'Settlement' and these identified settlements are shown in Figure 6.4 and in conjunction with ZTV in Figure 6.9. None of the Settlements lie within 20 km of the Proposed Development and none have potential to be significantly affected by the Proposed Development owing to one or a combination of the following factors; their separation distance from the Proposed Development; the limited visibility of the Proposed Development; the limited association between the settlement and Faray, where the Proposed Development would be located; and the existing human influences on views from the settlement. Settlements in the study area are, therefore, not assessed in further detail in this assessment. The effect of the Proposed Developments on residents is assessed with reference to the representative viewpoints.

6.6.18 The closest collection of properties to the uninhabited island of Faray is the coastal area of Guith, approximately 1.5 km to 2 km east across the Sound of Faray, on the island of Eday. It comprises several dispersed properties inset from the coastline. The effect of the Proposed Development on the Residential Visual Amenity of those individual properties that lie within a 2 km radius is presented in Appendix 6.2: Residential Visual Amenity Assessment.

Road Routes

6.6.19 The road pattern across Orkney's Northern Isles generally comprises 'B' class roads running centrally along the island's ridgeline or over its landmass, with minor roads extending off these towards the coastal edge. There are no 'A' class roads on the Northern Isle's and many of the roads are single track with passing places. There are no roads on Faray as this is an uninhabited island, although there are the remnants of a road along the central north-south spine.

6.6.20 On Eday, the main road is the B9063, which runs almost the length of the island, from Calf Sound in the north, to Backaland in the south, where the ferry terminal is situated. It is located closer to the eastern coast, with views typically drawn east towards Sanday, although also with views west from the narrow central section and more elevated parts to the north.

6.6.21 Westray's main roads extend from the main settlement of Pierowall on the north-east coast: the B9066 running along the spine of the eastern peninsula to Rapness in the south-east and the B9067 to Midbea in the south. In general, views from these roads crossing over the gently curved landform, open out into long-range panoramas of open sea or vistas of distant neighbouring islands. Towards Rapness the low-lying coast provides tranquil scenes enclosed by nearby islands sitting low on the horizon.

6.6.22 From the ferry terminal at Loth on Sanday the B9070 runs north along the ridgeline of the southern peninsula to Broughtown, with the B9068 extending along the spur to the north and the B9069 along the spur to the north-east. Towards Spur Ness and the prominent Spurness Point Wind Farm, views from the southern part of the ridge tend to focus on the west towards neighbouring Eday. Faray is not so readily visible owing to the extent of intervening landform both on Sanday and Eday.

Walking Routes

6.6.23 There are a number of core paths on the Northern Isles, either located along paths through the landscape or along the coastal edge or following minor roads. These paths are used by locals and visitors and enable an appreciation of the local and wider landscapes and seascapes. The most relevant of these core paths to the assessment are;

- ED1 Eday Heritage walk;
- ED5 Newark;
- ED6. Sands of Mussetter;
- W8 Castle o' Burrian and the Bay of Tafts; and
- R6. Faraclett Head.

Ferry Routes

6.6.24 Ferry routes from Kirkwall run to the islands of North Ronaldsay, Westray, Papa Westray, Eday, Stronsay and Sanday.

6.6.25 The crossing from Kirkwall to Westray takes one hour and twenty-five minutes with four crossings per day, except Sunday when there are two crossings. Kirkwall to Eday crossings take 1 hour 15 minutes with up to four crossings on weekdays, and two on Saturday and Sunday. Crossings from Eday to Sanday take twenty minutes with two crossings on Saturday, and one on Sunday, Tuesday and Thursday. Crossings from Eday to Stronsay take 35 minutes with one crossing on Monday, Wednesday, Thursday and Friday.

6.6.26 Generally, as these ferries pass between the islands of the archipelago passengers gain uninterrupted views of Faray from the more open waters of North Sound, North Ronaldsay Firth, Sanday Sound, Wide Firth and Westray Firth, as well as from the inland waters around smaller islands including Rapness Sound, Spurness Sound, Eday Sound, and the Sound of Faray.

6.6.27 Prior to the Covid pandemic, there were also more than 140 cruise liners visiting Orkney annually, using the piers at both Hatston and Kirkwall.

6.6.28 The ZTV shown in Figure 6.9 shows theoretical visibility of the Proposed Development across a number of ferry routes and areas of sea which are popular with watercraft. Theoretical visibility is shown to be almost continuous across the more open waters of North Sound, North Ronaldsay Firth, and Westray Firth. Visibility within the Stronsay Firth and inshore waters of Sanday Sound, and Eday Sound is less continuous owing to the screening effect of intervening islands. This includes Gairsay Sound and Rousay Sound to the south-west. In these areas there is little theoretical visibility. The extent of theoretical visibility derives in the main from the openness of the water, the distribution of islands across the area and the relatively low height of many of these islands. Overall, visibility from the ferry routes to Faray will be largely continuous albeit within a much wider seascape and landscape around.

6.6.29 The key ferry routes with potential to be affected by the Proposed Development run between Kirkwall and Westray, Kirkwall and North Ronaldsay, and Kirkwall and Eday. While other ferry routes may potentially be affected, the low frequency and short length of these crossings reduces the exposure of passengers to these effects.

Trends and Projected Future Baseline

6.6.30 In relation to Climate Change, the Stern Report states '*The scientific evidence is now overwhelming: climate change is a serious global threat, and it demands an urgent global response.*' While many of the large scale and immediate impacts of climate change will be experienced in other parts of the world, the impacts that are being experienced on the Orkney Islands will be experienced on an increasingly frequent basis and at increasing magnitudes.

6.6.31 United Kingdom Climate Projections 2018 (UKCP18) produced by the Met Office predict that the Scottish climate will get wetter, especially in the winter months and with more frequent storm events. Coastlines will be especially vulnerable due to a combination of rising sea levels and the predictions for more frequent stormy weather, and this could lead to coastal settlements being affected by flooding during high tides. A wetter climate on the Orkney Islands will mean greater risk of flooding in low-lying parts of the landscape, which in the study area, largely coincides with low-lying areas of farmland, where improved pasture is the predominant land use.

6.6.32 In terms of future development on the islands, Figure 6.11 shows the extent of operational, under construction, consented and application stage wind farm developments, as well as those in scoping for turbines greater than 50 m to blade tip. This shows the limited number and extent of wind farms being proposed within the study area, especially within the local area around the Proposed Development. The approach of the assessment to cumulative effects is outlined below and a more detailed assessment is contained in the main assessment in Sections 6.12 and 6.13. It must be noted that wind farm consents have up until recently been typically time limited and that in the absence of applications for repowering of wind farms, decommissioning would be the default.

Cumulative Wind Farm Developments

6.6.33 Both NatureScot and GLVIA3 advise in their guidance that the assessment of the cumulative impacts associated with the Proposed Development should encompass the effects of the proposal in conjunction with existing, under construction, consented and application stage wind farms awaiting determination. Schemes that are at the pre-planning or scoping stage are generally not considered in the assessment of cumulative effects because firm information on which to base the assessment is not available. The list of proposals presented in SNH guidance (SNH, 2012, p7) is as follows:

- *"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."*

6.6.34 The developments to be considered within the CLVIA are set out in Table 6.4 below. As stated in guidance (SNH, 2012, p15) '*At every stage in the process the focus should be on the key cumulative effects which are likely to influence decision making, rather than an assessment of every potential cumulative effect'.*

6.6.35 While the baseline presented in the LVIA would be altered by the introduction of further wind farms, the cumulative map in Figure 6.11, combined with the cumulative ZTVs in Figures 6.12 to 6.18, and the cumulative wirelines in Figures 6.19 to 6.29, together illustrate the limited influence of consented and application stage wind farms. The cumulative assessment, therefore, focuses on the cumulative effect of the Proposed Development in conjunction with the operational and under construction wind farms in the main assessment in Sections 6.12 and 6.13. A cumulative assessment is included where interactions with the consented or application stage wind farms are of relevance.

6.6.36 The cumulative situation changes frequently as applications are made or withdrawn, and the layouts of submitted application wind farms are changed. It is therefore necessary to set a cut-off date when the sites and layouts to be included are fixed. This has been set at the 15th September 2020. Any changes in the cumulative situation after this date have not been considered in the CLVIA.

6.6.37 The scale and proximity of cumulative wind farms and other development is also of relevance to the CLVIA, with the greatest influence arising where large-scale wind farms or other developments are situated in close proximity to the Proposed Development. The larger the development, generally, the higher the likelihood of a significant cumulative effect. Turbines of less than 50 m are not included within the assessment.

6.6.38 A total of 21 wind energy sites lie within a 40 km radius of the Proposed Development and these are listed in Table 6.4 below. Sites that lie outwith a 40 km radius of the Proposed Development have been discounted due to their distance from the Proposed Development which ensures that either one or both will be seen from a considerable distance away and, therefore, will have a very limited effect.

6.6.1 Table 6.4 also indicates whether or not cumulative wind energy sites are referenced in the CLVIA. Their separation distance from the Proposed Development, turbine height and number are the key reasons for excluding sites, as these developments are considered not to have the potential to contribute to the Proposed Development having a significant cumulative effect.

Table 6.4 - Cumulative Wind Energy Development within a 40 km Radius

Name	Status	Number of turbines	Blade tip height in m	Distance in km / Direction	Referenced in CLVIA
Sandy Banks	Operational	1	77	4.34 / S	Yes

Name	Status	Number of turbines	Blade tip height in m	Distance in km / Direction	Referenced in CLVIA
Spurness Point	Operational	5	100	6.93 / SE	Yes
Newark	Operational	1	59.7	7.46 / NNW	Yes
Kingarly Hill	Operational	1	67	11.41 / SW	Yes
Gallowhill	Operational	1	67	12.47 / NW	Yes
Westray Dev. Trust	Operational	1	77	12.72 / NW	Yes
Stronsay Dev. Trust	Operational	1	67	16.41 / SSE	Yes
Howe, Shapinsay	Operational	1	67	19.00 / S	Yes
Hammars Hill	Operational	5	67	19.50 / SW	Yes
Burgar Hill	Operational	6	Up to 116	20.99 / SW	Yes
Crowness Business Park	Operational	1	67	24.91 / SSW	Yes
Rennibister	Operational	1	67	26.50 / SSW	Yes
Holodykes	Operational	1	80	25.37 / SW	No – distant with limited inter-visibility
Upper Stove, Deerness	Operational	1	67	28.56 / SSE	No – distant with limited inter-visibility
Barnes of Ayre	Operational	3	67	32.16 / SSE	No – distant with limited inter-visibility
Northfield, Burray	Operational	1	70	37.82 / S	No – distant with limited inter-visibility
Work Farm	Consented	2	67	23.57 / S	No – distant with limited inter-visibility

Name	Status	Number of turbines	Blade tip height in m	Distance in km / Direction	Referenced in CLVIA
Akla	Consented	1	67	33.72 / SSW	No – distant with limited inter-visibility
Costa Head	Consented	4	125	23.04 / WSW	Yes
Hammars Hill Extension	Application	2	150	20.11 / SW	Yes
Orkney's Community Wind Farm Project – Quanterness	Application	6	149.9	24.28 / SSW	Yes

6.6.1 Baseline operational and under construction cumulative wind farms are taken into consideration in the main assessment of the Proposed Development. Consented and application-stage wind farms are considered only in the cumulative assessment. Cumulative ZTVs have been prepared to illustrate theoretical visibility of the Proposed Development in conjunction with operational Spurness Point, Westray Development Trust / Gallowhill turbines, Stronsay Development Trust turbine, Hammers Hill Wind Farm and Burgar Hill Wind Farm (Figures 6.12 to 6.16). There are also operational single turbines at Sandy Banks on Eday, Newark on Westray and Kingarly Hill on Rousay. Figures 6.17 and 6.18 show the cumulative ZTVs with the consented Costa Head and application stage Orkney's Community Wind Farm Project Quanterness wind farms respectively. The cumulative wirelines in Figures 6.19 to 6.29 demonstrate the influence of these operational wind farms and single turbine in respect of the 11 representative viewpoints.

6.6.2 The cumulative effects that will arise as a result of the addition of the Proposed Development will relate chiefly to open water and coastlines, open farmland and elevated locations from where it may be possible to see the Proposed Development simultaneously and in succession as part of wider views that contain other wind farms. Cumulative effects may also arise through sequential visibility of the Proposed Development from the roads and core paths on the Mainland of Orkney and ferries between the Mainland of Orkney and the Northern Isles, since other wind farms are visible from these routes.

6.7 Receptors Brought Forward for Assessment

6.7.1 Through a combination of the scoping process, baseline assessment and site work, the following landscape and visual receptors have been identified as having potential to undergo significant effects as a result of the Proposed Development.

6.7.2 These receptors form the basis of the assessment and are assessed in detail in Sections 6.12 and 6.13.

Landscape Elements

- Agricultural land.

Landscape Character Types and Units

- Coast with Sand LCT 308: Mussetter, Eday LCU;
- Holms LCT 295: Holm of Faray LCU / Rusk Holm LCU;

- Inclined Coastal Pasture LCT 302: Central Eday LCU / Fersness LCU;
- Low Island Pastures LCT 298: Rousay LCU;
- Moorland Hills LCT 314: South Eday LCU / North Eday LCU / Rousay LCU:
- Ridgeline Island Landscapes LCT 297: Westray LCU;
- Undulating Island Pasture LCT 299: Sanday LCU / Westray LCU; and
- Whaleback Islands LCT 296: Faray LCU / Egilsay LCU.

Regional Coastal Character Areas and Local Coastal Character Areas

- RCCA 3 Sanday West;
- RCCA 5 Eday: LCCA 5c Red Head to Greenan Nev / LCCA 5d Fersness Bay / LCCA Faray / LCCA Holm of Faray;
- RCCA 8 Westray North and East;
- RCCA 10 Rousay North: LCCA 10b Saviskaill Bay;
- RCCA 11 Rousay South: LCCA 11d Point of Avelshay to Scock Ness; and
- RCCA 12 Egilsay and Wyre.

Viewpoints

- Viewpoint 1: Guith, Eday;
- Viewpoint 2: Vinquoy Hill, Eday;
- Viewpoint 3: Sands of Mussetter, Eday;
- Viewpoint 4: Westray Ferry Terminal;
- Viewpoint 5: Ness of Tuquoy, Westray;
- Viewpoint 6: Spur Ness, Sanday;
- Viewpoint 7: North Bay, Sanday;
- Viewpoint 8: John's Hill, Stronsay;
- Viewpoint 9: Kierfea Hill, Rousay;
- Viewpoint 10: Hatston, Kirkwall;
- Viewpoint 11: Westray Ferry.

Principal Visual Receptors

- Westray Ferry;
- North Ronaldsay Ferry;
- B9066, Westray;
- B9063, Eday;
- ED1 Eday Heritage Walk;
- ED5 Newark;
- ED6. Sands of Mussetter;
- W8 Castle o' Burrian and the Bay of Tafts; and

- R6. Faraclett Head.

6.7.3 All other landscape and visual receptors have been discounted from the detailed assessment owing to the fact that there would be no likely significant effects as a result of the Proposed Development. This finding, in respect of each discounted receptor, relates to a combination of two or more of the following factors. Firstly, there is the separation distance between the receptor and the Proposed Development, which will reduce the prominence of the Proposed Development. Secondly, there is orientation and association, whereby receptors which are not orientated towards the Proposed Development or which do not have a close association with the location of the Proposed Development, will not be so susceptible to the effects. Thirdly, where intervening landscapes or where more influential landscape and seascape contexts occur, these moderate the comparative influence of the Proposed Development. Fourthly, where other human influences occur, most notably other close range wind farm developments, these also moderate the comparative influence of the Proposed Development. Fifthly, there are no national or regional landscape designations across most of the study area, denoting an absence of any special landscape value.

6.8 Standard Mitigation

6.8.1 This section describes the landscape and visual mitigation measures that have been incorporated through the iterative design of the Proposed Development in order to prevent, reduce or offset potentially negative landscape and visual effects caused by the construction and operation of the Proposed Development. It should be read in conjunction with the full project description and the rationale for site selection and scheme design in Chapter 2: Design Iteration.

Site Selection

6.8.2 OIC's site selection process, to identify the most suitable sites for Orkney's Community Wind Farm Project, followed a sieving process in which all internationally designated areas across the islands were discounted, along with a 700 m buffer zones around each residential property. This process highlighted Faray as one of the few areas with potential for wind farm development.

6.8.3 Faray presents a suitable site in respect of the complete absence of human habitation, which means that there are no residents within close range of the Proposed Development who might otherwise be potentially significantly affected. There are no ferries to the island and to visit the island requires chartering a boat. With no special attractions on the island, very few visitors come to this island. With the exception of the farmers who visit to tend the sheep there are, generally, no visual receptors on the island that would be affected.

6.8.4 The island is separated from the other islands by the surrounding inshore waters, which means there are no residents, road-users or walkers that would be affected within this close range area, although transitory ferry passengers and passengers on other vessels would be affected. The closest residents, road-users and walkers that would be affected occur on the western coast of Eday, which lies to the east of Faray. While the closest residential properties lie approximately 1.6 km from the nearest turbine, settlement along this coastline is typically sparse and dispersed, with no nucleated villages and only single-track minor roads providing access. A similar situation occurs along the Westray coastline to the north-west, albeit at the greater range of 3.5 km between the closest residential properties and nearest turbine.

6.8.5 The rural and relatively remote nature of Faray means that there are no residential receptors within especially close proximity and few within close to medium proximity. This, therefore, notably reduces the number of residents, road-users and walkers that would be affected and contributes to the suitability of the site.

6.8.6 The site is not covered by any national or regional landscape planning designations which would otherwise denote a special landscape value. Furthermore, there are no national or regional landscape planning designations or wild land areas within a 29 km radius of the site and the World Heritage Site Buffer Zone lies outwith a 28 km radius. This absence of designations across the site and the surrounding area out to a 28 km radius, adds to the suitability of the site, as the Proposed Development would not give rise to significant effects on designated landscapes with an inherently high or medium-high sensitivity.

6.8.7 Faray is classified as an example of the Whaleback Island LCT, a type characterised by low and rounded landform which slopes gently down to the coastal edge. While the landform and the landcover present a simplicity in terms of their homogenous and uniform nature, the small scale and intricate detail of the coastal features and the abandoned croft houses add a complexity that will serve to accentuate the large scale of the turbines. Faray is a small island, such that, by its very nature it could only accommodate a small number of turbines. Moreover, it would contain a small number of turbines within one, well-defined and distinct LCT. The linear and low-lying nature of the island inevitably prompts a linear and low-lying layout. This in turn, naturally presents a tidy and uncluttered layout, in which the turbines are all relatively well spaced and set at a similar low elevation. The small and low-lying landform of the island means that the Proposed Development would be seen as much part of the seascape context as the island context. Faray is seen to form a seaboard platform for the Proposed Development. The large scale of the proposed turbines will, however, appear at variance with the small scale of the island.

6.8.8 The settled and cultivated nature of much of the Orkney Islands means that the landscape has been extensively modified. The extent of human influence means that there are few natural or semi-natural areas. A dispersed settlement pattern and enclosed farmland occurs across much of Orkney, such that there is a human influence in almost every part. While Faray is no longer inhabited, it is still farmed with the landcover modified by the improved pasture required for sheep grazing. This reduces the sense of remoteness and wildness, which would otherwise add to the sensitivity of the landscape.

Layout Design

6.8.9 The iterative design process is described in detail in Chapter 2: Design Iteration and in the accompanying Design and Access Statement (DAS). The design of the wind farm layout is an important part of the EIA process as it is the stage where the most notable contribution can be made to mitigate likely landscape and visual effects. This helps to create a wind farm which is appropriate to the existing landscape character and visual features of an area. The iterative design process allows the effects of different wind farm layouts to be assessed then modified to prevent, reduce or offset effects. The residual effects reported in the following Sections 6.12 and 6.13, therefore, include embedded mitigation in the form of design refinement and consideration against landscape and visual objectives, for example, arranging turbines with respect to landform features, particular consideration of a view of the wind farm from a highly valued landscape, or ensuring the arrangement of turbines is aesthetically balanced from sensitive viewpoints and visual receptors. While the absence of national or regional landscape designations within a 28 km radius of the site denotes an absence of highly valued landscapes, many highly sensitive visual receptors have been identified on the close-range surrounding islands and their views have been an important consideration in the iterative design process.

6.8.10 In respect of the Proposed Development on Faray, the aim was to keep the proposed turbines sufficiently inset so as not to encroach on the coastal edge. The proposed turbines have been set at consistent elevations and spaced evenly, to produce a compact and legible layout from the key viewpoints on the surrounding islands. The iterative design has also taken into account technical and environmental constraints, principally relating to archaeological features and ecological designations, which have also helped guide the final layout. Figure 1.2 illustrates the site layout.

6.8.11 In terms of the layout of the site infrastructure, many of the key components have been located in the centre of the island, where their potential landscape and visual effect will be moderated. For example a long section of the access road follows the original track along the spine of the island and the main borrow pit search area has been located to the west of this, such that its visibility from the inhabited island of Eday to the east will be reduced. In the south-east of the island, a small cluster of infrastructure components has been formed close to the jetty, with the substation, small temporary construction compound and small borrow pit search area, in order to reduce vehicle movements across the island. A larger temporary construction compound is located further up the road, away from the coastal edge.

6.9 Likely Effects

6.9.1 Likely effects are those that are assessed as being likely to result from the construction, operation and decommissioning of a wind farm, according to the characteristics of the site, the Proposed Development, the landscape and visual receptors, and the interactions between these factors. Table 6.5 describes typical landscape and visual effects that can occur from a wind farm. Their inclusion in the table does not imply that they will occur, or occur as significant effects, as a result of the Proposed Development, but helps to highlight the considerations made in the assessment process.

6.9.2 Landscape and visual mitigation measures have been incorporated through the iterative design of the Proposed Development in order to prevent, reduce or offset likely landscape and visual effects. These are described in Section 6.8: Standard Mitigation presented above. The residual effects of the Proposed Development are those effects remaining after mitigation, which will become apparent under construction or operation. These are assessed in Section 6.12: Residual Effects on Landscape and Coastal Character, and Section 6.13: Residual Effects on Visual Receptors.

Table 6.5: Likely Landscape and Visual Effects - Construction, Operation and Decommissioning

Activity	Specific Element	Likely Effects	Likely Sensitive Receptors
Construction	Construction plant, temporary construction compounds and site facilities, a new extended slipway and landing jetty, hard standings, borrow pits, marine vessels, meteorological mast, turbines under construction, construction cranes, construction lighting.	Temporary physical effects on landscape fabric Temporary effects on landscape character Temporary effects on visual amenity	Physical landscape features e.g. agricultural land Landscape and coastal character receptors – LCTs / LCUs and RCCAs / LCCAs Views – experienced by different receptors e.g. residents, road users, walkers
Operation	Turbines, access tracks, permanent meteorological mast, slipway, landing jetty, daytime aviation lighting, substation compound, site office, transformers	Long term effects on landscape character Long term effects on visual amenity	

6.9.3 The effects of the Proposed Development on the landscape and visual receptors will arise principally from the construction, operation and possible decommissioning of the turbines, substation compound, temporary construction compounds, daytime aviation lighting, a new extended slipway, landing jetty and access tracks. The temporary construction facilities, such as cranes, construction vehicles, construction compounds, lighting, laydown areas and delivery vehicles required during construction will also have effects on the landscape and visual resource. It is anticipated that construction of the Proposed Development will take up to approximately 24 months; the construction effects identified are, therefore, predicted to occur during this period and end at the start of the operational stage. While the most wide-spread effects during the construction phase will relate to the tall cranes, it is anticipated that two months will be the maximum period during which the cranes will be active on the site, making this an especially short term effect. A Construction Environmental Management Plan will be prepared that will further detail the mitigation measures to be implemented during the construction phase.

6.9.4 In terms of daytime aviation lighting, it has been agreed that this should match the lighting used on the Sanday turbines. These are medium intensity steady red lights of minimum intensity 2000 cd. It

was further agreed that, in accordance with CAA policy, the lights could be dimmed to 10 % of their minimum intensity (200 cd) in conditions of high visibility. The infra-red lights will be medium intensity obstruction lights fixed on the hubs of all six turbines. Their effect will be moderated by their use during the hours of daylight and their reduced intensity during periods of good visibility.

6.9.5 The intensity of daytime aviation lighting also reduces sharply when observed from beneath the light, with reference to the horizontal. At -1 degree the intensity recommended by the CAA (via ICOA Annex 14 Volume 1 to the Chicago Convention) should not exceed 56 % of the maximum intensity, falling to 4 % at -10 degrees.

6.9.6 The combination of the reduced intensity during good visibility and the design of the lights to reduce intensity in angles below the horizontal, which will be set at the hub height of c.81.9 m, means that the overall effect on visual receptors will be greatly moderated. The impacts will relate principally to the presence and movement of the 149.9 m high turbines and while the daytime lighting may add to the overall impact, this addition will be especially incremental.

6.9.7 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

6.10 Additional Mitigation

6.10.1 There is very limited opportunity to mitigate landscape and visual effects outwith standard mitigation measures undertaken in the iterative design process. There is therefore no additional mitigation to be considered in the LVIA.

6.10.2 The residual effects of the Proposed Development, that is those effects that will remain after mitigation, are assessed in the sections presented below. These are categorised into effects on landscape elements, effects on landscape character, and effects on views, as described previously. Cumulative effects are also assessed in these sections as these effects relate principally to the operational and under construction wind farms that make up the baseline cumulative context, and more occasionally to the consented and application stage wind farms.

6.11 Residual Effects on Landscape Elements

Introduction

6.11.1 The first category of effects covered in the assessment is the physical effects on landscape elements. These are the direct effects on the fabric of the site, such as the removal of ground cover vegetation. Effects on landscape elements are found only on the site, where existing landscape elements may be removed or altered by the Proposed Development. This category of effects is made up of landscape elements and, in this case, there is only one element involved; agricultural land. The methodology for the assessment of physical effects is described in full in Appendix 6.1.

Agricultural Land

Baseline

6.11.2 Agricultural land is by far the predominant land use on Orkney, largely characterising the Orkney landscape. Farms are typically small in scale with small to medium sized fields, enclosed by post and wire fencing or drystone dykes, and containing improved or semi-improved pasture or arable crops. The site presents a different situation in that it occupies a small island, which although uninhabited, is still used to farm sheep. The land cover comprises improved or semi-improved pasture and while some definition of fields is formed by post and wire fencing, the island appears blanket covered by grass. The site comprises largely unenclosed fields of semi-improved or rough pasture. There are no hedgerow boundaries or trees on the site and no other areas of natural vegetation. While some drystone dykes exist, field boundaries are generally open, and this adds to the open appearance of the landscape.

Sensitivity

6.11.3 The value of the agricultural land is medium. There are no national or regional landscape designations which would otherwise denote a special value.

6.11.4 The susceptibility of the agricultural land to the Proposed Development is medium-low. The proposed turbines and associated infrastructure will be located on the agricultural land which occupies the site. This will result in the loss of agricultural land where access roads, crane pads and turbine foundations will be constructed. The land has been modified from its natural state by centuries of farming, such that there is little biodiversity, with the vegetation which occurs comprising either semi-improved pasture or rough grazing. There will, therefore, be no loss to natural vegetation and little loss to biodiversity.

6.11.5 The susceptibility of the agricultural land is moderated by the extent to which it has already been modified by cultivation, the ability of some of the agricultural land disturbed through the construction period to be reinstated and the limited extent of the land to be disturbed in proportion to the remainder of the site and the wider provision of agricultural land across Orkney.

6.11.6 The combination of the value of the agricultural land and its susceptibility to the Proposed Development gives rise to an overall **medium** sensitivity.

Magnitude of change

6.11.7 During the construction phase, the Proposed Development will lead to the loss of patches of the existing agricultural land where new access tracks, permanent hard-standings, turbine foundations, the substation compound, borrow pits and the temporary construction compounds will be constructed, as illustrated in Figure 1.2. The effect of this loss will be moderated by the fact that the majority of the agricultural land will remain unaffected and continue to be used for sheep grazing. Furthermore, no mature or well-established vegetation will be lost, and the vegetation lost is relatively limited in terms of biodiversity. Grasses will be able to recolonise areas of temporary removal, easily and post construction, areas of temporary removal will be reinstated.

6.11.8 Taking all these factors into account, the Proposed Development will give rise to a **medium-low** magnitude of change on the site.

Significance of Effect

6.11.9 The effect of the construction of the Proposed Development on the agricultural land of the site will be **not significant**. This finding relates to the modified state of the agricultural land, the limited extent of the agricultural land that will be lost, the wider extent of agricultural land across Orkney which limits the scarcity value of this physical element and the ease with which agricultural grasses can be reinstated post-construction.

6.12 Residual Effects on Landscape and Coastal Character

Introduction

6.12.1 Landscape character is the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and the way that this pattern is perceived. Effects on landscape character are manifested both on the site, where the pattern of elements that characterises the landscape will be directly altered by the addition of the Proposed Development to the site; and off-site, around the study area, where visibility of the Proposed Development may alter the way in which this pattern of elements is perceived. For example, if the Proposed Development is visible from the Holm of Faray LCU of the Holms LCT, the perceived experience of this area may be altered. This is because the visibility of the Proposed Development introduces new external influences as part of the wider context and characteristics, despite its physical location in a different, geographically separate, LCT.

6.12.2 Landscape character receptors fall into three groups:

- LCTs/LCUs;

- RCCAs/LCCAs; and
- Designated areas.

6.12.3 The assessment of effects on the LCTs / LCUs and LCCAs / RCCAs is described in the following sections of this chapter. There is no assessment of the effects on designated areas as there are none with potential to be significantly affected by the Proposed Development, owing principally to a combination of their distance from the site and limited extents of visibility, as described in Section 6.6. The detailed methodology for the assessment of effects on landscape character is described in Appendix 6.1.

6.12.4 It should be noted that levels of magnitude of change on landscape character receptors may be found to be lower than the magnitude of change on viewpoints that lie within these receptors. This means, for example, that if a viewpoint is assessed to undergo a medium-high magnitude of change it does not necessarily follow that the landscape character receptor within which it lies will also undergo a medium-high magnitude of change but may undergo a medium magnitude of change instead.

6.12.5 This is because the effects on viewpoints are assessed within the context of a specific outlook towards the site and are usually specifically selected to gain a direct view over the Proposed Development. The Proposed Development is, therefore, the principal consideration in the viewpoint assessment, and influences that lie in other areas of the view are of lesser relevance to the assessment. The landscape character of a receptor is not, however, determined so specifically by the outlook over the Proposed Development, and there are many other considerations, both visual and perceptual, that combine to give an area its landscape character. This means that the degree of influence of the Proposed Development on landscape character may be lower than its influence on a specific view. Viewpoints are referred to in this assessment as they do give a useful indication of the appearance of the Proposed Development from the landscape receptors, but the level of magnitude of change may vary between the viewpoint assessment and the landscape character assessment.

6.12.6 This is particularly true of areas that lie slightly further away from the site. In the immediate vicinity of the site, typically up to around 2 km to 3 km away, the magnitude of change on viewpoints and landscape character is likely to be similar, but beyond this, the magnitude of change on landscape character is found to often diminish more rapidly as the influence of the turbines is subsumed in the many other influences on landscape character.

Assessment of Effects on LCTs and LCUs

6.12.7 The LCTs and LCUs that cover the local study area of a 15 km radius are shown in conjunction with the ZTV in Figures 6.7a and 6.10. The following LCTs / LCUs have the potential to undergo significant effects and therefore require a detailed assessment in the LVIA:

- Coast with Sand LCT 308: Mussetter LCU (308a);
- Holms LCT 295: Holm of Faray LCU (295a) / Rusk Holm LCU (295b);
- Inclined Coastal Pasture LCT 302: Central Eday LCU (302a) / Fersness LCU (302b);
- Low Island Pastures LCT 298: Rousay LCU (298a);
- Moorland Hills LCT 314: South Eday LCU (314a) / North Eday LCU (314b) / Rousay LCU (314c):
- Ridgeline Island Landscapes LCT 297: Westray LCU (297a);
- Undulating Island Pasture LCT 299: Sanday LCU (299a) / Westray LCU (299b); and
- Whaleback Islands LCT 296: Faray LCU (296a) / Egilsay LCU (296b).

6.12.8 The effect on each of these LCTs / LCUs is assessed below. The LCTs / LCUs that cover the remainder of the study area were found through the review process to not have the potential to be significantly affected, largely owing to one or a combination of the following factors; their lack of association

with Faray; their distance from the Proposed Development; and the limited visibility of the Proposed Development. These LCTs / LCUs have therefore not been assessed in any further detail.

Coast with Sand LCT (308)

Baseline

6.12.9 The coastlines of the small isolated LCUs of this LCT comprise low-lying and gently curving bays. Natural sand deposition landforms and features, such as dunes, sand bays, ouses, ayres and tombolos, occur along the coastline. Adjoining pastures are characterised by unenclosed rough grasslands, and areas of marram grass and salt marsh. This machair habitat occurs extensively in this LCT and in combination with the sweeping sands, forms the defining feature. Views framed by curved beaches and headlands, make these areas popular with visitors. The absence of roads and settlement adds to the sense of remoteness, and visitor facilities that do occur are typically low key. The Coast with Sand LCTs occur in sheltered locations, more typically on east facing coasts rather than west facing coasts.

Coast with Sand LCT: Mussetter LCU (308a)

Viewpoint 3 is representative of views from this LCU.

Baseline

6.12.10 The Mussetter LCU of this LCT occupies a sheltered position on the western coast of Eday. The LCU comprises the Sands of Mussetter and the Sands of Doomy, which are orientated north and north-east towards Fersness Bay, with Faray set beyond the bay. They are enclosed by the rocky headland of Fers Ness to the west and Doomy to the north-east. The sands are formed by broad white beaches and backed by machair grasslands and low cliffs of tough boulder clay. This LCU is unsettled and largely undisturbed by human activities, albeit with fields of semi-improved grazing surrounding the LCU.

6.12.11 The low-lying and open nature of this LCU, means that it is exposed to external influences from the surrounding landscapes and seascapes. These influences are mostly natural, with the immediate enclosure of the rocky headlands to the west and east, and broader enclosure of the moorland hills, to the south and north-east. There is also a strong association with Faray, owing to the principal aspect of this LCU being northwards, towards where this island sits. In terms of human influences, there are a few isolated properties scattered along the minor road to the south and evident across the wider landscape. There is also Eday's 'London Airfield' to the immediate east, although comprising only a small building and low-lying tarmacked strip, this forms a relatively discreet feature in the landscape. Although Sandy Banks wind turbine is located approximately 1.5 km to the south and Spurness Point Wind Farm is located approximately 4.5 km to the east, intervening landform forms a screen that limits the influence of these operational turbines.

Sensitivity

6.12.12 The value of this LCU is medium. This LCU is not covered by any national or regional landscape designations which would otherwise denote a special value.

6.12.13 The susceptibility of this LCU to the effects of the Proposed Development is medium-high. This LCU has a strong intrinsic character relating to the broad, white sandy beach and the rocky coastline, which encloses the bay on either side. This LCU is also influenced by the outlook across the bay which is orientated north towards Faray. While the prominence of Faray is tempered by its low-lying landform, the orientation of this coastline in this direction ensures a close association is formed and this raises its susceptibility to the Proposed Development.

6.12.14 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.15 During the operational phase, the magnitude of change on this LCU would be **medium-high**. The ZTVs in Figures 6.7a and 6.10, show theoretical visibility of all six turbines to be practically continuous across the LCU, and the openness of the LCU means that actual visibility will reflect

theoretical visibility. There will be approximately 2.7 km between the closest turbine and closest LCU edge, extending to a maximum distance of 3.6 km to the furthest LCU edge.

6.12.16 The high part of the rating relates to the close association between this LCU and Faray, owing to the orientation of the Mussetter LCU coastline towards the island, and the openness of this coastal edge, which means that it would be exposed to the influence of the Proposed Development. The minimum separation distance of 2.7 km means that the six turbines would appear as large-scale vertical structures at variance with the strongly horizontal emphasis of the low islands and surrounding seascape, as well as the largely undeveloped character. The movement of the blades would introduce a dynamic feature that would add to their prominence by contrasting with the largely static landscape context.

6.12.17 The medium part of the rating relates to the fact that the Proposed Development would form an external influence with indirect effects on the character of this LCU. It would be seen set on a separate island and would not directly affect the intrinsic character of the sands and surrounding coastal edge. The relatively small number of turbines would also mean that the Proposed Development would be seen as a compact and well-contained group, occupying a small part of the wider landscape context, with the enclosing moorland hills of Eday and the wider seascape remaining unaffected.

6.12.18 During the construction phase, the magnitude of change on this LCU would be **medium-high**. The close proximity of this LCU to Faray means that many of the ground level works at the southern end of the island would be visible, including track, a new extended slipway and landing jetty construction. The construction of all the tall turbines, and the tall cranes used in this process, would be readily visible and would appear at variance with the undeveloped baseline character of the island. While the Proposed Development would form a prominent influence on the landscape character of the Mussetter LCU, the magnitude of change is prevented from being rated high owing to the relatively contained layout of the Proposed Development on a separate island set amidst a wider landscape and seascape context.

Significance of effect

6.12.19 During the construction and operational phases, the effect of the Proposed Development on the Mussetter LCU would be **significant**. This finding relates to the close association between this LCU and Faray, where the Proposed Development would be located.

Significance of cumulative effect

6.12.20 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

Holms LCT (295)

Baseline

6.12.21 The Holms LCT includes small, oval-shaped islands with smooth landform that is flat to slightly domed. Typically, these islands are low-lying, rising to only 5 m to 20 m above sea level, and exceptionally up to almost 40 m above sea level. The coastline fringes comprise rocky platforms and occasional low cliffs, with sandy or shingle beaches. Vegetation behind the coastline contains low-lying rough grassland, typically grazed by sheep. Levels of habitation and associated roads are low on most islands with historic structures including ruined crofts, fishing stations, beacons and wartime defence structures. The islands have some sense of remoteness albeit with the naturalness of the vegetation mostly modified by farming practices. These remote, often uninhabited and exposed islands, are often seen silhouetted against the sea, providing a focus in views from surrounding islands.

Holms LCT: Holm of Faray LCU (295a)

Baseline

6.12.22 Holm of Faray LCU is situated to the immediate north of Faray Whaleback Island LCU, where the site of the Proposed Development is located. This small island measures approximately 1.5 km in length

and 0.5 km in width and is separated from Faray by Lavey Sound at less than 100 m. Its similar north to south alignment and close proximity to Faray, means that it appears almost as a continuation to the landform of this Whaleback Island. Holm of Faray is typical of its type, presenting low and smoothly rounded landform, surrounded by a rocky shoreline and low cliffs, with numerous geos, a cave and an arch occurring. While the pastoral land cover is grazed by sheep, there is no recent evidence of past occupation, only occasional fence lines. The influence on this LCU from operational turbines is relatively limited, with Spurness Point at Sanday presenting the closest range wind farm at approximately 8.5 km, albeit largely screened by the intervening landform of Eday.

6.12.23 Being such a small island, much of the Holm of Faray's character is drawn from its wider surroundings, and as it is the narrow southern end of the Holm of Faray that abuts the northern end of Faray, Holm of Faray forms associations with the wider context through its longer western and eastern sides, as well as shorter northern end. Across the Rapness Sound, the western side of the Holm of Faray forms an association with the southern peninsula of Westray, and across the Sound of Faray, the eastern side forms an association with the northern end of Eday, both at ranges of approximately 2 km. At approximately 0.5 km, the northern end of the Holm of Faray comes closer to the southern tip of Wether Ness on Westray.

Sensitivity

6.12.24 The value of this LCU is medium. This LCU is not covered by any national or regional landscape designations which would otherwise denote a special value.

6.12.25 The susceptibility of this LCU to the effects of the Proposed Development is high. Holm of Faray LCU is located especially close to Faray, where the Proposed Development would be located. The LCU will, therefore, be especially susceptible to the effects of the Proposed Development. Despite the other associations which this LCU has with other surrounding seascapes and islands, the close proximity and low-lying nature of the landscape means that it will be readily susceptible to the changes in character that will arise as a result of the Proposed Development.

6.12.26 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.27 During the operational phase, the magnitude of change will be **high** across the LCU. The ZTVs in Figures 6.7a and 6.10, show theoretical visibility to be continuous across this LCU and the openness of the landscape means that actual visibility will be similar in extent. The proposed turbines will be seen at especially close ranges, between approximately 0.9 km from the closest LCU edge to the closest turbine and approximately 2.2 km from the furthest LCU edge.

6.12.28 While the Proposed Development will not be located within this LCU, it will have a notable visual influence on its character owing to the close association of the Holm of Faray LCU with the Faray Whaleback Island LCU, as these landscapes form an almost continuous landform feature, with only a short separation formed by Lavey Sound. The six turbines will form the most influential part of the Proposed Development owing to their large scale, moving and vertical form, relative to the low-lying island landscapes. Furthermore, these modern structures, will appear in contrast to the rural and semi-natural character of these islands.

6.12.29 During the construction phase, the magnitude of change will be **high**. This LCU is located a minimum distance of approximately 0.9 km from the closest turbine. This means that the construction of the turbines and the presence of the tall cranes will be a highly prominent feature, seen clearly across Lavey Sound. Many of the ground level construction processes and components, such as construction of the access tracks, will not form such a readily apparent feature owing to their location beyond the rising landform of the northern part of Faray. The incomplete appearance of the turbines and the periodic activity of the cranes will create an influence on this LCU which will be at variance with the rural character of the baseline landscape.

Significance of effect

6.12.30 The effect of the Proposed Development on the Holm of Faray LCU of the Holms LCT will be **significant** during the construction and operational phases. The close proximity of the Holm of Faray

LCU to Faray will heighten the influence that the Proposed Development will have on the landscape character of this small island.

Significance of cumulative effect

6.12.31 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the effect will be not significant.

Holms LCT: Rusk Holm LCU (295b)

Baseline

6.12.32 Rusk Holm is an even smaller island than the Holm of Faray, measuring only 500 m by 25 m, although these dimensions do not include the extensive skerry which stretches a further 700 m to the south and 300 m to the north. It is located approximately 1.3 km to the west of the south-west coast of Faray, where Rapness Sound meets Westray Firth. Other surrounding islands include, Fers Ness peninsula on Eday, at approximately 2 km to the south-east, and Point of Huro peninsula on Westray, at approximately 2.6 km to the north-west. While operational wind turbines form part of the wider context, they are too small and/or too distant to have a notable influence on the baseline character of this LCU.

6.12.33 The small area of the island comprises rough and semi-improved pasture used for sheep grazing. The island is uninhabited and there are few built structures, with the exception of sheepfolds at the northern and southern ends of the island, and a small windowless building, also at the southern end. This dates back to the early C19th and was used as a shelter for kelp gatherers. The small extents of the island means that, similar to the Holm of Faray LCU, much of its character is drawn from the surrounding seascapes and island landscapes.

Sensitivity

6.12.34 The value of the Rusk Holm LCU is medium. This LCU is not covered by any national or regional landscape designations which would otherwise denote a special value.

6.12.35 The susceptibility of the Rusk Holm LCU to the effects of the Proposed Development is high. The closest edge of the LCU is located a minimum distance of approximately 1.5 km to the nearest turbine. Despite the associations which this LCU has with the other surrounding seascapes and island landscapes, the close proximity to Faray means that this LCU is especially susceptible to changes made to this island. They are also both open and exposed island landscapes with a strong horizontal emphasis and few vertical features.

6.12.36 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.37 During the operational phase, the magnitude of change will be **high** across the LCU. The ZTV in Figure 6.7 shows theoretical visibility to be continuous across this LCU and the openness of the landscape means that actual visibility will be similar in extent. The proposed turbines will be seen at a range of approximately 1.5 km from the closest LCU edge to the closest turbine. Despite the Proposed Development being separated from Rusk Holm LCU by the sea, its orientation in relation to Rusk Holm is such that it would be seen across its full length, combined with the short separation distance, and the fore-shortening effect of the water, will mean that the Proposed Development will appear especially prominent and its character will contrast strongly with the rural and remote character of this island.

6.12.38 During the construction phase, the magnitude of change will be **high**. This LCU is located a minimum distance of approximately 1.5 km from the closest turbine. This means that the construction of the turbines and the presence of the tall cranes will be a readily apparent feature, seen clearly across the water. Many of the ground level construction processes and components, such as construction of the access tracks, will not form such a notable feature owing to their smaller scale, but will still be readily visible, especially where they occur on the western side of Faray. The incomplete appearance of the turbines and the periodic activity of the cranes will create an influence on this LCU which will be at variance with the predominantly rural and remote character of this island.

Significance of effect

6.12.39 The effect of the Proposed Development on the Rusk Holm LCU of the Holms LCT will be significant. This finding relates to the exposed character of this small island and the close association it has with nearby Faray.

Significance of cumulative effect

6.12.40 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

Inclined Coastal Pastures LCT (302)

Baseline

6.12.41 The Inclined Coastal Pasture LCT occurs intermittently around the coastlines of the Mainland of Orkney and its islands. This LCT is characterised by relatively low-lying pastoral farmland, set along the coastal edge, where the landform falls gently towards low cliffs or unenclosed bays. Coastlines tend to curve out to sea and include bay coastlines with occasional ouses and coastal wetlands nearby. The elevation of landform lies between 10 m to 50 m above sea level, occasionally reaching 100 m on larger islands. The field pattern is typically recti-linear with a predominant alignment towards the coastal edge. While traditional stone dykes emphasise the enclosure, the more common post and wire fences lack the same definition. Settlement typically comprises small scale clusters of resettled crofts, where field patterns are of a smaller scale, with occasional large farmsteads or isolated properties. Roads tend to follow the alignment of the coastal edge with access being drawn either seaward or landward off these routes. Open sky dominates most views, with inland views restricted by elevated ground and maritime views typically extending to other islands.

Inclined Coastal Pastures LCT: Central Eday LCU (302a)

Viewpoint 1 is representative of views from this LCU.

Baseline

6.12.42 The Central Eday LCU is one of the largest LCUs on the island, extending from the north coast to the south coast. In the north, it occupies the western coastal edge, in the south it occupies the eastern and southern coastal edges, while in the narrow central part of the island, it spans the western and eastern coastal edges. Typical to type, this LCU comprises relatively low-lying landform that slopes gently towards a coastal edge of curved coastal bays and low cliff headlands. Pastoral farmland consisting of rectilinear fields occupies this land and settlement is sparse and dispersed. Roads align with the coastal edge and tracks spur off these to access rural properties.

6.12.43 The northern part of the LCU has a close association with Faray owing to its close-range location, at a minimum of 1.2 km to the west across the Sound of Faray. The north-south alignment of the LCU and Faray, means that the coastal edges face each other, and this strengthens their association. The central part of Eday is the narrowest part of the island, and the low-lying nature of this part of the LCU means that it is influenced by the Moorland Hills LCT to the north and south, as well as the Coast with Sand LCT to the west and the variety of LCTs on the island of Sanday to the east. At a minimum distance of 2.5 km, Faray still has a notable influence on this part of the LCU, albeit tempered by the more immediate influences on character from the surrounding landscapes of Eday. In the southern part of Eday, the LCU switches to the eastern coastal edge, where the intervening Moorland Hills LCT forms a separation from the western coastal edge and the island of Faray beyond.

Sensitivity

6.12.1 The value of the Central Eday LCU is medium. This LCU is not covered by any national or regional landscape designations which would otherwise denote a special value.

6.12.2 The susceptibility of the Central Eday LCU to the effects of the Proposed Development is high in the northern part of the LCU, medium-high in the central part, and low in the southern part. This

variation reflects the variable strength of association between this LCU and Faray, as described above. While settlement and farming throughout the Central Eday LCU ensures human influences form an integral part of the baseline character, these developments and modifications are relatively small scale and rural in character. From the central part and southern parts of the LCU, operational Spur Ness Wind Farm has a notable influence and there are also small-scale wind turbines scattered over Eday. While these existing features moderate the susceptibility of the LCU, the undeveloped nature of Faray ensures the susceptibility remains high and medium-high.

6.12.3 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity in the northern and central part of this LCU and **medium-low** in the southern part.

Magnitude of change

6.12.4 During the operational phase, the magnitude of change on this LCU will be **high** in the northern part, **medium-high** in the central part and **low** in the southern part. The ZTVs in Figures 6.7a and 6.10, show that theoretical visibility of the Proposed Development will be continuous across the northern part of this LCU, almost continuous across the central part and limited to two small patches in the southern part. The orientation of the northern part of the LCU towards Faray, combined with the minimum distance to the proposed turbines ranging from 1.5 km, will ensure that the proposed turbines will have a notable influence on the landscape character of this northern part. These tall vertical structures will contrast with the low horizontal landform and the movement of the blades will add a dynamic feature into a relatively static landscape context.

6.12.5 The slightly lower magnitude of change in the central part of the LCU reflects the slight increase in the separation distance, as well as the slightly weaker association with Faray, whereby the coastlines do not directly face each other and other closer landscapes have a more immediate influence. The Proposed Development will, also, not appear as a new or unfamiliar feature, as Spurness Point Wind Farm is visible a minimum distance of 3 km to the east. The Proposed Development will, nonetheless, add a prominent, moving feature within a minimum distance of 2.8 km from the closest edge of this central part of the LCU, which will appear at variance with the existing contextual character in this north-westerly direction of a largely undeveloped landscape and seascape context.

6.12.6 In the southern part of the LCU, there is no theoretical visibility, with the exception of two patches occurring at Kirk Taking and Crook. This means there will be no change across the majority of this southern part of the LCU. Where visibility does occur, the magnitude of change will be moderated by the separation distance of 4.8 km and 5.1 km respectively, as well as the much closer association with the islands of Sanday and Stronsay to the east, compared with Faray to the west, which is largely screened by the intervening Moorland Hills LCT. Furthermore, the operational Spurness Point Wind Farm has a much stronger influence on the baseline character of this landscape.

6.12.7 There will be a cumulative effect on the Central Eday LCU, largely relating to the interaction between the Proposed Development and operational Spurness Point Wind Farm. While the presence of the Spurness Point turbines will ensure that the proposed turbines will not appear as new or unfamiliar features, the addition of the Proposed Development will be seen to spread the influence of this type of development to the west, where there is already an influence to the east.

6.12.8 During the construction phase, the magnitude of change on this LCU will be **high** across the northern part of the LCU, **medium-high** across the central part and **low** across the southern part. Ground level construction works taking place on the eastern side of Faray will be visible from the northern part of this LCU and will appear at variance with this largely undeveloped and uninhabited island. It will, however, be the presence of the tall cranes and the six emerging turbines that will have the greatest influence on landscape character. They will be seen set on the opposing coastal edge, appearing more exposed than they might otherwise owing to the openness of the intervening water and the foreshortening effect that this is likely to have.

Significance of effect

6.12.9 The effect of the Proposed Development on the Central Eday LCU of the Inclined Coastal Pasture LCT will be **significant** across the northern and central parts of the LCU, during both the construction and operational phases. In this case, the medium-high sensitivity combined with the high or

medium-high magnitude of change will lead to a significant effect whereby the large scale turbines, set on the opposing side of the Sound of Faray will have a notable influence on the character of this coastal landscape. The effect on the southern part of the LCU will be **not significant** as there will either be no visibility or visibility of limited extents will occur in an area where the predominant orientation of the landform is eastwards. This assessment also takes into account the additional effect the Proposed Development will give rise to in the context of the existing influence from the operational Spurness Point Wind Farm.

Significance of cumulative effect

6.12.10 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

Inclined Coastal Pastures LCT: Fersness LCU (302b)

Baseline

6.12.1 The Fersness LCU occupies a small area on the western coast of Eday, in the southern part of the island. It extends from the rocky headland of Fers Ness in the north, to the rocky shoreline of Sandybank in the south, and includes Sealskerry Bay along the coastline between. The landform rises into the Moorland Hills LCT to the south-east and east. These hills contain the southern part of this coastal LCU and reduce its association with other parts of the island. The headland at Fers Ness is much more exposed, forming the western enclosure to Fersness Bay, and set only 1 km from the southern tip of Faray.

6.12.2 The Fersness LCU is defined by a western coastline with a distinct north to south alignment. Beyond the sheltered enclosure of south-facing Sealskerry Bay, the coastline indents towards the south-east. A minor road wraps round the base of Fersness Hill, providing access to the scattered settlement and small fields of pasture, which cover the gently sloping landform, down towards the rocky coastal edge. The character of this LCU is predominantly small in scale and rural in character, with the exception of the single Sandy Banks turbine located in this LCU. The principal orientation of this LCU is westwards across the sea to the islands of Egilsay and Rousay. The exception to this occurs at Fers Ness headland, where the orientation opens up towards the central and northern parts of Eday, as well as the island of Faray.

Sensitivity

6.12.3 The value of this LCU is medium. This LCU is not covered by any national or regional landscape designations which would otherwise denote a special value.

6.12.4 The susceptibility of this LCU to the effects of the Proposed Development is medium-high in the northern part of this LCU and medium in all remaining parts. While the principal orientation of the wider Fersness LCU is west towards the islands of Egilsay and Rousay, the orientation of the northern part is north towards Faray and east towards the coastal landscapes around Fersness Bay. Other than small scale wind turbines on Eday and medium scale wind turbines on more distant islands, there are few large-scale structures influencing the character of this LCU and the development in this LCU is predominantly small in scale and rural in character.

6.12.5 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity in the northern part of this LCU and **medium** across remaining parts.

Magnitude of change

6.12.6 During the operational phase, the magnitude of change on this LCU will be **medium-high** in the northern part, **medium** in the central part and with **no change** across all remaining parts. The ZTVs in Figures 6.7a and 6.10, show that theoretical visibility of the Proposed Development will be continuous across the northern part, and into the central part of this LCU. There will be no visibility across the remaining parts. Despite the main orientation of the wider LCU being west towards the islands of Egilsay and Rousay, the orientation of the northern part, to the north and east, means that the Proposed Development will have a stronger influence on landscape character. With visibility

of the closest proposed turbine occurring at approximately 1.4 km from the closest LCU edge, the six large-scale proposed, moving turbines will form a prominent feature at variance with the largely undeveloped contextual character of this coastal headland.

6.12.7 In the central part of the LCU, as far south as Sealskerry Bay, the magnitude of change will reduce to medium. This reflects the less direct association between this part of the LCU and Faray, and the stronger association with the western seaboard. Within a range of 2.8 km to 4 km to the closest turbine, this central part will still be relatively close in range, and the relatively low-lying and open landscape will mean that the Proposed Development will still have a notable influence on character. In the southern part of the LCU, the ZTV shows that there will be no theoretical visibility and, therefore, there will be no change.

6.12.8 During the construction phase, the magnitude of change on this LCU will be **medium-high** across the northern part of the LCU, **medium** across the central part and with **no change** on the remaining parts. While ground level construction works associated with the new extended slipway, the landing jetty and the tracks, will be visible from the northern part of this LCU, from the central part, they will not be readily apparent. From both areas, it will be the presence of the tall cranes and the six emerging turbines that will have the greatest influence on landscape character. They will be seen set on the opposing coastal edge, appearing more exposed than they might otherwise owing to the openness of the intervening water and the foreshortening effect that this is likely to give rise to.

Significance of effect

6.12.9 The effect of the Proposed Development on the Fersness LCU of the Inclined Coastal Pasture LCT will be **significant** across the northern and central parts of the LCU out to approximately 4 km from the closest turbine, during both the construction and operational phases. In this case, the medium-high or medium sensitivity combined with the high or medium-high magnitude of change will lead to a significant effect. The influence of the large scale turbines, set on Faray to the immediate north, will have a notable influence on the character of this coastal landscape. The effect on all remaining parts of the LCU beyond approximately 4 km will be **not significant** as there will either be no visibility or visibility will occur in an area where the predominant orientation of the landform is west towards Egilsay and Rousay.

Significance of cumulative effect

6.12.10 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant.**

Low Island Pastures LCT (298)

Baseline

6.12.11 The Low Island Pasture LCT is flat and low-lying with heights generally below 10 m AOD and typically occurring along the coastal edge. These low landforms often extend into the surrounding water as small headlands off the main island, making them exposed to the elements, especially the possibility of flooding or inundation by the sea. The Low Island Pasture LCTs are often formed from sand deposits and some contain coastal dunes with Machair or links grasslands. Most are, however, farmed with improved pasture and some arable crops, set into a geometric pattern of small fields and with post and wire fences. The flatness of this landscape means that any vertical features stand out, including buildings and walls. It also means that from this LCT, extensive and unobstructed views occur although the angle of the views are especially low in level.

Low Island Pasture LCT: Rousay LCU (298a)

Baseline

6.12.12 The Rousay LCU of this type forms the low headland on the north-east corner of Rousay. It covers a small area of land and is adjoined to the eastern side of the Rousay LCU of the Moorland Hills LCT. The shoreline is mostly rocky with indents where sandy bays occur. The landform is mostly set at 10 m with a slight increase to 15 m around high points, decreasing to 5 m around the Loch of Scockness. The farmland comprises small fields of improved pasture and arable crops set in a tight

geometry of fields. The farmland extends up to the coastal edge apart from in some marginal sections where natural grasslands occur. This LCU is so small, development comprises only Scockness Farm and the access track leading to it.

6.12.13 While open shorelines occur to the north, east and south, the rising landform of Faraclett Hill forms enclosure to the immediate west and establishes a defining feature in the context of this LCU. Other external influences on the character of this LCU come from the Holm of Scockness, which lies less than 200 m to the south-east, Egilsay which lies approximately 1.0 km in the same direction and Kili Holm which lies approximately 1.7 km to the east. In contrast to these close-range islands, Faray lies approximately 7.7 km to the north-east and Eday approximately 7.3 km to the east, with Spurness Point Wind Farm on Sanday presenting a distant influence at approximately 14.8 km.

Sensitivity

6.12.14 The value of this LCU is medium. This LCU is not covered by any landscape designations which would otherwise denote a special landscape value.

6.12.15 The susceptibility of this LCU to the effects of the Proposed Development is medium-high. While there is an open outlook towards Faray, to the north-east, from this LCU, the closer and stronger associations of this LCU with the surrounding landscapes, reduces its association with the more distant islands, including Faray. The character of this LCU is, however, predominantly rural, with few influences from large-scale developments other than the single turbines visible on Rousay.

6.12.16 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.17 During the operational phase, the magnitude of change will be **medium-low**. The ZTVs in Figure 6.7a and 6.10, show theoretical visibility covering much of the LCU, with the exception of the lower-lying central section, including Loch of Scockness and the land to the south. The closest proposed turbine will be approximately 7.9 km from the closest edge of the LCU, such that the proposed turbines will appear to be of a moderate scale. All six will be readily visible, seen set on a distant island, the pronounced vertical, moving structures appearing in contrast with the low-lying horizontal landform of the islands and sea.

6.12.18 There are, however, a number of factors that prevent the magnitude of change from being rated higher than medium-low. The most notable is the association this LCU holds with its surrounding landscapes, especially the rising landform of Faraclett Head to the west. This will continue to form the principal external influence on the character of the LCU. There is also an influence from the opposing coastal edges of Egilsay and the holms to the east and south-east. It is in relation to the stronger influences from these closer range landscapes, that the influence of the Proposed Development will be moderated.

6.12.19 The presence of the single turbine on Kingarly Hill, other small-scale turbines on Rousay and more distant turbines in the wider context, will ensure that the proposed turbines do not appear as new or unfamiliar features. Despite being smaller, the closer range of the Kingarly Hill turbine, at approximately 3.2 km to the south-west, will mean that by comparison the proposed turbines will appear smaller. They will be seen as a relatively compact group within a much wider context of islands and sea, where other distant turbines are also visible.

6.12.20 During the construction phase, the magnitude of change will be **medium-low**. The ground level construction works will not be evident from this LCU owing to the separation distance and the low-lying nature of the LCU. While the structures of the emerging turbines and the tall cranes used in their construction, will be readily visible, these will be seen as distant elements with a limited influence on this LCU, owing to its closer range and closer association with surrounding landscapes.

Significance of effect

6.12.21 During the construction and operational phases, the effect of the Proposed Development on this LCU will be **not significant**. This assessment reflects the separation distance between the LCU and

the Proposed Development, as well as the stronger influence of the surrounding landscapes which form the immediate context to this LCU.

Significance of cumulative effect

6.12.22 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the effect will be **not significant**.

Moorland Hills LCT (314)

Baseline

6.12.23 The Moorland Hills LCT comprises the highest uplands of Orkney and occurs across Hoy, Rousay and Eday as well as the Mainland of Orkney, with heights ranging from 50 m to 480 m. These upland landscapes are made distinct on account, not only of their more elevated and steep sloping landform, but also the presence of open moorland landcover, the darker hues of which contrast notably with the brighter hues of the enclosed, improved and semi-improved pasture which largely characterises the Orkney landscape. Furthermore, they are seen in the context of relatively flat, coastal landscapes and other islands, which further accentuates their presence.

Moorland Hills LCT: South Eday LCU (314a)

Baseline

6.12.24 The South Eday LCU of the Moorland Hills LCT occupies much of the southern part of the island. While various LCTs are set around the coastline, the Moorland Hills LCT occupies the central core, albeit extending to the coastal edge in small sections to the north and west. The South Eday LCU is made distinct from the surrounding LCTs by its upland landform. At 101 m AOD, Ward Hill is the highest of the summits, set in the south-west of the island and with its western slopes descending to the western shoreline. Chapel Hill (77 m AOD), Flaughton Hill (99 m AOD) and Whitemaw Hill (93 m AOD), sit more centrally in the northern part of the LCU, while Fersness Hill (89 m AOD) sits out to the north-west. While the LCU is also made distinct by its less enclosed extents and unimproved pasture, fields of semi-improved and improved pasture do extend onto the lower slopes and fence lines cut across the upland area.

6.12.25 There are only roads and settlement around the fringes of this moorland LCU, with the B9063 to the east, the minor road to Newbigging to the north and associated properties, falling intermittently within the LCU boundary. There is, however, an access track leading to development on Flaughton Hill. The shape of the landform is such that the hills to the north have predominantly north-facing slopes, while the hills to the south face either west or east. While the character is largely rural, developments in this LCU, in combination with Spurness Point Wind Farm to the east and Stronsay Development Trust wind turbine to the south-east denote the direct and indirect influences that occur.

Sensitivity

6.12.26 The value of the South Eday LCU is medium. There are no national or regional landscape designations which would otherwise denote a special landscape value.

6.12.27 The susceptibility of this LCU to the effects of the Proposed Development is medium-high. The orientation of the northern slopes towards Faray, means there is a close association between these landscapes, and this raises the susceptibility of this part of the LCU in respect of changes on Faray. From the remaining parts of this LCU, there are internal influences on character which occur within the core of the uplands, as well as the other external influences which occur in response to the variety of coastal landscapes and seascapes which surround this LCU. While built development is limited in this LCU, there is an external influence on character from Sandy Banks single turbine in the Inclined Coastal Pasture to the immediate west and Spurness Point Wind Farm on Sanday to the east. The establishment of these structures as part of the baseline character, reduces the susceptibility of this LCU to the Proposed Development.

6.12.28 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.29 During the operational phase, the magnitude of change will be **medium-high** in the northern part of the LCU, and **medium** in the southern part. The ZTVs in Figures 6.7a and 6.10, show theoretical visibility extending almost continuously across the north facing slopes and summits of the northern hills, and more patchily across the southern hills. The closest proposed turbine would be located approximately 2.4 km from the closest LCU edge and extend across the northern slopes to the ridgeline between the summits Whitemaw, Flaughton and Chapel Hill, to a range of approximately 5 km. Because the general orientation of these northern slopes is north towards the Proposed Development, this ensures it will have a notable influence on landscape character.

6.12.30 Across the southern hills, which lie to the south of the ridgeline, theoretical visibility is shown to extend from approximately 5 km to 7 km. Despite visibility remaining fairly extensive, the magnitude of change will reduce to medium-low, reflecting not only the greater separation distance, but, moreover, the change in association. The orientation of the landform changes from being northerly, to being westerly or easterly and this weakens the relationship with Faray and those parts of Eday to the north, but strengthens the relationship with the southern parts of Eday and island landscapes to the west and east.

6.12.31 The magnitude of change in the southern part is also moderated by the closer range influence of Spurness Point Wind Farm, readily visible on the southern tip of Sanday at a minimum distance of approximately 4.6 km. While the proposed turbines are larger in scale than other existing turbines visible from this LCU, the small number of proposed turbines and their containment on the island of Faray, limits the influence of the Proposed Development by ensuring it occupies only a small proportion of the much wider context.

6.12.32 During the construction phase, the magnitude of change will be **medium-high** in the northern part of the LCU and out to the ridgeline of summits, and then **medium** south of this ridgeline, where the association with Faray is weaker. The elevated location of this LCU relative to Faray, means that much of the construction works will be readily visible, including the construction of tracks, foundations and substation. The emerging structures of the turbines and the presence of the tall cranes used in their construction, will form the most notable influence on the character of this LCU, as they will appear at variance with the predominantly rural character of the baseline context. From the southern hills, ground level construction works will be screened by intervening landform, and while the emerging proposed turbines and cranes will be visible above the ridgeline, the change in character will be moderated by the greater separation distance and closer association with other landscapes.

Significance of effect

6.12.33 During the construction and operational phases, the effect of the Proposed Development on the South Eday LCU of the Moorland Hills LCT will be **significant**. This assessment relates to the change in character that will occur across these moorland hills as a result of the introduction of the Proposed Development on the island of Faray to the north.

Significance of cumulative effect

6.12.34 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

Moorland Hills LCT: North Eday LCU (314b)

Viewpoint 2 is representative of views from this LCU.

Baseline

6.12.35 The North Eday LCU of the Moorland Hills LCT occupies much of the northern part of the island. It extends from Red Head (70 m AOD), at the northern tip, to Stennie Hill (66 m AOD), just north of the central section. The northern part of the LCU forms a narrow, north to south strip of land, following the upland ridgeline, that runs parallel to the Inclined Coastal Pasture LCT to the west. The southern part of the LCU broadens out, wrapping around Mill Loch and extending to the east coast

to include Greenbrae Hill (55 m AOD). The hills in the North Eday LCU are not as high or broad as the hills in the South Eday LCU and as a consequence, the distinction between the uplands and the lowlands is not as pronounced. The field patterns extend over the hill tops and the landcover is mostly semi-improved pasture, albeit with rougher moorland occurring, especially across the more remote land to the north of the island.

6.12.36 In contrast to the South Eday LCU of this type, roads occur more extensively across this LCU with the B9063 cutting north-south and other minor roads cutting west-east. The presence of these human influences reduces the sense of remoteness in this LCU, in which small patches of upland occur amidst a largely modified landscape. The Heritage Trail, linking archaeological sites between Mill Loch, via Vinquoy Hill, to Red Head, encourage visitors to access this LCU. Views from the western side of the LCU are drawn westwards towards Faray, while views from the eastern side are drawn eastwards to, and views in the centre are largely introverted towards Mill Loch and the basin landscape that surrounds it. From the eastern side, Spurness Point Wind Farm forms a prominent feature, set on the southern tip of Sanday, and while other distant turbines are visible within the wider context, small-scale turbines are also evident within the local context.

Sensitivity

6.12.37 The value of the North Eday LCU is medium. There are no national or regional landscape designations which would otherwise denote a special landscape value.

6.12.38 The susceptibility of this LCU to the effects of the Proposed Development is medium-high along the western ridgeline of the LCU and medium in those parts to the north and east of the LCU. The orientation of the western slopes towards Faray, means there is a close association between these landscapes, and this raises the susceptibility of this part of the LCU in respect of changes on Faray. From the remaining parts of this LCU, the medium susceptibility reflects the internal influences on character which occur within the core of the LCU, as well as the other external influences which occur in response to the variety of coastal landscapes and seascapes which surround this LCU. While built development is limited in this LCU, there are some small-scale wind turbines present and an external influence on character comes from Spurness Point Wind Farm to the east. The establishment of these structures as part of the baseline character, reduces the susceptibility of this LCU to the Proposed Development.

6.12.39 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity across the western slopes and ridgeline of the LCU and **medium** in all remaining parts.

Magnitude of change

6.12.40 During the operational phase, the magnitude of change will be **medium-high** along the western part of the LCU extending to the base of Noup Hill, and **medium** in the northern part between Noup Hill and Red Head, and the eastern parts of the LCU. The ZTVs in Figure 6.7a and 6.10, show theoretical visibility extending almost continuously across the west facing slopes and summits of the western hills, along the full length of the LCU, from Red Head to Stennie Hill. While visibility is shown to be patchy across the broader central to eastern parts, it is still fairly extensive across the west facing slopes. The closest proposed turbine would be located approximately 2.2 km from the closest LCU edge, with visibility extending out to a range of 5.4 km in the north and 4.7 km in the east. Visibility from the west will reveal all six turbines to their full extents, while visibility from the north and east will be partially reduced by the intervening landform, such that typically, blades and hubs will be seen set behind the western ridgeline.

6.12.41 Because the orientation of the western slopes is west towards the Proposed Development, this will ensure it has a notable influence on landscape character. The close proximity of these large-scale, vertical and dynamic structures will present a notable change to the landscape character of this western part of the LCU. Their prominence will be accentuated by the openness of this aspect and the small scale and relatively low-lying landscape of Faray. While the effect on those parts of the LCU to the north and east will be moderated to some extent by intervening landform screening the lower parts of some or all of the turbines, the relatively close proximity and the tall, moving blades

of the turbines, combined with the importance of the western skyline, beyond which they will be located, means that they will still form a notable influence on the character of this LCU as a whole.

6.12.42 During the construction phase, the magnitude of change will be **medium-high** in the western parts of the LCU and **medium** in the northern and eastern parts, where the association with Faray is not so strong. The elevated location of the western part of this LCU, relative to Faray, means that much of the construction works will be readily visible, including the construction of tracks, foundations and substation. The emerging structures of the turbines and the presence of the tall cranes used in their construction, will form the most notable influence on the character of this LCU, as they will appear at variance with the predominantly rural character of the baseline context. From the northern and eastern parts of the LCU, while ground level construction works will be screened by intervening landform, the emerging proposed turbines and cranes will be visible above the ridgeline, giving rise to a notable change in character.

Significance of effect

6.12.43 During the construction and operational phases, the effect of the Proposed Development on the North Eday LCU of the Moorland Hills LCT will be **significant**. This assessment relates to the close proximity of the Proposed Development to this LCU. Although the character influence from the northern and eastern parts of the LCU, will not be as emphatic, in terms of levels and extents, as it will from the western part, the presence of the proposed turbines behind the enclosing western ridgeline will still have a notable effect.

Significance of cumulative effect

6.12.44 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant.**

Moorland Hills LCT: Rousay LCU (314c)

Baseline

6.12.45 The Rousay LCU of this LCT forms the hilly headland on the north-east corner of Rousay. It covers a small area of land and is adjoined to the western side of the Rousay LCU of the Low Island Pastures LCT. The shoreline is mostly rocky with indents where sandy bays occur. The landform rises from sea level to a high point of 107 m AOD, with the north-western and northern slopes rising steepest from a rocky shoreline and the other slopes rising more gently from sandy bays or adjoining coastal edges. While farm fields extend onto the shallower lower slopes, and fence lines cut across the uplands, this LCU is characterised by rough pasture. Faraclett Farm and its access track are the only developments close to the edge of this LCU. There are, however, numerous archaeological remains across the hill and a footpath encircles the upper slopes and summit. Parking is provided at the end of the minor road and the footpath is popular with visitors to the island.

6.12.46 In contrast to the neighbouring Low Island Pastures LCT, which lies to the immediate east, the elevated landform of the Moorland Hills LCT, opens up the influences and associations that act on the character of this LCU. Most notably, there is an association with the wider LCU of the Moorland Hills LCT, which covers most of the island. In particular, the close range Kierfea Hill (235 m AOD) presents an upland context to the lower set headland of Faraclett Head. There is also a connection across to Egilsay, although this island is notably lower and flatter. Connections also occur with the larger islands of Westray to the north and Eday to the east, as well as the smaller island of Faray, set to the fore of the northern part of Eday. The more distant location of these islands does, however, reduce their influence on the contextual character of the Rousay LCU, compared to the closer range landscapes.

Sensitivity

6.12.47 The value of this LCU is medium. This LCU is not covered by any landscape designations which would otherwise denote a special landscape value.

6.12.48 The susceptibility of this LCU to the effects of the Proposed Development is medium-high. While there is an open outlook towards Faray, to the north-east, from this LCU, the closer and stronger

associations of this LCU with the surrounding landscapes, reduces its association with the more distant islands, including Faray. The character of this LCU is, however, predominantly rural, with few influences from large-scale developments other than the single turbines visible on Rousay and this adds to its susceptibility to the Proposed Development.

6.12.49 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.50 During the operational phase, the magnitude of change will be **medium-low**. The ZTVs in Figure 6.7a and 6.10, show theoretical visibility covering much of the LCU, with the exception of the south-west facing slopes which are screened by the landform of Faraclett Head. The closest proposed turbine will be approximately 8.3 km from the closest edge of the LCU, such that the proposed turbines will appear to be of a moderate scale. All six will be readily visible, seen set on a distant island, the pronounced vertical, moving structures in contrast with the low-lying, horizontal landform of the islands and sea, which will add complexity to the simplicity of the context.

6.12.51 There are, however, a number of factors that prevent the magnitude of change from being rated higher than medium-low. The most notable is the association this LCU holds with its surrounding landscapes, especially the rising landform of Kierfea Hill to the south-west and the wider extent of the Moorland Hills LCT across Rousay. There is also an influence from the nearby island of Egilsay and the holms to the east and south-east. While it is through comparison with these closer range landscapes, that the influence of the Proposed Development will be reduced, the elevation of the landform, does also mean that a more distant influence comes from these middle range islands.

6.12.52 The presence of the single turbine on Kingarly Hill and other small-scale turbines on Rousay, will ensure that the proposed turbines do not appear as new or unfamiliar features. Despite being smaller, the closer range of the Kingarly turbine, at approximately 2.6 km, will mean that by comparison the proposed turbines will appear smaller. They will be seen as a relatively compact group within a much wider context of islands and sea, where other distant turbines are also visible.

6.12.53 During the construction phase, the magnitude of change will be **medium-low**. The ground level construction works will not be readily evident from this LCU owing to the separation distance. While the structures of the emerging turbines and the tall cranes used in their construction, will be readily visible, these will be seen as distant elements with a limited influence on this LCU, owing to its closer range and closer association with surrounding landscapes.

Significance of effect

6.12.54 During the construction and operational phases, the effect of the Proposed Development on this LCU will be **not significant**. This assessment reflects the separation distance between the LCU and the Proposed Development, as well as the stronger influence of the surrounding landscapes which form the immediate context to this LCU.

Significance of cumulative effect

6.12.55 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant.**

Ridgeline Island Landscapes LCT (297)

Baseline

6.12.56 The Ridgeline Island Landscapes LCT is very similar to the Inclined Coastal Pastures LCT, with the main difference being that the former lacks the backdrop of the hinterland evident in the latter. This LCT is associated with Orkney's long narrow islands, which have a single central ridgeline along their length, and although Shapinsay is broader, the distinct ridgeline is still evident. A key characteristic of this LCT is the way in which the land use patterns have been determined by the geometry of the ridgeline, for example with the alignment of roads following the ridgeline and creating spurs perpendicularly and field patterns fitting in with the recti-linear geometry. Furthermore, the slope of the landform is fairly consistent, such that the land falls evenly from the ridgeline to the coast.

Ridgeline Island Landscapes LCT: Westray LCU (297a)

Viewpoint 4 is representative of views from this LCU.

Baseline

6.12.57 The Westray LCU of the Ridgeline Island Landscapes LCT, is the most extensive LCU to occur on the island of Westray, covering almost all of the long, narrow, south-easterly spur. The landform is relatively low and gently undulating, ranging mostly between 10 m and 30 m, with a general fall from the central ridgeline to the coastal edges. Low cliffs line much of the coastline, with rocky headlands projecting out into the sea, and rocky or sandy bays forming recessed enclosure. Typical of type, the B9066 forms a central spine down the ridgeline, from which minor roads and access tracks extend in a perpendicular or parallel direction, emphasising the rectilinear pattern of the fields. Farming is the predominant land use, with fields of improved pasture or arable covering the peninsula. Settlement is generally dispersed, albeit with some small clusters along roadsides and occasional larger farmsteads. While most development is small in scale and rural in character, the operational Newark turbine is located on the east coast of this peninsula and the Westray Development Trust / Gallowhill turbines have an influence from the Undulating Island Pasture LCT to the north-west.

6.12.58 The character of the Westray LCU is drawn primarily from its own landscape. Despite being a long and narrow peninsula, there is enough breadth to engender a sense of containment. The gentle undulations of the landform mean that the surrounding landscape often forms the context, and associations with the other parts of Westray or the neighbouring islands are not so strong. The exception to this occurs along the more elevated parts of the ridgeline and southern part of the LCU where stronger associations with surrounding landscapes occur. The orientation of the southern extent of the LCU towards Faray, ensures a stronger association is formed here.

Sensitivity

6.12.59 The value of the Westray LCU is medium. There are no national or regional landscape designations which would otherwise denote a special landscape value.

6.12.60 The susceptibility of this LCU to the effects of the Proposed Development is medium-high in the southern part, medium in the central part, and low in the northern part. This variation in susceptibility reflects the variation in association between the Westray LCU and the island of Faray where the Proposed Development will be located. From the southern part of the LCU, the landscape opens up towards the south-east, where Faray is located, making this part more susceptible. From the central part of the LCU, there is no close association with Faray, with the surrounding islands forming more of a background feature to the immediate landscape. This association weakens further in the northern part as the separation distance from Faray increases and the closer range landscapes of central and northern Westray, as well as Papa Westray, influence the context more readily.

6.12.61 The combination of the value of this LCU and its susceptibility to the Proposed Development results in a **medium-high** sensitivity in the southern part, **medium** in the central part and **medium-low** in the northern part.

Magnitude of change

6.12.62 During the operational phase, the magnitude of change will vary across this LCU with the closer range southern part being subject to a **medium-high** magnitude of change and the other remaining parts being subject to a **medium,** or **low** magnitude of change. The ZTVs in Figures 6.7a and 6.10 show almost continuous theoretical visibility extending across the southern part of the LCU and into the central part, where it becomes increasingly patchy towards the northern part of the LCU. From the southern coastline of the LCU, all six of the proposed turbines will be seen to their full extents. At a range of approximately 3 km to 5 km between this southern part of the LCU and the closest turbine, the proposed turbines will be seen as large scale structures, their vertical scale and modern appearance at variance with the low lying island landscape and predominantly rural character. The effect would, however, be moderated by the separation distance from this southern coast, and the presence of the ferry terminal, settlement and roads in this southern part of the island.

Furthermore, the small number of turbines and their containment on the island, means that they occupy a small part of the much wider context, that has an influence on the character of this LCU.

6.12.63 From the central part of the LCU, the magnitude of change will reduce to **medium**. The greater separation distance from the Proposed Development, at a range of approximately 5 km to 7 km, will mean that the proposed turbines will reduce in scale and occupy a smaller proportion of the wider context. As described above, the weaker association between this central part of the LCU and Faray, would moderate the influence that the Proposed Development would have on this part of the LCU, especially as the more immediate landscapes will have a comparatively stronger influence. As the Newark single turbine, located in this central part of the LCU, and the Westray Development Trust / Gallowhill turbines to the north-west, establish wind turbines as part of the baseline landscape character, the effect of the Proposed Development would be moderated, as they would not be seen as a new or unfamiliar feature, however they would also be seen as further wind farm development occurring in a different part of the wider context.

6.12.64 In the northern part of the LCU, theoretical visibility is shown to be patchier as the intervening landform serves to screen visibility of the proposed turbines. This reflects the changing nature of the influence, whereby the immediate landscape has an even stronger influence, in the context of which the Proposed Development would appear as more of a distant and background feature. There is also an existing influence form the Westray Development Trust / Gallowhill turbines, which although smaller in number and scale, presents a closer range example of this type of development, that will moderate the influence of the Proposed Development.

6.12.65 During the construction phase, the magnitude of change will vary across this LCU as described in respect of the operational phase above. While the separation distance, combined with the intervening landform would mean that many of the ground level construction works will not be readily visible from the central and northern parts of this LCU, the emerging structures of the turbines and the tall cranes used in their construction will be visible, albeit not a defining feature. From the southern part of the LCU, ground level works will be visible in combination with upper level works and their influence on landscape character will be accentuated by the openness of the intervening water and the exposed nature of both the Westray and Faray coastlines.

Significance of effect

6.12.66 During the construction and operational phases, the effect of the Proposed Development on the Westray LCU of the Ridgeline Island Landscapes LCT will be **significant** across the southern part out to approximately 7 km from the closest turbine and not significant across the central and northern parts beyond approximately 7 km. This assessment reflects the close association between the southern part of the LCU and Faray, where the Proposed Development would be located and the comparatively weaker association from other parts of the LCU.

Significance of cumulative effect

6.12.67 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant.**

Undulating Island Pastures LCT (299)

Baseline

6.12.68 The Undulating Island Pastures LCT is characterised by low hills rising to approximately 90 m AOD, with an undulating and variable landform of ridges and depressions, but without any distinct landform features. The gently sloping land falls towards coastal edges, characterised by bay coastlines, but which lack the degree of enclosure that defines the Enclosed Bays LCT. The principal land use is farming and the landcover comprises medium to large fields of improved pasture enclosed by fences and occasionally drystone dykes. It is a relatively open and exposed LCT with few trees or shrubs. Views typically extend out from the more elevated parts, over the surrounding landscape or out towards the sea. Farmsteads are randomly dispersed across this landscape, with occasional other nucleated or isolated settlement.

Undulating Island Pasture LCT: Sanday LCU (299a)

Viewpoint 6 is representative of views from this LCU.

Baseline

6.12.69 The Sanday LCU of the Undulating Island Pasture LCT covers most of the south-western spur of the island, extending from Broughton in the north, to Spur Ness in the south. Those parts of this peninsula which are not included in this LCU, are identified as part of the Coast with Sand LCT, occurring at Bay of Stove in the south, Doun Helzie in the south-east and Backaskaill Bay in the north. While the west coast is rocky and more exposed, the east coast is sandier and more sheltered. The peninsula is approximately 1.1 km at its narrowest, increasing to 2.6 km at its widest. The landform generally rises from both coastal edges to form a central ridgeline that follows the north-east to south-west alignment of the peninsula, this alignment changing to north-south in the southern-most section. High points are typically between 45 m and 65 m AOD and while slopes are mostly moderate, steep hill sides occasionally occur.

6.12.70 The land is farmed and small to medium sized fields are set out in a rectilinear pattern, perpendicular and parallel to the B9070, which forms an almost central dissection through the peninsula. There are no nucleated settlements, only dispersed farmsteads, crofts and other rural properties. Other developments include the five operational turbines of Spurness Point Wind Farm and the masts on The Wart (65 m AOD). The association of the west coast is west towards Eday, and north-west towards the Calf of Eday and The North Sound, while the association of the east coast is south-east across Sanday Sound. In the central part of the peninsula, the character is more closely related to the immediate landscape, albeit with wider connections from the higher ground, but less so from the lower ground.

Sensitivity

6.12.71 The value of this LCU is medium. There are no national or regional landscape designations which would otherwise denote a special landscape value.

6.12.72 The susceptibility of the LCU to the Proposed Development is medium. Faray is situated to the west of Eday, such that from Sanday, Faray is always seen to the rear of Eday. The extent to which the island is visible, is dependent on the level to which the intervening landform of Eday screens it. The separation of Faray from Sanday, owing to intervening Eday, reduces the association between these two islands. Furthermore, the central and northern parts of the Sanday LCU are orientated north-west across the sea, rather than towards Faray. The southern part is, however, orientated west towards Eday, although the susceptibility is moderated by the presence of Spurness Point Wind Farm in the southern part of this LCU. This LCU is characterised by a relatively broad and simple coastal landscape without any remarkable landform features and this also moderates its susceptibility to the Proposed Development.

6.12.73 The combination of the value of the Sanday LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium** sensitivity.

Magnitude of change

6.12.74 During the operational phase, the magnitude of change will be **medium-low**. The ZTVs in Figure 6.7a and 6.10, show almost continuous visibility of all six turbines across the western and central parts of this LCU, while there is no visibility shown along the eastern side of the LCU. The Proposed Development will be located a minimum distance of approximately 6.6 km from the closest western boundary of this LCU and 10.1 km from the furthest, such that they will appear as moderate scaled structures, especially in contrast to the closer range turbines of Spurness Point Wind Farm. The proposed turbines will be seen to variable extents depending on the extent of screening from the intervening landform on Eday. Typically, the landform of Faray will not be readily visible, such that the proposed turbines will appear to be set on the western side of Eday, with the lower parts of the turbines screened by the Moorland Hills LCT of Eday.

6.12.75 The effect of the Proposed Development on the Sanday LCU will be moderated by a combination of the following factors. Firstly, the separation distance between the LCU and the Proposed Development, combined with the appearance that they are set on the west coast of Eday rather

than Faray, will moderate the perceived scale of the turbines. Secondly, the relatively small number of turbines and their contained layout, will mean they will occupy only a small proportion of the wider landscape and seascape context. Thirdly, the presence of Spurness Point Wind Farm in this LCU ensures that this type of development is an established part of the baseline character, and although the Spurness Point Wind Farm turbines are smaller, their closer range means that they will present a favourable comparison that will reduce the perceived scale of the proposed turbines. Fourthly, although Sanday and Eday are predominantly rural in character, the extent of human influence through farming and settlement, means that remoteness or wildness do not form part of the baseline character of this LCU or surrounding landscapes.

6.12.76 During the construction phase, the magnitude of change will be **medium-low**. Ground level construction works will not be readily evident from this LCU owing to the extent of the intervening landform, combined with their separation distance from this LCU. While the structures of the emerging turbines and the tall cranes used in their construction, will be visible, their effect on the LCU will be moderated for the same reasons as set out above.

Significance of effect

6.12.77 During the construction and operational phases, the effect of the Proposed Development on the Sanday LCU of the Undulating Island Pastures LCT will be **not significant**. This finding relates chiefly to the separation of Sanday from Faray by the intervening island of Eday, the closer range influences on character from Sanday and Eday and the existing influence from Spurness Point Wind Farm in this LCU.

Significance of cumulative effect

6.12.78 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

Undulating Island Pasture LCT: Westray LCU (299b)

Viewpoint 5 is representative of views from this LCU.

Baseline

6.12.79 The Westray LCU of the Undulating Island Pastures is located in the central part of the island, extending from Gallow Hill in the north, to Ness of Tuquoy in the south, and to the rocky coastline in the west. This LCU comprises variety owing to the inclusion of the rocky and exposed western coastal edge, the sandy and sheltered Bay of Tuquoy and the gently undulating landform of the hinterlands. The landform generally rises from the south coast, towards the more upland landscapes to the north. The land is farmed for arable and livestock, with small to medium sized fields set out in a rectilinear pattern, perpendicular and parallel to the B9067. There are no nucleated settlements, only dispersed farmsteads, crofts and other rural properties. Other developments include the single turbines of the Westray Development Trust and Gallowhill Wind Farm.

6.12.80 It is within this local context that Fitty Hill (169 m AOD) and the rocky coastline to the west, the deep Bay of Tuquoy to the south, and the rolling farmland between, forms the intrinsic character of the LCU. In contrast, the middle and distant range landscapes set the wider context. The principal association of the west coast is west across the Westray Firth to Rousay, while the association of the south coast is south-east across the south-west peninsula of Westray to Faray. In the hinterland of the LCU, the character is more closely related to the immediate landscape, albeit with wider connections from the higher ground, but less so from the lower ground.

Sensitivity

6.12.81 The value of this LCU is medium. There are no national or regional landscape designations which would otherwise denote a special landscape value.

6.12.82 The susceptibility of the LCU to the Proposed Development is medium. The character of this LCU is drawn primarily from the landscape of the LCU and other surrounding LCUs on Westray. Although the small scale of the farm fields presents a small-scale landscape pattern, the vast skies and broad seascapes, presents a larger and simpler context, within which there is capacity for wind turbines.

Faray is situated to the south-east of Westray, such that Faray is seen as relatively distant island, partly or fully obscured by the southern part of Westray and forming part of the wider context. These factors reduce the association between this LCU and the site. Furthermore, while the Bay and Ness of Tuquoy are orientated towards the south-east, the other parts of the LCU are orientated in different directions and this limits any close association from the wider LCU.

6.12.83 The combination of the value of the Westray LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium** sensitivity.

Magnitude of change

6.12.84 During the operational phase, the magnitude of change in character will be **medium-low**. The ZTVs in Figures 6.7a and 6.10, show continuous visibility of all six turbines across the LCU, with the exception of substantial patches of no visibility along the western coast and in central parts and northern parts of this LCU. The Proposed Development will be located a minimum distance of approximately 9 km from the closest southern boundary of this LCU and 12.8 km from the furthest, such that the proposed turbines will appear as moderately scaled structures. The proposed turbines will be seen to variable extents depending on the extent of screening from the intervening landform on Westray. Typically, the landform of Faray will not be readily visible, such that the proposed turbines will appear to be set on the southern coast of Westray, with the lower parts of the turbines screened.

6.12.85 The effect of the Proposed Development on the Westray LCU will be moderated principally by the separation distance between the LCU and the Proposed Development which will moderate the perceived scale of the turbines. Also, the relatively small number of turbines and their contained layout, will mean they will occupy only a small proportion of the wider landscape and seascape context. While the Proposed Development will add a notable external influence to the character of this LCU, this effect will be moderated by the presence of the Westray Development Trust / Gallowhill turbines which ensures that this type of development is an established part of the baseline character. Although these operational turbines are smaller, their closer range means that they will present a favourable comparison that will reduce the perceived scale of the proposed turbines.

6.12.86 During the construction phase, the magnitude of change will be **medium-low**. Ground level construction works will not be readily evident from this LCU owing to the extent of the intervening landform, combined with their separation distance from this LCU. While the structures of the emerging turbines and the tall cranes used in their construction, will be visible, their effect on the LCU will be moderated for the same reasons as set out above.

Significance of effect

6.12.87 During the construction and operational phases, the effect of the Proposed Development on the Westray LCU of the Undulating Island Pastures LCT will be **not significant**. This finding relates chiefly to the separation distance between this LCU and the Proposed Development, the closer range influences on character from Westray, and the existing influence from operational wind turbines in this LCU.

Significance of cumulative effect

6.12.88 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be low or negligible and the cumulative effect will be **not significant.**

Whaleback Islands LCT (296)

Baseline

6.12.89 In the Orkney archipelago, this LCT occurs across nine small, sparsely populated, or uninhabited islands, including Gairsay, Egilsay and Faray. The Whaleback Islands LCT is characterised by smooth convex landform, which forms a dome shape over these roughly oval shaped islands. The landform is low-lying, with heights ranging between 20 m and 50 m AOD, and while mostly convex, there are also local undulations, terraces and depressions. There is an absence of trees, and the farmland,

which covers most of these islands, consists of fields of improved pasture, with arable in the more fertile and sheltered patches. There are also areas of rough grasses, heather moorlands and peat bogs, where the land remains uncultivated. The coastal edge comprises shingle beaches and low rock platforms, with occasional low cliffs forming a more distinctive feature. On islands where settlement occurs, it typically comprises occasional large farmsteads and scattered crofts accessed by a limited network of minor roads and tracks.

Whaleback Islands LCT: Faray LCU (296a)

Baseline

6.12.90 The site is located on the island of Faray, a small island set to the west of the island of Eday and south-east of the island of Westray. Faray is a narrow whale-back island, with a distinct north to south alignment. It measures only 3 km in length and less than 1 km at its widest section. Holm of Faray lies to the immediate north, separated by the narrow Lavey Sound and measuring only 1.5 km in length. The landform of the island gently rounds to a high point of 32 m, south of the centre and a high point of 31 m, north of the centre, with a gentle dip between.

6.12.91 The coastline of Faray is mostly rocky with only small bays in the north-east and south-west with sandy shores. The rocky shoreline and skerries form a notable edge around the island. While the coastline is relatively low, there are many small caves and geos cutting into the cliff edge, and a small arch on the north-west coast.

6.12.92 Despite the island being uninhabited by people since 1947, it continues to be inhabited by sheep. Fields of semi-improved pasture cover the island, with sheep grazing ensuring a low and homogenous landcover. The remnants of human occupation are evident in the single road extending down the spine of the island, and the ruined cottages and empty crofts which sit either side. These ruins and the old stone walls, although small and low, afford some enclosure and shelter to the livestock on this open and exposed island.

Sensitivity

6.12.1 The value of this LCU is medium. There are no national or regional landscape designations covering the island which would otherwise denote a special landscape value.

6.12.2 The susceptibility of this LCU to the effects of the Proposed Development is high. Faray is the site for the Proposed Development and, therefore, would be highly susceptible to the direct and indirect effects on the undeveloped character of this LCU.

6.12.3 The combination of the value of this LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.4 The magnitude of change during the operational phase will be **high**. All six proposed turbines and all associated infrastructure will be located on the island, such that there will be direct and indirect effects on the landscape character of the LCU. The six proposed turbines will appear at variance with the character of the island owing to the tall vertical form of the structures and the movement of their blades. The presence of the access roads, substation compound and met mast will also appear at variance with the predominantly rural character of the island. While built development is present on the island. in the form of old croft houses, these are small-scale, rural and disused. In contrast, the proposed turbines will be large-scale, modern and moving.

6.12.5 The magnitude of change during the construction phase will be **high**. The location of the six proposed turbines and associated infrastructure on the island means that the construction works will have direct and indirect effects on the landscape character of the LCU. The baseline character of the LCU will be altered by the presence and activity of the tall cranes and other plant used in the construction of the tall turbines, tracks, met mast, substation new extended slipway and landing jetty. There will also be a borrow pit, temporary construction compound and site offices.

Significance of effect

6.12.6 The effect of the Proposed Development on the Faray LCU will be **significant** during both the construction and operational phases. This assessment relates chiefly to the location of the Proposed Development on this small LCU, which will ensure it becomes the defining feature in respect of landscape character.

Significance of cumulative effect

6.12.7 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the effect will be **not significant.**

Whaleback Islands LCT: Egilsay LCU (296b)

Baseline

6.12.8 The Whaleback Islands LCT covers the whole of Egilsay. This is a small island, measuring approximately 5 km north to south, and 2 km west to east. It lies approximately 1.5 km to 2 km east of the eastern coast of Rousay, separated by Rousay Sound, and approximately 6.7 km south-west of Faray, separated by the Westray Sound. Egilsay is an inhabited island, albeit with a sparse and dispersed pattern of settlement, connected by a small number of minor roads and tracks. It is connected to Orkney mainland by a regular ferry service, which departs from Tingwall, and often travelling via Rousay and Wyre. Visitor attractions on the island include the C12th Norse, St Magnus Church and Manse Loch Nature Reserve.

6.12.9 The oval shape of the island, combined with its dome-shaped landform, makes Egilsay typical of the Whaleback Islands type. Albeit slightly steeper on the western side, the landform rises from both the western and eastern sides, to form a distinct north to south ridgeline through the island, with a high point of 35 m AOD in the south. The shape of the landform means the long western side forms a strong association with the eastern side of close-range Rousay, while the long eastern side forms a slightly weaker association with the western side of middle-range Eday. From the ridgeline, connections are made with more distant islands to the north and south, and it is only from the shorter, north-east facing slopes and coastline that a clear association with Faray is made.

Sensitivity

6.12.10 The value of the Egilsay LCU is medium. There are no national or regional landscape designations covering the island, which would otherwise denote a special landscape value.

6.12.11 The susceptibility of the Egilsay LCU to the effects of the Proposed Development is medium. The character of Egilsay is largely derived from the unique landform of the island itself, as well as the close-range influence from Rousay. Both these islands are settled and farmed and the human influence on Rousay is emphasised by the presence of the operational Kingarly Hill turbine and other smaller-scale turbines along the eastern side of the island. Although these are relatively small in scale, they, nonetheless, increase the influence of human artefacts on the landscape character context of Egilsay.

6.12.12 The combination of the value of the Egilsay LCU and its susceptibility to the effects of the Proposed Development results in an overall **medium** sensitivity.

Magnitude of change

6.12.13 During the operational phase, the magnitude of change on the Egilsay LCU will be **medium**. The ZTV shows that visibility of the Proposed Development will occur across the northern, eastern and central parts of the island but not the western parts. The Proposed Development will be seen at a minimum distance of 7 km, such that the turbines will be readily visible and be seen as medium scale elements. While other wind turbines already have an influence on this LCU, the proposed turbines will form a more substantial group of larger turbines, that will appear at variance with the largely undeveloped, and strongly horizontal context of seascape and islands.

6.12.14 Those factors which moderate the magnitude of change include the closer range influence of the coasts of Rousay and Eday, with Rousay especially setting the local context to the island. Although the turbines on Rousay are relatively small in size, their closer proximity will ensure they appear

larger in scale than the more distant proposed turbines. They also establish turbines as an existing influence on the landscape character of the Egilsay LCU. It is also in contrast to the closer-range islands, that the proposed turbines on the more distant island of Faray will have a comparatively weaker influence on the landscape character of this LCU, occurring as a back-ground, rather than an immediate feature. Most notable, however, is the small number of turbines and their containment within a small proportion of a much wider context of sea and islands.

6.12.15 During the construction phase, the magnitude of change will be **medium**. The ground level construction works will not be so readily evident owing to the separation distance between Egilsay LCU and the Proposed Development. The presence and activity of the tall cranes and the emergence of the tall turbines, they will be used to construct, will be readily visible. The magnitude of change will, however, be moderated owing to the same reasons cited above; namely the separation distance between the Egilsay LCU and the Proposed Development, the close range influence from other islands and the human artefacts, including wind turbines, located there, and the small proportion of the much wider context that the construction of the turbines will occupy.

Significance of effect

6.12.16 During the construction and operational phase, the effect of the Proposed Development on the Egilsay LCU of the Whaleback Islands LCT will be **not significant**. While the Proposed Development will have an influence, it will not be of a sufficient magnitude to redefine the landscape character of this LCU, largely owing to its closer association with Rousay.

Significance of cumulative effect

6.12.17 The limited influence of consented and application wind farms on this LCU means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant.**

Residual Effects on Coastal Character Areas

6.12.18 In addition to the assessment of effects on landscape character, this LVIA also includes the assessment of effects on coastal character. This makes reference to Orkney and Caithness Coastal Character Assessment, which has been produced by Land Use Consultants with the involvement of NatureScot, OIC, The Highland Council and Marine Scotland. This report describes the entire coastline of Orkney and North Caithness by breaking it down into Regional Coastal Character Areas (RCCA) and then further into Local Coastal Character Areas (LCCA).

6.12.19 The RCCAs and LCCAs are shown on Figure 6.7b, and those which are especially relevant to this assessment include the following:

- RCCA 3 Sanday West;
- RCCA 5 Eday: LCCA 5c Red Head to Greenan Nev / LCCA 5d Fersness Bay / LCCA Faray / LCCA Holm of Faray;
- RCCA 8 Westray North and East;
- RCCA 10 Rousay North: LCCA 10b Saviskaill Bay;
- RCCA 11 Rousay South: LCCA 11d Point of Avelshay to Scock Ness; and
- RCCA 12 Egilsay and Wyre.

6.12.20 The assessment below considers the potential impact of the Proposed Development on these RCCAs with reference to their constituent LLCAs, where these have been defined.

RCCA 3 Sanday West

Baseline

6.12.21 This RCCA includes the north and west coasts of Sanday as well as much of the southern peninsula extending from Backaskaill Bay in the south, through Spur Ness, to Whitemill Bay at the island's northern tip. Sanday West is rockier than Sanday East, with low cliffs set upon a shoreline comprising

wave cut platforms. The coastline is characterised by distinctive headlands, long sections of coastal cliffs, and occasional small bays of sand or shingle. This relatively low-lying and elongated island is exposed to the maritime influences of the North Sound, apart from along the Spur Ness coast in the south, where a sense of shelter is derived from neighbouring Eday to the west, and Stronsay to the south-east. Spur Ness to Bea Loch forms a long finger of land, characterised by a ridge which rises to 65 m AOD at The Wart and 50 m AOD at the Gump of Spurness with Spurness Point Wind Farm to the south of this. Generally, views from this RCCA are out across the open North Sound, apart from the coastline at Spur Ness which is orientated west towards Eday.

6.12.22 In the absence of detailed LCCA citations, this assessment is based on the Sanday West RCCA, supplemented with findings from site work carried out on Sanday. The section of most relevance to this assessment is the southern part of the RCCA, where the western coastline of the Spur Ness peninsula occurs. Although separated from Faray by Eday, this section of coastline is orientated west towards Eday and Faray, with a minimum distance of approximately 6.5 km between Sanday West RCCA and Faray. In comparison, the section of the coastline to the north of this is orientated north-west towards the North Sound with very limited association with Faray.

6.12.23 Between Strangtaing in the north and Spur Ness in the south, the coastline follows a north-south alignment with a broad convex curve, apart from where the more sheltered rocky bay of Loth in the south occurs, where the ferry terminal is situated. The coastline comprises low rocky cliffs with narrow beaches of boulders in sections. The hinterland is farmed, with small to medium sized fields set out in a rectilinear pattern, perpendicular and parallel to the B9070. There are no nucleated settlements, only dispersed farmsteads, crofts and other rural properties. Other developments in this hinterland with an influence on the adjacent coastal character, include the five turbines of operational Spurness Point Wind Farm and the masts on The Wart (65 m AOD).

Sensitivity

6.12.24 The value of this RCCA is medium. There are no national or regional landscape designations which would otherwise denote a special landscape value.

6.12.25 The susceptibility of the RCCA to the Proposed Development is medium in the southern part between Strangquoy Taing and Spur Ness, and medium to low or low in all remaining parts. Faray is situated to the west of Eday, such that from Sanday, Faray is always seen to the rear of Eday. The extent to which the island is visible, is dependent on the level to which the intervening landform of Eday screens it. The separation of Faray from Sanday, owing to intervening Eday, reduces the association between these two islands. Furthermore, the central and northern parts of the Sanday West RCCA are orientated north-west across the North Sound, rather than towards Faray. The southern part is, however, orientated west towards Eday, although the susceptibility is moderated by the presence of operational Spurness Point Wind Farm close to this southern part.

6.12.26 The combination of the value of the Sanday West RCCA and its susceptibility to the effects of the Proposed Development results in an overall **medium** sensitivity in the southern part and **medium-low** in all remaining parts.

Magnitude of change

6.12.27 During the operational phase, the magnitude of change will be **medium-low** or **low**. The ZTVs in Figures 6.7b and 6.10, show almost continuous visibility of all six turbines across the western coastline of the Sanday West RCCA. The Proposed Development will be located a minimum distance of approximately 6.6 km from the closest western boundary of this RCCA and 19.2 km from the furthest, such that the proposed turbines will appear as moderate to small scaled structures, especially in contrast to the closer range turbines at Spurness Point Wind Farm. The proposed turbines will be seen to variable extents depending on the extent of screening from the intervening landform on Eday. Typically, the landform of Faray will not be readily visible, such that the proposed turbines will appear to be set on the western side of Eday, with the lower parts of the turbines screened.

6.12.28 The effect of the Proposed Development on the Sanday West RCCA will be moderated by a combination of the following factors. Firstly, the separation distance between the RCCA and the Proposed Development, combined with the appearance that they are set on the west coast of Eday

rather than Faray, will moderate the perceived scale of the turbines. The low-lying nature of the coastline means that the intervening hills on Eday will notably reduce the extent to which the proposed turbines will be visible. Secondly, the relatively small number of turbines and their contained layout, will mean they will occupy only a small proportion of the wider landscape and seascape context. Thirdly, the presence of Spurness Point Wind Farm close to this RCCA ensures that this type of development is an established part of the baseline character, and although the Spurness Point Wind Farm turbines are smaller, their closer range means that they will present a favourable comparison that will reduce the perceived scale of the proposed turbines. The Proposed Development will, however, add to the sense of wind farm development affecting the context on both sides of this coastal landscape.

6.12.29 During the construction phase, the magnitude of change will be **medium-low**. Ground level construction works will not be readily evident from this RCCA owing to the low-lying nature of the coastline, the extent of the intervening landform, and the separation distance between this RCCA and the ground level construction works. While the structures of the emerging turbines and the tall cranes used in their construction, will be visible, their effect on the RCCA will be moderated for the same reasons as set out above.

Significance of effect

6.12.30 During the construction and operational phases, the effect of the Proposed Development on the Sanday West RCCA will be **not significant**. This finding relates chiefly to the separation of Sanday from Faray by the intervening island of Eday, the closer range influences on coastal character from Sanday and Eday, and the existing influence from Spurness Point Wind Farm close to this RCCA.

Significance of cumulative effect

6.12.31 The limited influence of consented and application wind farms on this RCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

RCCA 5 Eday

Baseline

6.12.32 This RCCA includes the coastlines of Eday, Calf of Eday, Faray and Holm of Faray. Eday is narrow in places and elongated, measuring approximately 13 km north to south and 4.5 km east to west at its widest points. It comprises two areas of elevated moorland connected by a narrow low-lying strip of land approximately 500 m wide. Its coastline is strongly indented. Calf of Eday is a small island to the north-east. The RCCA's coast is a mixture of exposed cliffs, low rocky foreshore, and sweeping shingle and sandy beaches. The hinterland is smoothly contoured, open farmland, transitioning to moorland on higher ground. Scattered settlement is concentrated at Southside and along the Calf Sound. Generally, views focus on neighbouring isles with panoramic views from cliffs at Red Head in the north of the island.

6.12.33 Parts of RCCA 5 Eday have been subdivided into LCCAs. Those of relevance to this assessment include LCCA 5c Red Head to Greenan Nev and 5d Fersness Bay LCCA. The detailed citations for these LCCAs have been used in the following assessments. Although there are no LCCA citations provided for Faray and the Holm of Faray, their importance to the assessment means that they have been considered as LCCAs, with the RCCA description supplemented through information gathered during site work on Faray.

RCCA 5 Eday: LCCA 5c Red Head to Greenan Nev

Baseline

6.12.34 This LCCA extends from Red Head, at the northern tip of Eday, down to Greenan Nev, which is the promontory on the west coast, just north of the Bay of Newark. This LCCA can be further subdivided into two distinct sections, with the northern part extending from Red Head to Broad Ebb, and the southern part extending from Broad Ebb to Greenan Nev. The northern part is characterised by rugged high cliffs, from which the hinterland of open and smooth moorland rises up to the high point of Noup Hill (57 m AOD). There are no roads or settlement in the hinterland and human

influences are limited to old post and wire fencing and peat cutting. The cliffs form a relatively straight, north-west facing coastal edge and are exposed to high winds and strong waves. Views from Red Head are drawn northwards across the limitless expanse of the North Sea, while to the west, the presence of Westray forms some containment. The character of this northern part of the LCCA is remote, exposed and often bleak.

6.12.35 In contrast the southern part of the LCCA is characterised by the settled and cultivated hinterland. The coastline is indented between Broad Ebb and Greenan Nev, with low sea cliffs interspersed with shingle and pebble beaches. It is set against the Sound of Faray and its orientation, west-north-west means that its outlook is towards Faray and the Holm of Faray. The presence of these islands, combined with the presence of Westray north-west and Rousay further south-west, present a much greater sense of containment and lesser sense of remoteness. Human influences are evident with the landscape modified by farm fields of pasture and arable, and dispersed settlement accessed by the minor road and tracks. This coastal strip is backed by the darker and less modified landscape of the open moorlands.

Sensitivity

6.12.36 The value of the Red Head to Greenan Nev LCCA is medium. This LCCA is not covered by any national or regional landscape designations which would otherwise denote a special value.

6.12.37 The susceptibility of the Red Head to Greenan Nev LCCA to the effects of the Proposed Development is medium in the northern part of the LCCA and high in the southern part. This variation reflects the variable strength of association between this LCCA and Faray, with the northern part orientated north-west over the open sea and the southern part orientated west directly towards Faray. While settlement and farming in the southern part ensures human influences form an integral part of the baseline character, these developments and modifications are relatively small in scale and rural in character. While there are no prominent wind farms visible from this coastline, wind turbines are evident as single domestic turbines on Eday, and commercial turbines on Westray and Rousay, although only visible in clear conditions.

6.12.38 The combination of the value of this LCCA and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity in the southern part of this LCCA and **medium** sensitivity in the northern part.

Magnitude of change

6.12.39 During the operational phase, the magnitude of change on this LCCA will be **medium** or **medium-low** or **no change** in the northern part and **high** in the southern part. The ZTVs in Figure 6.7b and 6.10, show that theoretical visibility of the Proposed Development will be continuous across the southern part of this LCCA, with visibility extending around Broad Ebb, but then no or low levels of visibility occurring along the remainder of the northern part of the coastline. The orientation of the southern part of the LCCA towards Faray, combined with the minimum distance to the proposed turbines ranging from 1.5 km, will ensure that the proposed turbines will have a notable effect on the coastal character of this southern part. These tall vertical structures will contrast with the low horizontal landform and the movement of the blades will add a dynamic feature into a relatively stable context.

6.12.40 The lower magnitude of change in the northern part of the LCCA reflects the increase in the separation distance, as well as the weaker association with Faray, whereby the coastlines do not directly face each other and the stronger influence comes from the outlook over the open sea. The ZTV shows visibility to extend over Broad Ebb onto Corbie Ness and although this section of coastline is not orientated towards the site, the relative proximity at approximately 2.7 km to 4.1 km means there will still be a medium magnitude of change, largely owing to the contrast these large vertical structures will present within such a low-lying context. Beyond Corbie Ness, the ZTV shows either no, or low levels of visibility and when combined with the greater separation distance and weaker association with the site, the influence from the Proposed Development will be notably reduced.

6.12.41 During the construction phase, the magnitude of change on this LCCA will be **high** across the southern part of the LCCA, **medium** between Broad Ebb and Corbie Ness and **medium-low** or **no change** across the remaining northern part. Ground level construction works on the eastern part of

Faray will be visible from the southern part of this LCCA but will be largely screened by intervening landform from the northern part. It will, however, be the presence of the tall cranes and the six emerging turbines that will have the greatest influence on coastal character. They will be seen set on the opposing coastal edge, appearing more exposed than they might otherwise owing to the openness of the intervening water and the foreshortening effect that this is likely to have. From the northern part, the turbines and cranes will not be visible, while between Broad Ebb and Crosbie Ness, the extent of visibility will be variable, albeit with upper parts of the structures visible.

Significance of effect

6.12.42 The effect of the Proposed Development on the Red Head to Greenan Nev LCCA will be **significant** across the southern part of the LCCA, and the northern part between Broad Ebb and Corbie Ness, during both the construction and operational phases. The influence of the large-scale turbines, set on the opposing side of the Sound of Faray, will have a notable influence on the character of this coastal landscape. The effect on the northern part of the LCCA, between Corbie Ness and Red Head will be **not significant** as there will either be no visibility or lower levels of visibility will occur from a more distant coastline, where the predominant orientation of the landform is north-eastwards.

Significance of cumulative effect

6.12.43 The limited influence of consented and application wind farms on this LCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant.**

RCCA 5 Eday: LCCA 5d Fersness Bay

Viewpoint 3 is representative of the character of this LCCA.

Baseline

6.12.44 The Fersness Bay LCCA covers a large concave section of coastline, extending from the headland of Greenan Nev in the north, to the headland of Fersness in the south-west. The northern part of the LCCA is characterised by narrow beaches of shingle and pebble between low and rocky shorelines, while the southern part is characterised by broad, sandy beaches backed by large, grass-covered dunes. The hinterland comprises gently rising landform, with fields of pasture or rough grazing. Settlement is limited to dispersed farmsteads accessed by minor roads and tracks. Despite these human influences, including the airfield behind Sands of Doomy, there is a sense of peace and tranquillity in these coastal landscapes.

6.12.45 The coastline forms a wide sweep from the north-east, through the east and south, to the south-west. Thus, the orientation of the different sections of coastline shifts. From Greenan Nev, the coastline faces south-west, where the narrow shingle and pebble beach at the Bay of Newark occurs. The coastline then forms a straight and rocky edge along the base of Stennie Hill, that faces due west. From Doomy headland, the broad sandy beaches of Mussetter and Doomy, sweep round to face north-west and north, with the headland at Fersness enclosing the bay by wrapping the landform around to face north-east and then east. While the orientation of these coastlines vary, the proximity of Faray means that it is almost a constant focus and a key influence in terms of coastal character.

6.12.46 The low-lying and open nature of this LCCA, means that it is exposed to external influences from the surrounding landscapes and seascapes. These influences are mostly natural, with the immediate enclosure of the rocky headlands, to the west and east, and broader enclosure of the moorland hills, to the south and north-east. There is also a strong association with Faray, owing to the principal aspect of this LCCA being orientated in towards where this island sits. In terms of human influences, there are a few isolated properties scattered along the minor road to the south and evident across the wider landscape. There is also Eday's 'London Airfield' to the immediate east, although comprising only a small building and low-lying tarmacked strip, this forms a relatively discreet feature in the landscape.

Sensitivity

6.12.47 The value of this LCCA is medium. This LCCA is not covered by any national or regional landscape designations which would otherwise denote a special value.

6.12.48 The susceptibility of this LCCA to the effects of the Proposed Development is medium-high. This LCCA has a strong intrinsic character relating to the broad, white sandy beaches and the rocky coastline, which encloses the bay on either side. This LCCA is also highly influenced by the outlook across the bay which is orientated in towards Faray.

6.12.49 The combination of the value of this LCCA and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.50 During the operational phase, the magnitude of change on this LCCA would be **medium-high**. The ZTVs in Figures 6.7b and 6.10 show theoretical visibility of all six turbines to be practically continuous across the LCCA and the openness of the LCCA means that actual visibility will reflect theoretical visibility. The LCCA will be located a minimum distance of approximately 1.5 km between the closest turbine and closest LCCA edge, extending to a maximum distance of 3.1 km to the furthest LCCA edge.

6.12.51 The high part of the rating relates to the close association between this LCCA and Faray, owing to the orientation of the coastline in towards the island, and the openness of this coastal edge, which means that it would be exposed to the influence of the Proposed Development. The minimum separation distance of 1.5 km means that the six turbines would appear as large-scale vertical structures at variance with the strongly horizontal emphasis of the low islands and surrounding seascape. The movement of the blades would introduce a dynamic feature that will add to their prominence. Although small scale and distant turbines are visible from this LCCA, the modern and human-made appearance of the proposed turbines will appear at variance with the rural character of the coastline.

6.12.52 The medium part of the rating relates to the fact that the Proposed Development will form an external influence with indirect effects on the character of this LCCA. It will be seen set on a separate island and will not directly affect the intrinsic character of the sands and surrounding coastal edge. The relatively small number of turbines would also mean that the Proposed Development will be seen as a compact and well-contained group, occupying a small part of the wider landscape context, albeit of a notable vertical scale.

6.12.53 During the construction phase, the magnitude of change on this LCCA would be **medium-high**. The close proximity of this LCCA to Faray means that many of the ground level works at the southern end of the island will be visible, including track, the new extended slipway and the landing jetty construction. The construction of all the tall turbines, and the tall cranes used in this process, will be readily visible and will appear at variance with the baseline character of the island. While the Proposed Development will form a prominent influence on the landscape character of the Fersness LCCA, the magnitude of change is prevented from being rated high owing to the relatively contained layout of the Proposed Development amidst a wider landscape and seascape context.

Significance of effect

6.12.54 During the construction and operational phases, the effect of the Proposed Development on the Fersness LCCA will be **significant**. This finding relates to the close association between this LCCA and Faray, where the Proposed Development would be located.

Significance of cumulative effect

6.12.55 The limited influence of consented and application wind farms on this LCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

RCCA 5 Eday: LCCA Faray

Baseline

6.12.56 The site is located on the island of Faray, a small island set to the west of the island of Eday and south-east of the island of Westray. Faray is a narrow whale-back island, with a distinct north to south alignment. It measures only 3 km in length and less than 1 km at its widest section. The Holm of Faray lies to the immediate north, separated by the narrow Lavey Sound and measuring only 1.5 km in length. The landform of the island gently rounds to a high point of 32 m, south of the centre and a high point of 31 m, north of the centre, with a gentle dip between.

6.12.57 The coastline of Faray is mostly rocky with only small bays in the north-east and south-west with sandy shores. The rocky shoreline and skerries form a notable edge around the island. While the coastline is relatively low, there are many small caves and geos cutting into the cliff edge, and a small arch on the north-west coast. The small size and narrow shape of the island means that it is strongly influenced by the marine environment, with shorelines often exposed to high winds and waves.

6.12.58 Despite the island being uninhabited by people since 1947, it continues to be inhabited by sheep. Fields of semi-improved pasture cover the island, with sheep grazing ensuring a low and homogenous landcover. The remnants of human occupation are evident in the single road extending down the spine of the island, and the ruined cottages and empty crofts which sit either side. These ruins and the old stone walls, although small and low, afford some enclosure and shelter to the livestock on this open and exposed island.

Sensitivity

6.12.59 The value of this LCCA is medium. There are no national or regional landscape designations covering the island which would otherwise denote a special landscape value.

6.12.60 The susceptibility of this LCCA to the effects of the Proposed Development is high. Faray is the site for the Proposed Development and, therefore, coastal character would be highly susceptible to the direct and indirect effects on this LCCA.

6.12.61 The combination of the value of this LCCA and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.62 The magnitude of change during the operational phase will be **high**. All six proposed turbines and all associated infrastructure will be located on the island, close to the coast, such that there will be direct and indirect effects on the coastal character of the LCCA. The six proposed turbines will appear at variance with the character of the island's coastline owing to the tall vertical form of the structures and the movement of their blades. The presence of the access roads, substation compound and met mast will also appear at variance with the predominantly rural character of the island. The location of the new extended slipway and landing jetty on the southern coast will give rise to direct effects on coastal character. While built development is present on the island, in the form of old croft houses, these are small-scale, rural and disused.

6.12.63 The magnitude of change during the construction phase will be **high**. The location of the six proposed turbines and associated infrastructure on the island means that the construction works will have direct and indirect effects on the landscape character of the LCCA. The baseline character of the LCCA will be altered by the presence and activity of the tall cranes and other plant used in the construction of the tall turbines, tracks, met mast, substation new extended slipway and landing jetty. There will also be borrow pits, temporary construction compounds and site offices near to the coast.

Significance of effect

6.12.64 The effect of the Proposed Development on the Faray LCCA will be **significant** during both the construction and operational phases. This assessment relates chiefly to the location of the Proposed Development on this small island which will ensure it becomes the defining feature in respect of its surrounding coastal character.

Significance of cumulative effect

6.12.65 The limited influence of consented and application wind farms on this LCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant.**

RCCA 5 Eday: Holm of Faray LCCA 5f

Baseline

6.12.66 Holm of Faray LCCA is situated to the immediate north of Faray Whaleback Island LCU, where the site of the Proposed Development is located. This small island measures approximately 1.5 km in length and 0.5 km in width and is separated from Faray by Lavey Sound and less than 100 m. Its similar north to south alignment and close proximity to Faray, means that it appears almost as a continuation to the landform of this Whaleback Island. The Holm of Faray is typical of its type, presenting low and smoothly rounded landform, surrounded by a rocky shoreline and low cliffs, with numerous geos, a cave and an arch occurring. While the pastoral land cover is grazed by sheep, there is no recent evidence of past occupation, only occasional fence lines.

6.12.67 Being such a small island, much of Holm of Faray's coastal character is drawn from its wider surroundings, and as it is the narrow southern end of the Holm of Faray that abuts the northern coast of Faray, the Holm of Faray forms associations with the wider context through its longer western and eastern coastlines, as well as shorter northern coast. Across the Rapness Sound, the western side of the Holm of Faray forms an association with the southern peninsula of Westray, and across the Sound of Faray, the eastern side forms an association with the northern end of Eday, both at ranges of approximately 2 km. At approximately 0.5 km, the northern end of the Holm of Faray comes closer to the southern tip of Wether Ness on Westray.

Sensitivity

6.12.68 The value of this LCCA is medium. This LCCA is not covered by any national or regional landscape designations which would otherwise denote a special value.

6.12.69 The susceptibility of this LCCA to the effects of the Proposed Development is high. The Holm of Faray LCCA is located especially close to Faray, where the Proposed Development would be located. The LCCA will, therefore, be especially susceptible to the effects of the Proposed Development. Despite the other associations which this LCCA has with other surrounding seascapes and islands, the close proximity and low-lying nature of the coastline means that it will be readily susceptible to the changes in character that will arise as a result of the Proposed Development.

6.12.70 The combination of the value of this LCCA and its susceptibility to the effects of the Proposed Development results in an overall **medium-high** sensitivity.

Magnitude of change

6.12.71 During the operational phase, the magnitude of change will be **high** across the LCCA. The ZTV in Figure 6.7 shows theoretical visibility to be continuous around this LCCA and the openness of the coast means that actual visibility will be similar in extent. The proposed turbines will be seen at especially close ranges between approximately 0.9 km from the closest LCCA coast to the closest turbine and approximately 2.2 km from the furthest LCCA coast.

6.12.72 While the Proposed Development will not be located on the Holm of Faray, it will have a notable visual influence on its coastal character owing to the close association of the Holm of Faray LCU with the Faray Whaleback Island LCU, as these islands form an almost continuous landform feature, with only a short separation formed by Lavey Sound. The six turbines will form the most influential part of the Proposed Development owing to their large scale and vertical form, relative to the low-lying island landscapes. Furthermore, these modern structures, will appear in contrast to the rural and semi-natural character of these coastlines.

6.12.73 During the construction phase, the magnitude of change will be **high**. This LCCA is located a minimum distance of approximately 0.9 km from the closest turbine. This means that the construction of the turbines and the presence of the tall cranes will be a highly prominent feature, seen clearly across Lavey Sound. Many of the ground level construction processes and components,

such as construction of the access tracks, will not form such a readily apparent feature owing to their location beyond the rising landform of the northern part of Faray. The incomplete appearance of the turbines and the periodic activity of the cranes will create an influence on this LCCA which will be at variance with the rural character of the baseline landscape.

Significance of effect

6.12.74 The effect of the Proposed Development on the Holm of Faray LCCA will be **significant** during the construction and operational phases. The close proximity of Holm of Faray LCCA to Faray will heighten the influence that the Proposed Development will have on the coastal character of this small island.

Significance of cumulative effect

6.12.75 The limited influence of consented and application wind farms on this LCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

RCCA 8 Westray North and East

Viewpoint 4 is representative of this RCCA.

Baseline

6.12.76 The RCCA comprises the northern, eastern and southern coastlines of Westray, from Noup Head in the north-west, to Point of Huro on the south-west tip. Between these larger, elongated headlands lie a succession of small, characteristic headlands and bays. A sense of enclosure is derived from the small bays, and the easterly coast facing onto Papa Westray across the Papa Sound. The coastline consists of broad platforms of rock, low cliffs in the north, and narrow sand or shingle beaches in the bays. Dunes and links grassland lie behind, with rough grassland at exposed headlands. Stone dykes often separate the agricultural hinterland from the coast. The main settlement of Pierowall lies on the Bay of Pierowall's natural harbour with the imposing landmark of Noltland Castle behind. Long panoramic views are afforded by a relatively flat landform.

6.12.77 In the absence of detailed LCCA citations, this assessment is based on the Westray North and East RCCA, supplemented with findings from site work carried out on Westray. The section of most relevance is the southern coastline, as it has the closest association with Faray. In comparison, the east coast is orientated north-east across the North Sound with intervening landform, including low coastal hills in the south, that limit the association between this coastline and Faray.

6.12.78 The southern coast of Westray is characterised by the splayed landform, with the elongated western peninsula extending in a south-westerly direction from Sands of Woo to Point of Huro, and the shorter eastern peninsula extending in a south-easterly directions from Sands of Woo to Weather Ness. These two spurs form almost a right angle, with their landform enclosing the waters of Rapness Sound. The south-westerly spur is characterised by its rocky coastline of low, wave-cut platforms, with a few small sandy beaches interspersed. While the predominant orientation is south-east, the coastline curves in and out between minor promontories. The hinterland rises gently to form a series of small, rounded hills, which are enclosed by a geometric pattern of small fields and used as pasture. Farmsteads occur intermittently along this more sheltered south-east facing coast. The main human influence along this coastline, however, is the Rapness Ferry Terminal, which comprises a large concrete pier and platform.

6.12.79 The south-easterly spur is formed by the rocky headland of Weather Ness. Here, the land rises more steeply from the shoreline, to form enclosure to the northern side of Rapness Sound and form a more prominent coastal feature. The shoreline comprises a narrower band of wave cut platforms, albeit extending around Weather Ness point. Fields of pasture and rough grazing cover the slopes of the hinterland and while roads and settlement do not extend onto this exposed headland, a track leads out to the point. A small quarry sits on this coastal edge, creating an exposed and steep quarry face.

Sensitivity

6.12.80 The value of the Westray North and East RCCA is medium. There are no national or regional landscape designations which would otherwise denote a special landscape value.

6.12.81 The susceptibility of this RCCA to the effects of the Proposed Development is medium-high on the southern coast, medium-low on the eastern coast, and low on the northern coast. This variation in susceptibility reflects the variation in association between the Westray RCCA and the island of Faray, where the Proposed Development would be located. From the southern coast of the RCCA, the landscape opens up towards the south-east, where Faray is located, making this coast more susceptible. From the eastern coast of the RCCA, there is only limited association with Faray, with the coastal landscape orientated north-east towards the North Sound and Papa Westray. This association weakens further on the northern coast as the separation distance from Faray increases and the closer range coasts and seascapes influence the context more readily.

6.12.82 The combination of the value of this RCCA and its susceptibility to the Proposed Development results in a **medium-high** sensitivity on the southern coast, **medium** on the eastern coast and **medium-low** on the northern coast.

Magnitude of change

6.12.83 During the operational phase, the magnitude of change will vary across this RCCA with the closer range southern coast being subject to a **medium-high** magnitude of change and the other remaining parts being subject to a **medium-low,** or **low** magnitude of change. The ZTVs in Figures 6.7 and 6.10 show almost continuous theoretical visibility extending across the southern coast of the RCCA. From here, all six of the proposed turbines would be seen to their full extents. At a range of approximately 3 km to 4 km between this southern part of the RCCA and the closest turbine, the proposed turbines will be seen as large scale structures, their vertical scale and modern appearance at variance with the low lying island landscape and its predominantly rural character. The effect would, however, be moderated by the separation distance from this southern coast, and the presence of the ferry terminal, settlement and roads in this southern part of the island. Furthermore, the small number of turbines and their containment on the island, means that they occupy a small part of the much wider context, that has an influence on the coastal character of this RCCA.

6.12.84 From the eastern coast of the RCCA, the magnitude of change will reduce to medium-low. The greater separation distance from the Proposed Development, with visibility shown at a range of approximately 6 km to 18 km, will mean that the proposed turbines will reduce in scale and occupy a smaller proportion of the wider coastal context. Furthermore, the intervening landform will reduce the extent to which the proposed turbines will be visible. As described above, the weaker association between this eastern coast and Faray, would moderate the influence that the Proposed Development would have on coastal character, especially as the opposing Papa Westray coastline will have a comparatively stronger influence. As the Newark single turbine establishes wind turbines as part of the baseline character, its presence would moderate the effect of the proposed turbines, as they would not be seen as a new or unfamiliar feature.

6.12.85 On the northern coast of the RCCA, theoretical visibility is shown to be patchier as the intervening landform serves to screen visibility of the proposed turbines. This reflects the changing nature of the influence, whereby the immediate landscape has an even stronger influence, in the context of which the Proposed Development would appear as more of a distant and background feature, at a minimum distance of 16 km. There is also an existing influence from the Westray Development Trust / Gallowhill turbines, which although smaller in number and scale, presents a closer range example of this type of development, that will moderate the influence of the Proposed Development.

6.12.86 During the construction phase, the magnitude of change will vary across this RCCA as described in respect of the operational phase above. While the separation distance, combined with the intervening landform would mean that many of the ground level construction works would not be readily visible from the eastern and northern coastlines, the emerging structures of the turbines and the tall cranes used in their construction will be intermittently visible, albeit not a defining feature. From the southern coast, ground level works will be visible in combination with upper level works

and their influence on landscape character will be accentuated by the openness of the intervening water and the exposed nature of both the Westray and Faray coastlines.

Significance of effect

6.12.87 During the construction and operational phases, the effect of the Proposed Development on the Westray North and East RCCA will be **significant** on the southern coast and **not significant** on the northern and eastern coasts. This assessment reflects the close association between the southern coast of the RCCA and Faray, where the Proposed Development would be located and the comparatively weaker association from other coasts in the RCCA.

Significance of cumulative effect

6.12.88 The limited influence of consented and application wind farms on this RCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

RCCA 10 Rousay North

Baseline

6.12.89 This RCCA occurs on Rousay's north coast between Scabra Head in the west to Faraclett Head in the east. The exposed north coast faces onto the open Atlantic with some shelter provided in the broad Saviskaill Bay. The gently curving coast includes numerous, sheer-sided, layered, sandstone cliffs up to 50 m in height, with erosional features of geos, blowholes, caves and arches. Behind the cliff edge lies rough grazing and moorland on smooth hills. The coast and hinterland are largely undeveloped with only scattered settlement around the Loch of Wasbister. The north-west coast, between Scabra Head and Saviskaill Head, is most rugged, natural and inaccessible. At Faraclett Head a circular coastal path is relatively well-used. The open Atlantic dominates broad panoramic views from the coast while focal points to the north include the Westray cliffs.

6.12.1 RCCA 10 Rousay North has been subdivided into two LCCAs; 10a Scabra Head to Saviskaill Head; and 10b Saviskaill Bay. LCCA 10b is of relevance to this study as it includes Faraclett Head which is closest to Faray and from which views in this north-easterly direction open up. LCCA 10a is more distant from Faray and its coastline is orientated in the opposite direction, thus limiting any close association. Furthermore, the ZTVs in Figures 6.7b and 6.10, show visibility to be very limited from this LCCA. For these reasons LCCA 10a is not assessed in detail.

RCCA 10 Rousay North: LCCA 10b Saviskaill Bay

Baseline

6.12.2 The Faraclett coastline of this LCCA wraps round the hilly headland on the north-east corner of Rousay. On the western side, high cliffs rise to over 50 m and then steeply rising grassland reaches a high point of 107 m AOD. These cliffs form well-defined enclosure to the eastern side of Saviskaill Bay. On the northern side of Faraclett, long wave cut platforms extend out into the sea and a lower coastal shelf wraps around the north-east, albeit with the landform rising higher behind. To the south of this, North Sand comprises a small beach of boulders and forms the separation between the impounded Lock of Scockness and the sea.

6.12.3 While farm fields extend onto the shallower, lower slopes, and fence lines cut across the uplands, the hinterland is characterised by rough pasture. Faraclett Farm and its access track are the only developments close to the edge of the coast. There are numerous archaeological remains across the hill and a footpath encircles the upper slopes and summit. Parking is provided at the end of the minor road and the footpath is popular with visitors to the island.

6.12.4 In contrast to the neighbouring Low Island Pastures LCT, which lies to the immediate east, the elevated landform of the Moorland Hills LCT, opens up the influences and associations that act on the character of this LCCA. Most notably, there is an association with the wider LCU of the Moorland Hills LCT, which covers most of the island. In particular, the close range Kierfea Hill (235 m AOD) presents an upland context to the lower set headland of Faraclett Head. There is also a connection across to Egilsay, although this island is notably lower and flatter. Visual connections also occur with the larger islands of Westray to the north and Eday to the east, as well as the smaller island of Faray,

set to the fore of the northern part of Eday. The more distant locations of these islands do, however, reduce their influence on the contextual character of the Rousay LCCA.

Sensitivity

6.12.5 The value of this LCCA is medium. This LCCA is not covered by any landscape designations which would otherwise denote a special landscape value.

6.12.6 The susceptibility of this LCCA to the effects of the Proposed Development is medium. While there is an open outlook towards Faray, to the north-east, from this LCCA, the intrinsic character of this coast, combined with its closer and stronger associations with the surrounding seascapes and coastal landscapes of Egilsay to the east and Westray to the north, reduces its association with the smaller and more distant islands, including Faray to the north-east.

6.12.7 The combination of the value of this LCCA and its susceptibility to the effects of the Proposed Development results in an overall **medium** sensitivity.

Magnitude of change

6.12.8 During the operational phase, the magnitude of change will be **medium-low**. The ZTVs in Figures 6.7b and 6.10, show theoretical visibility extending across the northern and eastern coastlines of Faraclett Head and the eastern coastline of Saviskaill Head but being screened from the eastern and central coastlines of Saviskaill Bay by the landform of Faraclett Head. The closest proposed turbine will be approximately 8.3 km from the closest edge at Faraclett Head and 12.9 km from Saviskaill Head, such that the proposed turbines will appear to be of a moderate scale. Where visibility occurs, all six will be readily visible, seen set on a distant island, the pronounced vertical structures in contrast with the low-lying horizontal landform of the islands and sea.

6.12.9 There are, however, a number of factors that prevent the magnitude of change from being rated medium. The most notable is the intrinsic character of the coastline, which strongly defines this northern part of Rousay. There is also the association between the coast and its hinterland, especially the rising landform of Kierfea Hill and the wider extent of the Moorland Hills LCT across Rousay. There is also an influence from the nearby island of Egilsay and the holms to the east and south-east and the dramatic western cliffs of Westray to the north. While it is through comparison with these closer range landscapes, that the influence of the Proposed Development will be reduced, the openness and exposure of the coastline, does also mean that a more distant influence comes from the middle range islands to the north-east, including Faray.

6.12.10 During the construction phase, the magnitude of change will be **medium-low**. The ground level construction works will not be readily evident from this LCCA owing to the separation distance. While the structures of the emerging turbines and the tall cranes used in their construction, will be readily visible, these will be seen as distant elements with a limited influence on this LCCA, owing to its closer range and closer association with surrounding landscapes and seascapes.

Significance of effect

6.12.11 During the construction and operational phases, the effect of the Proposed Development on this LCCA will be **not significant**. This assessment reflects the separation distance between the LCCA and the Proposed Development, as well as the stronger influence of the surrounding landscapes and seascapes which form the immediate context to this LCCA.

Significance of cumulative effect

6.12.12 The limited influence of consented and application wind farms on this LCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

RCCA 11 Rousay South

Baseline

6.12.13 This RCCA includes the south coast of Rousay, from Knee of Scabra in the west to Scock Ness in the east and includes the island of Eynhallow. It faces the sheltered and generally calm waters of surrounding sounds of Eynhallow, Wyre and Rousay. The generally convex coastline becomes less

regular to the west and is low and rocky with only a few bays and small shingle beaches. Its narrow foreshore rises to a pastoral hinterland with a distinctive, terraced form to the hillside and steep, moorland hills behind. Parallel to the coast and with scattered settlement nearby, the B9064 allows a panorama of numerous surrounding islands and seas, and of the Mainland in the south-west.

6.12.14 RCCA 11 Rousay South has been subdivided into four LCCAs; 11a Eynhallow; 11b Scabra Head to Tratland; 11c Tratland to Point of Avelshay; and 11d Point of Avelshay to Scock Ness. LCCA 11d is of relevance to this study as it includes Scock Ness which is closest to Faray and from which views in this north-easterly direction open up. The other LCCAs are located around the south or west of the island where the ZTV in Figures 6.7 and 6.10 show there to be no visibility. For this reason, LCCA 11a, 11b and 11c are not assessed in detail.

RCCA 11 Rousay South: LCCA 11d Point of Avelshay to Scock Ness

Baseline

6.12.15 A narrow and rocky foreshore extends from Point of Avelshay to Noustiger Bay. This coastline faces east across the narrow, sheltered and calm waters of Rousay Sound, to form a strong relationship with the opposing coastline of Egilsay. North of Noustiger Bay the coastline becomes more varied, as the coastline indents into the Bay of Ham, which is enclosed further east by the low promontory of Scock Ness, with its long, rocky taings. The Holm of Scockness is set south-east from Scock Ness headland and, although small, it almost blocks the channel between the north-east corner of Rousay and north-west corner of Egilsay.

6.12.16 The hinterland comprises a narrow coastal strip of improved pasture and arable crops set in a tight geometry of fields and backed by rising moorland. Settlement is typically small in scale and dispersed, and the character of the landscape is rural, although there is an influence from the Kingarly turbine. The low-lying nature of this coastline, combined with the close-range enclosure from surrounding islands, means that views are typically contained within the local context. The exception occurs around the north-east coast of Scock Ness, where views open up across the sea, albeit with Westray to the north, referenced as the key feature in the citation.

Sensitivity

6.12.17 The value of this LCCA is medium. This LCCA is not covered by any landscape designations which would otherwise denote a special landscape value.

6.12.18 The susceptibility of this LCCA to the effects of the Proposed Development is medium. While there is an open outlook towards Faray, to the north-east, from Scock Ness, the closer and stronger associations of this LCCA with the surrounding landscapes, reduces its association with the more distant islands, including Faray.

6.12.19 The combination of the value of this LCCA and its susceptibility to the effects of the Proposed Development results in an overall **medium** sensitivity.

Magnitude of change

6.12.20 During the operational phase, the magnitude of change will be **medium-low**. The ZTVs in Figures 6.7b and 6.10 show theoretical visibility covering much of the LCCA, with the exception of the south-facing section around the Bay of Ham. The closest proposed turbine will be approximately 7.9 km from the closest edge of the LCCA and 11.7 km from the furthest edge, such that the proposed turbines will appear to be of a moderate scale. All six will be readily visible, seen set on a distant island, their pronounced vertical structures in contrast with the low-lying horizontal landform of the islands and sea.

6.12.21 There are, however, a number of factors that prevent the magnitude of change from being rated medium. The most notable is the association this LCCA holds with the close range and opposing coastline of Egilsay, at a minimum of approximately 1.3 km to the east, as well as the small Holm of Scockness. Not only will these islands continue to form the principal external influence on the character of the LCCA but between Bay of Ham and Point of Avelshay, they will partly screen the Proposed Development, such that typically blades and tips will be seen behind the intervening landform.

6.12.22 The presence of the single turbine on Kingarly Hill and other small-scale turbines on Rousay, will ensure that the proposed turbines do not appear as new or unfamiliar features. Despite being smaller, the closer range of the Kingarly turbine, set on the rising hill slopes to the coastline, will mean that, by comparison, the proposed turbines will appear smaller. They will be seen as a relatively compact group within a much wider context of islands and sea, where other distant turbines are also visible.

6.12.23 During the construction phase, the magnitude of change will be **medium-low**. The ground level construction works will not be evident from this LCCA owing to the separation distance, the low-lying nature of the LCCA and the intervening landform of adjacent islands. While the structures of the emerging turbines and the tall cranes used in their construction, will be readily visible, these will be seen as distant elements with a limited influence on this LCCA, owing to its closer range and closer association with surrounding landscapes.

Significance of effect

6.12.24 During the construction and operational phases, the effect of the Proposed Development on this LCCA will be **not significant**. This assessment reflects the separation distance between the LCCA and the Proposed Development, as well as the stronger influence of the surrounding landscapes which from the immediate context to this LCCA.

Significance of cumulative effect

6.12.25 The limited influence of consented and application wind farms on this RCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant**.

RCCA 12 Egilsay and Wyre

Baseline

6.12.26 This RCCA covers the islands of Egilsay and Wyre, which lie to the east and south of Rousay respectively. These small, teardrop shaped islands face onto the relatively sheltered seas of Rousay Sound and Wyre Sound, forming smooth, elongated mounds with central ridge lines. Both islands have low, rocky coasts and occasional, small beaches of shingle and sand. The larger Egilsay has white sands on its east coast. The hinterlands are characterised by improved pasture and rough grazing, and settlement is scattered within higher ground, away from the coast. A key landmark is St Magnus Church's round tower on Egilsay. Surrounding views are of Rousay's high hills to the north and west, and of a panorama of enclosed sea and islands to the east and south.

6.12.1 In the absence of detailed LCCA citations, this assessment is based on the Egilsay and Wyre RCCA, supplemented with findings from site work carried out on Egilsay. The section of most relevance is the northern coastline, as it has the closest association with Faray. In comparison, the east coast is orientated east towards the southern part of Eday and the west coast is orientated west towards Rousay. Wyre is not especially relevant to this assessment owing to its greater separation distance from the Proposed Development and the intervening presence of Egilsay.

6.12.2 Egilsay is a small island, measuring approximately 5 km north to south, and 2 km west to east. It lies approximately 1.5 km to 2 km east of the eastern coast of Rousay, separated by Rousay Sound, and approximately 6.7 km south-west of Faray, separated by the Westray Sound. Egilsay is an inhabited island, albeit with a sparse and dispersed pattern of settlement, connected by a small number of minor roads and tracks. The coastal edge is low and rocky with the foreshore formed of wave cut rocks. On the north coast, these rocks form reefs extending out into the sea almost far enough to reach Kiri Holm. The west coast is separated from the east coast of Rousay by the narrow waters of Rousay Sound, such that there is a sense of containment. The ferry pier is the only development along the shoreline. The east coast also experiences a sense of containment, albeit from the more distant west coast of Eday. In the RCCA citation, the high hills of Rousay are described as a 'constant presence' while the 'panorama of islands' to the east and south are referenced in respect of views to Gairsay and Eday, but with no reference to Faray as a key feature.

Sensitivity

6.12.3 The value of the RCCA is medium. There are no national or regional landscape designations covering the island, which would otherwise denote a special landscape value.

6.12.4 The susceptibility of the northern coast of the RCCA to the effects of the Proposed Development is medium, while the susceptibility of the east coast is medium-low and the susceptibility of the west coast is low. The character of the RCCA is largely derived from the coast and hinterland of the island itself, as well as the close-range influence from Rousay. Both these islands are settled and farmed and the human influence on coastal character from Rousay is emphasised by the presence of domestic scale turbines along the eastern side of the island. Although these are relatively small in scale, they, nonetheless, increase the influence of human artefacts on the landscape character of the Egilsay coast.

6.12.5 The combination of the value of the Egilsay RCCA and its susceptibility to the effects of the Proposed Development results in an overall **medium** sensitivity.

Magnitude of change

6.12.6 During the operational phase, the magnitude of change on this RCCA will be **medium**. The ZTV shows that visibility of the Proposed Development will occur across the northern and eastern coasts of the island but not the western coast. The Proposed Development will be seen at a minimum distance of approximately 7 km, such that the turbines will be readily visible and be seen as moderate scale elements. While other wind turbines already have an influence on parts of this RCCA, the proposed turbines will form a more substantial group of larger turbines, that will appear at variance with the largely undeveloped, and strongly horizontal, context of sea and islands.

6.12.7 Those factors which moderate the magnitude of change include the closer range influence of the coasts of Rousay and Eday, with Rousay especially setting the local context to the island. Although the turbines on Rousay are relatively small in size, their closer proximity will ensure they appear larger in scale than the more distant proposed turbines. They also establish turbines as an existing influence on the landscape character of the Egilsay RCCA. It is also in contrast to the closer-range islands, that the proposed turbines on the more distant island of Faray will have a comparatively weaker influence on the coastal character of this RCCA, occurring as a back-ground, rather than an immediate feature. Most notably, however, is the small number of turbines and their containment within a small proportion of a much wider context of sea and islands.

6.12.8 During the construction phase, the magnitude of change will be **medium**. The ground level construction works will not be so readily evident owing to the separation distance between Egilsay RCCA and the Proposed Development. The presence and activity of the tall cranes and the emergence of the tall turbines will be readily visible. The magnitude of change will, however, be moderated owing to the same reasons cited above; namely the separation distance between the Egilsay RCCA and the Proposed Development, the close range influence from other islands and the human artefacts, including wind turbines, located there, and the small proportion of the much wider context that the construction of the turbines will occupy.

Significance of effect

6.12.9 During the construction and operational phase, the effect of the Proposed Development on the Egilsay RCCA will be **not significant**. While the Proposed Development will have an influence, it will not be of a sufficient magnitude to redefine the landscape character of this RCCA, largely owing to its closer association with Rousay.

Significance of cumulative effect

6.12.10 The limited influence of consented and application wind farms on this RCCA means that the cumulative magnitude of change will be **low** or **negligible** and the cumulative effect will be **not significant.**

6.13 Residual Effects on Visual Receptors

Assessment of Effects on Views

6.13.1 The first stage in the Assessment of Effects on Views comprises an evaluation of the effects at each of the representative viewpoints. This is carried out on site, using wirelines and photomontages to inform the assessment. The viewpoint locations are shown in conjunction with the ZTV in Figures 6.5a, 6.5b, 6.5c and 6.10. The viewpoints are illustrated in Figures 6.19 to 6.29 where a photograph of each view is accompanied by a computer-generated cumulative wireline and a photomontage.

6.13.2 In the wirelines, the Proposed Development turbines are shown in red, operational wind farms are shown in black, under construction wind farms are shown in purple and consented wind farms are shown in green.

6.13.3 The Proposed Development is assessed in respect of the baseline context comprising all operational and under construction wind farms. The cumulative assessment then considers the Proposed Development in respect of a cumulative context comprising the consented and application stage wind farms in addition to the operational and under construction wind farms.

Viewpoint 1: Guith, Eday

Baseline

6.13.4 This viewpoint is located on the western coast of Eday, in the northern part of the island. It is located at a high point on the minor road which connects Guith in the south with Linkataing in the north. This single-track road accesses the rural properties and farms along this coastal edge. The view is orientated west across the Sound of Faray to the island of Faray. The viewpoint is located a minimum distance of 1.9 km from the Proposed Development. The viewpoint is representative of the views of road-users and residents in this rural landscape.

6.13.5 This coastal edge is typical of the Inclined Coastal Pasture LCT, which occurs extensively across the island and is characterised by a farmed and settled landscape, comprising small and enclosed fields of improved and semi-improved pasture, and dispersed farmsteads and other dwellings. While the modification of this landscape through farming is readily evident, human influence is relatively light and the character is predominantly rural. To the east, enclosure is afforded by the rising landform of the Moorland Hills LCT, while to the west, the land falls gradually towards the shoreline.

6.13.6 The fall of the landform, from east to west, means that the coastal edge of Eday, between Guith and Linkataing is orientated west towards Faray, and that views are naturally drawn in this westerly direction. Faray forms the focus of the view and is characterised by its long and narrow form, which aligns north-south in parallel with this northern part of the Eday coastline. Its shallow, whaleback landform is pronounced by the tight covering of the grazed grasslands and the coastal edge is trimmed with low cliffs and rocky shores. The derelict crofts are set intermittently along the low ridgeline, presenting evidence of historic settlement. While Faray forms the focus, Holm of Faray and Westray are close and clearly visible to the north-west, and Rousay and Egilsay more distant to the south-west, these islands forming the wider context. While operational wind turbines are visible in the wider view, their small scale coupled with their separation distance means that they have a limited influence on the character of this view.

Sensitivity

6.13.7 The value of this view is medium. There are no formal viewpoints and no national or regional landscape designations which would otherwise denote a special value.

6.13.8 The susceptibility of road-users and residents in this area, to the effects of the Proposed Development, will be medium-high. Many of the properties are orientated south and not west, and the north to south alignment of the road means that views of road-users to Faray occur at an oblique angle. Despite the absence of direct views, the openness of this coastal edge, the proximity of the Proposed Development and the long term nature of the views of residents especially, means that views will be notably affected. The susceptibility is prevented from being rated high by the settled and cultivated character of this coastal landscape, as well as visibility of operational wind turbines within the wider context, all of which denote the baseline human influences evident in this view.

6.13.9 The combination of the value of the view and the susceptibility of the visual receptors to the Proposed Development gives rise to an overall **medium-high** sensitivity.

Magnitude of change

6.13.10 During operation, the magnitude of change will be **high**. The wireline in Figure 6.19e and photomontage in Figure 6.19f show that all six turbines will be visible, with the three on the east of the ridgeline seen to their full extents, and the three on the west of the ridgeline seen with only the base of the towers screened. At a minimum distance of 1.9 km to the closest turbine, they will be seen as close-range structures and with some infrastructure also readily visible, including tracks, crane pads and the permanent met mast.

6.13.11 The Proposed Development will change the character of this view by introducing large scale and dynamic vertical structures onto this island landscape. There will be daytime lighting on the hubs, which will be readily visible, albeit low in intensity during good visibility. Although seen in the context of the operational turbines in the wider context, the larger scale and closer range of the proposed turbines will make them appear especially prominent, particularly in relation to the scale of the abandoned buildings on the island. While they will not be seen in direct views from most dwellings, they will be readily visible from garden grounds, access tracks and in oblique angles from the minor road. In these situations, they will form the focus of the views of residents and road-users.

6.13.12 During construction, the magnitude of change will also be **high**. From this close-range and slightly elevated viewpoint, many of the ground level construction activities will be readily visible, including the construction of the tracks, crane pads, slipway, landing jetty and small borrow pit on the eastern side of the island. The most notable feature will, however, be the presence of the emerging tall turbines and tall cranes, which will draw the attention of road-users and residents and form a new focus in their views.

Significance of effect

6.13.13 The effect of the Proposed Development on road-users and residents between Guith and Linkataing will be **significant** during both the construction and operational phases. The close range, vertical scale and dynamic nature of the proposed turbines will make them a focus in views from this coastal landscape.

Significance of cumulative effect

6.13.14 The cumulative effect on the views of road-users and residents will be **not significant**. While the solus effect of the Proposed Development will give rise to a significant effect, as assessed above, the influence of the more distant application turbines on the cumulative situation is so limited that in conjunction with the Proposed Development the cumulative magnitude of change will be **medium-low** and the cumulative effect will be **not significant**. The cumulative context comprises the operational turbines plus the six turbines of application stage Orkney's Community Wind Farm Project – Quanterness at 26.2 km to the south and the two turbines of application stage Hammars Hill at 22.5 km to the south-west. The combination of the small number of turbines, their distance from the viewpoint and the limited number and scale of other operational wind farms, limits their potential for a significant cumulative effect to occur.

Viewpoint 2: Vinquoy Hill, Eday

Baseline

6.13.15 This viewpoint is located at the chambered cairn close to the summit of Vinquoy Hill, which at 76 m AOD is the highest point in the north of the island of Eday. This low and discreet hill forms part of the linear ridge, which is aligned north-south, with land falling gently away to the western coastal edge and falling more steeply to the eastern coastal edge. The Heritage Trail footpath, runs the length of the ridge, extending from Mill Loch in the south, to Red Head at the northern tip of the island. This path passes by a number of archaeological features, including chambered cairns and standing stones. The viewpoint is representative of the views of walkers on this path and across the wider Moorland Hills LCT, which covers the rural uplands in this northern part of the island.

6.13.16 The views from this ridgeline are panoramic in all directions, extending north-east to North Ronaldsay, east to Sanday, south-east to Stronsay, south across Eday, south-west to the Mainland of Orkney and Rousay, west to Faray and north-west to Westray. This array of islands presents much visual interest in all directions. The view is characterised by these rural island landscapes with their typically small scale and rural developments and land uses. These islands are small and open such that they form close connections across the intervening waters, to neighbouring islands. Wind turbines do form part of the baseline character, albeit their typically small scale and / or distant location means that their influence is limited.

Sensitivity

6.13.17 The value of this view is high. While this viewpoint is not covered by any national or regional designations, Vinquoy Hill is marked as a formal viewpoint on OS maps, and this denotes a special interest and value.

6.13.18 The susceptibility of walkers in this area is medium-high. Walkers will have a heightened awareness of their surroundings and part of their enjoyment will relate to the experience of the views. The elevated nature of the viewpoint, the openness of the landscape and the small-scale and rural character of development on Eday, all contribute to the susceptibility of walkers. The rating is, however, prevented from being assessed high owing to the existing human influences of settlement and cultivation on the island including farmsteads, transmission lines, telecoms masts and roads, as well as the presence of operational turbines in the wider context.

6.13.19 The combination of the value of the view and the susceptibility of the visual receptors to the Proposed Development gives rise to an overall **high** sensitivity.

Magnitude of change

6.13.20 During operation, the magnitude of change on the views of walkers will be **medium-high**. The wireline in Figure 6.20f and photomontage in Figure 6.20g show visibility will comprise all six turbines, seen practically to their full extents. With a minimum distance of 3.0 km to the closest turbine, they will be seen as close-range, large-scale, and dynamic vertical structures with daytime lighting on their hubs. They will be seen at variance with the character of the farmed and settled landscape where the viewpoint is located and the markedly horizontal, farmed landscape where the proposed turbines will be located. Access tracks, crane pads, slipway, landing jetty, borrow pit and the met mast will also be readily visible, adding to the influence that the Proposed Development will have on this view. The proposed turbines and associated infrastructure will form a new focus in the views of walkers.

6.13.21 The main factor which moderates the magnitude of change rating and prevents it from being rated high is the presence of existing human influences, most notably the five turbines at Spurness Point, as well as Sandy Banks on Eday and Kingarly Hill on Rousay. The addition of the Proposed Development will give rise to a cumulative effect, most notably in respect of Spurness Point, and while the location of the Proposed Development in the opposite direction to Spurness Point will increase the spread of wind farm development in this view, the relatively compact nature of Spurness Point combined with its separation from the viewpoint, moderates this effect. Although smaller in scale and more distant, the presence of these turbines ensures that the Proposed Development will not appear as a new or unfamiliar feature in this view, and that there will be some association between the Proposed Development and development visible in the baseline view. The Proposed Development will also be seen in the context of a landscape that has been modified by farming and settlement, albeit small in scale and rural in character.

6.13.22 During construction, the magnitude of change on the views of walkers will be **high**. The presence of tall cranes and emerging tall turbines on this exposed island will form a notable feature. Furthermore, the openness of the landscape will mean that the construction plant and ground level construction works will be visible from the upland landscape, adding to the overall extent of development visible.

Significance of effect

6.13.23 The effect of the Proposed Development on walkers in the northern part of Eday will be **significant** during both the construction and operational phases. Despite the existing influence of wind farm development on the surrounding islands, the closer-range and larger scale of the proposed turbines will make them the focus in the views of walkers in this upland area.

Significance of cumulative effect

6.13.24 The cumulative effect on the views of walkers will be **not significant**. While the solus effect of the Proposed Development will give rise to a significant effect, as assessed above, the influence of the more distant consented and application turbines on the cumulative situation is so limited that in conjunction with the Proposed Development the cumulative magnitude of change will be **medium-low** and the cumulative effect will be **not significant**. The cumulative context comprises the operational and under construction wind farms plus two of the four consented Costa Head turbines at 26.6 km to the south-west, the six, application stage, Orkney's Community Wind Farm Project – Quanterness turbines at 27.7 km to the south, and the two, application stage, Hammars Hill turbines at 23.9 km to the south-west. The combination of the small number of turbines and their distance from the viewpoint limits their influence on the cumulative context. While there is a cumulative effect with closer range operational Spurness Point, the cumulative interactions are moderated by the relatively compact nature of this wind farm, which means that it occupies only a small proportion of a much wider context.

Viewpoint 3: Sands of Mussetter, Eday

Baseline

6.13.25 This viewpoint is located on the western coast of the island of Eday. It is situated on the elevated outcrop which separates the Sands of Mussetter to the west and the Sands of Doomy to the east. The landform is orientated north-north-west across Fersness Bay to the small whaleback island of Faray. The sands are enclosed by the low and rocky coastlines which wrap around the bay to the west and the east. While a minor road sits parallel to the coastline, there is only one inhabited property in this coastal hinterland, and only a few dispersed properties further along the coast to the west. Eday's 'London Airport' occupies the level land to the east of Sands of Doomy. The view is representative of the views of walkers on the beach, as well as the small number of road-users and residents in this rural area.

6.13.26 The sands differ, in that the Sands of Mussetter are backed by boulder clay cliffs and comprise a shingle beach, while the Sands of Doomy are backed by dunes covered in marram grass and comprise a white sand beach. The separation of the sands from the minor road and the absence of settlement, adds to the sense of remoteness and tranquillity. While the airfield, to the east of Sands of Doomy, presents a more modern land use, its very infrequent use and relatively discreet presence limits its influence. Operational turbines are typically distant and small-scale, with the exception of Spurness Point Wind Farm, located 5.4 km to the east and with all five turbines visible, and also the single Sandy Banks turbine, located 1.9 km to the south, albeit partly screened by the intervening moorland hills.

6.13.27 Faray is framed within the bay, making it the focus in views from the surrounding landform, which defines the bay. The separation distance of approximately 2.5 km between the viewpoint and the Point of Scarabar, combined with its low elevation, means that the island appears relatively small and flat. Furthermore, the north-south alignment of the island means that in these views from the south, it is seen at its shorter width, rather than longer length, and this adds to a more condensed impression of its size. While Faray forms the focus in these views, the islands of Westray and Rousay form the wider visible context to the north-west and south-west, respectively.

Sensitivity

6.13.28 The value of this view is medium. There are no formal viewpoints which would otherwise denote a special value, and this viewpoint is not covered by any national or regional landscape designations.

6.13.29 The susceptibility of walkers, road-users and residents in this area is medium-high. The views of those few residents living in this area, are varied in terms of the principal orientation of their

properties and the predominant east-west alignment of the minor road, and this means that there are very few visual receptors with a direct outlook towards Faray. The openness of this coastal landscape, combined with the prominence of Faray as the focus, means that despite the indirect nature of the views, residents and road-users will still be notably susceptible. Walkers will be especially susceptible owing to the natural draw of views in this area towards Faray, although their susceptibility will be moderated somewhat by the existing presence and influence of the Spurness Point and Sandy Banks turbines. Visual receptors in this landscape will have an awareness of the scenic qualities of the surrounding landscapes and seascapes and this will add to their susceptibility.

6.13.30 The combination of the value of the view and the susceptibility of walkers, road-users and residents to the Proposed Development gives rise to an overall **medium-high** sensitivity.

Magnitude of change

6.13.31 During operation, the magnitude of change on the views of walkers, road-users and residents will be **medium-high**. The wireline in Figure 6.21e and photomontage in Figure 6.21f, show that all six of the turbines will be visible practically to their full extents, with the closest turbine at approximately 3.1 km from the viewpoint. From this rural southern aspect, the Proposed Development will introduce six large-scale and dynamic structures that will appear especially large in scale compared to the island landscape of Faray. Their pronounced vertical form will be accentuated by the pronounced horizontal form of the island and surrounding seascape. The modern appearance of these structures and the dynamic motion of their blades mean they will appear at variance with the rural character, although some smaller single turbines do form part of the wider baseline view. The slipway and landing jetty will be visible on the southern end of the island, along with the permanent mast and substation compound.

6.13.32 The magnitude of change is prevented from being assessed as high owing to the existing human influences evident from this viewpoint, including the operational turbines at Spurness Point on Sanday and the single turbine at Sandy Banks, which mean that the Proposed Development will not form a new or unfamiliar feature. It also reflects the settled and farmed context within which the viewpoint is located, with a slightly more urban influence also occurring in respect of the presence of the airfield and distant masts. Furthermore, the relatively small number of six turbines ensures that the group appears well-contained on this island landscape which is part of a relatively large scale and simple landscape and seascape context.

6.13.33 During construction the magnitude of change will be **medium-high**. The construction of the turbines will form the most readily visible feature of the Proposed Development, owing to the gradually increasing height of the emerging turbines and the presence and activity associated with the tall cranes used in their construction. Ground level works on the south of Faray will also be visible, with access tracks, crane pads, sub-station, slipway, landing jetty and the met mast, adding to the overall variance from the baseline character.

Significance of effect

6.13.34 The effect of the Proposed Development on the views of walkers, road-users and residents in this area will be **significant** during construction and operation. This assessment relates to the full extents of visibility that will be experienced at a relatively close range, which means the Proposed Development will form a new and defining focus in views from this area.

Significance of cumulative effect

6.13.35 The cumulative effect on the views of walkers, residents and road-users will be **not significant**. While the solus effect of the Proposed Development will give rise to a significant effect, as assessed above, the addition of other consented and application wind farms will not be readily visible from this viewpoint, and this means that in respect of this cumulative context, there will be a **negligible** cumulative magnitude of change.

Viewpoint 4: Westray Ferry Terminal

Baseline

6.13.36 This viewpoint is located close to Westray Ferry Terminal on the southern coastline of the island of Westray. The pier extends from the rocky coastline sheltered by the Point of Huro to the west and Weather Ness to the north. The view looks south-south-east, across Rapness Sound to the island of Faray, where the Proposed Development would be located, while the view south-east looks across Weatherness Sound to the closer range Holm of Faray. The view is representative of the views of ferry passengers who would be arriving from, or departing to, either Kirkwall on the Mainland of Orkney, Papa Westray, or Pierowall on Westray. It is also representative of the views of residents and road-users in this rural, southern part of Westray, known as Rapness.

6.13.37 Rapness is characterised by a settled and cultivated landscape, albeit with a strong association with the surrounding sea and islands. While development is typically small in scale and rural in character, there are also some larger developments including the Westray Ferry Terminal and parking for trailers next to the Sand of Woo, as well as a disused quarry to the east. While there are some operational turbines visible in the view, their small-scale and distant location limits their influence.

6.13.38 Views from this southern, coastal edge focus on the small and close-range Holm of Faray and island of Faray, with the larger island of Eday readily visible behind. The Holm of Faray and Faray are characterised by a coastal edge of low cliffs and rocky shoreline and hinterland of rounded landform with grassland covering. They are relatively low and discreet, sitting to the fore of the moorland hills of Eday. Collectively these islands form a prominent cluster that defines the views from the southern part of Westray.

Sensitivity

6.13.39 The value of this view is medium. There are no formal viewpoints, nor any national or regional landscape designations which would otherwise denote a special value.

6.13.40 The susceptibility of residents in this southern part of Westray is high. The principal outlook of properties along this coastal edge is south-south-east across Rapness Sound, in the direction of the site. For residents, their views will be long-term and this adds to their susceptibility. For walkers, open views towards the site are experienced from the minor road to the Point of Huro and from the footpath to Weather Ness and their susceptibility is medium-high. The susceptibility of road-users is, however, medium. This is because their views are channelled along the alignment of the road which is mostly oblique to the direction of the site. Walkers will typically be more aware of their surroundings and part of their experience will be the enjoyment of the open coastal views.

6.13.41 The combination of the value of the view and the susceptibility of residents and walkers, to the Proposed Development gives rise to an overall **medium-high** sensitivity, while the sensitivity of road-users is rated as **medium**.

Magnitude of change

6.13.42 During operation, the magnitude of change to the views of walkers, road-users and residents will be **medium-high**. The viewpoint will be located a minimum distance of 3.68 km from the closest turbine. As the wireline in Figure 6.22e and photomontage in Figure 6.22f show, all six of the proposed turbines will be visible, with all of Turbines 1, 2 and 3 seen to almost their full extents. While Turbines 3, 5 and 6 appear evenly spaced on the southern part of Faray, Turbines 1, 2 and 4 appear more tightly bunched on the northern part. The turbines will have daytime lighting on their hubs, albeit low intensity during good visibility.

6.13.43 As the photomontage in Figure 6.22f shows, the proposed turbines will appear as tall and dynamic structures. Their prominence will be accentuated by the contrast between their strong vertical form amidst the strong horizontal form of the low islands and surrounding sea, as well as the movement of their blades seen against the static landform. While the single turbine at Sandy Banks is visible in the baseline view, the Proposed Development will have a much more notable influence on the character of Rapness, owing to the larger scale of the proposed turbines and their greater variance with the baseline rural character. The magnitude of change is, however, prevented from being assessed as high, owing to the human influences which do currently exist, such as the Westray Ferry

Terminal and the nearby quarry, which mean that views are currently not without the influence of other man made developments.

6.13.44 During construction, the magnitude of change will also be **medium-high**. This assessment reflects the extent to which the site and many of the construction processes will be visible from this southern part of Westray. While the emerging turbines and the tall cranes used to construct them will form the most notable visual influence, the construction of the access tracks and closest crane pad will also be visible and will contribute to the magnitude of change.

Significance of effect

6.13.45 The effect of the Proposed Development on the views of walkers, road-users and residents in this southern part of Westray will be **significant**. This takes into account the proximity of the Proposed Development to the southern coast of Westray, the close association between the coast and Faray and the very limited influence of operational wind farms or turbines on viewers in this area.

Significance of cumulative effect

6.13.46 The cumulative effect on the views of walkers, residents and road-users will be **not significant**. While the solus effect of the Proposed Development will give rise to a significant effect, as assessed above, the addition of other consented and application wind farms will not be readily visible from this viewpoint, and this means in respect of the cumulative context, there will be **negligible** cumulative magnitude of change.

Viewpoint 5: Ness of Tuquoy, Westray

Baseline

6.13.47 This viewpoint is located on the Ness of Tuquoy on the south-western coast of the island of Westray. It is a rocky headland that forms the western enclosure to the Bay of Tuquoy, including the sheltered and sandy, south-east facing beach. At Ness of Tuquoy there is provision for visitor parking and an informal path around the rocky headland. While there is very little settlement along this coastal edge, the coastal hinterland is farmed and settled with some large farmsteads, dispersed rural properties, small scale turbines and minor roads evident. This viewpoint is representative of the views of walkers along the coastal edge, as well as residents and road-users with views across the coast from the hinterland.

6.13.48 While views from around the Bay of Tuquoy are largely introverted by the enclosing landform, from the Ness of Tuquoy they open up with visibility extending south to Rousay and south-east to Eday. Faray is located behind the peninsula that extends south-west to the Point of Huro and is therefore screened by the intervening landform. While Faray is low-lying, the moorland hills of Eday form a modest backdrop. In contrast, the higher moorland hills of Rousay appear more imposing, despite their longer range. While development in the view is predominantly small in scale and rural in character, operational turbines are visible, with Newark turbine at 3.8 km to the east, Westray Development turbine at 3.8 km to the north, and the Gallowhill turbine at 3.5 km to the north.

6.13.49 The landform wraps around the Bay of Tuquoy and extends south-east along the Rapness peninsula, such that these close-range, coastal edges largely define the character of this area. A patchwork of small fields containing arable crops or improved pasture encroach towards the coastal edge, where a thin band of coastal grasses line the rocky shoreline. Letto Sands forms a greater depth of sandy beach and forms the focus to the bay. Recessed from the coastal edge, roads and dispersed properties encircle the bay, with views predominantly drawn seawards. In contrast to the detail of the surrounding coastline, the other islands appear distinctly distant and lack a close association with this part of Westray.

Sensitivity

6.13.50 The value of the view is medium. There are no formal viewpoints in this area and no national or regional landscape designations, which would otherwise denote a special value.

6.13.51 The susceptibility of visual receptors in this western part of Westray to the effects of the Proposed Development is medium-high. The views from the Ness of Tuquoy and Bay of Tuquoy are largely characterised by the surrounding coastlines. This reduces the influence from the other islands,

which largely occur as background features. Residents are typically inset from the coastal edge and are typically orientated south rather than south-east towards the site. Roads are also inset with orientation either north-south or east-west, again with few direct views and with views being typically transitory. It is the views of walkers which will be most susceptible to the Proposed Development, with more open views occurring from the coastline and a heightened awareness of their surroundings forming part of the walking experience.

6.13.52 The combination of the value of the view and the susceptibility of the visual receptors to the Proposed Development gives rise to a **medium-high** sensitivity.

Magnitude of change

6.13.53 During operation, the magnitude of change on walkers, residents and road-users in this western part of Westray will be **medium**. The wireline in Figure 6.23f and photomontage in Figure 6.23g show that all six turbines will be visible, with the closest turbine at approximately 9.0 km. They will all be visible to practically their full height, albeit with the lower parts of the turbines partly concealed by intervening landform. They will be seen set behind the south-westerly peninsula of Rapness, but as Faray is not clearly visible as a separate island, they could appear to be located on Rapness, rather than Faray.

6.13.54 Those factors which will moderate the effects of the Proposed Development on visual receptors in this area include the small number of proposed turbines, their relatively compact layout, and their separation distance from this area, all of which combine to ensure they occupy only a small proportion of the wider view. While the vertical extent of these large turbines is more notable, their perceived scale is moderated by their association with the closer range landform of Rapness, upon which they appear to be located. Furthermore, views in this area are typically drawn in towards the focal feature of the bay, and, therefore, the location of the Proposed Development on the periphery of the enclosing landform, reduces their prominence.

6.13.55 Despite the small number of turbines, in the context of the Orkney Isles and the rural character of Westray, the Proposed Development will be seen as a moderate scale development. While the turbines will be seen in a sector of the view where there is very limited influence from operational turbines, they will not be seen as new or unfamiliar features as operational turbines are evident across Westray, visible as small scale features in other sectors of the view. The magnitude of change will also be moderated by the extent to which this western part of Westray has been modified by agricultural land uses and dispersed settlement, with human influence including a series of abandoned vehicles around the northern edge of the bay.

6.13.56 During construction, the magnitude of change on walkers, residents and road-users in this western part of Westray will be **medium-low**. Seen at a minimum distance of 9 km, and with intervening landform screening ground level works, it will be the presence of emerging turbines and activity of the tall cranes that will form the visible component of the construction phase. While they will form a readily visible feature from this coastal area, the magnitude of change will be moderated by the small proportion of the wider view they will occupy and the baseline influence from the operational turbines on Westray, despite their relatively small scale.

Significance of effect

6.13.57 During both construction and operation, the effect of the Proposed Development on the views of visual receptors in this western part of Westray will be **significant**. This finding relates to the open views from this coastline towards the Proposed Development.

Significance of cumulative effect

6.13.58 The cumulative effect on the views of walkers, residents and road-users will be **not significant** largely owing to the limited influence of the additional consented and application wind farms. Costa Head will be visible as two of the four consented turbines at a distance of 20.3 km to the south-west, and one of the application stage Orkney's Community Wind Farm Project – Quanterness turbines at 29.6 km to the south-east. The low levels of visibility combined with the limited influence of other operational turbines will mean that the cumulative magnitude of change will be **low**.

Viewpoint 6: Spur Ness, Sanday

Baseline

6.13.59 This viewpoint is located at Spur Ness, on the southern tip of Sanday, the island to the east and north-east of Eday and north of Stronsay. Sanday's only ferry terminal is located at Spur Ness, with ferries connecting to Kirkwall on the Mainland of Orkney, with the integrated service also connecting to Eday and Stronsay. From this southerly point, the B9070 passes along the long, narrow, south-western peninsula of the island to connect with the confluence of other roads in the central part of the island. Settlement is sparse in this southern part of Sanday, with farmsteads and isolated properties set towards the more sheltered eastern coast. This viewpoint is representative of the views of ferry passengers and road-users in this southern part of the island. The viewpoint is located on the elevated section of the B9070 as it ascends northwards from the coastline. It has been selected to avoid the view to the Proposed Development being screened by the ferry or the ferry terminal. The elevation also ensures that the proposed turbines are seen to slightly fuller extents. The viewpoint does, however, feature one of the Spurness Point turbines within the close range, which is unavoidable in this southerly section of the B9070.

6.13.60 From this viewpoint, the rising landform towards the north prevents wider views across Sanday, such that Spur Ness is the only part of the island visible. Views are, therefore, drawn west, across Eday Sound to Eday, and south, across Spurness Sound to Stronsay, with rocky holms present within the inshore waters. The eastern coast of Eday is set parallel to the western coast of Spur Ness, and with a separation of only 2 km to 3 km, these opposing coastlines form a close association. Eday is characterised by a rocky shoreline with a hinterland which is low and narrow behind the Bay of London, whilst rising to the north and south where low moorland hills occur.

6.13.61 Faray, which lies further north-west, is not visible from this viewpoint, owing to the intervening landform of Stennie Hill (66 m AOD). Settlement is sparse and dispersed along this eastern side of Eday, and while the dark hues of the moorland heather cover the upper parts of the low hills, the landscape is predominantly enclosed to form fields of pasture and arable. While Stronsay is visible to the south, its association with Sanday is weaker owing to the greater separation distance and absence of opposing coasts. Spur Ness is largely characterised by the presence and movement of the five Spurness Point operational turbines which are located on this southern tip of the island.

Sensitivity

6.13.62 The value of the view is medium. There are no formal viewpoints in this area and no national or regional landscape designations which would otherwise denote a special value.

6.13.63 The susceptibility of ferry passengers and road-users who experience views in this area is medium. These people are transient and the key factor influencing the susceptibility of visual receptors in this area is the existing presence of the five operational Spurness Point turbines. These establish wind farm development as a close range and established part of the baseline views and while this reduces the susceptibility of visual receptors to the presence of wind turbines, it can also heighten their susceptibility to the addition of further wind farm developments. The susceptibility of ferry passengers and road-users is moderated by the transitory nature of their views, as well as the oblique angle at which the site is situated relative to the direction of their routes. The openness of the seascape and landscape does, however, mean that they still experience largely uninterrupted views west towards Eday and, for ferry passengers especially, these views will be longer in duration.

6.13.64 The combination of the value of the view and the susceptibility of the visual receptors to the Proposed Development gives rise to an overall **medium** sensitivity.

Magnitude of change

6.13.65 During the operational phase, the magnitude of change will be **medium**. The wireline in Figure 6.24f shows that all six of the turbines will be visible to varying degrees, owing to the screening effect of the intervening landform. The two central turbines will be seen as blades, while the two turbines on either side of the intervening hill will be seen to below the hub. They will form a prominent feature owing to their perceived position on the opposing island, the movement of their blades, the openness of the landscape and the fore-shortening effect of the seascape.

6.13.66 The magnitude of change will, however, be most notably moderated by the existing influence of the operational Spurness Point turbines, which, because of their close proximity, will establish a scale comparison which will reduce the perceived scale of the proposed turbines, despite their larger size. Furthermore, the proposed turbines will not cause such variance from the baseline view, as the operational turbines already present a notable influence. In respect of the Spurness Point turbines, the addition of the Proposed Development will give rise to a cumulative effect, as it will be seen to spread wind farm development onto a new island and into a new sector of the view. This effect will, however, be moderated by the combination of the separation distance and the partial concealment by intervening landform. The proposed turbines will have the same daytime lighting as the Spurness Point turbines.

6.13.67 Although six turbines is a relatively small number, in the context of the Orkney Isles where wind farms typically comprise less than six turbines and single turbines are a more common feature, the Proposed Development will still have an impact, despite its compact and evenly spaced layout. In terms of vertical scale, perceptions will be moderated by the appearance of the proposed turbines being located on Eday, despite being located on more distant range Faray at 7.43 km, and the partial screening by intervening landform will further reduce their prominence. Comparison with the low scale of the Eday landform will, however, ensure the turbines still appear large in scale.

6.13.68 During the construction phase, the magnitude of change will be **medium**. The screening effect of the landform on Eday means that all ground level construction works will be concealed. The key features will, therefore, be the emerging turbines and the tall cranes used in their construction, seen rising above the ridgeline of Stennie Hill. The magnitude of change on ferry passengers and road-users will, however, be moderated by the exiting presence of the Spurness Point turbines which will ensure the construction of the proposed turbines will not present such a notable variance in the baseline character.

Significance of effect

6.13.69 The effect of the Proposed Development on ferry passengers and road-users in Spur Ness will be **not significant** during the construction and operational phases. Despite the close association between this coastline and westward looking views towards the site, the existing influence of the operational Spurness Point turbines and the partial screening of the proposed turbines by the intervening landform ensures that the Proposed Development will not redefine the character of views from this area.

Significance of cumulative effect

6.13.70 The cumulative effect on the views of ferry passengers and road-users will be **not significant** largely owing to the limited influence of other consented and application wind farms. Application stage Orkney's Community Wind Farm Project – Quanterness Wind Farm will be visible as a distant feature at 27.1 km to the south-west. The low levels of visibility combined with the limited influence of other operational turbines will mean that the cumulative magnitude of change will be **low**.

Viewpoint 7: Burness, Sanday

Baseline

6.13.71 This viewpoint is located on the minor road which connects the B9068 with Whale Point in Burness, on the north-west coast of Sanday. It is located at the bend in the road to the west of the B9068 junction and west of Howland Farm. The viewpoint is representative of the views of road-users in this area, as well as the views of residents who live in dispersed dwellings across this rural landscape. The viewpoint lies approximately 14.8 km to the north-east of the Proposed Development.

6.13.72 The view is characterised by the close-range surrounding farmland, with its low cover of improved pasture and arable crops, set in fenced fields with landform falling gently towards the coastal edge. This landscape forms part of the Low Island Pastures LCT, characterised by its low-lying, open and relatively flat landform, which is exposed to the vast skies and changeable weather. Settlement is typically sparse and dispersed, comprising farmsteads and other residential properties.

6.13.73 From this western coast of Burness, views are drawn over the North Sound to the Calf of Eday and the island of Eday. The red cliffs fringe the low moorland hills in this northern part of the island and

wrap around the coastal basin of Carrick, while the low rounded holm of the Calf of Eday sits to the fore. While single turbines of a domestic scale are visible across this north-western part of Sanday, there are no larger turbines or wind farms visible and human influences are limited to the wide-spread modification of the landscape for farming and rural settlement.

Sensitivity

6.13.74 The value of this view is medium. There are no formal viewpoints in this area and no national or regional designations which would otherwise denote a special value.

6.13.75 The susceptibility of residents in this area is medium-high. While the houses and the roads are separated from the site by the North Sound, the Calf of Eday and the island of Eday, the principal orientation of the houses is south-east. Although Faray is not directly visible owing to the screening effect of the intervening landform of Eday, the site is set in this sector of the view. The views of residents will be experienced over the long term and this adds to their susceptibility. The roads do not align towards the site such that views of road-users are typically oblique toward the site and this makes their susceptibility medium, despite the openness of the landscape and the seascape, which means almost all road sections are uninterrupted.

6.13.76 The combination of the value of the view and the susceptibility of the visual receptors to the Proposed Development gives rise to an overall **medium-high** sensitivity for residents and **medium** for road-users.

Magnitude of change

6.13.77 During the operational phase, the magnitude of change will be **medium-low**. The Proposed Development will be located 14.75 km to the south-west of the viewpoint, appearing to be set on the island of Eday, albeit in reality set on the more distant island of Faray. The wireline in Figure 6.26d shows that all six turbines will be visible, albeit with all six towers concealed by the intervening landform. Five of the turbines will be seen with their hubs and blades, while the remaining one will be seen only as blades appearing and disappearing on the skyline. They will be seen evenly spaced behind the ridgeline and cliff tops, to the right of Stennie Hill (66 m).

6.13.78 Despite the orientation of this north-west coastline and associated properties towards the site, and the eye-catching feature that the movement of the blades will create in clear conditions, there are a number of factors which will moderate the magnitude of change. Firstly, there is the separation distance of 14.8 km and the appearance of the turbines being located on Eday, which combine to make the proposed turbines appear relatively small in scale. Secondly, there is the extent to which the turbines are screened by intervening landform which means they will be seen to approximately half their full vertical extent. Thirdly, there is the association of the turbines with a relatively low-lying part of the Eday ridgeline, along which there are more prominent hills. They will also be seen to occupy a small proportion of a much wider views and the simplicity and scale of the outlook means that the Proposed Development will be able to be accommodated within this view. Fourthly, small-scale turbines are a common feature across the island of Sanday, and whilst not comparable to the scale of the proposed turbines, do nonetheless, establish turbines as a feature of the baseline character.

6.13.79 During the construction phase, the magnitude of change will also be **medium-low**. The extent to which the site is concealed by the intervening landform means that the ground level works will not be visible and only the construction of the upper parts of the proposed turbines will be visible. The most notable features will be the structures of the emerging turbines and the tall cranes required for their construction. The limited extent to which these higher-level construction works will be visible combined with the separation distance of 14.8 km from which they will be seen, will notably moderate the magnitude of change.

Significance of effect

6.13.80 The effect of the Proposed Development on views of residents and road-users in the Burness area of Sanday will be **not significant** during both the construction and operational phases. This finding relates principally to the distance from which the Proposed Development will be visible and the

extent to which it will be screened by intervening landform, despite the orientation of the coastal edge in the general direction of the site.

Significance of the cumulative effect

6.13.81 The cumulative effect on the views of residents and road-users will be **not significant**, owing to the fact that there will be no visibility of other consented or application wind farms, which means that there will be **no change** to the cumulative situation.

Viewpoint 8: John's Hill, Stronsay

Baseline

6.13.82 The viewpoint is located on the low summit of John's Hill (48 m AOD) in the north of the island of Stronsay. This is a formal viewpoint marked on O.S. maps. It is signed from the B9062, where road-side parking is provided, and from which, a fenced path leads to the low summit where an interpretation board is located. It is representative of the views of visitors to the viewpoint, as well as road-users on the B9062 and rural residents in the local area. The viewpoint is located approximately 12.6 km to the south-east of the site, with the view looking north-west across Eday Sound towards the west coast of the island of Eday.

6.13.83 Stronsay comprises a 'main body' in the south, with a spur to Rothiesholm Head in the west, where the single Stronsay Development Trust turbine is located, and a long narrower spur to the north-west, where John's Hill is located. Along this north-western spur, the landform falls either south-west or north-east from the central ridgeline to the respective coastlines, such that there is no strong association between these parts of the island and the islands to the north-west, including Eday and Faray. It is only at the very northern part of the island, where the landform becomes orientated towards the north-west, that an association with these islands is formed. While Faray is screened by the intervening landform of Eday, the eastern coast of Eday is readily visible, as well as the southern part of Sanday, with the five operational turbines at Spurness Point forming a notable feature.

6.13.84 Stronsay is a low-lying island with John's Hill at 48m forming one of the few high points. It is also one of the more fertile islands, which is made evident by the extent of arable farm fields covering much of the island. While the character of the island is typically small in scale and rural in character, the simplicity of the landform, the broad sweep of the horizons and the vast scale of the skies and seascapes presents a more expansive aspect to this context. There is also a number of small-scale turbines dispersed across the island.

Sensitivity

6.13.85 The value of the view from John's Hill is high owing to its recognition as a formal viewpoint, and despite the absence of any national or regional landscape designations.

6.13.86 The susceptibility of the visual receptors to the effects of the Proposed Development is medium-high. Although a small hill, John's Hill is recognised as a viewpoint and there is an openness of aspect, especially from the west through to the north-east. With the site located to the north-west, is sits within this open aspect. Visitors to this point will have a heightened awareness of their surroundings that will be accentuated by the interpretation board which highlights local features. The susceptibility of visual receptors is most notably moderated by the existing human influences which are already evident in this view. As well as the extensive modification of the landscape through agricultural practices and dispersed settlement, there is also an influence from small-scale, domestic turbines as well as larger commercial wind farms, most notably Spurness Point, readily evident on the southern tip of Sanday and the Stronsay Development Trust turbine on the south of this island.

6.13.87 The combination of the value of the view and the susceptibility of the visual receptors to the Proposed Development gives rise to an overall **medium-high** sensitivity.

Magnitude of change

6.13.88 During the operational phase, the magnitude of change will be **medium-low**. The wireline in Figure 6.26e shows that all six of the proposed turbines will be readily visible. The blades, hubs and towers will be visible, albeit with the towers screened to variable extents by the intervening landform of

Eday. Although the proposed turbines will be set on the more distant island of Faray, they will appear to be set on Eday, located between the rising landform of Vinquoy Hill to the north and Ward Hill to the south. They will be seen a minimum distance of 12.6 km from the viewpoint, such that they will be seen as medium scale features in views from the north of Stronsay. The openness of the foreground landscape and middleground seascape, creates a simple and uninterrupted outlook which increases the relative prominence of the proposed turbines.

6.13.89 The magnitude of change is prevented from being rated medium or medium-high owing to a combination of the separation distance between the viewpoint and the Proposed Development, the influence of the other island landscapes and seascapes in the view, and the existing influence of operational wind turbines evident in the view.

6.13.90 The separation distance of 12.6 km to the closest turbine means that the six turbines will occupy a small proportion of the wider view and appear as a relatively compact and well-contained group. As all sectors of the view are equally interesting and attractive, as illustrated by the interpretation board at this formal viewpoint, the Proposed Development will not be associated with an especially important sector of the view. Furthermore, the perceived association of the Proposed Development with closer range Eday, will mean the scale of the turbines will be referenced against the closer range hills on Eday, thus making the turbines appear comparatively smaller than they might otherwise appear. The proposed turbines will also appear comparable in scale to the turbines at Spurness Point on the southern tip of Sanday, which will help to moderate the effect of their actual larger size. The Proposed Development will add to the sense of an accumulation of wind farm development within this wider area, however the similar scale of the cluster of turbines and their separation from those on Spurness Point ensures that wind farms do not become the key characteristic of the view, which remains largely defined by the island and seascape setting.

6.13.91 During the construction phase, the magnitude of change will be **medium-low**. The separation distance combined with the screening effect of the intervening landform of Eday, will mean that ground level works will not be visible from the north of Stronsay. Higher level works, comprising the construction of the proposed turbines using tall cranes, will be visible. While the emerging turbines will be taller than the existing turbines at Spurness Point, the magnitude of change will be moderated by their greater separation distance of 12.6 km, which will make them appear comparable in scale. Furthermore, they will be seen in a sector of the view where wind farm development is already evident.

Significance of effect

6.13.92 The effect of the Proposed Development on visual receptors in this northern part of Stronsay will be **not significant**. This assessment relates to a combination of the separation distance between the viewpoint and the Proposed Development, the relatively small proportion of the view the Proposed Development will occupy amidst the much wider panorama, and the existing influence of the operational Spurness Point Wind Farm.

Significance of cumulative effect

6.13.93 The cumulative effect on the views of residents and road-users will be **not significant**. The influence of the more distant consented and application turbines on the cumulative situation is so limited that in conjunction with the Proposed Development the cumulative magnitude of change will be **low** and the cumulative effect will be not significant. The cumulative context comprises the addition of the six, application stage, Orkney's Community Wind Farm Project – Quanterness turbines at 25.7 km to the south, and the two, application stage, Hammars Hill turbines at 26.5 km to the west. The combination of the small number of turbines, their distance from the viewpoint and the limited number and scale of other operational wind farms, limits the potential for a significant cumulative effect to occur.

Viewpoint 9: Kierfea Hill, Rousay

Baseline

6.13.94 This viewpoint is located on the summit of Kierfea Hill on the eastern side of the island of Rousay. The ZTV in Figure 6.5b shows theoretical visibility to extend across this eastern side, which is closest

to the Proposed Development, set a minimum distance of 11.3 km to the north-east. At 235 m AOD, Kierfea Hill is the highest point on the island and its location in the north-east means that it is the closest hill to the Proposed Development. The viewpoint is representative of the views of walkers, as well as road-users on the nearby B9064 and residents in this rural area. The viewpoint is accessed from the B9064 which climbs steeply across the eastern flank of the hill, leaving only a short off-road climb to the top. Kierfea Hill was chosen as the viewpoint as it is representative of the formal viewpoint on the B9064 as well as presenting the widest panoramic outlook available, that also ensures all cumulative developments are visible.

6.13.95 The view is orientated north-east towards the small island of Faray, which is the site for the Proposed Development. Faray sits to the fore of Eday, located a minimum distance of 11 km from the viewpoint and characterised by its long and low landform. The view northwards, features the island of Westray, located a minimum distance of 9.5 km from the viewpoint. This island is characterised by the high, rocky cliffs on the western coast and the long peninsula extending south-east. The view eastwards, features the island of Eday, located a minimum distance of 10 km from the viewpoint and characterised by Vinquoy Hill to the north and Ward Hill to the south, with low landform between and bright white sands tracing sections of the western coastline. To the south-east, Egilsay is located a minimum distance of 4 km from the viewpoint and is characterised by its low whaleback landform. From the south through to the north-west, the view looks over the hinterland and northern coast of Rousay, which is characterised largely by upland moorland.

6.13.96 All the islands are characterised by the low landcover associated with sheep farming, with the differentiation between improved, semi-improved and rough grazing evident in the changing colour of the landscape, from bright green, to faded green, to brown. While this patchwork is visible on the more distant islands, the detailed features of the enclosures and farm buildings are more readily evident on closer range Egilsay. Small scale settlement is also visible, typically comprising isolated and dispersed dwellings set in exposed landscapes devoid of tree cover.

6.13.97 The view from Kierfea Hill is open and expansive in all directions. While there is no principal focus, the main draw for viewers is typically across the surrounding seascape to the islands of Westray, Eday and Faray, with the islands of Rousay and Egilsay forming more of the immediate context. Wind turbines stand out as a prominent form of development, across both the surrounding landscape of Rousay and the more distant landscapes of the surrounding islands. The closest turbine is Kingarly Hill at 2.8 km to the south, while the five turbines of Hammars Hill and six turbines of Burgar Hill are readily visible, both at approximately 10 km to the south-west. To the north, more distant turbines are visible on Westray, while to the north-east, the five Spurness Point turbines and single Sandy Banks turbine are clearly visible despite their distance.

Sensitivity

6.13.98 The value of the view is high. While the viewpoint is located on Kierfea Hill, it is also representative of the formal viewpoint on the B9064, and this denotes a recognised value. Kierfea Hill presents the widest panoramic outlook available and ensures all cumulative developments are visible.

6.13.99 The susceptibility of walkers, road-users and residents in the north-east of Rousay is medium-high. The elevated nature of this north-eastern part of the island makes it attractive to walkers and opens up expansive views of which Faray occupies a part. Part of the walking experience is the appreciation of the surrounding context and this raises the susceptibility of this group. For residents, their views are longer term and where their views are towards the north-east, their susceptibility will be heightened. For road-users, the B9064 follows an elevated route over the eastern flank of Kierfea Hill, which opens up expansive views to the north-east and this raises their susceptibility, despite the more transitory nature of their views. The presence and influence of operational wind turbines on Rousay moderates the susceptibility of visual receptors as these present close-range examples of this type of development, albeit occurring as single turbines rather than wind farms.

6.13.100 The combination of the value of the view and the susceptibility of the viewers leads to a **medium-high** rating for sensitivity.

Magnitude of change

6.13.101 During operation, the magnitude of change will be **medium**. The wireline in Figure 6.27f shows that all six turbines will be visible to practically their full extents. They will be seen from 11.3 km on Kierfea Hill. The proposed turbines will be seen set along the low landform of Faray, with Eday wrapping around its northern and southern extents. While the separation distance will moderate their scale to some extent, comparison with the low-lying landform of the islands will reference their relatively large scale. The openness and simplicity of the seascape also means that there will be a fore-shortening effect, whereby the proposed turbines may appear closer than they actually are and the presence of the smaller scale single turbine on Eday will serve to accentuate the larger scale of the proposed turbines.

The tall, vertical, moving and man-made form of the turbines will appear in contrast to the rural scene where there are few development features and where the combination of seascape and landscape is markedly horizontal. The magnitude of change is prevented from being rated high or medium-high owing principally to the existing influence of operational turbines, both across Rousay and the surrounding islands. The larger number and larger scale of the proposed turbines will, nonetheless, be evident. They will be seen from an island which is settled and cultivated, and this denotes the widespread human influence across these islands, albeit with development typically being small in scale and rural in character. The Proposed Development will be seen as a relatively compact group of turbines, and from this distance of 11.3 km, they will be seen to occupy only a small proportion of a much wider view in which there is wide-spread scenic interest. While views are naturally drawn towards the islands, the relative low-lying nature of the landform means that there are no landmark features that might otherwise add to the prominence of the Proposed Development, with the closer range and more upland landform of Rousay forming more of a defining feature. The simplicity and expansiveness of the view presents a context which has capacity to accommodate the Proposed Development. During construction, the magnitude of change will be **medium**. While ground level works will possibly be too small scale to be visible from this distance, the emerging turbines and the tall cranes used in their construction will be readily visible and in contrast to the baseline character. The magnitude of change will not be higher than medium owing to the relatively small number of turbines being constructed and the existing human influences experienced along this coast, as described above.

Significance of effect

6.13.102 The effect of the Proposed Development on the views of walkers, road-users and residents in this north-eastern part of Rousay will be **significant** during the construction and operational phases. Despite the separation distance between this area and the Proposed Development, the existing influence from operational turbines and the small proportion of the wider view that the proposed turbines will occupy, they will nonetheless form a defining feature.

Significance of cumulative effect

6.13.103 The cumulative effect on the views of walkers, residents and road-users will be **not significant**. The influence of the more distant consented and application turbines on the cumulative situation is so limited that in conjunction with the Proposed Development the cumulative magnitude of change will be **low** and the cumulative effect will be not significant. The cumulative context comprises the addition of the four consented Costa Head turbines at 11.8 km to the west, two of the six application stage Orkney's Community Wind Farm Project – Quanterness turbines at 18.1 km to the south, and the two application stage Hammars Hill turbines at 10.4 km to the south-west. The combination of the small number of turbines, their distance from the viewpoint and the limited number and scale of other operational wind farms, limits the potential for a significant cumulative effect to occur.

Viewpoint 10: Hatston, Kirkwall

Baseline

6.13.104 This viewpoint is taken from Grainshore Road next to Hatston Industrial Estate on the north-western side of Kirkwall. This viewpoint is representative of the views from the Kirkwall area on the Mainland of Orkney and this viewpoint was selected as it presents an uninterrupted view across the Wide Firth, northwards to where the site is located. Hatston is a place name that refers to the farm and

cluster of residential properties located to the north of the A965, as well as the industrial estate set along the coastal edge. The viewpoint is located close to where the A965 meets the western junction into the Hatston Industrial Estate. It has been selected to represent the views of road-users in this area and through Hatston Industrial Estate, as well as residents at Hatston Farm and the adjacent residential development and residents of Kirkwall who experience views over the Wide Firth. It is also representative of people on boats crossing the Wide Firth. The view looks north towards the site.

6.13.105 The Wide Firth is largely contained by surrounding landform. Western Mainland wraps around the west and north-west of the firth, while the whaleback landform of Gairsay and the higher hills of Rousay can be seen to the north and north-west. The mainland also wraps around to the east and Shapinsay forms a relatively low and large island feature to the north-east, with more distant Eday seen beyond. Faray is so distant and low-lying that it is barely perceptible from this range, appearing as part of the short section of open horizon in this northern sector.

6.13.106 While the character of Kirkwall and Hatston is defined by the extent of urban development, views over the Wide Firth present a simpler scene comprising more rural landscapes within a seascape setting. While it is evident that these landscapes are farmed and lightly settled, there is also evidence of wind farm development with the single turbine at Crowness Business Park forming an especially close range feature, and then Hammars Hill wind farm seen on the moorland hills of Western Mainland at 10.8km to the north.

Sensitivity

6.13.107 The value of this view is medium. There are no formal viewpoints and this viewpoint is not covered by any national or regional designations which would otherwise denote a special value.

6.13.108 The susceptibility of residents in this area is medium-high, while the susceptibility of road-users is medium. The principal outlook from Kirkwall and Hatston is north across the Wide Firth, which is where the site is located. Many of the residential properties are orientated in this direction and from the more elevated properties especially, open views will be experienced by residents potentially over long periods of time. In contrast, Grainshore Road and the A965 follow the coastline, such that the orientation is principally west-east, such that the views of road-users towards the site are not direct and typically oblique. These views are also transitory and, therefore, experienced over short periods of time.

6.13.109 The combination of the value of the view and the susceptibility of the visual receptors to the Proposed Development gives rise to an overall **medium-high** sensitivity for residents and **medium** sensitivity for road-users.

Magnitude of change

6.13.110 During operation, the magnitude of change on the views of road-users and residents will be **medium-low**. The wireline in Figure 6.28e and photomontage in Figure 6.28f show visibility will comprise all six turbines, albeit seen at a distance of 25 km. Although set on Faray, the small and low-lying extent of this island means that it may not be readily discernible in this view, such that the six turbines will appear to be set along the open horizon, as if an offshore, rather than onshore wind farm.

6.13.111 The magnitude of change will be moderated by the distant location of the wind farm which will ensure that the proposed turbines will be seen as small-scale structures. They will be seen to occupy only a small proportion of a much wider view. Furthermore, this wider view comprises existing wind turbines and wind farms, which will not only avoid the Proposed Development from appearing as a new or unfamiliar feature but will also avoid the proposed turbines from appearing large in scale, as closer range examples will appear larger.

6.13.112 The magnitude of change is, however, prevented from being rated low, as it will be seen to introduce a further wind farm development into a new sector of the view, and in a position at the centre of the main northerly views from this northern coastal edge, where it will occupy what appears to be a short section of open horizon. While this will draw attention to the Proposed Development, it will

not redefine these views, largely because of the extent of existing human influences in the view and the much wider landscape and seascape context characterising the view.

6.13.113 During construction, the magnitude of change on the views of road-users and residents will be **medium-low**. From this distant range of 25 km, while ground level construction works will not be visible, the presence of tall cranes and emerging tall turbines will be visible, albeit seen as a distant and small-scale feature. While this will form a focus in views from Hatston and Kirkwall, it will not redefine the character if these views owing to the extent of existing human influences, including other closer range wind farm developments and single turbines.

Significance of effect

6.13.114 The effect of the Proposed Development on residents and road-users in the Hatston and Kirkwall area will be **not significant** during both the construction and operational phases. The distant location of the Proposed Development from this area will ensure that it forms a distant and small scale feature, occupying only a small proportion of a wider view, in which human influences already have a notable effect.

Significance of cumulative effect

6.13.115 The cumulative effect on the views of road-users and residents in the Hatston area will be **not significant**. The application stage wind farm with the most notable influence on the cumulative situation will be Orkney's Community Wind Farm Project – Quanterness, located only 1.2 km to the west. Application stage Hammars Hill Extension will also be visible at 10.8 km to the north-west, seen along the same ridgeline as the five operational Hammars Hill turbines. It is in this context that the introduction of the Proposed Development will give rise to only a **medium-low** cumulative magnitude of change. The addition of the Proposed Development would not reach the threshold of significant cumulative effects as its more distant location means that by comparison the turbines will appear much smaller in scale.

Viewpoint 11: Westray Ferry

Baseline

6.13.116 This viewpoint is located on the Kirkwall to Westray ferry, at a point where it crosses the Westray Firth, approximately 7 km from the ferry terminal at Rapness on Westray, and approximately 24 km from the ferry terminal at Kirkwall. The viewpoint is representative of the views of passengers on the Westray or Papa Westray ferry and will be similar to views obtained by passengers on the North Ronaldsay ferry, which passes through Faray Sound, on the eastern side of Faray. The ferry takes one hour and twenty-five minutes, with four crossings per day, except Sunday, when there are only two crossings.

6.13.1 Views from the ferry are characterised by the combination of the surrounding seascape and surrounding islands. Despite the openness of the sea, islands can be seen in almost every sector of the view, presenting some sense of containment and limiting the extent of open horizons. The open and expansive views that can be experienced from the ferries is one of the key attractions to travellers and especially visitors to the islands. Views from the ferry to the Northern Isles are made especially interesting by the number of different islands that are passed on both sides and their relatively close proximity, which means that features on the islands are readily visible in clear conditions.

6.13.2 From the ferry viewpoint, Faray is the closest of the islands and is characterised by its gently dome-shaped landform, fringed by a rocky shoreline and low cliffs. Despite its uninhabited state, human influences are still evident, with derelict houses visible along the central ridgeline and sheep grazing the semi-improved pasture. The character is rural and the lack of modern or large scale development adds to the sense of remoteness.

6.13.3 Wind farm development is evident in wider views from the ferry, albeit never close in range or large in scale. From the viewpoint, the closest turbines are Sandy Banks, visible on Eday to the east at 3.6 km, Spurness Point, visible beyond Eday to the east at 8.5 km and Kingarly Hill, visible on Rousay to the south-west at 9.5 km. Hammars Hill and Burgar Hill Wind Farms area also visible as distant

features on the Mainland of Orkney and Gallowhill and Westray Development Trust single turbines are visible on Westray to the north-west.

Sensitivity

6.13.4 The value of the view is medium. There are no formal viewpoints and the Wide Firth is not covered by any national or regional scenic designations.

6.13.5 The susceptibility of passengers on the ferry is medium-high. This relates to the experience of passengers, many of whom will have a heightened awareness of their surroundings owing to the openness and availability of panoramic views from the ferry, particularly when travelling north and away from the more developed Mainland of Orkney. While the arrival into Orkney will be important for many passengers, their susceptibility may be moderated by the unremarkable nature of the relatively flat surrounding landscapes and the existing influence of developments on the Mainland of Orkney.

6.13.6 The combination of the value of the view and the susceptibility of viewers leads to an overall **medium to high** rating for sensitivity.

Magnitude of change

6.13.7 During operation, the magnitude of change will be **high**. The wireline in Figure 6.28e shows that all six turbines will be visible almost to their full extents. They will be seen at a distance of 2.1 km from this viewpoint to the south-west of the island but the ferry route will come within 1 km of the closest turbine slightly further north. The exposed nature of Faray in views from Westray Firth, the strong vertical form of the proposed turbines in contrast with the strong, horizontal form of the island and surrounding seascape, the movement of the large blades and presence of daytime lighting on turbine hubs ensures that the Proposed Development will form a prominent feature. The openness and simplicity of the seascape mean that there will be a foreshortening effect whereby the proposed turbines may appear closer than they actually are and associated infrastructure, such as met mast, access tracks, crane pads, slipway and landing jetty will add to the extent of visible development.

6.13.8 During construction, the magnitude of change will be **high**. This reflects the visual draw that the presence of the emerging turbines and the tall cranes used in their construction will have on ferry passengers. The prominence of the site will be accentuated by the openness of the water and clear views of the turbines, and construction of access tracks, crane pads, landing jetty, slipway and borrow pit will be apparent from the closer range sections of the ferry route.

Significance of effect

6.13.9 The effect of the Proposed Development on the views of ferry passengers will be **significant** during the construction and operational phases. This assessment relates chiefly to the prominence of the Proposed Development site in views from Westray Firth, which will ensure that the Proposed Development will form a focal feature.

Significance of cumulative effect

6.13.10 The cumulative effect on the views of passengers on ferries across Westray Firth will be **not significant**. While the solus effect of the Proposed Development will give rise to a significant effect, as assessed above, the influence of application stage Hammars Hill at 18.1 km to the south-west and application stage Orkney's Community Wind Farm Project – Quanterness at 22.3 km to the south, along with the influence of the operational turbines, will be sufficiently limited that they will not contribute towards a significant cumulative effect at this location. The addition of the Proposed Development to the cumulative situation will give rise to a **low** cumulative magnitude of change and the effect will be not significant.

Principal Visual Receptors

6.13.11 The second part of the assessment of effects on views is the assessment of the effects that the Proposed Development will have on the views from principal visual receptors. The principal visual receptors considered in the assessment include people in settlements and on route corridors,

including roads, walking routes and national cycle routes, all of which are shown in Figure 6.4, and shown in conjunction with the ZTV in Figure 6.9.

6.13.12 The principal visual receptors assessed in detail have been selected as they have potential to undergo significant effects as a result of the Proposed Development. Not all principal visual receptors are relevant to the assessment, as not all have the potential to undergo a significant effect, and that is why a preliminary assessment to identify the most important and sensitive receptors has been carried out. This has involved the use of ZTVs and wirelines to indicate the extents, level and nature of theoretical visibility and site work to determine the extents, level and nature of actual visibility. This process has identified the people associated with the following principal visual receptors as requiring detailed assessment;

- Northern Isles Ferries;
- B9066, Westray;
- B9063, Eday;
- ED1 Eday Heritage Walk;
- ED5 Newark;
- ED6 Sands of Mussetter;
- W8 Castle o' Burrian and the Bay of Tafts; and
- R6. Faraclett Head.

Northern Isles Ferries

Viewpoints 4, 10 and 11 are representative of the views of ferry passengers.

Baseline

6.13.13 The Proposed Development has the potential to give rise to significant effects on the views of ferry passengers travelling between the Mainland of Orkney and the Northern Isles of Westray, Papa Westray and North Ronaldsay. Ferries from the Mainland of Orkney to the Northern Isles pass northwards through Wide Firth, which is largely enclosed by the Mainland wrapping around the west and east, Shapinsay to the north-east and Gairsay to the north. At the point between the north-west tip of Shapinsay and Gairsay, the ferry routes diverge, with ferries travelling to Eday, Sanday, Stronsay, and further on to the Shetland Isles, bearing north-east, while ferries to Westray, Papa Westray and North Ronaldsay continue to bear in a northerly direction. This point is approximately 15 km from the Proposed Development. The Westray and Papa Westray ferries pass Faray on its western side, while the North Ronaldsay ferry passes on the eastern side through the narrow Sound of Faray. Both routes come within 1 km of the Proposed Development.

6.13.14 The open and expansive views that can be experienced from the ferries is one of the attractions to travellers and especially visitors to the islands. Views from the ferries to the Northern Isles are made especially interesting by the number of different islands that are passed on both sides and their relatively close proximity, which means that features on the islands are readily visible in clear conditions. Their presence also means that there is some sense of containment and limit to the extent of open horizons. The Northern Isles are all relatively small islands with relatively low-lying landform. They are characterised by rural farming, mostly livestock grazing, but also some arable, and settlement is typically sparse and dispersed, often following the historic pattern of the crofts.

6.13.15 In passing north from the Wide Firth, the whaleback island of Gairsay is close to the west of the ferry route and the ridgeline island of Shapinsay is close to the east. While the waters open up towards the east, the small islands of Wyre and Egilsay present some containment to the west, especially with the more pronounced uplands of Rousay forming a notable backdrop. The island of Eday then forms a feature to the east, with the small island of Faray set in views directly to the north.

6.13.16 In passing south from the North Sound, the Westray and Papa Westray ferries run alongside the eastern coast of Westray, while the North Ronaldsay ferry runs alongside the western coast of

Sanday. The North Sound forms an expanse of open water and the passage south comes to a narrowing of the waters, whereby the eastern coast of Westray and northern coast of Eday form a funnel. In the centre of this funnel lies the Holm of Faray and Faray, this arrangement accentuating their prominence in the views of ferry passengers.

6.13.17 Wind farm development is evident in wider views from the ferry, albeit never close in range or large in scale. From the ferry route, Hammars Hill is the most visible wind farm on the Western Mainland, with Burgar Hill partly screened by the intervening ridgeline. The single turbines of Kingarly Hill on Rousay and Sandy Banks on Eday, are also readily visible despite their relatively small scale. Closer to Faray, Spurness Point Wind Farm can be seen set behind Eday and the cluster comprising Gallowhill / Westray Development Trust turbines can be seen on Westray.

Sensitivity

6.13.18 The value of the views from the ferry routes is medium. There are no formal viewpoints and the sea is not covered by any national or regional scenic designations which would otherwise denote a special value.

6.13.19 The susceptibility of passengers on the ferry is medium-high. This relates to the experience of passengers, many of whom will have a heightened awareness of their surroundings owing to the openness and availability of panoramic views from the ferry. While views are transitory, the moderate speed of the ferry and the openness of the seascapes and island landscapes means that views can be experienced for a substantial period of time.

6.13.20 The combination of the value of the view and the susceptibility of viewers leads to an overall **medium-high** rating for sensitivity.

Magnitude of change

6.13.21 During the operational phase, the magnitude of change on ferry passengers on the Westray, Papa Westray and Ronaldsay ferries range from **high** at the closest points to Faray to **medium-low** or **low** at the furthest points. The ZTV in Figure 6.9 shows that all six of the turbines will be theoretically visible along the full length of these ferry routes. The ferry terminal at Kirkwall is located approximately 26 km from the Proposed Development, while the Westray ferry terminal is located approximately at 4 km, the Papa Westray ferry terminal at approximately 13 km and the North Ronaldsay ferry terminal at approximately 27 km.

6.13.22 The magnitude of change will be **medium**, **medium-high** or **high** for ferry passengers within a distance of approximately 12 km to the south and within approximately 8 km to the north-west, on the Papa Westray route and approximately 7 km to the north-east, on the North Ronaldsay route.

6.13.23 At 12 km to the south, the ferry routes for Westray, Papa Westray and North Ronaldsay, have passed through the channel formed by the north-west tip of Shapinsay to the east and Gairsay to the west. In this area to the north of Shapinsay and Gairsay, views extend across the more open waters to Eday and Faray, the positions of which align with the northerly direction of the ferry routes. This raises their prominence in views of ferry passengers and will raise the prominence of the proposed turbines which are to be located on Faray. To the south of this 12 km extent, the views of ferry passengers are focussed more on the adjacent coastlines of Shapinsay and Gairsay and the magnitude of change here will be **medium-low**, possibly reducing to **low** with a greater separation distance and more urban influences, closer to Kirkwall.

6.13.24 On the Papa Westray ferry route to the north-west of Faray, **medium**, **medium-high** or **high** magnitudes of change will occur out to a range of approximately 8 km from the Proposed Development. While the alignment of the ferry route is south-east and the Proposed Development will be located to the south, clear views will still be experienced, and the proposed turbines will form a notable feature. Beyond the 8 km extent, the magnitude of change will drop to **medium-low** or **low**, as the south-east spur of Westray starts to form an intervening feature that reduces the prominence of Faray and the proposed turbines. The closer range island of Papa Westray also starts to take over as more of a focus, along with the rocky cliff line of eastern Westray.

6.13.25 On the North Ronaldsay ferry route to the north-east of Faray, **medium**, **medium-high** or **high** magnitudes of change will occur out to a range of approximately 7 km from the Proposed

Development. While the alignment of the ferry route is south-west towards the Proposed Development, the intervening landform of the northern part of Eday will start to partly screen the full extents of the proposed turbines, thus reducing their prominence in the views of ferry passengers. Beyond the 7 km extent, the magnitude of change will drop to **medium-low** or **low**, as the northern coast of Eday starts to form an intervening feature that reduces the prominence of Faray and the proposed turbines.

6.13.26 During the construction phase, the magnitude of change will follow the same range of ratings set out above, in respect of the operational phase. The key features will be the emerging turbines and the tall cranes used in their construction, which will be visible over a considerable length of the ferry routes. Although only at its full scale towards the end of the construction phase, the Proposed Development will, nonetheless, form an eye-catching feature in the views of north-bound and south-bound ferry passengers, owing to the incomplete appearance of the turbines and the associated construction activities. The construction of the access tracks, crane pads, slipway, landing jetty and borrow pit will be especially visible where the ferries pass close to Faray.

Significance of effect

6.13.27 The effect of the Proposed Development on the views of ferry passengers on the Westray, Papa Westray and North Ronaldsay ferries, will be **significant** during the construction and operational phases, out to a radius of approximately 12 km to the south and approximately 8 km to the north-west, on the Papa Westray route, and 7 km to the north-east, on the North Ronaldsay route. This finding relates principally to the openness of the seascape, the exposed nature of Faray, the proximity of the ferry routes to Faray, and the relatively limited influence from other wind farm developments and turbines.

Significance of cumulative effect

6.13.28 The cumulative effect on the views of ferry passengers on the Westray, Papa Westray and North Ronaldsay ferries will be not significant**.** This finding relates to the limited influence of other operational and proposed wind farms, which are relatively small in scale and distant in location. The more notable wind farm developments are Hammars Hill which is set along the ridgeline of the moorland hills on Western Mainland and Spurness Point which is on Sanday but seen set behind Eday. There are also more single and small groups of turbines seen set on Westray, Rousay, Eday and Shapinsay. The additional application wind farms that are to be considered in the cumulative assessment include the two Hammars Hill extension turbines and the six Orkney's Community Wind Farm Project – Quanterness turbines. The separation distance of these application stage wind farms from the Proposed Development of 24 km and 20 km respectively, means that where inter-visibility occurs, the wind farms will not be seen in close proximity. This means the cumulative magnitude of change will be **medium-low** and the cumulative effect will be **not significant**.

B9066

Baseline

6.13.29 The B9066 is the main road on Westray, linking Gill Pier near Pierowall, in the north of the island with Rapness Pier in the south of the island. Apart from where it wraps around the Bay of Pierowall, the road is routed along the central spine of the south-eastern spur of the island, following a predominantly north-west to south-east alignment. The relatively low-lying and gently undulating landform has meant that the road has evolved in long straight sections without interruptions from obstructive landform features. The openness of the landscape also means that views from the road are without interruptions, with views extending to the surrounding islands from the upper sections, albeit more contained by surrounding landform in the lower sections.

6.13.30 The influences along this route relate predominantly to the agricultural land uses and dispersed settlement. The exception occurs in the northern part, which passes through the nucleated settlement of Pierowall, where development encloses the road and the outlook is very much focussed on Pierowall Bay. While settlement continues along the B9066 to the south of Pierowall, it becomes gradually more sparse with fewer clusters and more dispersed patterns emerging. The B9066 forms the central spine, from which minor roads and tracks are drawn perpendicularly towards the coastal edges, and also in parallel to form a rectilinear pattern across the landscape.

This is further accentuated by the rectilinear pattern of the fields, which are mostly enclosed by post and wire fencing but also occasional stone dykes. The fields mostly comprise improved pasture for livestock grazing, but also some arable. Farmsteads with large sheds occur intermittently across this farmed landscape. While the coastal edges of Westray comprise some dramatic coastal cliffs, especially on the north-eastern side, only glimpsed views of these can be seen from the road. In addition to the small-scale and rural developments, there is a single turbine at Newark, three turbines at Gallowhill / Westray Development Trust and more distant turbines visible on Sanday, Eday and Rousay.

Sensitivity

6.13.31 The value of the views from the B9066 are medium. There are no formal viewpoints and this route is not covered by any national or regional landscape designations, which would otherwise denote a special value.

6.13.32 The susceptibility of road-users on the B9066 between Gill Pier and Rapness Pier is medium or medium-high. While the transitory nature of road-users would typically moderate their susceptibility, in respect of the southern section of the B9066, its alignment south-east towards the site raises susceptibility, as road-users would be experiencing views directly towards the Proposed Development. In the northern section of the B9066, where this visual connection does not occur and where there is a more notable influence from the operational turbines at Gallowhill / Westray Development Trust, the susceptibility is medium.

6.13.33 The combination of the value of the view and the susceptibility of road-users on the A9066 gives rise to a **medium-high** sensitivity for road-users in the southern section and a medium sensitivity for road-users in the northern section.

Magnitude of change

6.13.34 During operation, the magnitude of change on the views of south-bound road-users between Einor and Rapness will be **medium** or **medium-high**, while on the views of south-bound road-users between Pierowall and Einor and all north-bound road-users, the magnitude of change will be **medium-low** or **no change.** The ZTV in Figure 6.9 shows that theoretical visibility along the southern section of the B9066 will be continuous and the openness of the landscape means that actual visibility would broadly match these extents. In the central and northern sections, visibility becomes more intermittent as the undulations of the landform mean that visibility is screened from the north-west facing slopes.

6.13.35 Between Einor and Rapness, the B6099 aligns directly towards the Proposed Development and this will accentuate its prominence in views of south-bound road-users, leading to **medium** and **medium-high** magnitudes of change. This section of road lies between 4 km and 7.5 km from the Proposed Development. At Dean there is a cluster of properties which forms a brief and uncharacteristic enclosure along the road. It is in the section north of this cluster that the alignment of south-bound road-users is to the south-south-east rather than the south-east, such that it is not directly aligned to the Proposed Development. This factor, combined with the greater separation distance from, and weaker association with the southern coast, and the closer association with not only the surrounding hinterland, but also coastal views to the north and south, reduces the magnitude of change to **medium**. In the northern section, beyond Einor, visibility becomes increasingly intermittent. The smaller scale of the turbines, experienced by road-users from this greater distance, further reduces the magnitude of change to **medium-low**, with **no change** occurring in those sections where there is no visibility.

6.13.36 During the construction phase, the magnitude of change will follow the same range of ratings set out above, in respect of the operational phase. The key features will be the emerging turbines and the tall cranes used in their construction, which will be visible over a considerable length of the B9066, albeit with the extents of visibility typically decreasing with distance and intervening landform increasingly screens the proposed turbines. It is the alignment of the southern section of the B9066, towards the site that will accentuate the presence of the emerging turbines and tall cranes and make them an eye-catching feature in the views of south-bound road-users.

Significance of effect

6.13.37 The effect of the Proposed Development on the views of road-users on the B9066 between Pierowall and Rapness will be **significant** during construction and operation for south-bound road-users over the 3.8 km southern section and **not significant** for north-bound road-users in the southern section and all road-users in the northern section. This assessment relates to the alignment of the southern section of the B9066 towards the Proposed Development which will make it an especially prominent feature in the views of south-bound road-users out to a distance of approximately 7.5 km from the Proposed Development.

Significance of cumulative effect

6.13.38 The cumulative effect on the views of road-users on the B9066 will be **not significant**. This finding relates to the limited influence of other operational and proposed wind farms, which are relatively small in scale and / or distant in location. The more notable wind farm developments include the three Gallowhill / Westray Development Trust turbines, which are located less than 1 km from the northern section of the B9066 and the single Newark turbine, which is located less than 1 km from the southern section. Closer to the southern end of the B9066, the five Spurness Point turbines are visible, set behind the intervening landform of Eday. This means the cumulative magnitude of change will be **low** and the cumulative effect will be **not significant**.

B9063

Baseline

6.13.39 Eday is a long and relatively narrow island with a predominant north-south orientation. On Eday, the main road is the B9063, which runs almost the length of the island, from Calfsound in the north, to Backaland in the south where the Bay of Backaland ferry terminal is situated. The B9063 is located on the eastern side of the island, with views typically drawn east towards Sanday, although also with views west from the narrow central section and more elevated parts to the north. The B9063 cuts a section through the variety of different landscape character types that occur on the island.

6.13.40 The northern end is located in the Coastal Basin LCT of the Bay of Carrick, which has a strong association with the Calf of Eday, to the immediate north across Calf Sound. Settlement occurs along this coastal edge, set within a fine patchwork of small farm fields. The road rises to the south, as it passes into the Moorland Hills LCT, dipping down at Loch Bomo, before rising up between Hill of Calfsound and Hill of Bomo and then descending down into the Enclosed Bay LCT with Mill Bay to the east and Mill Loch to the west. Settlement is clustered and dispersed along this section of road and there is a sense of enclosure from the surrounding landform, including the ridgeline of the Moorland Hills LCT to the west. The partial enclosure continues as the road passes between Stennie Hill and Mill Hill, before descending down into the Inclined Coastal Pasture LCT, which covers the narrowest and lowest part of the island, and from where, views open out to the west and east. The B9063 then ascends up and along the eastern flank of the Moorland Hills LCT which cover the central part of southern Eday. The road remains on the eastern side of these hills, passing in and out of the parallel Inclined Coastal Pasture LCT, before turning east down towards the Low Island Pastures LCT where it terminates at the ferry terminal.

6.13.41 The influences along this route relate predominantly to the agricultural land uses and dispersed settlement. The lower-lying areas are more modified by cultivation and settlement, with clusters of settlement and patchworks of small fields of arable and pasture. Where the road passes over higher ground, there is less settlement and less enclosure, with rough grasslands and moorlands used for hill sheep farming. The B9063 forms the central spine, from which minor roads and tracks are drawn perpendicularly towards the coastal edges. In the northern section, views of the eastern coastal edge typically open up where the road passes close to low-lying bays, in the central section where beaches occur on either side and along the southern section where the road traverses the lower hill slopes. Views are predominantly drawn east towards Sanday, with the west coast only visible from the low-lying section in the centre of the islands. In addition to the small-scale and rural developments evident on Eday, there is a single turbine at Sandy Banks and five turbines at Spurness Point on Sanday.

Sensitivity

6.13.42 The value of the views from the B9063 is medium. There are no formal viewpoints and this route is not covered by any national or regional landscape designations, which would otherwise denote a special value.

6.13.43 The susceptibility of road-users on the B9063 between Calfsound and Backaland is medium. The transitory nature of road-users and the relatively short length of the road mean that views are only experienced over relatively short periods of time. While many local trips will be shorter than the full length, many visitors come to the island and travel the full length either by car or bicycle. The road runs north-south, which is perpendicular to the direction towards the Proposed Development and, therefore, there will be no direct views, which might otherwise have increased the susceptibility of road-users. While there are many small scale turbines visible from the B9063, the larger scale Spurness Point Wind Farm is visible from sections of the road, set across the Eday Sound, on the southern tip of Sanday.

6.13.44 The combination of the value of the view and the susceptibility of road-users on the A9066 gives rise to a **medium** sensitivity.

Magnitude of change

6.13.45 During operation, the magnitude of change on the views of road-users between Calfsound and Stennie Hill will be **medium**, between Stennie Hill and just south of the Newbigging minor road junction will be **medium-high**, while south of this, the magnitude of change will be **low** or **no change**. The ZTV in Figure 6.9 shows that theoretical visibility along the northern section of the B9066 will be almost continuous, with the exception of small patches of no visibility occurring at Calfsound, Loch of Bomo, Mill Bay, and east of Stennie Hill. The openness of the landscape means that actual visibility would broadly match the extent of theoretical visibility shown. In the southern section, there are only a few small patches of visibility as the Moorland Hills LCT starts to intervene and gradually prevent visibility from occurring over the remaining section.

6.13.46 Between Calfsound and Stennie Hill, the proposed turbines will be mostly seen set behind the western ridgeline of the island. In the low-lying central section between Stennie Hill and just south of the Newbigging minor road junction, the proposed turbines will be visible at a distance of approximately 3.2 km to 4.4 km, seen across the Sands of Doomy and without the interruption of intermediate landform. The distance between road-users on the northern section of the B9063 and the closest turbine, will be 3.6 km at the closest point and 4.4 km at the furthest point, showing that the distance will remain fairly constant. While the extent to which the proposed turbines are visible will vary depending on the extent to which the intervening landform will screen them, they will mostly be seen as moving blades, set behind the western ridgeline. While these will form large scale and dynamic features at variance with the rural landscapes of Eday, the magnitude of change will be moderated by the north-south alignment of the road, which will mean they will be seen between an oblique and perpendicular angle to the forward direction of road-users. While there will be some variability along this northern section of the road, especially in patches where no visibility occurs, the magnitude of change will be **medium-high** in the lower-lying central section and **medium** in the other remaining parts.

6.13.47 The magnitude of change on the views of road-users on the southern section of the B9063, from just south of the Newbigging minor road junction, will be **low** where some small patches of visibility occur and then **no change** for the remainder of the route, where the ZTV shows there to be no theoretical visibility. From this southern section of the B9063, the emphasis shifts, with a closer association forming with the eastern coastal edge, as well as the opposing western coastal edge of Sanday.

6.13.48 During the construction phase, the magnitude of change will follow the same range of ratings set out above, in respect of the operational phase. The key features will be the emerging turbines and the tall cranes used in their construction, which will be visible over a considerable length of the B9066, albeit with the extents of visibility typically decreasing with distance and intervening landform increasingly screening the proposed turbines. It is the alignment of the southern section

of the B9066, towards the site that will accentuate the presence of the emerging turbines and tall cranes and make them an eye-catching feature in the views of south-bound road-users.

Significance of effect

6.13.49 The effect of the Proposed Development on the views of road-users on the B9063 between Calfsound and just south of the Newbigging minor road junction will be **significant** during construction and operation for road-users and not significant for road-users in the southern section south of the Newbigging minor road junction. This assessment relates to the proximity of the proposed turbines and the feature they will form, seen set behind the western ridgeline of Eday, despite these views being experienced at an oblique angle to the direction of the road.

Significance of cumulative effect

6.13.50 The cumulative effect on the views of road-users on the B9063 will be **not significant**. This finding relates to the limited influence of other operational and proposed wind farms, which are relatively small in scale and / or distant in location. The more notable operational wind farm developments include the five Spurness Point turbines, which are located a minimum of approximately 4 km from the central section. The additional consented and application stage wind farms are not readily visible from this road. This means the cumulative magnitude of change will be **low** and the cumulative effect will be not significant.

ED1 Eday Heritage Walk

Baseline

6.13.51 Eday Heritage Walk provides access into the moorland hills in the north of the island. It has been designed to connect sites of archaeological interest, mostly cairns and chambered cairns, a number of which occur across these hills. ED1 connects the junction between the B9063 and the Linkataing minor road, where the central cluster of properties, including the island's Post Office and shop are situated, with Red Head, which is the most northern tip of the island. The path starts off on the minor road, heading west past Mill Loch, before turning north onto a sign-posted path into the moorland hills. The path passes a number of cairns and chambered cairns, before climbing up a steep south-east facing slope to get onto the central ridgeline where Vinquoy Hill (Viewpoint 2 at 76 m AOD) forms the high point. The path then passes onto the eastern side of the ridgeline as it dips down into a valley, before rising again onto Noup Hill (57 m AOD). From here, the path continues along the ridgeline to the end point of Red Head (70 m AOD).

6.13.52 The experience of walkers along ED1 varies with the changing context. The first section of the path is within a settled landscape where roads and properties occur. There is a sense of containment in this landscape, as the low hills surround the central feature of Mill Loch, forming an enclosed basin. The hills to the north are more open and exposed. They comprise moorland land cover used for hill sheep farming, and there are no settlements or roads, although these features are readily evident in the neighbouring landscapes. Views from the ridgeline are expansive, drawn mostly to the surrounding islands of Sanday, Faray and Westray, but also with views out to Rousay. As the path passes further north, the character becomes increasingly remote as human influences become less evident. The path runs along a coastal headland, surrounded by high cliffs and rocky shorelines, with strong maritime influences occurring. From here, the views of walkers are drawn across the open and featureless expanse of North Sound.

6.13.53 Spurness Point Wind Farm is visible from notable sections of the path at a distance of approximately 3.5 km to 5.5 km to the closest turbine. It will be seen set on the southern tip of Sanday, in a direction to the south-east of the path. While other operational wind turbines are visible on Westray and Rousay, as well as smaller scale single turbines on Eday, their separation distance and smaller scale means they have a limited influence on the cumulative context.

Sensitivity

6.13.54 The value of the view is medium. There are no formal viewpoints in this area and no national or regional landscape designations that would otherwise denote a special scenic value.

6.13.55 The susceptibility of walkers to the changes arising as a result of the Proposed Development is medium-high. The susceptibility of walkers relates to their awareness of their surroundings and appreciation of the views. Walkers travel at a slower pace than road-users and therefore, experience views for a longer duration. They are also able to experience the wider extents of views more fully and focus on specific features more than transitory road-users might. The views of walkers are not, however, long term and this prevents susceptibility from being rated as high.

6.13.56 The combination of the value of the view and the susceptibility of walkers to the Proposed Development gives rise to an overall **medium-high** sensitivity.

Magnitude of change

6.13.57 During the operational phase, the magnitude of change on the views of walkers on ED1 will be **medium-high** along the section either side of Vinquoy Hill, **medium** from Noup Hill to Red Head and **medium** from the B9063 junction to the Stone of Setter, with **no change** occurring in the remaining sections. The ZTV in Figure 6.9 shows that visibility along ED1 is intermittent with the sections along the ridgeline showing visibility of all six of the turbines, while sections to the east of the ridgeline showing no or more limited visibility owing to the screening effect of the intervening landform. Where visibility does occur, the proposed turbines will be seen within the range of 3.1 km to 5.1 km, such that they will appear as large-scale structures, at variance with the relatively small scale of the island of Faray and the western coastal edge of Eday. Their prominence will be accentuated by the movement of the blades, which will form an eye-catching feature in the views of walkers. Daytime lighting will also be visible on the turbine hubs, albeit low intensity during good visibility.

6.13.58 Walkers on the path will experience a cumulative effect owing to the interactions between the Proposed Development and the operational wind farm at Spurness Point. While the presence of Spurness Point, prevents the Proposed Development from appearing as a new or unfamiliar feature, it's addition, at close-range on the western side of the island, will extend the influence of wind farm development, which is currently concentrated at close range on the eastern side, and this will add to the magnitude of change.

6.13.59 The section with the highest levels of visibility occurs across Vinquoy Hill, from where all six turbines will be seen to their full extents. In the low-lying section around Mill Loch, the extent of visibility will be notably reduced by the intervening hills to the west. This will mean that the Proposed Development will be seen as blades moving behind the western ridgeline. Despite the full extent of the proposed turbines not being visible, the blades will still form a prominent feature and, at a range of approximately 3.1 km to 3.4 km, will appear as large scale components relative to the scale of the hills. Where visibility occurs between Noup Hill and Red Head, the magnitude of change will also be medium, as the full extent of the turbines will be partly screened by the intervening landform of Muckle Hill of Linkataing and Vinquoy Hill. Furthermore, the association between this coastal headland and Faray is weaker than it is from Vinquoy Hill, as a closer association with the open seascape prevails.

6.13.60 During the construction phase, the magnitude of change will be **medium-high, medium** or **no change**, with the same distribution of these ratings as defined for the operational phase above. The key features will be the emerging turbines and the tall cranes used in their construction, which will be fully visible from Vinquoy Hill and only partly visible from the sections alongside Mill Loch and out to Red Head, where intervening landform will screen the lower parts of these structures. Ground level works including the construction of access tracks, crane pads, slipway, landing jetty, borrow pit and substation will also be readily visible from Vinquoy Hill and will add to the overall extent of visible construction on the island, but will not be readily visible from other sections. The construction works will form a focal attraction in the views of walkers on ED1 owing to the close range and incomplete appearance of the turbines and associated construction activities.

Significance of effect

6.13.61 The effect of the Proposed Development on the views of walkers on ED1, will be **significant** during the construction and operational phases. ED1 covers parts of the higher ridgelines in the north of Eday, from which walkers will experience clear views towards the Proposed Development. This will

present a notable variation from the baseline character and will form a new defining feature in their views.

Significance of cumulative effect

6.13.62 The cumulative effect on the views of walkers on ED1 will be **not significant**. This finding relates to the limited influence of other operational and proposed wind farms, which are relatively small in scale and / or distant in location. The more notable operational wind farm developments include the five Spurness Point turbines, which are located on Sanday at a minimum of approximately 3.5 km to the south-east and the single turbine at Sandy Banks on Eday, at a minimum of approximately 5.5 km to the south. The additional consented and application stage wind farms are not readily visible from this path. This means the cumulative magnitude of change will be **low** and the cumulative effect will be not significant.

Core Path ED5 Newark

Baseline

6.13.63 Core Path ED5 connects the B9063, just south of Stennie Hill, with the section of coastline between Bay of Doomy and Bay of Newark. From the B9063, the path extends west then south-west along the edges of farm fields of rough pasture, to meet the western coastal edge of Eday, at the Bay of Doomy. From here, the path turns north to follow the north-south alignment of the coast, with the path routed on top of the cliffs. The path terminates where it meets the Bay of Newark close to the small settlement of Guith. This is a short walk with the coastal section measuring just over 1 km.

6.13.64 From this western edge of Eday, views look out across Fersness Bay, where the small island of Faray is situated, which at a minimum distance of 2.2 km from the Bay of Newark, forms a focal feature in the views of walkers. While there is rural development in Guith to the north, there is no development along ED5 and the character of the views are largely defined by the rising moorland slopes to the east and the rocky cliff line to the west. In terms of other wind farm developments, Spurness Point on Sanday, is visible at relatively close range from the southern slopes of Stennie Hill, with some limited visibility also of Sandy Banks over the moorland hills to the south.

Sensitivity

6.13.65 The value of the views from the route is medium. There are no formal viewpoints in this area and no national or regional landscape designations that would otherwise denote a special scenic value.

6.13.66 The susceptibility of walkers to the changes arising as a result of the Proposed Development is medium-high. The susceptibility of walkers relates to their awareness of their surroundings and appreciation of the views. Walkers travel at a slower pace than road-users and therefore, experience views for a longer duration. They are also able to experience the wider extents of views more fully and focus on specific features more than transitory road-users might. The views of walkers are not, however, long term and this prevents susceptibility from being rated as high.

6.13.67 The combination of the value of the view and the susceptibility of walkers to the Proposed Development gives rise to an overall **medium-high** sensitivity.

Magnitude of change

6.13.68 During the operational phase, the magnitude of change on the views of walkers on ED5 will be **high** along the coastal section between Bay of Doomy and Bay of Newark and **medium-high** along the hinterland section south of Stennie Hill. The ZTV in Figure 6.9 shows that all six of the turbines will be theoretically visible along the full length of ED5. The proposed turbines will be seen within the range of 2.2 km to 3.2 km, such that they will appear as large-scale structures, at variance with the relatively small scale of the island of Faray and the western coastal edge of Eday. Their prominence will be accentuated by the movement of the blades, which will form an eye-catching feature in the views of walkers. Daytime lighting will also be visible on the turbine hubs, albeit low intensity during good visibility.

6.13.69 In the hinterland section the medium-high magnitude of change reflects the baseline influence from Spurness Point Wind Farm which is situated a minimum distance of approximately 4 km to the east. The presence of these five operational turbines will moderate the effect of the Proposed

Development as this type of development already forms an established part of the baseline character. However, the addition of the Proposed Development would also give rise to a sequential cumulative effect with Spurness Point Wind Farm as it would introduce a further wind farm development, such that wind farms would be a prominent feature in the views towards the islands in both an easterly and a westerly direction from parts of the route.

6.13.70 During the construction phase, the magnitude of change will be **high** and **medium-high**. While the key features will be the emerging turbines and the tall cranes used in their construction, ground level works including the construction of access tracks, crane pads, slipway, landing jetty, borrow pit and substation will also be readily visible and will add to the overall extent of visible construction on the island. The site will be visible from ED5 and will form a focal attraction in the views of walkers owing to the close range and incomplete appearance of the turbines and associated construction activities.

Significance of effect

6.13.71 The effect of the Proposed Development on the views of walkers on ED5, will be **significant** during the construction and operational phases. ED5 comes in close proximity to Faray and walkers will experience close-range views of the Proposed Development, that will present a notable variation from the baseline character and will form a new defining feature in their views.

Significance of cumulative effect

6.13.72 The cumulative effect on the views of walkers on ED5 will be **not significant**. This finding relates to the limited influence of other operational and proposed wind farms, which are relatively small in scale and / or distant in location. The more notable operational wind farm developments include the five Spurness Point turbines, which are located a minimum of approximately 4 km to the east of the hinterland section. The additional consented and application stage wind farms are not readily visible from this path. This means the cumulative magnitude of change will be **low** and the cumulative effect will be not significant.

Core Path ED6 Mussetter

Baseline

6.13.73 Core Path ED6 provides access along the Sands of Doomy and Sands of Mussetter on the southern and south-eastern sides of Fersness Bay. The landform is orientated north-north-west across Fersness Bay to the small whaleback island of Faray. The sands are enclosed by the low and rocky coastlines, which wrap around the bay to the west and the east. The sands differ, in that the Sands of Mussetter are backed by boulder clay cliffs and comprise a shingle beach, while the Sands of Doomy are backed by dunes covered in marram grass and comprise a white sand beach. The separation of the sands from the minor road and the absence of settlement, adds to the sense of remoteness and tranquillity. While the airfield, to the east of Sands of Doomy, presents a more modern land use, its very infrequent use and relatively discreet presence limits its influence. Operational turbines are typically distant and small-scale, with the exception of Spurness Wind Farm, located approximately 5 km to the east, and also the single Sandy Banks turbine, located approximately 2 km to the south, albeit partly screened by the intervening moorland hills.

6.13.74 Faray is framed within the bay, making it the focus in views of walkers on the beaches. The separation distance of approximately 2.5 km to 3.0 km, combined with its low elevation, means that the island appears relatively small and flat. Furthermore, the north-south alignment of the island means that in these views from the south, it is seen at its shorter width, rather than longer length, and this adds to a more condensed impression of its size. While Faray forms the focus in these views, the islands of Westray and Rousay form the wider visible context to the north-west and south-west, respectively.

Sensitivity

6.13.75 The value of the views from the route is medium. There are no formal viewpoints in this area and no national or regional landscape designations that would otherwise denote a special scenic value.

6.13.76 The susceptibility of walkers to the changes arising as a result of the Proposed Development is medium-high. The susceptibility of walkers relates to their awareness of their surroundings and appreciation of the views. Walkers travel at a slower pace than road-users and therefore, experience views for a longer duration. They are also able to experience the wider extents of views more fully and focus on specific features more than transitory road-users might. The views of walkers are not, however, long term and this prevents susceptibility from being rated as high.

6.13.77 The combination of the value of the view and the susceptibility of walkers to the Proposed Development gives rise to an overall **medium-high** sensitivity.

Magnitude of change

6.13.78 During the operational phase, the magnitude of change on the views of walkers on ED6 will be **medium-high**. The ZTV in Figure 6.9 shows that all six of the turbines will be theoretically visible along the full length of ED6. The proposed turbines will be seen within the range of 2.5 km to 3.0 km, such that they will appear as large-scale structures, at variance with the relatively small scale of the island of Faray and the coastal edge around Fersness Bay. Their prominence will be accentuated by the movement of the blades, which will form an eye-catching feature in the views of walkers. Daytime lighting will also be visible on the turbine hubs, albeit low intensity during good visibility. The addition of the Proposed Development would also give rise to a sequential cumulative effect with Spurness Point Wind Farm as it would introduce a further wind farm development, such that wind farms would be a prominent feature in the views towards the islands in both an easterly and a westerly direction from the eastern part of the path.

6.13.79 During the construction phase, the magnitude of change will be **medium-high**. While the key features will be the emerging turbines and the tall cranes used in their construction, ground level works including the construction of access tracks, crane pads, slipway, landing jetty, borrow pit and substation will also be readily visible and will add to the overall extent of visible construction on the island. The site will be visible from ED6 and will form a focal attraction in the views of walkers owing to the close range and incomplete appearance of the turbines and associated construction activities.

Significance of effect

6.13.80 The effect of the Proposed Development on the views of walkers on ED6, will be **significant** during the construction and operational phases. ED6 comes within close proximity to Faray and walkers will experience close-range views of the Proposed Development, that will present a notable variation from the baseline character and will form a new defining feature in their views.

Significance of cumulative effect

6.13.81 The cumulative effect on the views of walkers on ED5 will be **not significant**. This finding relates to the limited influence of other operational and proposed wind farms, which are relatively small in scale and / or distant in location. The additional consented and application stage wind farms are not readily visible from this path. This means the cumulative magnitude of change will be **low** and the cumulative effect will be not significant.

Core Path W8 Castle o' Burrian and the Bay of Tafts

Baseline

6.13.82 Core Path W8 is located in the southern part of Westray. It comprises a number of different sections that connect the west and east coast. On the east coast, there is a section that follows the high cliffs from Rack Wick past Castle o' Burrian, which is a squat sea stack, popular for viewing puffins and other coastal features such as Stanger Head, south to Geo of Rustling Stones. From here the path turns south-west to follow a track through the geometric pattern of farm fields, passing over the B9066 to meet the west coast on the southern side of the Bay of Tafts. From here the path follows the Links around the bay, but instead of extending around the Twiness headland, it extends back onto the B9066 and follows this route before connecting back onto the west coast, where the path extends north-west along the sandy shoreline.

6.13.83 The sections of W8 that occur on the west and east coasts are characterised by the distinct and dramatic coastal features. The focus of walkers in these sections will most likely be on the immediate

coastal scenery. In those sections which pass over the hinterland to connect the coasts, there is not so much scenic interest as the farmland is typical of much of the farmland that occurs across the Orkney Islands. In those sections, it is likely that the focus of walkers will extend from the immediate farmland to the coastal edges and beyond. From this part of Westray, views open up to the south and extend from across the Rapness Sound to the Holm of Faray, Faray and Eday.

Sensitivity

6.13.84 The value of the views from the route is medium. There are no formal viewpoints in this area and no national or regional landscape designations that would otherwise denote a special scenic value.

6.13.85 The susceptibility of walkers to the changes arising as a result of the Proposed Development is medium-high. The susceptibility of walkers relates to their awareness of their surroundings and appreciation of the views. Walkers travel at a slower pace than road-users and therefore, experience views for a longer duration. They are also able to experience the wider extents of views more fully and focus on specific features more than transitory road-users might. The views of walkers are not, however, long term and this prevents susceptibility from being rated as high.

6.13.86 The combination of the value of the view and the susceptibility of walkers to the Proposed Development gives rise to an overall **medium-high** sensitivity.

Magnitude of change

6.13.87 During the operational phase, the magnitude of change on the views of walkers on W8 will be **medium-high** along the central sections, and **medium-low** on the east and west coast sections. The ZTV in Figure 6.9 shows that all six of the turbines will be theoretically visible along almost all of the central sections of W8. It also shows that visibility on the east coast section will be intermittent, with patches around Castle o' Burrian and Stanger Head showing no visibility. This limited visibility relates to this coastline facing north and north-west, while the Proposed Development lies to the south-east, with small hills occurring in the intervening area. Visibility on the east coast is also limited owing to the Bay of Tafts being separated from Rapness Sound and Faray by the intervening landform of the south-western peninsula of Westray and then the coastline to the north of this being further separated by the Twinness headland.

6.13.88 Where visibility occurs across the central section, the proposed turbines will be seen between a range of approximately 4.5 km to 5.9 km from the closest turbine. The scale of the proposed turbines relative to the scale of the islands of Faray and Eday, will raise the prominence of the Proposed Development and make it a focal feature in the views of walkers in these central sections. On the east and west coasts, there is a stronger association with the intrinsic character of the immediate coastal scenery and a weaker association with the more distant islands to the south-east. This factor, in combination with the more limited extent to which the proposed turbines will be visible, owing to intervening landform, will limit their influence on the views of walkers.

6.13.89 The more notable operational turbines include the single Newark turbine, which is located a minimum of approximately 1.4 km to the north of Castle o' Burrian and the Gallowhill / Westray Development Trust turbines approximately 7.1 km to the north-west. While these developments ensure that wind turbines from part of the baseline character, their small scale limits the potential for a cumulative effect to arise, and in contrast, the Proposed Development will appear notably larger in terms of scale and number of turbines.

6.13.90 During the construction phase, the magnitude of change will be **medium-high** in the central section and **medium-low** on the west and east coasts. The key features will be the emerging turbines and the tall cranes used in their construction, and these will be visible from the central sections of W8. The extent of intervening landform between the west and east coast sections and the site of the Proposed Development will reduce the extent to which the emerging turbines and construction cranes will be visible, thus limiting their influence on the views of walkers. While ground level works will typically be screened by intervening landform from most of W8, some visibility may arise from the more elevated central sections and this will add to the overall extent of visible construction on the island.

Significance of effect

6.13.91 The effect of the Proposed Development on the views of walkers on the central sections of W8, will be **significant** during the construction and operational phases. The central sections of W8 are open to the south, such that the views of walkers will be changed by the presence and movement of the tall turbines set out on Faray. The effect of the Proposed Development on the views of walkers on the east and west coast sections of W8, will be not significant during the construction and operational phases. Visibility from these sections is much more limited and will not significantly affect the views of walkers.

Significance of cumulative effect

6.13.92 The cumulative effect on the views of walkers on R6 will be **not significant**. This finding relates to the limited influence of other operational and proposed wind farms, which are relatively small in scale and / or distant in location. The more notable operational turbines include the single Newark turbine, which is located a minimum of approximately 1.4 km to the north of Castle o' Burrian and the Gallowhill / Westray Development Trust turbines approximately 7.1 km to the north-west. The additional consented and application stage wind farms are not readily visible from this path. This means the cumulative magnitude of change will be **low** and the cumulative effect will be not significant.

Core Path R6 Faraclett Head

Baseline

6.13.93 Core Path R6 forms a circular path around Faraclett Head on Rousay. Faraclett Head is a small area of moorland hills, which sits in the north-east corner of Rousay. It rises up from cliffs on the west and a rocky shoreline on the north and east, to a high point of 107 m. The start and finish of R6 is just south of Faraclett Farm, where provision for parking is made. The path climbs up the gentler south-east facing slope in a north-westerly direction towards the summit, before passing along the ridge towards the north-east and then looping round through the east and south to arrive back at the starting point. The walk is approximately 3 km in length and passes close by the archaeological remains of a cairn and chambered cairn.

6.13.94 From this north-eastern corner of Rousay, views extend north across the Westray Firth to Westray, north-east to Faray and Eday and east to Eday. These islands all appear relatively small and low-lying with little visible development other than relatively small scale, close-range single turbines and more distant wind farms visible from the summit. On Rousay, Faraclett Head is characterised by the open and undeveloped moorland which covers this small coastal hill. Settlement is, however, evident at Faraclett Farm and along the coastline to the south.

Sensitivity

6.13.95 The value of the views from the route is medium. There are no formal viewpoints in this area and no national or regional landscape designations that would otherwise denote a special scenic value.

6.13.96 The susceptibility of walkers to the changes arising as a result of the Proposed Development is medium-high. The susceptibility of walkers relates to their awareness of their surroundings and appreciation of the views. Walkers travel at a slower pace than road-users and therefore, experience views for a longer duration. They are also able to experience the wider extents of views more fully and focus on specific features more than transitory road-users might. The views of walkers are not, however, long term and this prevents susceptibility from being rated as high. Furthermore, the susceptibility of walkers on Faraclett Head is moderated slightly by the presence of Kingarly Hill turbine and other more distant turbines on Westray and Eday.

6.13.97 The combination of the value of the view and the susceptibility of walkers to the Proposed Development gives rise to an overall **medium-high** sensitivity.

Magnitude of change

6.13.98 During the operational phase, the magnitude of change on the views of walkers on R6 will be **medium**. The ZTV in Figure 6.9 shows that all six of the turbines will be theoretically visible along the northern, eastern and southern sections with a gap in visibility occurring around the western

section. The proposed turbines will be seen within the range of approximately 8.8 km to 9.9 km to the closest turbine, such that they will appear as moderate scale structures, occupying only a small proportion of a much wider view. They will, nonetheless, form a focal feature from R6 owing to the openness of this coastline towards the north-east, the contrast between the scale of the turbines and the scale of the island landscapes of Faray and Eday behind, and the scale of the turbines relative to other wind farms visible in the baseline view. The more notable operational turbines include the single Kingarly Hill turbine, which is located on Rousay a minimum of approximately 3 km to the south of R6, and Sandy Banks, which is located on Eday, a minimum of approximately 10 km to the east. Their prominence will be accentuated by the movement of the blades, which will form an eye-catching feature in the views of walkers.

6.13.99 During the construction phase, the magnitude of change will be **medium**. The separation distance of approximately 9 km means that the smaller scale, ground level construction works will not be readily visible and it will mostly be the emerging turbines and the tall cranes used in their construction, that will give rise to a visual effect. These structures will be visible from R6 and will form a focal attraction in the views of walkers owing to their scale relative to the scale of Faray and Eday, as well as relative to other operational turbines in views from this path.

Significance of effect

6.13.100 The effect of the Proposed Development on the views of walkers on R6, will be **significant** during the construction and operational phases. Views from R6 open up towards the north-east and it is in this context that the Proposed Development will form a notable addition to the views of walkers.

Significance of cumulative effect

6.13.101 The cumulative effect on the views of walkers on R6 will be **not significant.** This finding relates to the limited influence of other operational and proposed wind farms, which are relatively small in scale and / or distant in location. The more notable operational turbines include the single Kingarly Hill turbine, and Sandy Banks, which is located on Eday. Additional consented and application stage wind farms are not readily visible from this path owing to the intervening landform of the moorland hills on Rousay. This means the cumulative magnitude of change will be **low** and the cumulative effect will be not significant.

6.14 Summary

6.14.1 The assessment of landscape and visual effects has been carried out to identify the significant effects that are likely to arise as a result of the Proposed Development. It has considered the effects on landscape and visual receptors, as well as the cumulative effect of the Proposed Development in addition to other wind farm developments. The process involved identifying those receptors with potential to be significantly affected and assessing the potential impacts that the construction and operation of the Proposed Development will give rise to. The significance of the effects has been assessed through combining the sensitivity of each receptor with a prediction of the magnitude of change that will occur as a result of the Proposed Development.

6.14.2 The Proposed Development comprises the construction of the six proposed turbines, each 149.9m to blade tip, and associated infrastructure, including access tracks, crane hardstandings, underground cabling, possible external transformers, on-site substation and maintenance building, temporary construction compounds, possible borrow pits, permanent meteorological mast, a new extended slipway and a landing jetty. The proposed turbines will not be lit with visible night-time lighting but will be lit with daytime aviation lighting. The site layout is shown in Figure 2.1.

6.14.3 The site is situated on the island of Faray in the Northern Isles of the Orkney Islands. Faray is a small uninhabited whale-back island, set to the west of the island of Eday and the south-east of the island of Westray. The island is used for sheep farming and comprises open fields of improved pasture. There is no development on the island other than the abandoned cottages of the former crofters and the temporary lidar associated with the Proposed Development.

6.14.4 There are relatively few operational wind farms in the study area. The most notable is Spurness Point Wind Farm which comprises five turbines set on the southern tip of the island of Sanday. There

are also medium and small scale turbines on Eday, Rousay and Westray, with a small group of two turbines also on Westray.

6.14.5 The study area for the Proposed Development covers a radius of 40 km and within this area, those receptors with the potential to be significantly affected have been assessed in detail. This has included one landscape element, 14 Landscape Character Units, nine Regional Coastal Character Areas or Local Coastal Character Areas, 11 viewpoints and eight principal visual receptors. Photomontages have been prepared for all 11 viewpoints. The figures also include a wireline of the Proposed Development on its own and wirelines with all other cumulative developments. These visualisations have helped assist in the assessment process. Figures 6.1 to 6.18 show plans of the study area, landscape receptors, visual receptors and ZTVs of the Development on its own and in combination with other cumulative wind farms, while Figures 6.19 to 6.29 show the photographs, wirelines and photomontages from the representative viewpoints.

6.14.6 In respect of the physical effects on landscape elements, the assessment found that the direct effect on the agricultural land as a result of the construction of the Proposed Development will be not significant. The losses will comprise only a small proportion of a much wider landscape resource, with improved pasture occurring in abundance across the Orkney Islands. Furthermore, improved pasture will be relatively easy to re-establish either post-construction or post-decommissioning, depending on the short or long term use of the area.

6.14.7 In respect of effects on landscape character, the assessment found there will be significant effects within a 6 km to 7 km radius of the Proposed Development, with significant effects occurring wholly in respect of five of the LCUs, and partly in respect of a further four LCUs. These LCUs are either close to the site or occur around the Westray Firth from where a strong association arises with the island of Faray, where the Proposed Development will be located. All LCUs beyond this radius will undergo not significant effects.

6.14.8 In terms of coastal character, the assessment found there will be significant effects within a 4 km to 5 km radius of the Proposed Development, with significant effects occurring wholly in respect of three of the RCCAs/LCCAs and partly in respect of a further two RCCAs/LCCAs. These RCCAs/LCCAs are either close to the site or occur around the Westray Firth from where a strong association arises with the island of Faray, where the Proposed Development will be located. All RCCAs/LCCAs beyond this radius will undergo not significant effects.

6.14.9 In respect of landscape designations, the assessment found that there will be no significant effects in respect of national and regional landscape designations within the study area. This finding relates principally to the fact that there are no regionally designated landscapes on the Orkney Islands and that the closest nationally designated landscapes are Balfour Castle GDL, at a minimum distance of approximately 19 km, and West Mainland and Hoy NSA, at a minimum distance of approximately 29 km, with very limited extents and levels of visibility occurring from both these designated areas.

6.14.10 In respect of effects on visual amenity, of the 11 viewpoints assessed, the assessment found that seven will be significantly affected during the construction and operational phases of the Proposed Development. These viewpoints are all located within an approximate 12 km radius of the Proposed Development. The viewpoints will mostly be affected owing to either their close proximity to the construction works and operation of the Proposed Development, or their greater sensitivity. All viewpoints beyond this 12 km range will not be significantly affected as a result of the Proposed Development, owing largely to their greater separation distance, as well as the wider natural and human influences which define their contextual character.

6.14.11 In terms of the principal visual receptors assessed, the assessment found there will be significant effects within a 12 km radius of the Proposed Development, with significant effects occurring wholly in respect of five of the PVRs, and partly in respect of a further three PVRs. It was found that there would be significant effects on ferry passengers travelling between the Mainland of Orkney and the Northern Isles of Westray, Papa Westray and North Ronaldsay out to approximately 12 km south, 8 km north-west and 7 km north-east. There would also be significant effects on road-users of the B9066 on Westray over an approximate 2.5 km section from the south-coast out to 7 km and on road-users of the B9063 on Eday over an approximate 5.3 km section from the north-coast out to 4.5 km. In respect of Core Paths, there would be significant effects on the three close range paths

on Eday, and the closest paths on Westray and Rousay. The remainder of these routes, and all other routes, will not be significantly affected during both the construction and operational phases. There will be no significant effects on settlements. There will, however, be significant effects on local residents, with these effects being covered by the representative viewpoints.

6.14.12 The most relevant wind farms to the cumulative assessment are operational and these form part of the baseline situation. The assessment of the Proposed Development in addition to the cumulative situation is covered by the main assessment as this takes into account all the operational wind farms, including Spurness Point Wind Farm and the single turbines at Sandy Banks on Eday, Kingarly Hill on Rousay and Newark on Westray. The cumulative assessment considers the effects of the Proposed Development in addition to consented (but not yet built) and application stage wind farms, the most relevant to this assessment being consented Costa Head Wind Farm, application stage Orkney's Community Wind Farm Project – Quanterness and application stage Hammars Hill extension.

6.14.13 There will be no significant cumulative effects largely owing to the relatively small scale of the cumulative wind farms, both in terms of the number of turbines and their size, and / or their distance from the Proposed Development, which prevents wind farms becoming the prevailing characteristic of landscape character or visual amenity. This assessment applies to both consideration of the cumulative effects of the Proposed Development in conjunction and in combination with the other cumulative wind farms.

6.14.14 The RVAA in Appendix 6.2 has considered the impact of the Proposed Development on the visual amenity of residents within a 2 km radius. There are five properties on the west coast of Eday which lie between 1.64 km and 2.01 km from the nearest proposed turbine. While all five of these properties will undergo a medium-high magnitude of change and a significant effect, none will reach the Residential Visual Amenity Threshold which would otherwise indicate that the effects could potentially be overbearing.

6.14.15 In summary, the Proposed Development will give rise to significant effects on landscape and coastal character during the construction and operation of the Proposed Development, albeit contained within the localised extent of approximately 6 km to 7 km. It will give rise to significant effects on visual amenity out to approximately 12 km during the construction and operation of the Proposed Development. While landscape and visual receptors beyond these ranges may be affected by the influence of the Proposed Development, these effects will not be significant. There will be no significant cumulative effects.

6.14.16 All effects during the construction of the Development will be short-term and reversible and all effects during the operation of the Development will be long-term and reversible. All effects will be adverse in nature.

Table 6.8: Summary of Residual Significant Effects

Receptor	Sensitivity	Construction - magnitude of change	Construction- significance of effect	Operation - magnitude of change	Operation - significance of effect	Cumulative magnitude of change / effect
Agricultural Land	Medium to low	Medium	Not significant	N/A	N/A	N/A
Coast with Sand LCT Mussetter LCU	Medium-high	Medium-high	Significant	Medium-high	Significant	Low or negligible Not significant
Holms LCT Holm of Faray LCU	Medium-high	High	Significant	High	Significant	Low or negligible Not significant
Holms LCT Rusk Holm LCU	Medium-high	High	Significant	High	Significant	Low or negligible Not significant
Inclined Coastal Pastures LCT Central Eday LCU	Medium-high – northern and central parts Medium-low – southern part	High – northern part Medium-high – central part Low – southern part	Significant – northern and central parts Not significant – southern part	High – northern part Medium-high – central part Low – southern part	Significant – northern and central parts Not significant – southern part	Low or negligible Not significant

Receptor	Sensitivity	Construction - magnitude of change	Construction- significance of effect	Operation - magnitude of change	Operation - significance of effect	Cumulative magnitude of change / effect
Inclined Coastal Pastures LCT Fersness LCU	Medium-high – northern part Medium – remaining parts	Medium to high – northern and central parts No change – southern part	Significant – northern and central parts Not significant – southern parts	Medium to high – northern and central parts No change – southern part	Significant – northern and central parts Not significant – southern parts	Low or negligible Not significant
Moorland Hills LCT South Eday LCU	Medium-high	Medium-high – northern part Medium – southern part	Significant	Medium-high – northern part Medium – southern part	Significant	Low or negligible Not significant
Moorland Hills LCT North Eday LCU	Medium-high – western part Medium – northern and eastern parts	Medium-high – western part Medium – northern and eastern parts	Significant	Medium-high – western part Medium – northern and eastern parts	Significant	Low or negligible Not significant
Moorland Hills LCT: North-east Rousay LCU	Medium-high	Medium-low	Not significant	Medium-low	Not significant	Low or negligible Not significant
Ridgeline Island Landscapes LCT Westray LCU	Medium-high – southern part Medium – central part	Medium-high – southern part Medium-low or low – northern part	Significant – southern part Not significant – northern part	Medium-high – southern part Medium-low or low – northern part	Significant – southern part Not significant – northern part	Low or negligible Not significant

Receptor	Sensitivity	Construction - magnitude of change	Construction- significance of effect	Operation - magnitude of change	Operation - significance of effect	Cumulative magnitude of change / effect
	Medium-low – northern part					
Undulating Island Pastures LCT: Sanday LCU	Medium	Medium-low	Not significant	Medium to low	Not significant	Low or negligible Not significant
Undulating Island Pastures LCT: Westray LCU	Medium	Medium-low	Not significant	Medium to low	Not significant	Low or negligible Not significant
Whaleback Islands LCT: Faray LCU	Medium-high	High	Significant	High	Significant	Low or negligible Not significant
Whaleback Islands LCT: Egilsay LCU	Medium	Medium	Not significant	Medium	Not significant	Low or negligible Not significant
RCCA 3 Sanday West	Medium – southern section Medium-low – remaining sections	Medium-low	Not significant	Medium-low	Not significant	Low Not significant

Receptor	Sensitivity	Construction - magnitude of change	Construction- significance of effect	Operation - magnitude of change	Operation - significance of effect	Cumulative magnitude of change / effect
RCCA 5 Eday: LCCA 5c Red Head to Greenan Nev	Medium-high – southern section Medium – northern section	High – southern section Medium – central section Medium-low / no change – northern section	Significant – southern and central section Not significant – northern section	High – southern section Medium – central section Medium-low / no change – northern section	Significant – southern and central section Not significant – northern section	Low Not significant
RCCA 5 Eday: LCCA 5d Fersness Bay	Medium-high	Medium-high	Significant	Medium-high	Significant	Low Not significant
RCCA 5 Eday: LCCA 5e Faray	Medium-high	High	Significant	High	Significant	Low Not significant
RCCA 5 Eday: LCCA 5f Holm of Faray	Medium-high	High	Significant	High	Significant	Low Not significant
RCCA 8 Westray North and East	Medium-high – southern coast Medium – eastern coast Low – northern coast	Medium-high – southern coast Medium-low – eastern coast Low – northern coast	Significant – southern coast Not significant – eastern and northern coasts	Medium-high – southern coast Medium-low – eastern coast Low – northern coast	Significant – southern coast Not significant – eastern and northern coasts	Low Not significant

Receptor	Sensitivity	Construction - magnitude of change	Construction- significance of effect	Operation - magnitude of change	Operation - significance of effect	Cumulative magnitude of change / effect
RCCA 10 Rousay North: LCCA 10b Saviskaill Bay	Medium	Medium-low	Not significant	Medium-low	Not significant	Low Not significant
RCCA 11 Rousay South: LCCA 11d Point of Avelshay to Scock Ness	Medium	Medium-low	Not significant	Medium-low	Not significant	Low Not significant
RCCA 12 Egilsay and Wyre	Medium	Medium	Not significant	Medium	Not significant	Low Not significant
Viewpoint 1: Guith, Eday	Medium-high	High	Significant	High	Significant	Medium-low Not significant
Viewpoint 2: Vinquoy Hill, Eday	High	Medium-high	Significant	Medium-high	Significant	Medium-low Not significant
Viewpoint 3: Sands of Mussetter, Eday	Medium-high	Medium-high	Significant	Medium to high	Significant	Negligible Not significant

Receptor	Sensitivity	Construction - magnitude of change	Construction- significance of effect	Operation - magnitude of change	Operation - significance of effect	Cumulative magnitude of change / effect
Viewpoint 4: Westray Ferry Terminal, Westray	Medium-high – residents and walkers Medium – road-users	Medium-high	Significant	Medium-high	Significant	Negligible Not significant
Viewpoint 5: Ness of Tuquoy, Westray	Medium-high – walkers and visitors Medium – road-users	Medium	Significant	Medium	Significant	Low Not significant
Viewpoint 6: Spur Ness, Sanday;	Medium	Medium	Not significant	Medium	Not significant	Low Not significant
Viewpoint 7: North Bay, Sanday	Medium-high – residents Medium – road-users	Medium-low	Not significant	Medium-low	Not significant	Negligible Not significant
Viewpoint 8: John's Hill, North Stronsay	Medium-high	Medium-low	Not significant	Medium-low	Not significant	Low Not significant
Viewpoint 9: Kierfea Hill, East Rousay	Medium-high	Medium	Significant	Medium	Significant	Low Not significant
Viewpoint 10: Hatston, Kirkwall	Medium-high – residents	Medium-low	Not significant	Medium-low	Not significant	Medium-low Not significant

Receptor	Sensitivity	Construction - magnitude of change	Construction- significance of effect	Operation - magnitude of change	Operation - significance of effect	Cumulative magnitude of change / effect
	Medium – road-users					
Viewpoint 11: Westray Ferry	Medium-high	High	Significant	Medium-high	Significant	Low Not significant
Northern Isles Ferries	Medium-high	High / medium-high / medium – out to 12 km south, 8 km north-west and 7 km north-east Medium-low / low – all remaining sections	Significant – out to 12 km south, 8 km north-west and 7 km north-east Not significant – all remaining sections	High / medium-high / medium – out to 12 km south, 8 km north-west and 7 km north-east Medium-low / low – all remaining sections	Significant – out to 12 km south, 8 km north-west and 7 km north-east Not significant – all remaining sections	Medium-low Not significant
B9066, Westray	Medium-high – southern section Medium - northern section	Medium-high / medium – out to 7.5 km north-west Medium-low / no change – beyond 7.5 km north-west	Significant – out to 7.5 km north-west Not significant – beyond 7.5 km north-west	Medium-high / medium – out to 7.5 km north-west Medium-low / no change – beyond 7.5 km north-west	Significant – out to 7.5 km north-west Not significant – beyond 7.5 km north-west	Low Not significant
B9063, Eday	Medium	Medium-high - central section Medium – northern section	Significant – northern and central sections Not significant – southern section	Medium-high - central section Medium – northern section	Significant – northern and central sections Not significant – southern section	Low Not significant

Receptor	Sensitivity	Construction - magnitude of change	Construction- significance of effect	Operation - magnitude of change	Operation - significance of effect	Cumulative magnitude of change / effect
		Low / no change – southern section		Low / no change – southern section		
ED1 Eday Heritage Walk	Medium-high	Medium-high – western section Medium – northern and eastern sections	Significant	Medium-high – western section Medium – northern and eastern sections	Significant	Low Not significant
ED5 Newark	Medium-high	High – coastal section Medium-high – hinterland section	Significant	High – coastal section Medium-high – hinterland section	Significant	Low Not significant
ED6 Sands of Mussetter	Medium-high	Medium to high	Significant	Medium to high	Significant	Low Not significant
W8 Castle o' Burrian and the Bay of Tafts; and	Medium-high – central sections Medium – eastern and western sections	Medium-high – central sections Medium-low – eastern and western sections	Significant – central sections Not significant – eastern and western sections	Medium-high – central sections Medium-low – eastern and western sections	Significant – central sections Not significant – eastern and western sections	Low Not significant
R6 Faraclett Head	Medium-high	Medium	Significant	Medium	Significant	Low Not significant

6.15 References

Council of Europe (2000). European Landscape Convention. Available at: https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=09000016802f80c6

Landscape Institute (2019). Visual representation of development proposals - Technical Guidance Note 06/19. Available at: https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf

Landscape Institute and IEMA (2013). Guidelines for Landscape and Visual Impact Assessment: Third Edition. Routledge, London.

Ironside Farrar (2014). Landscape Capacity Assessment for Wind Energy in Orkney

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

Orkney Islands Council (2017). Supplementary Guidance: Energy. Available at: https://www.orkney.gov.uk/Files/Committees-and Agendas/Development%20and%20Infrastructure/DI2017/01-03-2017/I03_App2_Supplementary_Guidance_Energy.pdf

Scottish Government (2014). National Planning Framework 3. Available at: https://www.gov.scot/publications/national-planning-framework-3/

Scottish Government (2014). Scottish Planning Policy. Available at: https://www.gov.scot/publications/scottish-planning-policy/

Scottish Natural Heritage (February 2017). Visual Representation of Wind Farms Version 2.2. Available at: https://www.nature.scot/visual-representation-wind-farms-version-22-february-2017

Scottish Natural Heritage (1998). Review 100: Orkney Landscape Character Assessment. Available at: https://www.nature.scot/sites/default/files/2018-01/Publication%201998%20-%20SNH%20Review%20100%20-%20Orkney%20landscape%20character%20assessment.pdf

Scottish Natural Heritage (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments. Available at: https://www.nature.scot/sites/default/files/2017-09/A675503%20-%20Assessing%20the%20cumulative%20impact%20of%20onshore%20wind%20energy%20developments.pdf

Scottish Natural Heritage and the Countryside Agency (2002). Landscape Character Assessment Guidance for England and Scotland. Available at: https://www.nature.scot/sites/default/files/2018-02/Publication%202002%20-%20Landscape%20Character%20Assessment%20guidance%20for%20England%20and%20Scotland.pdf

Scottish Natural Heritage (2016). Orkney and North Caithness Coastal Character Assessment. Available at: https://www.nature.scot/professional-advice/landscape/coastal-character-assessment

Scottish Natural Heritage (2017). Siting and Designing of Windfarms in the Landscape: Version 3a. Available at: https://www.nature.scot/sites/default/files/2017-11/Siting%20and%20designing%20windfarms%20in%20the%20landscape%20-%20version%203a.pdf

7 Ornithology

Contents

7.1	Executive Summary	7-3
7.2	Introduction	7-4
7.3	Legislation, Policy and Guidelines	7-4
7.4	Consultation	7-6
7.5	Assessment Methodology and Significance Criteria	7-8
7.6	Baseline Conditions	7-15
7.7	Receptors Brought Forward for Assessment	7-27
7.8	Identification and Evaluation of Key Impacts	7-28
7.9	Likely Effects	7-30
7.10	Additional Mitigation and Enhancement	7-41
7.11	Residual Effects	7-44
7.12	Cumulative Assessment	7-45
7.13	Summary	7-50
7.14	References	7-54

This page is intentionally blank.

7 Ornithology

7.1 Executive Summary

Following consultation with Nature Scotland, a suite of ornithological surveys was adopted for the purposes of assessing the avian baseline conditions for the Proposed Development. The surveys included: vantage point surveys, breeding bird surveys, breeding seabird surveys and storm petrel surveys, all undertaken between April 2019 and August 2020.

Three species of high conservation value; raptor and owl, and two species of common raptor were registered during the full year of vantage point surveys. None were assessed as breeding within the site or within the 2 km survey area. Ten species of wildfowl and divers were recorded during the non-breeding season, while only two species were noted during the breeding season [Redacted] and greylag goose with only greylag goose confirmed as breeding. Three species of gull were recorded as breeding on the island with a further two species recorded during both the non-breeding seasons. Ten species of waders were recorded, six were recorded as breeding. Storm petrels were recorded as breeding within stone structures and boulder piles in both 2019 and 2020 predominantly located within a stone dyke running around the northern perimeter of the island. Small numbers of Arctic tern and a single great skua territory were recorded during surveys while black guillemot, fulmar and shag were abundant on the cliffs and boulders around the island fringes.

Although the levels of recorded flight activity are considered to be low or moderate, for the purposes of completeness, collision risk modelling was undertaken for greylag goose, [Redacted] , great skua, lapwing, oystercatcher, golden plover and curlew. Night-time flight activity surveys were undertaken for storm petrel but due to the low levels of flight activity at collision risk height no analysis was undertaken for this species.

An assessment of ornithology effects arising from the construction and operation of the Proposed Development was undertaken, based on the current proposed layout and turbine dimensions. Through a standardised evaluation method, Important Ornithological Features were identified and brought forward for assessment. Important Ornithological Features taken forward for further consideration include one designated site (Mill Loch Site of Special Scientific Interest (SSSI)) and 13 species and species groups (greylag goose, [Redacted] lapwing, oystercatcher, redshank, golden plover[ringed plover, curlew, great skua, Arctic tern, black guillemot, shag and gull species).

In line with guidelines, the impact assessment process assumes the application of standard mitigation measures. With these in place, predicted effects were considered to be barely perceptible and therefore not significant for all Important Ornithological Features. With further specific mitigation detailed, residual effects for construction and operation phases are considered to have barely perceptible adverse significance, i.e. not significant whereas proposed enhancement measures proposed for breeding storm petrels is predicted to have a long-term significant beneficial effect on the breeding population.

Likely cumulative effects of nearby operational developments, as well as those currently consented or at application stage of planning, were also considered and no significant cumulative effects are anticipated as a result of the Proposed Development.

7.2 Introduction

Scope of Study

7.2.1 This chapter considers and provides an assessment of the likely effects of the Proposed Development on the ornithological interests covering both the area of the island of Faray above Mean Low Water (MLW), i.e. 'the site', and the surrounding area. The Proposed Development also covers an area below the MLW to the south-east of the island, this larger area is the 'Proposed Development boundary'.

7.2.2 This chapter presents the baseline ornithological interests and considers the likely impacts of the Proposed Development on notable species, while focusing on Important Ornithological Features (IOFs).

7.2.3 Likely ornithological effects of the Proposed Development are outlined and an assessment is provided based on the value of the receptor and the magnitude of the impact giving the significance of the effect. Where appropriate, mitigation measures to enhance, prevent, minimise or control identified ornithological effects are presented and residual ornithological effects following the adoption of those measures are assessed.

7.2.4 This chapter (and its associated figures) is not intended to be read as a standalone assessment. As such, reference should be made to Technical Appendices 7.1 Avian Baseline Conditions, 7.2 Collision Risk Modelling and 7.3 Storm Petrel Report, as well as other chapters of this EIA Report as referenced appropriately.

7.2.5 Likely ornithological effects associated with the development of a wind farm can occur throughout the three main phases of a wind farm's lifespan (construction, operation and decommissioning) and may include: direct habitat loss and indirect effects on habitat quality, mortality from collision with turbines and disturbance and displacement effects.

Description of the Site

7.2.6 The site comprises the island of Faray, an uninhabited island to the north and west of Eday and south-southeast of Westray in the Orkney Islands. The smaller island Holm of Faray is immediately to the north. Faray is approximately 17 km northeast of Mainland Orkney, and approximately 25 km from Kirkwall.

7.2.7 The site comprises two hillocks with the southern-most forming approximately the central point of the island, rising to 32 m Above Ordnance Datum (AOD). Approximately 700 m to the north a second hill rises to 31 m AOD. The ground level falls away fairly gently from the two hills, the steepest slope being near the coast to the west of the southern hill. The coastline is generally defined by rocky cliffs with geos and caves, except on the west coast near the north of the island and on the far southeast coast, where there are stretches of beach.

7.2.8 A number of abandoned dwellings are present on the island, the majority of which have lost their roofing. The island is used by a crofter to graze sheep throughout the year.

Statement of Competence

7.2.9 The assessment has been carried out in accordance with the Code of Professional Conduct of the Chartered Institute of Ecology and Environmental Management (CIEEM) by Allan Taylor (BA (Hons), MSc. ACIEEM) and Richard King (BSc (Hons), MSc., MCIEEM), ecologists and ornithologists with over 20 combined years' experience.

7.3 Legislation, Policy and Guidelines

7.3.1 Relevant legislative and avian census documents have been taken into account as part of this ornithological assessment. Of particular relevance are:

- Council Directive 2009/147/EC on the conservation of wild birds (i.e. the "Birds Directive");

- The Ramsar Convention on Wetlands (1975);
- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended);
- The Wildlife and Countryside Act (WCA) 1981 (as amended);
- The Wildlife and Natural Environment (Scotland) Act 2011 (as amended);
- The Nature Conservation (Scotland) Act 2004 (as amended);
- The Scottish Biodiversity Strategy, with Scottish priority species and habitats listed on the Scottish Biodiversity List (SBL), is also pertinent and is based on the former UK Biodiversity Action Plan (UK BAP), and regional biodiversity targets defined through the Orkney Local Biodiversity Action Plan (LBAP) (Orkney Islands Council, 2013); and
- Eaton *et al.* (2015), Birds of Conservation Concern (BoCC) 4: the Population Status of Birds in the United Kingdom, Channel Islands and the Isle of Man.

Planning Policy

7.3.2 Chapter 5 of this EIA Report sets out the planning policy framework that is relevant to the EIA process. The policies set out include those from the Orkney Local Development Plan (LDP) (2017), those relevant aspects of Scottish Planning Policy (SPP), Planning Advice Notes and other relevant guidance. In addition to policies within SPP and the LDP relevant to ornithology and nature conservation, regard has been had to the Planning Advice Note (PAN) 60: Planning for Natural Heritage (amended in 2008).

Best Practice Ornithological Guidance

7.3.3 As well as detailed consultation with NatureScot (NS), formerly Scottish Natural Heritage (SNH), current best practice guidance on assessing ornithological interests in relation to onshore wind farm developments was followed. A full description of relevant guidance is presented in Technical Appendix 7.1; however, of particular relevance to ornithology are:

- Guidelines for Ecological Impact Assessment in the UK and Ireland (Chartered Institute of Ecology and Environmental Management (CIEEM), 2018);
- Guidelines for Environmental Impact Assessment (Institute of Environmental Management and Assessment (IEMA), 2005);
- Survey Methods for Use in Assessing the Impacts of Onshore Wind Farms on Bird Communities (SNH, 2017);
- Windfarms and Birds: Calculating a Theoretical Collision Risk Assuming No Avoiding Action (SNH, 2000);
- Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model (SNH, 2018a);
- Developing field and analytical methods to assess avian collision risk at wind farms (Band *et al*. 2007);
- Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas (SNH, 2018b);
- Assessing the Cumulative Impacts of Onshore Wind Farms on Birds (2018c);
- Assessing Connectivity with Special Protection Areas (2016); and
- Assessing the Cumulative Impact of Onshore Wind Energy Developments (SNH, 2012).

7.4 Consultation

7.4.1 Table 7.1 provides details of consultations undertaken with relevant regulatory bodies, together with action undertaken by the Applicant in response to consultation feedback.

Table 7.1 – Consultation Responses

Consultee	Consultation Response	Applicant Action
Orkney Islands Council (Case Officer: Environment) Scoping Opinion 26th April 2019	[Redacted]	All points noted and all designated sites are taken into account in the assessment.
	The assessment should address the effects of all stages of the proposal on the bird species of these sites, including collision risk. Vantage Point surveys should be undertaken in line with current guidance which may be accessed from the SNH website at www.nature.scot, and advice should be sought from SNH on the scope and frequency of these surveys, as well as potential vantage point locations. It should also consider the cumulative impact of the proposal with other wind turbine developments, including any wind energy proposals which are currently in the planning system. Information on the qualifying features of the relevant internationally and nationally designated sites is available from 'SiteLink' which may be accessed from the Scottish Natural Heritage website at https://sitelink.nature.scot/home.	All points noted and all survey were completed following the SNH wind farm guidance and JNCC seabird monitoring handbook. Consultation with SNH/NatureScot was ongoing throughout the duration of the survey period. All other wind farms in Orkney have been taken into consideration as part of the cumulative assessment.
	Ornithology We welcome the commitment to undertake a breeding bird survey which will include a survey of breeding storm petrel, with follow up studies of nocturnal flight activity where necessary.	No additional action required.
	Supporting seabird survey data is available from JNCC's National Seabird Census. Faray and Holm of Faray were last surveyed in 2018 (see count	All historic seabird was taken into consideration with the

Consultee	Consultation Response	Applicant Action
NatureScot Scoping Opinion 26th April 2019	results at http://jncc.defra.gov.uk/smp/sitesBrowser.aspx?siteID=93797). Further details regarding the distribution/breeding locations in 2018 may be available from the national census coordinator.	ornithological desk study completed for assessment.
	We welcome the proposed checks for breeding storm petrels, given the lack of survey data since they were last recorded breeding on Faray and Holm of Faray in 2000. The standard methods for assessing collision risk do not apply to storm petrels because of their nocturnal behaviour, but we would be happy to discuss the need for any further assessment that might be required should storm petrel breeding colonies or other significant activity be recorded. See additional advice below regarding the potential effect on birds of any lighting that may be required on the turbines for aviation safety.	Consultation regarding storm petrel activity surveys was completed in January and February 2020, with the detailed approach approved by NS by email on 19th February 2020 which included continuing nocturnal surveys at proposed turbine locations to best assess collision risk for this species.
NS phone conversation and email confirmation from Senior Casework Manager 20th December 2019	Following on going consultation and the provision of all of the first year's survey results NS were asked for clarification on whether it was considered necessary to undertake further survey for the site. Following discussions on the first year of survey results it was agreed that there was "no need for a second year of VP surveys, breeding seabird (except potentially storm petrel) and breeding bird walkover surveys." NS responded: *"Yes, that's right. Though the gaps in storm petrel data include potential deficiencies in the VP survey as well the breeding survey."*	A second year of storm petrel breeding survey and storm petrel activity surveys was completed, but in order to allow for comparison the callback survey in 2020 was completed using a standardised playback storm petrel call that was used during storm petrel breeding surveys on Mousa, Shetland.
RSPB Scoping Opinion 26th April 2019	Having examined the scoping report, we wish to reiterate comments made by SNH regarding the welcome inclusion of a survey of breeding storm petrels, with follow-up nocturnal flight activity where necessary. You may find the following links useful for determining monitoring methods for storm petrels: a paper evaluating the use of infrared video http://rdcu.be/xGKt; and a paper on the most recent surveys on Mousa, giving useful details on playback survey methodology http://www.seabirdgroup.org.uk/seabird-30-15.	All points noted.

Consultee	Consultation Response	Applicant Action
	On the survey effort point, we do not support the proposal to undertake only one years' worth of data collection. A lack of two years' worth of data will serve to increase any uncertainties in the assessment and devalue the robustness of its conclusions. As stated in the Scoping Report, there are a number of designated sites, including SPAs and pSPAs, within 20 km of Faray. Due consideration should be given to potential connectivity to these sites, particularly with regard to the collision risk impacts on their qualifying features and any in-combination impacts from other relevant developments.	See NS response (20th December 2019) above. The site comprises grazed grassland low level cliffs which provide good breeding habitat for typical coastal and grassland species in Orkney. No breeding habitat was recorded for other target species, including hen harrier, merlin and red-throated diver, on the site or within 2km of the site. A second year of data collection was completed for the key ornithological interest on the site with a second full storm petrel callback survey and a second season of nocturnal activity surveys.

7.5 Assessment Methodology and Significance Criteria

7.5.1 This section identifies the 'key ornithology and nature conservation issues' which have been considered as part of the Ornithological Impact Assessment, describes the methods used to establish baseline conditions and assess the magnitude and significance of the likely ornithological effects of the Proposed Development.

Design Iteration

7.5.2 The following assessment is based on the final site layout, which has undergone various iterations over an extended process that has taken into account for a variety of potential constraints. Ultimately, the final design (Figure 1.2) is one that has taken into consideration all of these constraints to lessen the potential for any impacts to be experienced by any single receptor across the variety of disciplines that have all provided input into the Proposed Development's final layout (further details on design iteration provided in Chapter 2). There will be a micro-siting allowance of up to 50 m in all directions in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify ornithological (or other) constraints that could be avoided. The assessments within this chapter has taken considerations of this 50 m micro-siting and it does not alter the conclusions formed as to likely effects.

Desk Study

7.5.3 A desk study was undertaken of web-based resources to identify baseline data for the Proposed Development site and wider area. Where relevant, the desk study was supplemented through consultation with relevant non-statutory organisations for a 5 km radius of the Proposed Development. Further details on the desk study can be found in Appendix 7.1.

Site Scoping Visit

7.5.4 The scope of the ornithology surveys, including field survey methods and vantage point (VP) survey locations, were developed and agreed with NS, taking cognisance of current best practice guidance (SNH, 2017).

Field Studies

7.5.5 Ornithology field surveys for the Proposed Development were carried between April 2019 and March 2020 and in July 2020.

7.5.6 Surveys were carried out at a variety of times and in different weather conditions to ensure data were collected that were fully representative of a range of behaviour patterns.

7.5.7 SNH (2017) guidance indicates that wind farm assessments should focus on 'target species'. NS defines ornithological target species as:

- Those protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended);
- Those listed on Annex 1 of the Council Directive 79/409/EEC on the Conservation of Wild Birds;
- Regularly occurring migratory species which are either rare, vulnerable or warrant species consideration on account of the proximity of migration routes, or breeding, moulting, wintering or staging areas in relation to the proposed wind farm; and
- Species occurring at the site in nationally or regionally important numbers.

7.5.8 NS guidance goes on to note that consideration should be given to species of local conservation concern (i.e. those listed in LBAPs), but that target species should be restricted to those likely to be affected by wind farms. Pre-scoping consultation with NS, combined with the results of the data study, identified that survey work to inform the assessment should account for the potential presence of 'scarce' diurnal raptors, geese and wading bird species within and adjacent to the site.

7.5.9 A summary of the ornithological methods adopted is provided in this chapter, however, please refer to Appendices 7.1, 7.2 and 7.3 for full details.

Study Area

7.5.10 Appropriate study areas (i.e. the 'Survey Area') for each specific survey were derived from a combination of the practicalities of the site being an island surrounded by open sea with difficult access and best practice guidance (SNH, 2017) and are provided below and shown in Figure 7.1:

- Flight activity VP surveys: the island of Faray above MLW plus up to 500 m within 2 km of VP location;
- Breeding bird walkover survey: the island of Faray above MLW plus areas visible on Holm of Faray to the north up to 500 m;
- Wintering bird survey: the island of Faray above MLW plus areas visible up to 500 m;
- Breeding seabird survey: the island of Faray above MLW plus areas visible on Holm of Faray; and
- Storm petrel callback survey: the island of Faray above MLW.

Vantage Point survey

7.5.11 NS guidance advises that VP locations should be selected to achieve maximum visibility from the minimum number of survey locations. An arc of up to 180 degrees extending to 2 km from the observer can be effectively surveyed from each VP (subject to topography, vegetative screening and any other constraints to effective survey). A minimum of 36 hours of survey effort should be completed at each VP during both the breeding season and winter periods, and the timing of VP watches should be varied to ensure that all times of day are appropriately covered.

7.5.12 Two VP's, facing north and south at the same location were initially selected following review of aerial imagery and Ordnance Survey maps, and then ground-truthed during an avian site scoping visit completed in April 2019. The selected VP location was approved through consultation with NS prior to the commencement of surveys in April 2019. The location of the VP and the respective viewsheds are presented in Figure 7.1.

7.5.13 VP surveys were completed between April 2019 and March 2020. A total of 36 hours was undertaken at each VP during the breeding season and 36 hours at each VP during the non-breeding season. VP watches were conducted for periods of no longer than 3 hours in a single watch. A minimum 30 minute break was observed between watches to allow the observer an adequate rest time between VP watches.

Breeding Bird Survey

7.5.14 A walkover technique based on the Brown and Shepherd method (1993) was employed and covered the site and where possible a further 500 m survey buffer. The method involved approaching within 100 m of all parts of the Survey Area to record the presence of waders. Four survey visits were conducted during the period mid-April to early July in 2019, with a minimum two week gap between each of the survey visits. NS guidance (SNH, 2017) recommends that four survey visits should be completed over the breeding season, based on recommendations set out in Calladine *et al*. (2009). The breeding bird Survey Area (Survey Buffer (500m)) is shown in Figure 7.1.

7.5.15 It should be noted that due to the fact the site is an island no dedicated breeding raptor surveys were undertaken as breeding raptors would have been located during the breeding bird walkover. This was further supplemented by a data request from the ORSG for up to 2 km from the site.

Nesting Seabird Survey

7.5.16 Full island counts covering both the cliffs and island top were undertaken for the following species:

- Skuas (Arctic skua (*Stercorarius parasiticus*) and Great skua (*Stercorarius skua*)) – single walkover survey, visit mid-June to count adult birds on territory;
- Gulls – single visit using vantage points to count adults on nests, late-May to Early June;
- Arctic tern (*Sterna paradisaea*) – weekly visits using vantage points to count incubating adults, mid-May to mid-June;
- Black guillemot (*Cepphus grylle*) – two walkover surveys to count pre-nesting adult breeding birds from the cliff tops, undertaken on 30th April and 1st May 2019;
- Fulmar (*Fulmarus glacialis*) – a full island census by boat of apparently occupied nests, on 28th June;
- Shag (*Phalacrocorax aristotelis*) – a full island census by boat of apparently occupied nests, 30th May; and
- Storm petrel (*Hydrobates pelagicus*) – a full island callback survey, undertaken in June 2019 and repeated July 2020.

Winter walkover surveys

7.5.17 A winter walkover survey was completed between February 2020 and March 2020 to identify winter roosting and foraging bird populations within the Survey Area. The surveys were carried out in line with methods detailed in Gilbert *et al.* (2011) and consisted of three survey visits.

Survey Limitations

7.5.18 Access to the site, being a rugged, uninhabited island without a working landing area, is heavily reliant on good weather meaning undertaking surveys was significantly more difficult than a typical mainland site. The difficulties in accessing the island and the requirement to leave the site before

dark and arrival in good visibility means the hourly spread of surveys (i.e. dawn and dusk surveys) was more difficult to achieve than normal. The lack of nocturnal species on the island (i.e. owls) means this is not seen as a significant limitation to the survey data.

7.5.19 In addition, ITPE made a commitment not to undertake surveys between mid-September and December in order to prevent any potential for disturbance to breeding grey seals (*Halichoerus grypus*), for which parts of the island and entire coastline are designated as a Special Area of Conservation (SAC). The protected areas of the SAC include the area around the landing jetty meaning landing on the island during the seal breeding season had the potential to create unnecessary disturbance to seals and was therefore avoided (please refer Chapter 8: Terrestrial Ecology and Chapter 16: Underwater Noise Assessment for more details on this marine mammal SAC).

7.5.20 The gap in nonbreeding season surveys was further exacerbated by continued difficult weather conditions with high winds and large swell meaning landing on the island for surveys was not possible in December or January. Some survey visits were then condensed into a shorter period in March which could not be spread any further due to the impending lockdown due to covid-19, which was imminent. Despite the lack of temporal spread of data it is deemed unlikely there was any significant flight activity on the island over the winter months that differed significantly from the data collected in February and March.

7.5.21 Storm petrel activity surveys planned for June 2020 were delayed due to the covid-19 lockdown and were undertaken at the first possible time period it was considered safe and pragmatic to do so. They were completed in the second week of July 2020. This delay in surveys was not considered to significantly impact on the survey results.

Evaluation Methods for Ornithological Features

7.5.22 Table 7.2 lists the criteria used to determine the value of ornithological features in a geographical context.

Table 7.2 – Geographical Evaluation Criteria

Scale of Ornithological Value	Criteria	Examples
International	Nature conservation resource, i.e. designated nature conservation area, habitat or populations of species, of international importance. N.B. For designations, such as a Special Protection Area (SPA), this may also include off-site features on which the qualifying population(s) are considered, from the best available evidence, to depend.	International nature conservation areas: – Any Special Protected Area (SPA); – Any potential SPA (pSPA); and – Any Ramsar wetland. Significant numbers of a designated population outside the designated area. Any species listed on Annex 1 of the Birds Directive. A site supporting more than 1 % of the EU population of a species.
National (Scotland)	Nature conservation resource, i.e. site or population of species, of national importance.	National nature conservation areas:

Scale of Ornithological Value	Criteria	Examples
	NB. Includes designated sites but may also include off-site ornithological receptors on which the qualifying population(s) of designated sites are considered, from the best available evidence, to depend.	– Any Site of Special Scientific Interest (SSSI) or National Nature Reserve (NNR) designated for ornithological feature(s). – A site supporting more than 1 % of the UK population of a species. – Nationally important population / assemblage of a species listed on Schedule 1 of the WCA.
Council area (Orkney)	Nature conservation resource, i.e. nature conservation designation, habitat or species, of importance on a county scale.	Statutory and non-statutory nature conservation designations: – Any Local Nature Reserve (LNR); – Any Local Nature Conservation Site (LNCS); – Any Scottish Wildlife Trust (SWT) reserve; – A council-scale important population / area of a species listed on the Scottish Biodiversity List (SBL) (Scottish Government, 2013) as requiring conservation action. A county-scale important population/area of a species listed on the LBAP. A county-scale important population / assemblage of species listed on Schedule 1 of the WCA.
Local (i.e. within 2 km of the site)	Nature conservation resource, e.g. a habitat or species of importance in the context of the local district	A breeding population of a species or a viable area of a habitat that is listed in a Local BAP because of its rarity in the locality. An area supporting 0.05-0.5 % of the UK population of a species. Any species included on the Birds of Conservation Concern (BoCC) Red List (Eaton *et al*., 2015). A council-scale important population of an amber-listed species on the BoCC. A breeding population of a species on the SBL. All breeding populations of Schedule 1 species not captured in higher scale categories.
Less than local	Unremarkable, common and widespread habitats and species of little/no intrinsic nature conservation value.	Common, widespread, agricultural and/or exotic species (such as escapees).

7.5.23 Where a feature qualifies under two or more criteria, the higher value is applied to the feature.

7.5.24 In the context of this chapter, any ornithological feature of local or higher value is considered an Important Ornithological Feature (IOF).

Impact Assessment Methods

7.5.25 The approach taken to completing the Ecological Impact Assessment (EcIA) follows the established CIEEM guidelines for ecological impact assessment (CIEEM, 2018) and considers the factors described below.

7.5.26 The approach to Impact Assessment in this chapter of the EIA report (and Chapter 8: Terrestrial Ecology) differs slightly from the other chapters in order to ensure compliance with the CIEEM guidelines (CIEEM 2018) which are the industry standard and considers the factors described below.

Ornithological Zone of Influence

7.5.27 The Ornithological Zone of Influence (OZoI) is defined as the area within which there may be ornithological features subject to effects from the Proposed Development. Such effects could be direct (e.g. habitat loss resulting from land-take or removal of a building occupied by breeding birds) or indirect (e.g. noise or visual disturbance causing a species to move out of the OZoI). The OZoI is determined through:

- review of the existing baseline conditions based on desk study results, field surveys and information supplied by consultees;
- identification of sensitivities of ornithological features, where known;
- the outline design of the Proposed Development and approach to construction; and
- through liaison with other technical specialists involved in the assessment, e.g. hydrologists and noise specialists.

7.5.28 In order to consider potential ornithological impacts to species at a wider geographical scale, and where reliable and robust data are available, consideration is made for each IOF at the Natural Heritage Zone (NHZ) level (i.e. NHZ2 – North Caithness and Orkney).

Temporal Scope

7.5.29 Likely impacts on ornithological features have been assessed in the context of how the predicted baseline conditions within the OZoI might change between the surveys and the start of construction.

Characterising Ornithological Impacts and Effects

7.5.30 In accordance with the CIEEM guidelines, the following definitions are used for the terms 'impact' and 'effect':

- Impact – Actions resulting in changes to an ornithological feature. For example, the construction activities of a development removing woodland; and
- Effect – Outcome to an ornithological feature from an impact. For example, the effects on a species population from loss of woodland.

7.5.31 In accordance with the CIEEM guidelines, when determining impacts on IOFs, reference is made to the following:

- Beneficial or adverse – i.e. whether the impact has a beneficial or adverse effect in terms of nature conservation objectives and policy;
- Magnitude – i.e. the size of an impact, in quantitative terms where possible;
- Extent – i.e. the area over which an impact occurs;
- Duration – i.e. the time for which an impact is expected to last;

- Timing and frequency – i.e. whether impacts occur during critical life stages or seasons; and
- Reversibility – i.e. a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible.

7.5.32 Unless stated otherwise impacts assessed below are assumed to be adverse, reversible and last of the period of the phase of the development.

7.5.33 For the purposes of this assessment, the predicted impacts on an ornithological feature are categorised as 'no impact', 'barely perceptible', 'low', 'medium' or 'high', based on the definitions in Table 7.3.

Table 7.3 – Levels of impact

Level of impact	Definition
No impact	No detectable impacts on the ornithological resource, even in the immediate term.
Barely perceptible	Detectable impact but reversible within 12 months. Not expected to affect the conservation status of the nature conservation designation, habitat or species under consideration.
Low	Detectable impacts, and may be irreversible, but either of sufficiently small scale or of short-term duration to have no material impact on the conservation status of the nature conservation designation, habitat or species population.
Medium	Detectable impact on the status of the nature conservation designation, habitat or species population in the medium term but is reversible / replaceable given time, and not a threat to the long-term integrity of the feature.
High	Irreversible impact on the status of the nature conservation designation, habitat or species and likely to threaten the long-term integrity of the feature. Not reversible or replaceable. Will remain detectable in the medium and long-term.
The following definitions have been applied in respect to timescales: Immediate: Within approximately 12 months; Short term: Within approximately 1-5 years; Medium term: Within approximately 6-15 years; and Long term: More than 15 years.	

7.5.34 The magnitude of any impact on IOFs was categorised according to the criteria outlined in Table 7.3, which is based on a table presented in the CIEEM (2018) guidelines. The concept of integrity refers to coherence of ecological structure and function and includes both temporal and spatial considerations.

7.5.35 Both direct and indirect impacts are considered: direct ornithological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ornithological impacts are attributable to an action but affect ornithological resources through effects on an intermediary ecosystem, process or feature, e.g. fencing of a development site and subsequent lack of grazing may create suitable grassland for ground nesting birds.

7.5.36 The assessment is undertaken in relation to the baseline conditions that would be expected to occur if the Proposed Development were not to take place, and therefore may include possible predictions of future changes to baseline conditions, such as environmental trends and other completed or planned development. Both adverse and beneficial impacts are possible. It is important to appreciate that this approach is not a rigid framework for assessment and the assessment of impact categories is a matter of professional judgement.

Limitations to Assessment

7.5.37 The surveys were undertaken at appropriate times of year, under favourable survey conditions and with full access to the study area, though in order to prevent disturbance to breeding grey seals and then stormy weather conditions and covid-19 restrictions meant non-breeding season surveys were compressed into a smaller time period than planned. As such, no significant limitations were identified.

7.6 Baseline Conditions

Desk Study Results

Statutory Designated Sites

7.6.1 As summarised in Appendix 7.1 and displayed on Figure 7.2, three international, one proposed international and six national nature conservation designations occur within 10 km of the Proposed Development boundary.

7.6.2 The Calf of Eday SPA (also designated as a SSSI) lies 2.7 km north-east of the Proposed Development boundary and is designated for a seabird assemblage of international importance. The SSSI is additionally designated for its breeding population of cormorant (*Phalacrocorax carbo*).

7.6.3 The North Orkney proposed SPA (pSPA) lies 5.1 km south of the Proposed Development boundary with the primary reason for the proposed designation including [Redacted] non-breeding great northern diver (*Gavia immer*) and non-breeding slavonian grebe (*Podiceps auritus*). The numbers of migratory/non-breeding species are another primary reason for the proposed designation which include common eider (*Somateria mollissima*), shag, long-tailed duck (*Clangula hyemalis*), red-breasted merganser (*Mergus serrator*); and velvet scoter (*Melanitta fusca*). Following the precautionary principle, as a proposed designation (i.e. pSPA) this site is considered to be of International ornithological importance.

7.6.4 Rousay SPA (also designated as a SSSI) lies 6.1 km south-west of the Proposed Development boundary and is designated for a seabird assemblage of international importance as well as its breeding Arctic tern population. The SSSI is additionally designated for its breeding guillemot (*Uria aalge*) and kittiwake (*Rissa tridactyla*).

7.6.5 West of Westray SPA lies 9.8 km north-west of the Proposed Development boundary and is designated for a seabird assemblage of international importance as well as breeding populations of Arctic tern (*Stercorarius parasiticus*) and guillemot.

7.6.6 [Redacted]

Non-statutory Nature Conservation Designations

7.6.7 Two Local Nature Conservation Sites (LNCS) are located within 2 km of the Proposed Development boundary. At c.1.3 km east and on the west of Eday, Braehead is designated for nationally important upland heath, blanket bog and oligotrophic and dystrophic lake habitats (avian interests include [Redacted] and breeding waders). Resting Hill LNCS is c.1.7 km east of the Proposed Development boundary and adjacent to Braehead LNCS; it is designated for nationally important upland heath and blanket bog habitats (avian interests include Arctic skua, curlew, lapwing, snipe, skylark and twite) (OIC, 2017b). The coast of Faray and Holm of Faray are also part of an RSPB Important Bird Area (IBA).

7.6.8 In addition, the Onziebust RSPB reserve is located 7.2 km south-west of the Proposed Development boundary and is designated for its breeding corncrake (*Crex crex*), curlew (*Numenius arquata*), lapwing (*Vanellus vanellus*) and redshank (*Tringa totanus*).

JNCC seabird data

7.6.9 A total of 13 breeding species have been recorded on Faray including: Arctic skua, Arctic tern, black-headed gull (Choroicocephalus ridibundus), common gull (Larus canus), cormorant, fulmar, great black-backed gull (Larus marinus), herring gull (Larus argentatus), shag, storm petrel, lesser black-backed gull (Larus fuscus), great skua and black guillemot.

Orkney RSG data

7.6.10 No historical records of Schedule 1 breeding species, such as hen harrier, merlin or peregrine, were recorded within 2 km of the site in 2018 and 2019.

Field Survey Results and Receptor Evaluation

7.6.11 Full details of the field survey results are provided in Appendix 7.1 with a summary of relevant results used to inform the assessment of likely ornithological impacts provided below. Details of flight lines of target species are presented in Appendix 7.1 with details presented on Figures 7.3 to 7.14.

Waterfowl and Divers

[Redacted]

7.6.12 [Redacted]

Greylag Goose

7.6.13 Greylag goose (*Anser anser*) were registered frequently during VP surveys between April 2019 and March 2020. A total of 42 flightlines were recorded during the VP surveys with a combined total of 233 birds and maximum count of 47 birds forming one skein was recorded on 26th July 2019. The total flight time recorded was 2,309 seconds of which 797 seconds was recorded below 10 m, the remaining 1,512 seconds was recorded at potential collision height (PCH) (see Figure 7.13). A single breeding record for greylag goose was recorded in the centre of the site (see Figure 7.14).

7.6.14 The presence of greylag geese on Orkney is complicated by an increasing feral population which remain on Orkney throughout the year and which are considered in some areas to be a pest species (due to their impact on agricultural crops) and, as such, their numbers are controlled under special licence issued through NatureScot.

7.6.15 Greylag goose was recorded utilising the Proposed Development as a feeding and roosting site and also utilising the airspace above the Proposed Development for commuting, with a total of 42 flights recorded, of which 32 flights were recorded in the winter months. The presence of greylag goose and the moderate usage of the site as a stopover/staging roost to access areas of higher value within the wider region increase the biodiversity value of the site. Consequently, the presence of wintering greylag goose indicates that the importance of the site for this species is considered to be of **Local** ornithological value

Pink-Footed Goose

7.6.16 Pink-footed goose (*Anser brachyrhynchus*) were only recorded on a single occasion from VP surveys when a single bird flew over the site on 20th March 2020. A single bird was recorded on the sea during the first winter walkover in February 2020. The fact that the observations were of two records of a single bird indicate that the importance of the site for this species is considered to be **Less than Local**.

[Redacted]

7.6.17 [Redacted]

[Redacted]

7.6.18 [Redacted]

7.6.19 [Redacted]

Other Waterfowl and Divers

7.6.20 Eider, red-breasted merganser, long-tailed duck and great-northern diver, teal (*Anas crecca*) and wigeon (*Anas penelope*) were all recorded in small numbers in the sea around the site during the winter walkover survey. Of these species long-tailed duck, eider and great northern diver are qualifying species of the North Orkney pSPA which is located 5.1 km south of the site.

7.6.21 As these species are sea ducks or non-breeding divers, it is to be expected that they weren't recorded within the site boundary, however their presence in the sea directly adjacent to the site (during the winter months) does increase the biodiversity value of the local area., Given the pSPA is over 5 km from the site and the fact they were recorded in such low numbers, indicates that the importance of the site for other waterfowl and divers is considered to be of **Less than local** ornithological value.

[Redac

7.6.22 [Redacted]

[Redacted

7.6.23 [Redacted]

7.6.24 [Redacted]

7.6.25 [Redacted]

7.6.26 [Redacted]

[Reda

7.6.27 [Re
da
cte

7.6.28 [Redacted]

7.6.29 [Redacted]

7.6.30 [Redacted]

7.6.31 [Redacted]

[Redact

7.6.32 [Redacted]

7.6.33 [Redacted]

7.6.34 [Redacted]

7.6.35 [Redacted]

7.6.36 [Redacted]

Common Raptors and Raven

Kestrel, sparrowhawk and raven

7.6.37 A single record of an individual kestrel and five records of sparrowhawk were recorded during the VP surveys. No evidence of breeding was noted for kestrel or sparrowhawk was recorded in the site, but a possible kestrel breeding attempt was recorded on the edge of the 2 km survey buffer during 2018 from the desk study (i.e. located off the island of Faray). Raven (*Corvus corax*) was commonly recorded within the site during both the VP surveys and the breeding bird survey. A single record of breeding raven was on cliffs in the site during breeding bird surveys. The fact that the observations were so infrequent means that the importance of the site for these three species is considered to be **Less than Local**.

Waders

Curlew

7.6.38 Curlew (*Numenius arquata*) were regularly recorded within the site between April 2019 and March 2020. A total of 24 flights were recorded during VP surveys, with a maximum number of four individuals recorded during a VP survey on 27th August (see Figure 7.4). No breeding territories were

identified within the Survey Area following the breeding bird survey. Small numbers of curlew were also recorded during winter walkover surveys with between eight and ten birds noted on each survey visit.

7.6.39 Curlew is BoCC red-listed, as well as an SBL and Orkney LBAP species and considered to be a species at risk from wind farm developments (SNH, 2018b), as a result of its declining population. The fact that the site is being regularly used by this species in small numbers means that it is considered to be of **Local** area ornithological value.

Dunlin

7.6.40 Dunlin (*Calidris alpina*) are an SBL and amber listed species, as well as a local priority species on the Orkney LBAP and were recorded once during the VP surveys. Dunlin were not recorded as a breeding species on the island. The limited and infrequent observations for this species indicate that the importance of the site for this species is considered to be **Less than Local**.

Golden Plover

7.6.41 Golden plover (*Pluvialis apricaria*) were recorded within the site on 21 occasions during VP surveys, with a total of 309 individuals registered. A total of three (one probable and two possible) golden plover breeding territories were recorded within the site boundary (Figure 7.5), which represents 0.2 % of the estimated NHZ2 Orkney and North Caithness (ONC) population (1,474 pairs) (Wilson *et al.*, 2015). Golden plover was also recorded in low numbers on the island top during each of the wintering bird survey visits.

7.6.42 Golden plover is an Annex 1 species and is legally protected accordingly. Golden plover is also an SBL and Orkney LBAP species as well as being considered to be a species at risk from wind farm developments (SNH, 2018b). The presence of breeding golden plover and the fact that the Proposed Development site is being used by golden plover in small numbers as a winter roost indicate that the importance of the site for this species is considered to be of **Local** ornithological value.

Lapwing

7.6.43 A total of 106 flights of lapwing were recorded during the VP surveys with a maximum number of 62 birds recorded during a single VP survey on 1st September 2019. Eleven potential lapwing territories (eight possible and three probable) were recorded within the Survey Area following the breeding bird walkover survey (see Figure 7.6), which represents 0.22 % of the estimated ONC population (estimated total of 5,000 pairs, Tait (2012)). In addition, low numbers were recorded during each visit of the winter walkover survey peaking at 12 on the first visit on 26th February 2020.

7.6.44 Lapwing are a BoCC Red List, SBL and Orkney LBAP species and numbers of this species are rapidly declining across Scotland and the UK as a whole and as such are considered to be a species of conservation concern. The presence of breeding lapwing and the fact that the Proposed Development site is being regularly used by lapwing, the importance of the site is considered to be of **Local** ornithological value for this species.

Oystercatcher

7.6.45 Oystercatcher (*Haematopus ostralegus*) were regularly recorded within the site between April 2019 and March 2020. A total of 47 flights were recorded during VP surveys, with a maximum number of nine individuals recorded on 25th July 2019. A total of 31 potential breeding territories (17 possible and 14 probable) were defined within the Survey Area, following the breeding bird survey (See Figure 7.7). Thirty-one breeding territories represents 0.31 % of the estimated ONC population (estimated at 10,000 pairs, Tait (2012)).

7.6.46 Oystercatcher are a BoCC Amber List and Orkney LBAP species. Due to the presence of multiple breeding territories, and the fact that the Proposed Development site is being regularly used by oystercatcher, the importance of the site is considered to be of **Local** ornithological value for this species.

Purple Sandpiper

7.6.47 Purple sandpiper (Calidris maritima) were recorded during all three visits of the winter walkover surveys with a peak count of 25 on March 21st 2020. The fact that the observations were so infrequent means that the importance of the site for this species is considered to be **Less than Local**.

Redshank

7.6.48 Redshank (*Tringa totanus*) was recorded utilising the site for breeding and foraging and also utilising the airspace above the site for commuting, with twelve flights totalling 15 individuals recorded throughout the VP survey period (see Figure 7.8). In addition, five (two possible and three probable) redshank breeding territories were recorded within the Survey Area. Redshank is BoCC amber listed as a result of its declining population. The presence of breeding redshank and the fact that redshank use the site and the airspace over the site is considered to increase the biodiversity at a local level the importance of the site is considered to be of **Local** ornithological value for this species.

[Redacted]

7.6.49 [Redacted]

Snipe

7.6.50 Snipe (*Gallinago gallinago*) was recorded utilising the site for breeding and foraging as well as passing across the site, with ten flights totalling 15 individuals recorded throughout the VP survey period (see Figure 7.8). In addition, ten (eight possible and two probable) snipe breeding territories were recorded within the Survey Area, which represents 0.3 % of the estimated ONC population (3,326 pairs) (Wilson *et al.*, 2015) (see Figure 7.8). Snipe is an Orkney LBAP and BoCC amber-listed species as a result of its declining population. The presence of breeding snipe is considered to increase the biodiversity at a local level and therefore the importance of the site isconsidered to be of **Local** ornithological value for this species.

Turnstone

7.6.51 Turnstone (*Arenaria interpres*) were recorded four times from VP surveys and were not recorded as a breeding species on the island. Turnstone were recorded during all three visits of the winter walkover surveys with a peak count of 40 birds registered on February 26th 2020. The fact that the observations were so infrequent means that the importance of the site for this species is likely to be **Less than Local**.

Seabirds, Skuas and Gulls

Arctic skua

7.6.52 Arctic skua were recorded once from VP surveys and were not recorded as a breeding species within the study area. The fact that the observations were so infrequent means that the importance of the site for this species is likely to be **Less than Local**.

Arctic tern

7.6.53 Arctic tern was recorded on three occasions during VP surveys in the breeding season and three small colonies, totalling 15 incubating individuals, were noted with thirteen on the beach in the south of the site during the breeding bird walkover surveys (see Figure 7.14).

7.6.54 Arctic tern is an Annex 1 species and is legally protected accordingly. Arctic tern is also an SBL and Orkney LBAP species. The presence of breeding Arctic tern is considered to increase the biodiversity

at a local level and therefore the importance of the site is considered to be of **Local** Ornithological Value for this species.

Black guillemot

7.6.55 Black guillemot were not recorded during VP surveys however a full island survey registered black guillemot breeding around much of the island edges with a maximum count of 299 adults birds associated with the colony recorded within 300 m of the coastline on 30th April 2019.

7.6.56 Black guillemot is an Orkney LBAP and BoCC amber listed species as a result of its declining population. Black guillemot are a relatively common and widespread breeding species on Scotland's coasts and 299 breeding adults represents an estimated 0.8 % of the Scottish breeding population, with an estimated 18,750 breeding pairs in Scotland (Forester *et al.,* 2012). Forester *et al,* (2012) also state that areas of the highest densities of breeding black guillemot in Scotland include Holm of Papa Westray which lies approximately 15 km north of Faray.

7.6.57 The presence of black guillemot is considered to improve the biodiversity at a local level and is therefore the site is considered to be of **Local** ornithological value for this species.

Fulmar

7.6.58 Fulmar (*Fulmaris glacialis*) were recorded frequently during VP surveys and a full island survey recorded fulmar breeding around much of the island edges with a total of 472 adults on nests (AON's) recorded, of which 50 were recorded on Holm of Faray, during the cliff survey on 28th June 2019 (Figure 7.10). Fulmar is an Orkney LBAP species. Fulmar are a common and widespread breeding species on Scotland's coasts and 472 AON's represents 0.54% of the estimated Orkney breeding population with an estimated 88,560 AON's in Orkney in 1984/85 (Grey, 2002) and 0.1% of the estimated 486,000 AON's in Scotland (Forester *et al.,* 2012).

7.6.59 The presence of fulmar is considered to improve the biodiversity at a site level, although as they form only a small proportion of the national breeding population the site is considered to be of **Less than Local** ornithological value for the purposes of this assessment.

Great skua

7.6.60 Great skua were regularly recorded within the site between April 2019 and September 2019. A total of 26 flights were recorded during VP surveys, all of which consisted of individual birds. A single potential breeding territory was also defined within the Survey Area following the breeding bird survey (See Figure 7.14). One breeding territory represents 0.05 % of the estimated ONC population of 1,868 pairs (Wilson *et al.*, 2015).

7.6.61 Great skua are a BoCC Amber List and Orkney LBAP species. Due to the presence a breeding territory, and the fact that the Proposed Development site is being regularly used by great skua during the breeding season, the site is considered to be of **Local** ornithological value for this species.

Gulls

7.6.62 Common gull (*Larus canus*), great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*) and lesser black-backed gull (*Larus fuscus*) were all commonly recorded during VP surveys and a single Iceland gull (*Larus glaucoides*) was also noted. Three species of gull were noted as breeding within the study area (See Figure 7.17), with common gull nesting predominantly on the island top (17 AON's). A total of great black-backed gull 32 AON's were recorded during breeding bird surveys, of which 18 were on the cliffs and 14 on the island top. A total of 96 herring gull AON's were recorded, 91 of which were located on the island top and five on cliffs.

7.6.63 An estimated 11,208 pair of common gulls (Tait, 2012), 1,712 pairs of great black-backed gulls and 3,455 pairs of herring gulls (Wilson et al., 2015) breed on Orkney meaning the colonies at the site consist of 0.18 %, 1.87 % and 2.78 % of the Orkney population, respectively. Scottish population estimates, taken from Birds of Scotland (Forrester et al., 2007), are 48,100 common gull, 14,800 great black-backed gull and 72, 100 herring gull meaning the Faray gull AON's constitute 0.04 %, 0.22 % and 0.13 %, respectively, of the breeding Scottish population.

7.6.64 All the four regularly recorded gull species are of conservation concern as a result of their inclusion in the BoCC red and amber lists. Flights of gulls through the Survey Area were commonly recorded from VP surveys and the site was observed to be used for both breeding common, great black-backed and herring gulls. Due to the presence of three species of breeding gull within the Survey Area, and one further gull species utilising the site, it is considered that their presence increases the biodiversity resource of the site and wider environs and therefore the site is considered to be of **Local** ornithological value for these species.

Shag

7.6.65 Shag were infrequently recorded during VP surveys however a full island survey recorded shags breeding around much of the island edges with a total of 162 AON's birds recorded on 30th May 2019 (See Figure 7.9).

7.6.66 Shag is an Orkney LBAP and BoCC red-listed species as a result of its declining population.

7.6.67 Shag are a relatively common and widespread breeding species on Scotland's coasts and 162 breeding pairs represents 0.5 % - 0.8 % of the estimated breeding species with an estimated 21,500-30,000 breeding pairs in Scotland (Forester *et al.,* 2012). The presence of shag is considered to improve the biodiversity at a local level and the site is therefore considered to be of **Local** ornithological value for this species.

Storm Petrel

7.6.68 Storm petrel were not recorded during diurnal VP surveys, which is as expected as they only return to and leave breeding grounds during the night. The targeted storm petrel surveys identified an estimated 91/87 (2019/2020 survey results) breeding locations throughout the island. The majority of the nest locations (>50 %) were found to be concentrated in the boulders making up both collapsed sections and standing sections of the dyke along the north of the island (see Confidential Figure 7.11).

7.6.69 Dedicated night-time surveys recorded low levels of flight activity over the island top, with returning birds flying low and directly to nest locations in order to avoid detection by predators (such as gulls and skuas). For further details of storm petrel survey methodology and survey results please refer to Appendix 7.3.

7.6.70 Storm petrel is an Annex 1 species and is legally protected accordingly. Storm petrel is also an SBL and Orkney LBAP species, as well as being BoCC Amber listed. A total of 91 Adults On Site (AOS) comprises 4.87 % of the estimated Orkney total (1,870) and 0.42 % of the estimated Scottish total AOS (21,730) as of survey 1999-2002 (Mitchel et al., 2004).

7.6.71 Given the high conservation value of storm petrel (i.e. it's Annex 1 species status), and its presence of approximately 5 % of Orkney's breeding population storm petrel the site is therefore considered to be of **Council** ornithological value for this species.

Other passerine species

7.6.72 A small number of species of conservation concern were recorded during the breeding bird walkover survey and included three BoCC red-listed species: skylark (*Alauda arvensis*), linnet (*Carduelis cannabina*) and twite (*Linaria flavirostris*). A further two BoCC amber-listed species were also recorded: meadow pipit (*Anthus petrosus*) and swallow (*Hirundo rustica*).

7.6.73 These species are typical of these habitats within Orkney. Although their presence does enrich the biodiversity of the local area, the site is considered to be of **Less than local** ornithological value for these common passerine species.

Likely future baseline without development

7.6.74 The forward baseline at the site in the case that the Proposed Development is not built is assumed to be very similar to the conditions outline in the section above. This assumes that there will be no change in the current land use of the island, being a sheep farm and being uninhabited and undisturbed throughout much of the year. The majority of ornithological species on the island rely

on the availability of food from within surrounding seas and beaches as well as grassland and cliffs to nest in or on. It is considered unlikely that there will be any significant change in the baseline conditions on the island in the coming years should the land use remain in its current state.

Summary of Evaluation of Recorded Features

Table 7.4 - Summary of Evaluation of Ornithological Features

Feature	Summary	Level of Importance
Designated Sites		
Doomy and Whitemaw Hill SSSI	Located 2.5 km south south-east of the Proposed Development boundary. Designated for breeding whimbrel and Arctic skua.	National
Mill Loch SSSI	[Redacted]	National
Calf of Eday SPA	Located 2.7 km north-east of the Proposed Development boundary. Designated for a seabird assemblage of international importance.	International
Calf of Eday SSSI	Located 2.7 km north-east of the Proposed Development boundary. Designated for breeding cormorant.	National
North Orkney pSPA	Located 5 km south of the Proposed Development boundary. Annex I species are a primary reason for the proposed designation, including; [Redacted] non-breeding great northern diver and non-breeding Slavonian grebe. The numbers of migratory/non-breeding species are another primary reason for the proposed designation, including: non-breeding common eider, shag, long-tailed duck, red-breasted merganser and velvet scoter.	International
Rousay SPA	Located 6.1 km west south-west of the Proposed Development boundary. Designated for a seabird assemblage of international importance and breeding Arctic tern.	International
Rousay SSSI	Located 8.2 km west south-west of the Proposed Development boundary. Designated for a moorland breeding bird assemblage and breeding Arctic tern, Arctic skua and kittiwake.	National
West Westray SPA	Located 9.8 km west north-west of the Proposed Development boundary. Designated for a seabird assemblage of international importance and breeding Arctic tern and guillemot.	International

Feature		Summary	Level of Importance
Onziebust RSPB Reserve		Located 7.2 km south-west of the Proposed Development boundary. Designated for breeding corncrake, curlew, lapwing and redshank.	Council
Local Nature Conservation Sites / RSPB IBA		Two LNCS site within 2 km of the Proposed Development boundary and IBA which overlaps the site.	Council
Waterfowl and Divers			
[Redacted]		Annex 1, Schedule 1, SBL, BoCC Amber and Orkney LBAP listed species. Recorded on one occasion in winter months.	Less than local
Greylag Goose		Frequently recorded in winter months, likely some naturalised birds. BoCC Amber listed species.	Local
Pink-footed Goose		Infrequently recorded in winter months in Proposed Development. BoCC amber listed.	Less than local
[Redacted]		[Redacted]	Local
Other Waterfowl and Divers	Eider	Recorded in sea directly adjacent to the site in winter months, possible breeding species.	Less than Local
	Great-northern diver	Recorded in sea directly adjacent to the site in winter months.	Less than Local
	Long-tailed duck	Recorded in sea directly adjacent to the site in winter months.	Less than Local
	Red-breasted merganser	Recorded in sea directly adjacent to the site in winter months.	Less than Local
	Teal	Frequently recorded, BoCC Amber listed species.	Less than Local
	Wigeon	Frequently recorded, BoCC Amber listed species.	Less than Local
Raptors			
[Redacted		[Redacted]	Less than local
[Reda		[Redacted]	Less than local

Feature	Summary	Level of Importance
	1, Schedule 1, BoCC Amber, Orkney LBAP listed and SBL species.	
[Redact	[Redacted]	Less than local
Common Raptors and Raven		
Raven	Commonly recorded, breeding on site.	Less than local
Kestrel	Infrequently recorded, BoCC Amber and Orkney LBAP listed species.	Less than local
Sparrowhawk	Infrequently recorded, BoCC Amber and Orkney LBAP listed species.	Less than local
Waders		
Curlew	Frequently recorded but not breeding in Proposed Development. SBL / BoCC Red Orkney LBAP listed. Designated species for RSPB site within 10 km of the site.	Local
Dunlin	Infrequently recorded during surveys. No breeding behaviour was observed for this species during the breeding bird survey. SBL, BoCC Amber and Orkney LBAP listed.	Less than local
Lapwing	Frequently recorded and breeding in Proposed Development. SBL / BoCC Red Orkney LBAP listed. Designated species for RSPB site within 10 km of the site.	Local
Oystercatcher	Frequently recorded and breeding in Proposed Development. BoCC Amber, Orkney LBAP listed.	Local
Golden plover	Frequently recorded, possible breeding in small numbers Proposed Development, Annex 1 species, BoCC Amber, Orkney LBAP listed.	Local
Redshank	Infrequently recorded and breeding in Proposed Development. BoCC Amber and and Orkney LBAP listed species. Designated species for RSPB site within 10 km of the site.	Local
[Redacted]	[Redacted]	Local
Sanderling	BoCC Amber and Orkney LBAP listed species. Infrequently recorded, winter visitor.	Less than local

Feature	Summary	Level of Importance
Snipe	Infrequently recorded breeding records in Proposed Development. BoCC Amber and Orkney LBAP listed species.	Local
Turnstone	Infrequently recorded, winter visitor. Orkney LBAP listed species.	Less than local
Seabirds, Skuas and Gulls		
Arctic tern	Recorded breeding in Proposed Development; Annex 1, BoCC Red, Orkney LBAP listed and SBL species.	Local
Arctic skua	Infrequently recorded, BoCC Red and Orkney LBAP list species.	Less than local
Great skua	Frequently recorded in breeding season, probable breeding species, BoCC Amber list species.	Local
Common gull	Commonly recorded, Breeding records in Proposed Development BoCC Amber and Orkney LBAP listed species.	Local
Great black-backed gull	Commonly recorded, Breeding records in Proposed Development BoCC Amber, Orkney LBAP and SPL listed species.	Local
Herring gull	Commonly recorded, Breeding records in Proposed Development BoCC Red, Orkney LBAP and SPL listed species.	Local
Black Guillemot	Infrequently recorded, abundant breeding species, BoCC Amber and Orkney LBAP list species.	Local
Fulmar	Frequently recorded, common breeding species, BoCC Amber and Orkney LBAP list species.	Less than local
Shag	Commonly recorded, abundant breeding species, BoCC Red and Orkney LBAP list species.	Local
Storm Petrel	Recorded breeding throughout structures in Proposed Development; Annex 1, BoCC Amber, Orkney LBAP listed and SBL species.	Council
Other Passerine Species		
Five passerine species typically found in this habitat-type in Orkney	Commonly recorded species typical of the habitat, BoCC red and amber listed, Orkney LBAP and SBL species.	Less than local

7.7 Receptors Brought Forward for Assessment

7.7.1 As noted in Section 7.4, under Evaluation Methods for Ornithological Features, ornithological features of local and higher value are considered IOFs. Due to a range of factors, some of these IOFs can be scoped-out of further consideration:

- Designated sites:
  - North Orkney pSPA, Rousay SPA and SSSI and West Westray SPA are located between 5 km - 10 km from the Proposed Development. These distances are considered beyond potential connectivity given the qualifying features supported therein and not to be subject to impacts resulting from the Proposed Development and, therefore, not considered any further in this assessment.
  - Doomy and Whitemaw Hill SSSI is over 2.5 km away and designated for species that were only very infrequently recorded on the site, therein and not to be subject to impacts resulting from the Proposed Development and, therefore, not considered any further in this assessment.
  - Calf of Eday SPA and SSSI is located over 2.5 km away and designated for it's seabird assemblage (SPA qualifying feature) and breeding cormorant (SSSI qualifying feature) which were only recorded during VP surveys outside of the non-breeding season. Given the distance from the site and the limited records and seasonality of cormorant across the site, the Calf of Eday is considered beyond connective distance and, therefore, not considered any further in this assessment.
  - Onziebust RSPB Reserve is over 7 km from the Proposed Development. This distance is considered beyond potential connectivity given the qualifying features supported therein and not to be subject to impacts resulting from the Proposed Development and, therefore, not considered any further in this assessment.
  - Braehead and Resting Hill Local Nature Conservation Sites are between 1.3 km to 2 km from the Proposed Development and on a different island and given the distance means it is unlikely these local sites will be impacted by the Proposed Development.
- Species (scoped out of further assessment due to level of importance as described above and summarised in Table 7.4):
  - [Redacted]
  - pink-footed goose;
  - other waterfowl and divers;
  - [Redacted]
  - merlin;
  - [Redacte
  - common raptors and raven;
  - dunlin;
  - sanderling;
  - turnstone;
  - Arctic skua;

- fulmar; and
- other passerine species.

7.7.2 The remaining IOFs of Local value or higher, and therefore taken forward for further assessment, include:

- designated sites:
  - Mill Loch SSSI.
- Species/Species Groups:
  - greylag goose;
  - [Redacted]
  - waders
    - curlew;
    - lapwing;
    - oystercatcher;
    - golden plover;
    - redshank;
    - [inged plover;
    - snipe;
  - arctic tern;
  - great skua;
  - black guillemot;
  - shag;
  - gull species (i.e. common gull, great black-backed gull and herring gull); and
  - storm petrel.

7.8 Identification and Evaluation of Key Impacts

Standard Mitigation

7.8.1 As previously noted, following CIEEM guidance (CIEEM, 2018), the assessment process assumes the application of standard mitigation measures. This section of the assessment details the mitigation measures that are recommended to ameliorate identified effects associated with the construction and operational phase of the Proposed Development. These measures are aimed to prevent, reduce or offset any likely significant effects of the Proposed Development on identified ornithological receptors. This approach is in accordance with best practice guidance and UK, Scottish and Local Government environmental, planning and sustainability policies.

7.8.2 The principles and objectives for mitigation associated with the Proposed Development have been developed through an iterative process with the Applicant's design team and through discussion with NS and other stakeholders.

7.8.3 Mitigation includes best practice methods and principles applied to the Proposed Development as a whole (generic measures) as well as site specific mitigation measures applied to individual locations (specific measures).

7.8.4 All ornithological mitigation will be incorporated into a Construction Environmental Management Plan (CEMP). This CEMP, to be confirmed, will outline all required mitigation and provide details on timelines for undertaking mitigation for each identified ornithological receptor. This CEMP will also outline a timetable of actions and form part of the contract documents to ensure delivery of mitigation specified in this chapter. In addition, the CEMP would incorporate the provision of an Ecological Clerk of Works (ECoW) to oversee the implementation of recommended mitigation.

Generic/Embedded Mitigation

7.8.5 In the event of consent the generic mitigation measures that apply to all ornithological receptors across the Proposed Development, and which are considered as embedded in the site development proposals and therefore assumed to be the case for the purposes of assessing potential impacts, are outlined below:

- Prior to any construction of the Proposed Development, the Applicant will undertake a series of pre-construction ornithological targeted checks to update the baseline information reported in this chapter. The full scope and requirements of the pre-construction checks will be agreed with the Planning Authority and involve engaging a Suitably Qualified Ecologist (SQE). The aim of these checks would be to provide up to date information on possible new breeding attempts for key target species, such as Schedule 1 raptors, in order to finalise the mitigation proposals. This would be in addition to completing a final check prior to construction for protected species (see Chapter 8: Terrestrial Ecology and Chapter 16: Underwater Noise Assessment of this EIA Report) and would be discussed and agreed with NS.
- Further to or incorporated into the update surveys above, protection of breeding bird nests from damage and/or destruction during the breeding season will need to be ensured. Wherever possible, all vegetation clearance will occur outside the bird (and seal) breeding season (i.e. between end of December – March, inclusive), to ensure that no active nests are damaged or destroyed by the proposed works. If work is required after March 31st, the SQE will search areas of clearance in advance of works and buffer active nests as appropriate. This would include any areas of clearance and vegetation removal for access tracks, compounds or turbine bases due to the populations of ground nesting birds on and around the site.
- Removing vegetation from working areas outside the breeding season in December and January, would also reduce the attractiveness of those areas to breeding birds the following season, which means that birds are less likely to breed in those areas.
- Avoidance of unnecessary disturbance to habitats by minimising the extent of ground clearance and other construction practices as far as practicable.
- An ecological toolbox talk with supporting literature will be given to all site personnel as part of site induction on the potential presence of ornithological species and any measures that need to be undertaken should such species be discovered during construction activities. The toolbox talk will also include the requirement to report and log any bird casualties (including due to the met-mast) at the Proposed Development during construction and operation of the site.

7.8.6 As part of the Proposed Development proposals it will be necessary to develop and implement a Site Restoration Plan (SRP) as part of the CEMP to ensure the regeneration of those areas of habitat that have been temporarily lost through construction works.

7.8.7 In order to facilitate restoration, disturbed ground will be restored as soon as practicably possible using materials removed during the construction of access tracks, excavation of cable trenches and turbine foundations. To achieve this, any excavated soil will need to be stored in such a manner that is suitable to facilitate retention of the seed bank. This will aid site restoration and help conserve the pre-construction floristic interests at the site.

7.8.8 Additional, specific mitigation measures are discussed in Section 7.10.

7.9 Likely Effects

Description of the Proposed Development

7.9.1 As described in Chapter 3, the Proposed Development will consist of six wind turbines with a maximum blade tip height of up to 149.9 m. The specific turbine manufacturer and model has not yet been selected, as this will be subject to a pre-commencement tendering exercise and will be confirmed post-consent.

7.9.2 The proposed final locations of the turbines have been defined, in order to enable the EIA report to fully describe the Proposed Development for which permission is being sought. The British National Grid coordinates denoting where each of the turbines are proposed to be located are listed in Chapter 3 and shown on Figure 1.2.

7.9.3 The main elements of the Proposed Development which have the potential to impact on IOFs, both during construction and operation are:

- Landing facility works (landing jetty construction and slipway upgrade; see below);
- Track construction, including bridging/culverting of two drainage ditches, mobile plant traffic movements and potential for dust generation;
- Temporary borrow pit operations, including potential for dust generation;
- Met mast installation;
- Turbine foundation creation (including excavation, pile-driving of anchors, etc.);
- Crane pad and permanent hardstanding construction;
- Cable-laying and grid connection infrastructure (including substation);
- Temporary lay-down and site compound areas;
- Temporary materials storage (soils and turves);
- Site water management; and
- Site restoration (track batters, compounds, etc.).

Construction Impacts

7.9.4 The above activities have the potential to cause the following construction impacts to the IOFs identified for the site:

- Direct loss of habitat.
- Direct loss of foraging habitat and/or breeding habitat for protected species.
- Indirect loss of foraging habitats and/or breeding habitat for species, through displacement.
- Disturbance and displacement to habitats and species (including noise, vibration, pollution), due to track and turbine base construction, as well as turbine erection, heavy machinery, noise and human activity on the site. Disturbance of ground vegetation and ground-nesting birds may affect a 5 m zone around all infrastructure.

Operational Impacts

7.9.5 The potential operational impacts have been identified as:

- Habitat change (modification) over time (N.B. operation phase drying of peaty or marshy substrates may affect up to 5m around cut track).
- Direct and indirect loss of foraging or breeding habitat due to displacement or avoidance.

- Mortality resulting from collision with turbines.
- Cumulative impacts of the Proposed Development in the context of other nearby wind farms (operational, consented and in planning).

Construction Effects

Designated Sites

Mill Loch SSSI

7.9.6 Impacts on habitats within designated sites have been considered unlikely given their distances from the site (see Chapter 8: Terrestrial Ecology). In addition, with the designated site on a different island any significant residual hydrological effects are unlikely to occur (see Chapter 11: Geology, Peat, Hydrology and Hydrogeology). Impacts are, therefore limited to those affecting populations of species qualifying as features of the designated site, [Redacted]

.

Waterfowl and Divers

Greylag goose

7.9.7 The Proposed Development site is considered to be of Local importance for greylag goose. Greylag goose utilise the site as a breeding, foraging and roosting location and utilise the airspace above the Proposed Development site for commuting flights. Construction would lead to temporary disturbance effect as a result of an increase in noise and vibration. Construction activities would also lead to the displacement of the single breeding pair as well as foraging and roosting birds.

7.9.8 There is a large amount of similar habitat for roosting and foraging geese on the other sections of the island and all the surrounding islands in the local area, in particular on Holm of Faray and Westray to the north and on Eday to the east of the Proposed Development, so the temporary displacement of geese is not considered significant.

7.9.9 The effects on greylag goose during construction are considered to be immediate and temporary and a **barely perceptible** adverse impact and therefore not significant.

[Redacted]

7.9.10 [Redacted]

7.9.11 [Redacted]

Waders

Curlew

7.9.12 The Proposed Development site is considered to be of local area importance for curlew. Curlew were recorded using the Survey Area for foraging but no breeding territories were recorded within the study area.

7.9.13 Although no breeding territories were recorded for curlew on the island it is considered a possibility they could breed there in small numbers in future years, so likely impacts on curlew during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat

loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.9.14 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories as a result of disturbance, the standard mitigation outlined in paragraphs in 7.8.1-7.8.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified, then appropriate mitigation measures to protect nest sites will be implemented.

7.9.15 The overall effects on curlew during construction are considered to be temporary and of **barely perceptible** adverse impact and therefore not significant at the local area scale.

Lapwing

7.9.16 The Proposed Development site is considered to be of Local importance for lapwing. Lapwing were recorded using the Survey Area for breeding, foraging and roosting with a total of 11 territories recorded within the Survey Area. Of the 11 territories recorded within the Survey Area, one was recorded upon the Proposed Development infrastructure and a further one within 50 m.

7.9.17 Potential impacts on lapwing during construction include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed or abandoned. Paragraph 7.8.5 – 7.8.8 outlines the proposed construction mitigation measures in order to ensure nest sites would be protected from construction-related disturbance.

7.9.18 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories as a result of disturbance, the standard mitigation outlined in paragraphs in 7.8.5 – 7.8.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.9.19 The overall effects on lapwing during construction are considered to be temporary and of **low** adverse impact and therefore not significant effects at the local area scale.

Golden plover

7.9.20 Golden plover were recorded as possibly breeding within the Survey Area in low numbers (assessed as having one probable and two possible territories). Golden plover were also recorded in small numbers using the site for foraging and roosting throughout the year. The site contains limited suitable breeding habitat for this species and it is likely birds recorded in April were likely using the site as a stopover point before heading to suitable breeding grounds. Given the presence of only one probable and two possible breeding territories for this species, as well as more favourable breeding habitat being located outwith the site boundary, displacement effects are unlikely to be greater than the Local level importance.

7.9.21 Likely impacts on golden plover during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.9.22 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories as a result of disturbance, the standard mitigation outlined in paragraphs in 7.8.5 – 7.8.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.9.23 The overall effects on golden plover during construction are considered to be temporary and of **barely perceptible** adverse impact and therefore not significant at the local area scale.

Oystercatcher

7.9.24 The Proposed Development site is considered to be of Local importance for oystercatcher. Oystercatcher were recorded using the Survey Area for breeding, foraging and roosting with a total of 31 territories recorded within the Survey Area. Of the 31 territories recorded within the Survey Area, three were recorded upon the Proposed Development infrastructure and a further three within 50 m.

7.9.25 Likely impacts on oystercatcher during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.9.26 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. In the lead up to and during the breeding season, in order to avoid the abandonment of nests or breeding territories as a result of disturbance, the standard mitigation outlined in paragraphs in 7.8.5 – 7.8.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.9.27 Although there is some potential for the displacement of oystercatcher breeding territories during construction within the breeding season, the overall effects on oystercatcher during the construction phase are considered to be temporary in nature and of **low** adverse impact and therefore not significant at the local area scale.

Redshank

7.9.28 The Proposed Development site is considered to be of Local importance for redshank. Redshank were recorded using the Survey Area for breeding, foraging and roosting with a total of five territories recorded within the Survey Area. Two of the five breeding attempts registered following the breeding bird survey were recorded within 50 m of the Proposed Development infrastructure.

7.9.29 Likely impacts on redshank during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.9.30 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories as a result of disturbance, the standard mitigation outlined in paragraphs in 7.8.5 – 7.8.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.9.31 The overall effects on redshank during construction are considered to be temporary and of **low** adverse impact and therefore not significant at the local area scale.

[Redacted]

7.9.32 [Redacted]

7.9.33 [Redacted]

7.9.34 [Redacted]

[Redacted]

7.9.35 [Redacted]

Snipe

7.9.36 The Proposed Development site is considered to be of Local importance for snipe. Snipe were recorded using the Survey Area for breeding, foraging and roosting with a total of ten territories recorded within the Survey Area. Of the ten territories recorded within the site, one was located within Proposed Development infrastructure and a further five within 50 m.

7.9.37 Likely impacts on snipe during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.9.38 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories as a result of disturbance, the standard mitigation outlined in paragraphs in 7.8.5 – 7.8.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.9.39 The overall effects on snipe during construction are considered to be temporary and of **low** adverse impact and therefore not significant at the local area scale.

Seabirds, Skuas and Gulls

Arctic tern

7.9.40 The Proposed Development site is considered to be of Local importance for Arctic tern. Arctic tern were recorded as breeding within the Survey Area with a colony of 14 in the south-west of site and a smaller colony on three nests and single nest on beaches in the west and north of the site. The breeding locations are located over 200 m from the nearest site infrastructure.

7.9.41 Likely impacts on Arctic tern during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.9.42 Potential disturbance may result in displacement from the areas of land clearance and a wider area adjacent to it. Additionally, if the disturbance occurs during the breeding season this may result in the abandonment of nests or breeding territories. However, pre-construction checks and the ECoW will identify active nesting locations during any works taking place in the breeding season and implement appropriate mitigation measures to protect any nest sites.

7.9.43 The overall effects on Arctic tern during construction are considered to be temporary and of **low** adverse impact and therefore not significant at the local area scale.

Black guillemot

7.9.44 The Proposed Development site is considered to be of Local importance for black guillemot. Black guillemot were recorded as breeding around the island edges with a maximum total of 299 adult birds recorded around the island during surveys. Black guillemot breeding in crevises and boulder fields at the bases of cliffs which are located away from all the site infrastructure.

7.9.45 The breeding locations of this species are away from all site infrastructure and as such are unlikely to be disturbed meaning during construction effects are considered to temporary and of **barely perceptible** adverse impact and therefore not significant at the local area scale.

Shag

7.9.46 The Proposed Development site is considered to be of Local importance for shag. Shag were recorded as breeding within the Survey Area with 162 AON's recorded on the cliffs around the island edges. The breeding locations are located at the base of cliffs in caves and on ledges and away from all the site infrastructure.

7.9.47 The breeding locations of this species are away from all site infrastructure and as such are unlikely to be disturbed meaning during construction effects are considered to temporary and of **barely perceptible** adverse impact and therefore not significant at the local area scale.

Great skua

7.9.48 Great skua were recorded as possibly breeding within the Survey Area in very low numbers (assessed as having one probable territory). Great skua were also recorded in small numbers using the site for foraging and roosting throughout the breeding season. Great skua prefer open heather moorland for breeding and there is little of this optimal breeding habitat for this species within the site. Adjacent islands Eday and Westray have larger expanses of heather moorland that provide great skua their preferred breeding habitat. The probable breeding attempt from 2019 was located on top of proposed infrastructure, but given it was the only breeding pair on the island and that there is similar grassland habitat elsewhere on the island it is considered likely that this pair will relocate away from the disturbed area. Given the presence of only one probable breeding territory for this species, as well as more similar breeding habitat which is located within the site boundary, displacement effects are unlikely to be greater than the Local level importance.

7.9.49 Likely impacts on great skua during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.9.50 Potential disturbance during construction may result in displacement from the areas of land clearance and a slightly wider area adjacent to it. During the breeding season, in order to avoid the abandonment of nests or breeding territories, as a result of disturbance the standard mitigation outlined in paragraphs in 7.8.5 – 7.8.8, including the pre-construction checks and the appointed ECoW will identify active nesting locations prior to any works taking place. If nest sites are identified then appropriate mitigation measures to protect nest sites will be implemented.

7.9.51 The overall effects on great skua during construction are considered to be temporary and of **barely perceptible** adverse impact and therefore not significant at the local area scale.

Gull species

7.9.52 The Proposed Development site is considered to be of Local importance for gulls. Great black-backed gull, herring gull and common gull were recorded as breeding within the Survey Area with colonies of each of the species on the island top as well as single birds scattered along the cliff tops around the site. There are three herring gull and one great black-backed gull within 100 m of turbines and no common gull territories. All three gull species were recorded flying over and roosting on the site in small numbers.

7.9.53 Likely impacts on gulls during construction would include potential mortality as a result of construction activities, temporary disturbance as a result of soil stripping and increased noise and vibration and temporary habitat loss. Mortality may result if construction activities are undertaken during the bird breeding season where nests and chicks may be destroyed.

7.9.54 Potential disturbance may result in displacement from the areas of land clearance and a wider area adjacent to it. Additionally, if the disturbance occurs during the breeding season this may result in the abandonment of nests or breeding territories. However, pre-construction checks and the ECoW will identify active nesting locations during any works taking place in the breeding season and implement appropriate mitigation measures to protect any nest sites. Roosting gulls may be displaced during the non-breeding season. There is a large amount of similar habitat for roosting

gulls in the local area, in particular west and east of the Proposed Development, so the temporary displacement of gulls from this roost site is not considered significant.

7.9.55 The overall effects on gulls during construction are considered to be temporary and of **low** adverse impact and therefore not significant at the local area scale.

Storm petrel

7.9.56 Storm petrel were confirmed as breeding within boulders, walls and stone structures across the site with 91 AOS in 2019 and 87 AOS in 2020 (Confidential Figure 7.11). Storm petrel were also recorded flying to and from nest sites within the breeding season during night-time. No records of storm petrel were registered flying during daylight hours.

7.9.57 Likely impacts on storm petrel during construction are likely restricted to temporary disturbance as a result of soil stripping and increased noise and vibration. Storm petrel nest in burrows within structures so it is therefore considered that there would be only limited possibility of mortality if construction activities are undertaken during the bird breeding season when nests and chicks may be destroyed.

7.9.58 Storm petrels are unlikely to be affected in flight during construction as they fly during the hours of darkness and only between May and September meaning any overlap with construction activities are unlikely. The most likely impact on storm petrels during construction is potential disturbance on nesting birds in particular during initial sitting and incubation in June and July when they are present on nests during daylight hours and have been noted to be sensitive to vibrational disturbance (Watson *et al,* 2014).

7.9.59 Disturbance during the development of onshore wind farms on storm petrel (and other similar species) is not well documented and no recommended disturbance stand-off distance was recorded within the recommended disturbance guidance by Ruddock and Whitfield, 2007. The only Schedule 1 species in this document that also nest within structures similar to the storm petrels within the site is barn owl (*Tyto alba*) which are given the recommended disturbance distance of between 50-100 m for construction activity. Using barn owl as an example it was decided that a minimum stand-off distance of 100 m for storm petrel would also be pragmatic.

7.9.60 During the site design process, particular attention has been used in order to avoid storm petrel breeding locations using a minimum 100 m disturbance buffer around all breeding locations from both 2019 and 2020 callback surveys. A single nest site recorded in 2020 was located in direct proximity to an access track and within 50 m of the main junction of tracks which splits to turbines east, west and north on the site and it was not considered possible to redesign the infrastructure so as to avoid this location. Attempts to relocate this nesting location are described as part of the proposed mitigation measures presented in Section 7.10 paragraphs 7.10.2 – 7.10.12. Potential disturbance may result in the abandonment of nests or breeding territories while adult birds are preparing for and undertaking incubation with just the aforementioned single nest recorded within 100 m of site infrastructure.

7.9.61 Storm petrels are highly vulnerable to predation being a ground nesting species with bird species such as gulls and skuas likely to predate both birds and eggs whenever the chance arises. Storm petrels are more vulnerable to predation by brown rats (*Rattus norvegicus*). Brown rats are considered to be pivotal to storm petrel breeding success to the point that the occurrence of breeding colonies in the northern isles of Scotland rely on the absence of brown rats (de Leon et al., 2006). The construction of Proposed Development will involve an increase in boat traffic landing on the island and with larger vessels used to carry turbines and other construction materials. As such, there is the possibility that, without biosecurity measures in place, construction traffic could inadvertently transport invasive and/or problematic species onto the island, such rats and mice, increasing the potential for predation of storm petrel and their nests. If species such as brown rat are inadvertently introduced onto the island then it would be possible to eradicate them, although this would be dependent on early detection.

7.9.62 The overall effects on storm petrel during construction are considered to be short-term and of **medium** adverse impact and therefore not significant at the regional area scale.

7.9.63 Please note that an integral part of the Proposed Development's operation on Faray is to support future populations of storm petrel through the enhancement and monitoring of the main breeding colony structure for future generations. Details of the enhancement measures proposed are presented in Section 7.10 paragraphs 7.10.2 – 7.10.12.

Operation Effects

7.9.64 Effects of land take on birds (i.e. decreased resource availability) are considered to be limited given the small percentage (<5 %) of the site that will be occupied by the footprint of the Proposed Development (8.1 ha). There is the potential for a component of the Proposed Development infrastructure to be sited on, or close to, a specific type and area of habitat used by one or more bird species carried through in this assessment. That potential effect is assessed, where relevant, in the species text that follows.

7.9.65 The two main ways in which birds can be affected by operational wind farms are:

- through displacement due to ongoing disturbance caused by wind turbine structures (i.e. barrier effect) and associated equipment (and by periodic servicing of them); and
- potential mortality through collision with moving blades or associated infrastructure.

Displacement

7.9.66 A range of studies have concluded that most bird species are not significantly affected by operational wind farms (e.g. Vauk, 1990; Percival, 2005; Devereux *et al*., 2008; Winkelmann, 1994; Langston & Pullan, 2003; Hotker *et al*., 2006). This is reflected, in part, by NS guidance (SNH, 2017) on birds and wind farms which does not, for example, normally recommend surveys for breeding passerines. NS guidance, which is the UK standard, indicates that effort should focus on species and/or species groups that are thought to be susceptible to the effects of wind farms or highly protected species on which potential effects remain unclear.

7.9.67 Turbines may also present a barrier effect to the movement of birds across a site, restricting them from accessing wider areas. The effect this would have on a population is difficult to predict. If birds have to regularly fly over or around an array this may result in greater energy expenditure, while birds displaced into other, suboptimal habitats may experience reduced foraging potential. Such impacts could effectively limit birds being able to build energy reserves, potentially affecting survival and/or breeding success.

<u>Waders</u>

7.9.68 Of those species identified as IOFs that use the site and are carried forwards in this assessment wader species, golden plover, lapwing, oystercatcher, redshank, [Redacted] and snipe have been assessed as breeding (including possibly, probably and confirmed territories) within the study area. As outlined in Table 7.4, the site is considered to be important for all these species at the Local level.

7.9.69 In addition to disturbance to birds during the construction phase, the operation of turbines and associated human activities for maintenance purposes also has the potential to disturb birds and displace them from the site. Existing information (e.g. de Lucas *et al*., 2007; Douglas *et al*., 2011; Haworth & Fielding, 2012) and reviews of effects (e.g. Madders & Whitfield, 2006; Hötker *et al*., 2006; Gove *et al*., 2013; Harrison *et al*., 2017) suggest that most birds are affected only slightly, if at all, although these effects require further study. Other studies involving long-term monitoring of golden plover (Fielding & Haworth 2010, 2012, 2013, Douglas *et al.,* 2011) and curlew (Whitfield *et al.*, 2010) found no evidence of displacement due to wind farm infrastructure for either species. In addition, in their study of the effects of wind turbines on the distribution of wintering farmland birds, Devereux *et al*. (2008) did not find any effect on four species groups (seed-eaters, corvids, gamebirds and Skylark), except for pheasant (*Phasianus colchicus*) an introduced species.

7.9.70 However, contradictorily in other studies, breeding birds have been found to be displaced within 300 m from a turbine (e.g. Gill *et al*., 1996; Percival, 1998; Hötker *et al*., 2006), with some studies suggesting some potential for partial displacement effects at greater distances (Pearce-Higgins *et*

al., 2009). Wind turbines might also displace birds from much larger areas if they act as a barrier to bird movements, or if availability of suitable habitat is restricted.

7.9.71 The evidence suggests that impacts vary between species and sites (Madders & Whitfield, 2006). There is potential for some disruption of feeding and nesting due to increased human activity for maintenance purposes, although this infrequent maintenance is unlikely to create any notable increase in disturbance as compared to current farming practices which sees activity of workers using quad bikes and other farm vehicles, which can be daily and involve workers living on the island with sheep dogs. There are limited pressures resulting from grazing livestock, only sheep are present on the island. Therefore, the overriding source of disturbance and displacement of birds during the operational period is considered to be the turbines operating (Pearce-Higgins *et al*., 2009).

7.9.72 On a precautionary basis, displacement effects on golden plover, lapwing, oystercatcher, [Redacted] and redshank are likely to be limited to c.200 m around the proposed turbine locations. This distance is based on published disturbance distances for golden plover and lapwing (Yalden & Yalden, 1989, 1990; Hötker *et al*., 2005; Pearce-Higgins *et al.*, 2009) and extend to similar short sward nesting species, such as oystercatcher and redshank.

7.9.73 Any initial displacement of waders during the operational phase will likely lead to birds using other similar areas of breeding habitat within the site and wider areas including on Holm of Faray as well as Eday and Westray north and east of the site. Additionally, it is considered likely over time that the birds will habituate to the presence of the turbines and return to breeding locations close to the site infrastructure and a grazing management plan outlined in the additional mitigation (see Section 7.10) will provide improved breeding habitat in the southern and northern sections of the site, with low levels of disturbance from farming activities and reduced egg and chick loss due to trampling by sheep.

7.9.74 The overall displacement effects on breeding waders on the site (i.e. golden plover [one possible affected territory], lapwing [five], oystercatcher [nine],[Redacted] redshank [three] and snipe [nine] are therefore assessed to be significant at no more than the local level. Given the availability of suitable habitat (beyond the likely extent of displacement) within the site and wider area, and the likelihood (based on research referenced above) that population-level effects will not occur.

7.9.75 Given the availability of alternative breeding habitat directly adjacent within the site and islands in close proximity to the site and the proposed mitigation the effects on waders are of **low** adverse level of medium-term duration and the effects not significant.

Seabirds, Skuas and Gulls

7.9.76 Due to their adaptability to humans and the uniformity of the similar available habitat (almost the entirety of the site is made up grassland fields, grazed by sheep) away from the site infrastructure it is deemed likely that the gull species and the single great skua will relocate elsewhere on the island to breed. There is also similar habitat to the site north on the Holm of Faray and larger islands Eday to the east and Westray to the north.

7.9.77 Given the availability of alternative breeding habitat directly adjacent to the site, the ability of these species to habituate to humans and the proposed mitigation the effects on seabirds are of low adverse level and of short-term duration and the effects not significant.

Storm petrel

7.9.78 Due to the informed and iterative process employed while designing the Proposed Development, all infrastructure has been located over 100 m from breeding storm petrel burrows (with the exception of the single burrow found within the stone structure within 50 m of a main track junction which may need to be relocated depending on the timing of construction works, as discussed in Paragraph 7.9.60) and the proposed mitigation mean that there will be no further impacts of operational displacement during operation of the proposed Development. As such, no impact is predicted on this species as a result of the operation of the Proposed Development.

Collision

7.9.79 For the purposes of this Section of the ornithology EIA Report all collision risk modelling (CRM) and analyses were completed following best practice guidelines and recommended species-specific biometrics and avoidance rates (Band et al., 2007 and SNH 2000, 2010, 2013, 2017 and 2018a). Collision risk analysis was informed by the data obtained during the VP surveys and corresponding flight lines (Figure 7.4-7.13); full details of the calculations are provided in Technical Appendix 7.2.

Greylag goose

7.9.80 Data collated by Dürr (2019) indicate there have been 31 collisions of greylag goose with wind turbines recorded in Europe to date (latest update 09 January 2019). Of these, 16 have been in Germany, six in the Netherlands, four in Norway, three in Spain, one in Austria and one in Belgium. None have been reported in the UK.

7.9.81 With a total of 9,899 seconds recorded at collision height and a species-specific avoidance rate of 99.8 % it is predicted that 0.15 collisions will occur per annum. Although the Applicant is seeking planning permission in- perpetuity in order to create a figure for comparison with other wind farm sites and use in the cumulative assessment a figure for 25 years is used as the 'lifetime' of the Proposed Development this equates to 3.85 collisions potentially occurring. Mitchell *et al.* (2012) estimate that the wintering population of greylag geese on Orkney numbers approximately 70,000 (estimated at 10,000 of the naturalised population and 60,000 migratory Icelandic birds). The mortality predicted represents 0.0055 % of the winter greylag population and is therefore not considered to be significant.

7.9.82 Therefore, direct impacts on greylag goose as a result of turbine collision are of **barely perceptible** level and the effects not significant.

Curlew

7.9.83 There is very little publicly available literature on collision of curlew with turbines. NS have therefore accepted a default avoidance rate of 98% for this species. However, documented collisions in Europe (Dürr, 2019) are low in the context of species population level.

7.9.84 The CRM output predicted that 0.078 collisions will occur annually and that over 25 year of operation of the Proposed Development this equates to 1.94 collisions. The breeding curlew population on Orkney is an estimated 3,223 pairs, or 0.7 % of the UK total breeding population (Wilson *et al*., 2015). This is considered to be a very low collision rate (0.001 % of the Orkney population) and, as such, is not considered significant with respect to the local or Orkney population and is therefore not considered to be significant.

7.9.85 Therefore, impacts on curlew as a result of turbine collision are of **barely perceptible** level and the effects not significant.

Lapwing

7.9.86 There is very little publicly available literature on the collision of lapwing with onshore wind turbines. NS have therefore accepted a default avoidance rate of 98% for this species.

7.9.87 Following the CRM, it is estimated that 0.7 collisions will occur annually and that over 25 years of operation this may result in 17.5 collisions. The breeding lapwing population of Orkney is an estimated 5,000 pairs, or 0.7 % of the UK total breeding population. The CRM output represents 0.18 % of the Orkney population potentially colliding with turbines and is therefore not considered to be significant.

7.9.88 Therefore, collision impacts by lapwing are of **low** level and the effects not significant.

Golden plover

7.9.89 A total of 39 golden plover fatalities have been reported in Europe, according to Dürr (2019), none of which occurred in the UK. In the context of European breeding and wintering populations, this level of mortality is considered to be very low.

7.9.90 Although golden plover were assessed as holding three breeding territories within the study area (one probable and two possible territories) all of the flight time recorded at potential collision height for this species was registered during the winter non-breeding season (all flights are shown in Table A9, Technical Appendix 7.1). Five flights were recorded during the breeding season but all of these took place beneath potential collision height and so are not used for CRM purposes.

7.9.91 The CRM output predicted 0.49 collisions for golden plover occurring annually and over a notional 25 years of operation this equates to 12.1 collisions across the lifetime of the Proposed Development. The breeding golden plover population on Orkney is estimated at 1,474 breeding pairs (Wilson et al., 2015) and the wintering population is estimated at 10,000 birds meaning the mortality predicted represents 0.41 % of the breeding and 0.121 % of the wintering Orkney population and is therefore not considered to be significant.

7.9.92 Therefore, direct mortality impacts as a result of turbine collision are of **low** level and the effects not significant.

Oystercatcher

7.9.93 There is very little publicly available literature on collision of oystercatcher with wind turbines. NS have therefore accepted a default avoidance rate of 98 % for this species.

7.9.94 The CRM output predicts a collision rate of 0.19 collisions per annum, equating to 4.9 collisions over a notional 25 year operation of the Proposed Development. The oystercatcher breeding population on Orkney is estimated at 10,000 pairs. The CRM predicted collision rate represents 0.0245 % of the Orkney population colliding every 25 years and is therefore not considered to be significant.

7.9.95 Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects are not significant.

Snipe

7.9.96 Studies at four windfarms in Orkney recorded a total of 11 snipe carcasses between 2009 and 2018 (Upton, 2018). Wider studies that are publically available are limited and NS have accepted a default avoidance rate of 98 % for this species.

7.9.97 The CRM output predicts a collision rate of 0.14 collisions per annum, equating to 3.6 collisions over a notional 25 year operation of the Proposed Development. The snipe breeding population on Orkney is estimated at 3,326 pairs (Wilson et al., 2015). The CRM predicted collision rate represents 0.05 % of the Orkney population colliding every 25 years and is therefore not considered to be significant.

7.9.98 Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects are not significant.

Great skua

7.9.99 No collisions of great skua with wind turbines in Europe have been documented by Dürr (2019). Upton (2014c) suggest that the initial NS recommended avoidance rate of 98 % is a precautionary rate and that an avoidance figure of 99.5 % (as used in the CRM for great skua in this assessment) is more likely to be appropriate. This is supported through post construction carcass searching at the operational Burgar Hill wind farm, Hammars Hill wind farm and Hoy community turbine schemes (Upton, 2012b), which has resulted in no evidence of great skua collisions being found. Furthermore, Furness (2015) provides anecdotal evidence that great skua carcasses typically remain in-situ for long-periods due to an apparent reluctance of great skua to scavenge their kin (despite frequently scavenging carcasses of other species). Carcass searches are therefore likely to be a reliable monitoring method for this species, and the conclusions drawn by Upton (2014c) are considered to be robust.

7.9.100 The CRM provided an output of 0.03 collisions will occur during the breeding season, equating to 0.65 collisions over the notional 25 years of operation of the Proposed Development. The great skua breeding population on Orkney is estimated at 1,868 pairs (Wilson et al., 2015). The modelled

collision rate represents 0.0174 % of the Orkney population and is therefore not considered to be significant.

7.9.101 Therefore, direct mortality impacts as a result of turbine collision are of **barely perceptible** level and the effects not significant.

Red-throated diver

7.9.102 Dürr (2019) reports one documented collision for red-throated diver in Europe, occurring at Bremen, Germany. It is possible that the species' tendency to avoid wind farms (e.g. Halley & Hopshaug, 2007; Percival, 2014; Petersen, 2007; Topping and Petersen, 2011) precludes collision risk to some degree. Okill (1992) reports the discovery of a red-throated diver assumed to have been killed by flying into overhead wires, and Furness (2015) provides two further examples of birds reportedly flying into fences on Foula. Furness (2015) further suggests that red-throated diver may actively avoid turbines due to their vulnerability of colliding with objects that they cannot detect over distance, which, given the lack of breeding habitat for this species within the site and surrounding 2 km in all directions around the site, is of relevance to the Proposed Development. Post construction monitoring work by Upton (2012a; 2014a, 2014b) at Burgar Hill Wind Farm, Orkney, did not find any evidence of red-throated diver collision over eight breeding seasons of monitoring.

7.9.103 The diver flightlines during the breeding season all followed an east west axis over the island therefore CRM for this species used the linear rather than random model (See Appendix 7.2), and provided an output of 0.03 collisions per annum, equating to 0.82 collisions over a notional 25 year operation period of the Proposed Development. The red-throated diver breeding population on Orkney is estimated at 97 pairs (Wilson et al., 2015). The modelled collision rate over a 25 year period represents 0.42 % of the Orkney population and is therefore not considered to be significant.

7.9.104 Therefore, direct mortality impacts as a result of turbine collision are of **low** level and the effects not significant.

Storm Petrel

7.9.105 Night-time surveys did not identify any storm petrels flying at potential collision risk height at any of the six turbine locations, with all recorded flights at these locations noted as below 10 m in height. For this reason, CRM was not undertaken for storm petrel and the potential for this species colliding with wind turbines is considered to be **negligible** and not significant.

Decommissioning

7.9.106 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

7.10 Additional Mitigation and Enhancement

7.10.1 In the event of consent and in addition to the provision of generic mitigation measures (see Section 7.8), the following specific measures are designed to avoid, reduce and enhance identified ornithological features on the site.

Storm Petrel

7.10.2 Specific mitigation for breeding storm petrel will focus on two approaches. Firstly, the prevention of increased predation and secondly through enhancement by creating a new, stable nesting structure within the vicinity of the largest colony with the aim of supporting the current population and increasing storm petrel breeding numbers.

Biosecurity

7.10.3 Storm petrel are highly vulnerable to predation being a ground nesting species, with opportunistic bird species such as gulls and skuas likely to predate both birds and eggs whenever the chance arises. However, storm petrel are considered more vulnerable to predation by brown rats (*Rattus norvegicus*) and the occurrence of breeding colonies in the northern isles of Scotland rely on the absence of brown rats (de Leon *et al.*, 2006). With this is in mind, it is critically important that during the construction and operation of the wind farm that strict biosecurity measures are put in place and followed to prevent the introduction of potential predators accessing the island and desecrating not only nesting storm petrel but other ground nesting birds across the island, such as waders, gulls and terns.

7.10.4 The RSPB have produced a series of biodiversity guidelines in order to prevent recolonization of the Shiant Isles by rodents and thus protecting burrow nesting birds, including puffin (Fratercula arctica) (Thomas and Varnham, 2016). Prior to the construction and operation of the wind farm a 'Biosecurity Plan' is required to be drafted and agreed with NatureScot and Orkney Islands Council and will be put in place to prevent rodents being introduced to the site.

7.10.5 The Biosecurity Plan will include consideration of the following:

- humane rodent traps on board vessels and around all landing areas;
- only run mooring lines if essential;
- all mooring ropes that are used to have mooring hoods and line guards;
- before unloading all packed gear to be thoroughly inspected for rodent evidence;
- all construction staff to be fully briefed by site ECoW to identify signs of rodent presence both on board vessels and on the site; and
- position the mooring so the boat stays in the water at low tide to prevent rodent access.

New Breeding Habitat

7.10.6 The main storm petrel breeding colony is located along the north-west corner of the island within a partially collapsed dry-stone dyke that shows signs of ongoing decay. In order to further support the storm petrel colony on the site, it is proposed that collapsed sections of the dyke are carefully re-built with suitable petrel breeding burrows located within.

7.10.7 Bolton *et al.* (2004) outline the use of plastic nest boxes for storm petrels in the Azores, where the provision of 115 plastic nest boxes covered with stones saw a 12 % increase in breeding numbers in the first year of occupation, increasing to 28 % in the second year. Bedolla-Guzman *et al*. (2016) outlined the use of a combination of wood and concrete nest boxes to create new breeding habitat for storm petrels off the coast of Mexico, although uptake was slow, evidence of successful breeding was recorded. Bolton (1996) outlined that nest uptake in artificial nests was not significantly different in artificial nests as compared to natural nest. Overall, 36 % of 81 boxes were used each year, with 26 nests on a boulder beach used more often than 55 nests in dry stone walls (46 % vs. 31-33 % respectively). The nests had a nesting chamber of 10 cm long, 15.2 cm diameter PVC piping, an observation chamber and a 6 cm diameter entrance tunnel. A relatively small section of wall can potentially house a large number of nest cavities, as demonstrated by a storm petrel wall on Skokholm Island off the southwest coast of Wales upon which an artificial nesting structure was erected approximately 10 m in length and was subsequently able to support 100 nesting storm petrel (The Wildlife Trust of South and West Wales, 2017).

7.10.8 It is proposed to build up sections of the dyke that have collapsed, or are showing signs of imminent collapse, being careful to leave parts that are still actively used by nesting petrels. Cavities within the wall will be water tight to keep dry and entrance holes will be small enough to allow access to smaller bird species (such as storm petrels) but restrict predation by larger species such as gulls, will be incorporated into the structure. The north of the island is both currently the preferred breeding location for petrels on the island and also well away from both proposed construction disturbance

and operational turbines. The new structure will be in the northwest of the island and will be installed ahead of the breeding season in April and prior to the commencement of construction of site infrastructure on the island top, if practical, it will be built 12 months (or more) ahead of construction to allow birds to familiarise themselves with the replacement structure for a full breeding season. The location of the newly created structure will be completed out with both the seal and bird breeding seasons (i.e. between the end of December and end of March) and created so not to modify areas already used by petrel or impinge on the seal breeding grounds. . If work is required after March 31st, the SQE will search areas of clearance in advance of works and buffer active nests as appropriate.

7.10.9 Possible locations for the new sections of petrel wall are shown in Figure 7.15. Proposed sections of wall are to be created while also ensuring a reasonable stand-off from the archaeologically protected chambered cairn also in the northern section of the site.

7.10.10 Artificial colonies such as this can be designed in such a manner as to enable easy access for monitoring breeding activity while also limiting potential for any disturbance. The monitoring of breeding success at the colony, with all nesting locations known and access for activities such as ringing chicks and an ongoing storm petrel monitoring program, would provide data needed to ensure the enhancement of the breeding colony habitat is successful. As such throughout construction and operation of the proposed wind farm development detailed monitoring of the colony will be undertaken.

7.10.11 A full monitoring program of storm petrel colony is proposed, focusing on the newly created nesting habitat with a yearly full island callback count to be completed in late June / July in each of the first five years following construction of the nest wall. This will be repeated every three years thereafter throughout the operation of the Proposed Development. Further monitoring will include a minimum of two visits a year for the first five years and again each three years thereafter for another five visits, throughout a total of 20 years of operation, for ringing and monitoring of the storm petrel on the island.

7.10.12 There is a single storm petrel nesting location in a boulder pile directly alongside the track in the south of the island. It is deemed highly unlikely that the development will in any practical way be able to avoid disturbance to this breeding location, pending what time of year construction commences. If disturbance to the nesting location is unavoidable then it is required to relocate (and rebuild or recreate if unable to move in complete condition) the boulder pile a minimum of 100 m away from site infrastructure and turbines (See Figure 7.15). In advance of being moved either whole or brick by brick the boulder pile will first be checked by an archaeologist. In addition to the relocation of the above nest, it is proposed to ensure the pointing and stone work within the small structure adjacent to the landing area is maintained in order to prevent the structure, which is currently assessed as unsuitable for breeding storm petrels, deteriorating and providing suitable habitat for breeding petrels. The maintenance of this structure will prevent colonisation by storm petrels in an area likely to be highly disturbed during both construction and operation of the wind farm and encourage newly colonising birds to use habitat elsewhere on the island away from site infrastructure, most notably the newly constructed 'stone petrel wall'.

Waders and other ground nesting species

7.10.13 The island is a working sheep farm and the entire island is grazed by sheep at certain times of year. The current grazing regime involves the use of temporary fencing to prevent sheep accessing certain areas around the island during lambing in particular the sections of higher cliffs, in order to prevent lambs falling over cliff edges. In order to provide areas of longer grassy sward and a mosaic of grassland swards on the island for the benefit of ground nesting birds it is proposed to extend these fenced off areas (using a combination of permanent or currently standing fencing and temporary fencing). Sheep will be excluded out of these fenced off areas (See Figure 7.15) between the start of April and the end of June to allow the completion of incubation of ground nesting species such as lapwing, snipe and oystercatcher. In agreement with the tenant, a total of 16.6 hectares will be included in the areas of restricted grazing and the variable sward heights in these areas will also provide good foraging areas for some wading species as well as cover for incubating and newly hatched birds.

7.11 Residual Effects

7.11.1 Following the application of mitigation measures, which include land management, residual effects of the Proposed Development on ornithological interest are as follows:

7.11.2 During the construction phase the following impacts may occur:

- Disturbance and displacement of wintering greylag goose, curlew, lapwing (potentially one displaced and up to 11 territories disturbed), golden plover (up to three territories disturbed), oystercatcher (three displaced and 31 territories disturbed), redshank (up to five territories disturbed), [Redacted] snipe (one displaced and up to 10 territories disturbed), great skua (one territory displaced), Arctic tern (up to 15 territories disturbed), storm petrel (one displaced) may occur but this will be minimised through the timing of the work and the use of buffered exclusion zones.

7.11.3 The proposed pre-construction surveys, the appointed ECoW and the adoption of grazing management measures will ensure that the death or injury of any bird is unlikely.

7.11.4 During the operation phase the following impacts could potentially occur due to the proximity of turbines:

- Displacement of lapwing (up to 5 territories within 200 m of proposed infrastructure), golden plover (up to a single territory within 200 m), oystercatcher (up to nine territories within 200 m), redshank (up to three territories within 200 m), [Redacted] snipe (up to nine territories within 500 m), great skua (single territory within 200 m); and following mitigation measures no storm petrel nests will be disturbed.
- The potential for collision with turbines of greylag goose (one bird every 2,381 years), curlew (one bird every 2,132 years), lapwing (one bird every 140 years), golden plover (one bird every 277 years), great skua (one bird every 1,869 years), oystercatcher (one bird every 267 years) and [Redacted] (one bird every 30 years).

7.11.5 Given the implementation of the biosecurity measures and installation of nesting features within the rebuilt stone dyke on the north of the island (see paragraphs 7.10.2 – 7.10.12) there is a predicted long-term net gain for breeding storm petrel with the potential for breeding numbers to double on the island.

7.11.6 Given the grazing regime along both east and western edges of the site, both which supports good densities of ground nesting birds (see paragraph 7.10.13), it is considered that this will lead to a more favourable nesting habitat in these areas for waders and other ground nesting species. This is particularly attributed to the exclusion of sheep through the critical egg developmental and chick rearing stages which may lead to a net gain of successful fledgling rates for ground nesting species, such as lapwing, and potentially attract other species, such as curlew, to breed on the island.

7.11.7 Collision-related mortality is predicted to be very low for all species modelled and of a magnitude where it is expected that there will be no discernible population-level effect above natural mortality levels.

7.11.8 Taking into account the proposed mitigation measures, it is concluded that the Proposed Development will not have a significant adverse effect at greater than the Local level for any species using the site and immediate surrounding area. Following the successful implementation of the mitigation and enhancement measures outlined in this chapter, it is anticipated that there will be a high and significant beneficial impact on breeding storm petrel and a low and not significant beneficial impact on ground nesting waders.

7.11.9 Taking into account the proposed mitigation measures, it is concluded that the Proposed Development will not have a significant adverse effect on the integrity of any of the statutory designated sites identified as having potential connectivity with the Proposed Development.

7.11.10 There is an inherent level of uncertainty associated with ecological impact assessment (as acknowledged in CIEEM Guidance). However, post-construction monitoring (PCM) is proposed to assess the efficacy of the newly installed storm petrel breeding walls on an ongoing basis. This will consist of storm petrel monitoring across the first five then every three operational years up to 20 years (i.e. years 0, 1, 2, 3, 4 and every 3 years thereafter during 20 years of operation operation). Survey methods and timings may be adjusted across monitoring years according to each year's survey results, as well as informing other Habitat Management Plan (HMP) factors.

7.11.11 This assessment has fully considered the principles of and guidance provided by Scottish Planning Policy, the Nature Conservation (Scotland) Act 2004, the Orkney Local Development Plan 2017, and the Orkney LBAP. In particular, consideration has been given to international responsibilities and the protection of designated sites.

7.12 Cumulative Assessment

7.12.1 The cumulative assessment of effects on receptors takes into consideration other operational, under construction and in planning developments. The assessment does not include for developments at the scoping stage, in accordance with SPP and given the lack of detailed information on such proposed developments. The assessment takes into account all types of developments considered to be relevant in the context of the assessed impacts, not just wind farm developments.

7.12.2 The assessment of ornithological effects associated with the Proposed Development alone predicted no significant effects for every IOF due to the low suitability of habitat within the site, lack of breeding records and the relatively low activity levels of IOFs recorded during baseline surveys.

7.12.3 The Proposed Development lies within NHZ2 and so a qualitative cumulative assessment of the likely effects of local wind farm projects (due to the distance involved only the Orkney area of NHZ2 is considered) as shown in Table 7.5, on local IOF populations, is considered. There are approximately 500 single domestic scale turbines on Orkney and in NHZ2 which generally have no collision risk data and given the large number of those out of immediate vicinity of the site are not considered within this assessment.

7.12.4 For the purpose of this cumulative assessment it is considered that all other developments included in cumulative calculations remain as they were at installation and remain so for the assessment (25 year) period. As such, where appropriate the annual collision rates calculated for the Proposed Development are expanded to a 25 year equivalent in order to allow for comparisons between developments.

7.12.5 Collision risk modelling at the site identified negligible impacts from the results for all species, with the exception of [Redacted] where a total of 0.83 collisions were predicted over a 25 year operating period of the wind farm. This collision risk figure still predicts that impacts due to collision risk are low and are considered not to be significant. Storm petrel displacement and collision risk has not been considered on any other onshore wind farm developments on Orkney and are therefore not considered as part of the cumulative assessment.

7.12.6 The cumulative assessment therefore has been limited to disturbance-displacement of wader species [Redacted] with negligible effects predicted for habitat loss associated with the Proposed Development.

Waders

7.12.7 Golden plover, lapwing, oystercatcher, redshank, [Redacted] and snipe were all recorded breeding within the site and some habitat suitable for roosting or feeding may become unavailable due to displacement effects around turbines and other infrastructure. These wader species were recorded breeding within most local wind farm sites (see Table 7.5) and are relatively common breeding species in Orkney where suitable open habitats are present. A small number of breeding pairs of wader may be effected by displacement due to the construction and operation of wind farms, although in some cases, grazing management measures may help offset such losses of habitat.

7.12.8 Overall, the residual cumulative effect on the local golden plover, lapwing, oystercatcher, redshank, [Redacted] and snipe population from operational displacement is classified as barely perceptible adverse and is not significant. This is also likely to be the level of significance for the contribution of wind farm projects within NHZ2 when scaled up to the relevant population (national/Scottish wintering or migrating populations).

[Redacted]

7.12.9 [Redacted]

Table 7.5 – Cumulative Assessment of Likely Ornithological Effects: Wind Farm Development in Orkney (including single turbine developments within 2 km)

Site Name	Distance from Proposed Development	Stage	Details / Description of Significant Residual Effects
Hammars Hill, Evie	19 km south-west.	Installed	[Redacted] Waders were recorded breeding within the site including (Oystercatcher: 9, Lapwing: 7, Golden Plover: 1, Snipe: 10, Curlew: 12, Redshank: 5; and Short-eared owl: 1). [Redacted]
Holodyke Wind Turbine, Birsay	25 km south-west	Operational	SNH request for ornithology assessment (due to potential impacts on [Redacted] short-eared owl and [Redacted], no details of ornithology data found on Planning Portal but as the site was approved impacts on ornithology are assumed to be acceptable.
Hesta Head, South Ronaldsay	47 km south	Approved	Golden plovers were seen relatively frequently during the spring and autumn passage periods, sizeable flocks were occasional, foraging in the general area with up to 350 present on 7 April 2011 and 16 April 2011 and 260 on 11 December 2015. Otherwise the records were occasional to frequent between late September and early May and appeared to relate to local movements of 1–50 birds, in various directions over and past the Proposed Development, often at risk height. Other listed species observed at the proposed development include; Greylag goose, Oystercatcher, Lapwing, Redshank and Curlew. The surveys for breeding birds in 2011 found two pairs of redshank and five pairs of curlew within the Survey Area, although it seemed likely that up to seven or eight pairs of curlews may have been present. No snipe were confirmed as breeding in 2011, but in 2016 up to two were seen drumming. [Redacted]
Bu arm Repowering, Stronsay	16.6 km south-east	Installed	It was assessed that four species were at risk from collision with turbine ([Redacted] golden plover, dunlin and arctic skua). No CRM details were available.

Site Name	Distance from Proposed Development	Stage	Details / Description of Significant Residual Effects
Hammers Hill Extension	20 km south-west	Application	[Redacted] [Redacted] greylag goose, short-owl and golden plover were frequently observed from VP watches. Breeding bird surveys identified oystercatcher (18), greylag goose (2), [Redacted] red grouse (1), lapwing (2), arctic skua (1–2), snipe (2), great skua (1–2), curlew (11), common gull (5), dunlin (1) and redshank (3) territories. CRM was undertaken for greylag goose, golden plover, [Redacte as well as [Redacted] which was assessed as having an annual collision risk at 955 avoidance of 0.266, at 97.5 % 0.1333 and at 99 % of 0.053.
Work Farm, St Ola	23 km south-west	Approved	No collision risk modelling was undertaken. Ornithology surveys identified both breeding and wintering greylag geese and golden plover in the vicinity of the site. A desk study outlined the presence of wintering wading birds in the vicinity, most notably golden plover and redshank. Small numbers of breeding curlew, lapwing and oystercatcher breed in the local area.
Gallowhill	12.5 km north-west	Installed	No evidence of ornithology surveys or collision risk modelling available of the Planning Portal.
Burgar Hill, Evie	21 km south-west	Installed	As Evie wind farm. (No detailed ornithology results were detected for later turbine applications [Redacted])
Spurness Wind Farm, Sanday	7 km east south-east	Installed	Surveys undertaken by RSPB at the site identified breeding gulls, Arctic tern, Arctic skua and fulmar. No collision risk modelling was undertaken.
Costa Head, Birsay	23 km west south-west	Application	Curlew and golden plover were recorded regularly from VP surveys. Curlew, lapwing and redshank were recorded breeding within the site in small numbers. [Redacted]
Barns of Ayre, Deerness	31 km south south-east	Installed	No ornithology surveys were undertaken or collision risk modelling.

Site Name	Distance from Proposed Development	Stage	Details / Description of Significant Residual Effects
Orkney's Community Wind Farm Project - Quanterness	24 km south south-west	Application	Potential for disturbance and displacement of wintering greylag goose, wintering pink-footed goose, curlew (no direct displacement, up to 6 territories disturbance), lapwing (potentially two displaced and up to 20 territories disturbed), golden plover (up to 2 territories), oystercatcher (four displaced and up to 30 territories disturbed), redshank (up to 4 territories), [Redacted] snipe (up to 4 territories) and Arctic tern (1 territory) [Redacted]
Orkney's Community Wind Farm Project - Hoy	48 km south-west	Application	[Redacted] Potential displacement of curlew (2) and snipe territories was recorded.
Akla	33 km south-west	Application	[Redacted, [Redacted] , great skua most frequently recorded from VP watches as well as golden plover, greylag goose and whimbrel. Oystercatcher (14,18), lapwing (8,3), Snipe (12,18) Curlew (15,12), redshank (5,1) were recorded breeding good numbers.[Redacted]

7.13 Summary

7.13.1 The ornithology study area varies dependent on the bird survey undertaken; however all surveys were carried out in accordance with relevant legislation and best practice guidelines.

7.13.2 The following birds were recorded on site:

- Wildfowl and divers – one species of swan, two species of goose, two species of diver and five duck species during the non-breeding season, only greylag goose were recorded as breeding.
- Gull – five species during both the breeding and non-breeding seasons.
- Raptors and owls - three species of scarce raptors and owls and two species of common raptor during the year, although none were recorded breeding in the site or within the 2 km survey buffer.
- Wader - ten species of waders were recorded, six were recorded breeding.
- Seabirds and skua: six species of seabirds and skuas were recorded breeding which includes a peak count of 91 storm petrel territories.
- Other grassland and moorland birds - species of conservation concern recorded during breeding surveys included three red-listed species: skylark, linnet and twite.

7.13.3 An assessment of likely effects on ornithological receptors identified no predicted significant effects.

7.13.4 An ECoW will oversee the implementation of mitigation measures including the application of best practice guidance and the avoidance, where possible, of site clearance during the bird breeding season. Should nests be discovered then they will be clearly demarcated and buffer zones established around nesting sites to prevent damage to the nests and disturbance of adults caring for young.

7.13.5 When all mitigation measures are implemented, negligible effects on birds are anticipated due to the Proposed Development and the implementation of mitigation and enhancement measures may lead to net gains with regards to storm petrel (through biosecurity measures and the installation of nesting features) as well as ground nesting bird species such as lapwing, and oystercatcher due to a grazing management plan leading to less nesting attempts failing during the incubation period. When all mitigation measures are implemented, there are no predicted cumulative impacts on birds predicted due to the Proposed Development.

Table 0.6 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial / Adverse
Construction					
Greylag goose disturbance and displacement.	Barely Perceptible and not significant	Adverse	None.	Barely Perceptible and not significant	Adverse
[Redacted]	Barely Perceptible and not significant	Adverse	None.	Barely Perceptible and not significant	Adverse
Curlew disturbance and displacement.	Barely Perceptible and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Lapwing disturbance and displacement.	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Golden plover disturbance and displacement.	Barely Perceptible and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Oystercatcher disturbance and displacement.	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
[Redacted]	Low and not significant	Adverse	[Redacted]	Barely Perceptible and not significant	Adverse
Redshank disturbance	Low and not significant	Adverse	Timing of works or pre-construction check for nesting	Barely Perceptible	Adverse

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial / Adverse
and displacement.			birds. Exclusion zones during breeding season.	and not significant	
Snipe	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Arctic tern disturbance and displacement.	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Storm petrel disturbance and displacement	Medium and not significant	Adverse	Minimum 100 m exclusion zone from nesting locations, timing of works and pre-construction check for nesting birds. Enforced biosecurity plan.	Low	Adverse
Gulls	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Great skua	Barely Perceptible and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Shag, Black guillemot	Barely Perceptible and not significant	Adverse	None	Barely Perceptible and not significant	Adverse
Operation					
[Redacted]	Low and not significant	Adverse	None	Low and not significant	Adverse
Lapwing and golden plover – collision risk	Low and not significant	Adverse	None	Low and not significant	Adverse

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial / Adverse
Greylag goose / great skua /other wader collision risk	Barely Perceptible and not significant	Adverse	None	Barely Perceptible and not significant	Adverse
Storm Petrel	Low and not significant	Adverse	Creation of new breeding habitat in north of site with potential to double the island population. Continued biosecurity measures.	High and significant	Beneficial
Ground nesting waders and other species displacement	Low and not significant	Adverse	Grazing management to remain in place throughout the lifetime of scheme.	Low and not significant	Beneficial

Table 0.7 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
[Redacted]	Collision mortality	A combined annual collision risk of 0.21 birds is predicted which is not considered to be significant	Barely Perceptible and not significant	Adverse
Wader collision risk / nest displacement	Disturbance, displacement and collision mortality	Wader data is not available for a number of developments across Orkney. Cumulative collision risk values for these species are very low. Some temporary displacement is likely during construction however with a HMP in place this will be offset	Barely Perceptible and not significant	Adverse

7.14 References

Band, W, Madders, M, & Whitfield, D.P. (2007) *Developing field and analytical methods to assess avian collision risk at wind farms.* In: Janss, G, de Lucas, M & Ferrer, M (eds.) Birds and Wind Farms. Quercus, Madrid. 259-275

Bedolla-Guzman, Y., Masello, J.F., Aguirre-munoz, A. & Quillfeldy, P. 2016. A wood-concrete nest box to study burrow-nesting petrels. Marine Ornithology 44: 249–252 (2016).

BirdlLife International (2004) *Birds in Europe: population estimates, trends and conservation status*. BirdLife Conservation Series No. 12, Cambridge, UK.

Bolton M. (1996) Energy expenditure, body-weight and foraging performance of storm petrels Hydrobates pelagicus breeding in artificial nesting chambers. Ibis, 138, 405-409

Bolton, M., Medeiros, R., Hothersall, B. & Campos, A. (2004) The use of artificial breeding chambers as a conservation measure for cavity-nesting procellariiform seabirds: a case study of the Madeiran storm petrel (*Oceanodroma castro*). Biological Conservation 116 (2004) 73–80.

Bolton, M., Brown, J. G., Moncrieff, H., Ratcliffe, N. and Okill, J.D. 2010. Playback re-survey and demographic modelling indicate a substantial increase in breeding European Storm-petrels Hydrobates pelagicus at the largest UK colony, Mousa, Shetland

Calladine, J., Garner, G., Wernham, C. & Thiel, A. (2009) The influence of survey frequency on population estimates of moorland breeding birds. *Bird Study*, 56: 3, 381-388.

CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Chartered Institute of Ecology and Environmental Management, Winchester

de Leon, A., Minguez, E., Harvey, P., Meek, E., Crane, J, & Furness, R.W. (2006). Factors affecting breeding distribution of Storm-petrels *Hydrobates pelagicus* in Orkney and Shetland, bird study, 53:1, 64-72. Av ailable online at: https://www.tandfonline.com/doi/abs/10.1080/00063650609461417

de Lucas, M.G.F., Janss, S.F.E & Ferrer, M. (2007). Birds and wind farms: risk assessment and mitigation. Quercus, Madrid, Spain.

Devereux, C.L., Denny, M.J.H. & Whittingham, M.J. (2008) Minimal effects of wind turbines on the distribution of wintering farmland birds. Journal of Applied Ecology

Douglas, D., Bellamy, P., & Pearce-Higgins, J. (2011) Changes in the abundance and distribution of upland breeding birds at an operational wind farm. Bird Study 58, Issue 1, 2011

Dürr, T. (2019). *Vogelverluste an Windenergieanlagen / bird fatalities at wind turbines in Europe*. Available at: http://ow.ly/wusS9 Accessed October 2019

Eaton MA, Aebischer NJ, Brown AF, Hearn RD, Lock L, Musgrove AJ, Noble DG, Stroud DA and Gregory RD (2015) Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man. British Birds 108, 708–746. Available at: britishbirds.co.uk/wp-content/uploads/2014/07/BoCC4.pdf (accessed June 2018).

European Parliament (2009). Council Directive 2009/147/EC: The Conservation of Wild Birds Directive. Available at: http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:020:0007:0025:EN:PDF#

Farm Advisory service (FAC). Management and conservation for farmland Waders. Technical note TN688.

Fielding, A.H. & Haworth, P.F. (2010). Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines between 2005-2009. Haworth Conservation, Isle of Mull, Scotland.

Fielding, A.H. & Haworth, P.F. 2012. Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines – 2011 update. Haworth Conservation, Isle of Mull, Scotland.

Fielding, A.H. & Haworth, P.F. 2013. Farr windfarm: A review of displacement disturbance on golden plover arising from operational turbines between 2005-2013. Haworth Conservation, Isle of Mull, Scotland.

Forester, R.W., Andrews, I.J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrilla, B., Betts, M,W., Jardine, D.C. & Grundy, D.S. (EDS) 2012. The Digital Birds ofScotland. the Scottish Ornithologists Club, Aberlady.

Furness, R.W. (2015). A review of red-throated diver and great skua avoidance rates at onshore wind farms in Scotland. Scottish Natural Heritage Commissioned Report No. 885

Gilbert, G, Gibbons D W & Evans J, 2012. Bird Monitoring Methods: A Manual of Techniques for Key UK Species.

Gill, J.P., Townsley, M. and Mudge, G.P., (1996). Review of the impacts of wind farms and other aerial structures upon birds. SNH Review 21: 68pp

Gove, B., Langston, R.H.W., McCluskie, A., Pullan, J.D. & Scrase, I. (2013). Wind farms and birds: an updated analysis of the effects of wind farms on birds, and best practice guidance on integrated planning and impact assessment. Report prepared by BirdLife International on behalf of the Bern Convention. Strasbourg, 17 September 2013.

Grey, M. (2002) A Natural History Audit for the Island of Westray, Orkney - *Commissioned by the Westray Development Trust. available online at: http://www.globalislands.net/userfiles/scotland_7.pdf*

Hardey, J., Crick, H., Riley, H., Etheridge, B., and Thompson, D. (2013) *Raptors: A field guide to surveys and monitoring.* The Stationery Office; 3rd revised edition.

Halley, D.J. & Hopshaug, P. (2007). Breeding and overland flight of red-throated divers Gavia stellata at Smøla, Norway, in relation to the Smøla wind farm. NINA Report 297. 32 pp.

Harrison, C., Llyod, H. & Field, C. (2017). Evidence review of the impact of solar farms on birds, bats and general ecology. (NEER012). Natural England. First edition.

Hayhow, D. B., Ausden, M. A., Bradbury, R. B., Burnell, D., Copeland, A. I., Crick, H. Q. P., Eaton, M. A., Frost, T., Grice, P. V., Hall, C., Harris, S. J., Morecroft, M. D., Noble, D. G., Pearce-Higgins, J. W., Watts, O., Williams, J. M. (2017), *The state of the UK's birds 2017.* The RSPB, BTO, WWT, JNCC, NE and NRW, Sandy, Bedfordshire.

Hötker, H., Thomsen, K-M & Koster, H. (2006) The impact of renewable energy generation on biodiversity with reference to birds and bats – facts, gaps in our knowledge, areas for further research and ornithological criteria for the expansion of renewables. NABU Report, Germany.

IEMA (1995). Guidelines for Baseline Ecological Assessment. Institute of Environmental Management and Assessment.

IEEM (2006) Guidelines for Ecological Impact Assessment. Institute of Ecology and Environmental Management.

Langston, R.H.W. & Pullan, J.D., (2003) Wind farms and Birds: An analysis of the effects of wind farms on birds, and guidance on environmental assessment criteria and site selection issues. Birdlife International.

Madders, M. & Whitfield, D.P. (2006). Upland raptors and the assessment of wind farm impacts. Ibis 148, 43-56.

Mitchell, C. 2012. *Mapping the distribution of feeding Pink-footed and Iceland Greylag Geese in Scotland.* Wildfowl & Wetlands Trust / Scottish Natural Heritage Report, Slimbridge. 108pp.

Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risley, K & Stroud, D. *(2013).* Population estimates of birds in Great Britain and the United Kingdom. *British Birds 106: 64-100*

Okill, J. D. (1992) Natal dispersal and breeding site fidelity of red-throated Divers Gavia stellata in Shetland. Ringing & Migration, 13, 1, 57-58

Orkney Islands Council (2013). Orkney Local Biodiversity Action Plan 2013-2016. Available online at: http://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/DM_Guidance/The_Orkney_Local_Biodiversity_Action_Plan_2013-2016.pdf .

Pearce-Higgins, J.W., Stephen, L., Langton, R., Bainbridge, I. and Bullman, R. (2009) The distribution of breeding birds around upland wind farms. Journal of Applied Ecology (46) 1323 -1331.

Pearce-Higgins, J.W., Stephen, L., Douse, A., Langston, R. (2012) Greater impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Journal of Applied Ecology. 49, 2, April 2012, 386-394

Percival, S.M. (1998). Birds and Turbines: managing potential planning issues. Proc. of the 20th BWEA Conference 1998: pp 345-350

Percival, S.M. (2005) *Birds and wind farms: what are the real issues?* British Birds 98: 194-204.

Percival, S. M. (2014). Kentish Flats Offshore Wind Farm: Diver Surveys 2011-12 and 2012-13. Ecology Consulting, Durham, UK, on Behalf of Vattenfall Wind Power

Petersen, I. K. & Fox, A. D. (2007). Changes in bird habitat utilisation around the Horns Rev 1 offshore wind farm, with particular emphasis on Common Scoter. Report request. Commissioned by Vattenfall A/S. National Environmental Research Institue, University of Aarhus, Denmark.

Ruddock & Whitfield (2007). A review of disturbance distances in selected bird species.

Scottish Government (2013). Scottish Biodiversity List. Version 1.5. Available online at: http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL

Sim, I.M.W., Dillon, I.A., Eaton, M.A., Etheridge, B., Lindley, P., Riley, H., Saunders, R., Sharpe, C. and Tickner, M. (2007). Status of the Hen Harrier *Circus cyaneus* in the UK and the Isle of Man in 2004, and a comparison with the 1988/89 and 1998 surveys. Bird Study 54, 256–267.

SNH (2000) *Windfarms and Birds - Calculating a theoretical collision risk assuming no avoiding action*. SNH Guidance Note. Available at http://www.snh.gov.uk/docs/C205425.pdf

SNH (2010) SNH Avoidance Rate Information and Guidance Note. Use of Avoidance Rates in the SNH Windfarm Collision Risk Model.

SNH (2012) Assessing the Cumulative Impact of Onshore Wind Energy Developments. Available at: https://www.nature.scot/sites/default/files/2017-09/Guidance%20note%20%20-%20Assessing%20the%20cumulative%20impact%20of%20onshore%20wind%20energy%20developments.pdf

SNH (2013). Avoidance rates for wintering species of geese in Scotland at onshore wind farms. Available at http://www.snh.gov.uk/docs/A916616.pdf

SNH (2017). Recommended Bird Survey Methods to inform Impact Assessment of Onshore Wind Farms. SNH Guidance Note Series

SNH (2018a). *Avoidance Rates for the onshore SNH Wind Farm Collision Risk Model.* Version 2. Scottish Natural Heritage, Inverness.

SNH (2018b). Assessing Significance of Impacts from Onshore Windfarms on Birds outwith Designated Areas (2014, updated 2018). SNH Information and Guidance Note. SNH, Battleby.

SNH (2018c). Assessing the cumulative impacts of onshore wind farms on birds. SNH Information and Guidance Note. SNH, Battleby.

Tait C (2012). The Orkney Guide Book. Nature and Environment pp28-41.

The Wildlife Trust of South and West Wales (2017). The New Petrel Station on Skokholm Island has the Team all Fueled Up. Available at: https://www.welshwildlife.org/conservation/new-petrel-station-skokholm-island-team-fueled/

Thomas, S., Varnham, K. (2016) Seabird Island Restoration Project, RSPB - Island Biosecurity Manual. Available online at: https://ww2.rspb.org.uk/our-work/conservation/shiantisles/work/downloads/hyperlinks/RSPB_Shiants%20LIFE_Biosecurity%20Manual.pdf

Topping C, & Petersen J,K. (2011). Report on a Red-throated diver agent-based model to assess the cumulative impact from offshore wind farms. Report commissioned by the Environmental Group. Aarhus University, DCE – Danish Centre for Environment and Energy

Upton, A. (2012a). Red-throated diver wind turbine avoidance, Burgar Hill, Orkney: 2007- 2012. Firth Ecology, Finstown.

Upton, A. (2012b). *Great skua wind turbine avoidance in Orkney*. Firth Ecology, Finstown.

Upton, A. (2014a). Wind Farm Bird Monitoring – 2013. Carcase searches and owl watches at Orkney wind farm sites. Firth Ecology, Finstown.

Upton, A. (2014b). Red-throated diver wind turbine avoidance in Orkney: 2014 update. Firth Ecology, Finstown.

Upton, A. (2014c). *Great skua wind turbine avoidance in Orkney: 2014 update*. Firth Ecology, Finstown.

Upton, A. G. (2018). Wind Farm Bird Monitoring – 2018: Carcass Searches at Orkney Wind Farm Sites. Unpublished report for Birsay Energy Ltd and Hammars Hill Energy Ltd.Vauk, G. (1990) Biological and ecological study of the effects of construction and operation of wind power land ownerships. Jahrgang/Sonderheft, Endbericht. Norddeutsche Naturschutzakemie, Germany.

Watson, H., Bolton, B. & Monaghan, P. 2014. Out of sight but not out of harm's way: Human disturbance reduces reproductive success of a cavity-nesting seabird. Biological Conservation 174 (2014) 127-133

Whitfield, D.P. Green, M. & Fielding, A.H. 2010. Are breeding Eurasian curlew *Numenius arquata* displaced by wind energy developments? Natural Research Projects Ltd, Banchory, Scotland.

Wilson, M.W., Austin, G.E., Gillings, S. and Wernham, C.V. (2015) *Natural Heritage Zone Bird Population Estimates*. SWBSG Commissioned Report: 1504.

Winkelmann, J.E. (1994) Bird/wind turbine investigations in Europe. Proc. of the National Avian Wind Power Planning Meeting, Denver, Colorado, pp 43-48.

Yalden, D.W. & Yalden, P.E. (1989). The sensitivity of breeding Golden Plovers Pluvialis apricaria to human intruders. Bird Study 36: 49–55.

Yalden, P.E. & Yalden, D.W. (1990). Recreational disturbance of breeding Golden Plovers Pluvialis apricaria. Biol. Conserv. 51: 243–262.

8 Terrestrial Ecology and Nature Conservation

Contents

8.1	Executive Summary	8-1
8.2	Introduction	8-3
8.3	Legislation, Policy and Guidelines	8-3
8.4	Consultation	8-5
8.5	Assessment Methodology and Significance Criteria	8-6
8.6	Baseline Conditions	8-11
8.7	Do Nothing Scenario	8-20
8.8	Evaluation of Recorded Features	8-20
8.9	Receptors Brought Forward for Assessment	8-23
8.10	Standard Mitigation	8-26
8.11	Likely Effects	8-29
8.12	Additional Mitigation and Enhancement	8-42
8.13	Residual Effects	8-45
8.14	Cumulative Assessment	8-45
8.15	Summary	8-46
8.16	References	8-57

This page is intentionally blank.

8 Terrestrial Ecology and Nature Conservation

8.1 Executive Summary

8.1.1 An assessment of terrestrial ecology effects arising from the construction and operation of the Proposed Development on the uninhabited island of Faray was undertaken and is presented, based on the Proposed Development layout and turbine dimensions.

8.1.2 Following consultation with Orkney Islands Council (OIC), NatureScot (formerly Scottish Natural Heritage, SNH) and Scottish Environment Protection Agency (SEPA), a range of ecological studies were undertaken, to identify the terrestrial ecological interests of the Proposed Development and to establish the ecological baseline for the ecological impact assessment (EcIA). This included identification of existing wildlife records and nearby sites designated for nature conservation (compiled for the desk study) and survey of the habitats and faunal interests of the site. The following field surveys were undertaken:

- Habitats: extended Phase 1 habitat survey and National Vegetation Classification (NVC) assessment;
- Otter survey;
- Seal survey; and
- Bat survey.

8.1.3 The primary habitats identified on site above the shoreline (listed in order of size) are:

- Improved grassland;
- Semi-improved acid grassland; and
- Marshy grassland.

8.1.4 A range of small pools are present across the island, many of which are ephemeral. Several wet and dry ditches cross the island and a single and very short burn is present within the Study Area, outwith the development footprint. This flows directly west to the shore from two springs which rise in an area of marshy grassland to the west of the island centre.

8.1.5 The desk study identified the presence of five sites of international and national importance designated for nature conservation, 15 designated seal haul-outs and two local nature conservation sites within 10 km of the site. The presence of grey seals and [Redacted] was also noted.

8.1.6 Through a standardised evaluation method devised by the Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2018), Important Ecological Features (IEFs) were identified and brought forward for assessment. IEFs taken forward to assessment include:

- Faray and Holm of Faray Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) (designated for grey seals, supporting the second-largest breeding colony of grey seals in the UK);
- Designated seal haul-outs;
- Standing water;
- Intertidal boulders/rocks;
- Groundwater-dependent terrestrial ecosystem (GWDTE) marshy grassland with springs;
- Otter; and
- Non-breeding grey seals.

8.1.7 Potential impacts of the construction and operation phases are presented, prior to an assessment of the effects of those impacts. In line with the CIEEM guidelines, the impact assessment process assumes the application of standard mitigation measures. Additional measures to control remaining impacts are also detailed, including development of Method Statements and Species Protection Plans. Of particular importance is a commitment to avoid construction works within the grey seal breeding season, the most sensitive period of the local seal population's lifecycle. With these in place, residual effects are assessed to be, at most, **negligible** adverse during construction for all described IEFs. During operation, there will be, at most, temporary **minor** adverse impacts to individual seals, if maintenance visits or major repairs are required during the breeding season. Overall, both construction and operational effects are therefore considered **not significant** under the EIA Regulations.

8.1.8 With a lack of connectivity to any other wind farms, or other types of developments, no cumulative effects are anticipated for the terrestrial (i.e. non-avian) interests of the site.

8.1.9 The assessment concludes that there will be no significant adverse effect on any of the terrestrial ecological interests of the site, resulting from the construction and operation of the Proposed Development.

8.2 Introduction

8.2.1 This chapter sets out the methods used to describe and evaluate the non-avian ecological features within the area of the Proposed Development. It documents the baseline conditions and includes an assessment of the likely effects of the Proposed Development on ecological features above a certain value, and defines mitigation and compensation measures where significant effects are predicted.

8.2.2 Marine ecological features are described and assessed in Chapter 16 Ornithological features are described and assessed in Chapter 7. Hydrological and geological features are described and assessed in Chapter 11.

8.2.3 This chapter has been authored by ITPE and is supported by baseline data provided within the following technical appendices:

- Appendix 8.1 - Habitat Survey and Ecological Desk Study;
- Appendix 8.2 - Otter (*Lutra lutra*) Survey;
- Appendix 8.3 - Seal Survey;
- Appendix 8.4 - Storm Petrel and Bat Activity Survey; and
- Appendix 8.5 – Report to Inform Habitats Regulations Appraisal (HRA).

8.2.4 The "Study Area" for the ecological surveys included a variable radius buffer beyond the shoreline (with Mean Low Water Springs, MLWS, taken as the limit of the island), depending upon the survey; see paragraph 8.5.3 below and Appendices 8.1-8.4. Assessment is extended out to the designated seal haul-outs between Faray and the port facilities of Hatston Quay, on mainland. Below the MLWS line, impacts to ecological features are assessed in Chapter 16 Underwater Noise.

8.2.5 The specific objectives of the chapter are to:

- Describe the ecological impact assessment (EcIA) methodology and criteria used to make the assessment;
- Describe the ecological baseline conditions;
- Describe the likely effects of the Proposed Development, including direct, indirect and cumulative effects in the presence of standard mitigation;
- Describe any additional mitigation measures proposed to address significant effects; and
- Assess any residual effects.

Statement of Competence

8.2.6 The assessment has been carried out in accordance with the Code of Professional Conduct of the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018). This chapter has been prepared by Mark Berry (BSc (Hons), MSc, MSc, MSc, MCIEEM PIEMA), an ecologist with over 19 years' experience.

8.3 Legislation, Policy and Guidelines

Legislation

8.3.1 The relevant legislation and guidance documents have been reviewed and considered as part of this ecological impact assessment (EcIA). Of particular relevance are:

- Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (the "Habitats Directive") (EEC, 1992);

- The Conservation (Natural Habitats &c.) Regulations 1994 (as amended in Scotland) (the "Habitats Regulations") (UK Government, 1994);
- The Wildlife and Countryside Act 1981 (as amended) (WCA) (UK Government, 1981);
- The Conservation of Habitats and Species Regulations 2010 (as amended) (UK Government, 2010);
- Nature Conservation (Scotland) Act 2004 (as amended) Scottish Government, 2004);
- Marine (Scotland) Act 2010 (Scottish Government, 2010);
- The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 (Scottish Government, 2014a); and
- The Wildlife and Natural Environment (Scotland) Act 2011 (as amended) (the "WANE Act") (Scottish Government, 2011a).

Planning Policy

8.3.2 Chapter 5 of the EIA Report provides an overview of all the relevant planning policy. Of particular relevance to this chapter are:

- National Planning Framework 3 (Scottish Government, 2014b);
- Scottish Planning Policy (SPP; Scottish Government, 2014c); and
- Orkney Local Development Plan (OIC, 2017a).

8.3.3 Planning Advice Note (PAN) 60: Planning for Natural Heritage provides guidance relevant to this assessment and the Proposed Development (Scottish Government, 2008).

Biodiversity Priorities

Scottish Biodiversity List

8.3.4 Scottish Ministers created the Scottish Biodiversity List (SBL) (Scottish Government, 2013) to satisfy the requirements under Section 2(4) of the Nature Conservation (Scotland) Act 2004, assist public bodies in carrying out conservation of biodiversity, and provide the general public with information regarding conservation within Scotland. The SBL comprises species and habitats listed using both scientific and social criteria. Only scientific criteria are considered relevant to this chapter. They include the following:

- All UK Priority Species present in Scotland;
- Species which Scotland has an international obligation to safeguard;
- All species defined as nationally rare at a UK level that are present in Scotland;
- Species with populations present (resident, wintering or breeding) in 5 or fewer 10 km squares or sites in Scotland;
- All species that are endemic to Scotland;
- Any sub-species or race that is widely recognised and accepted by the scientific (or other relevant) community and that is endemic to Scotland, if it also meets one of the other criteria; and
- Natural and semi-natural habitats that are known to be particularly important for supporting assemblages of plant or animal groups that are data deficient, such as fungi, bryophytes, lichens, algae and invertebrates.

Local Biodiversity Reporting

8.3.5 The Orkney Local Biodiversity Action Plan (LBAP) is a targeted action plan for the period 2018 – 2022 (Orkney's Biodiversity Steering Group, 2018). The LBAP addresses biodiversity planning in Orkney through the following four themes: greenspace, farmland, peatland and the marine environment.

Guidance

8.3.6 Further key guidance documents relating to the assessment of effects of wind farms on terrestrial (non-avian) ecological receptors that have been referenced in this assessment include the following:

- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018);
- Good Practice during Wind Farm Construction (SNH, 2019);
- Monitoring the Otter *Lutra Lutra* (Chanin, 2003a);
- Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation (Scottish Natural Heritage *et al*., 2019)
- Bat Surveys for Professional Ecologists: Good Practice Guidelines (Collins, 2016); and
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017).

8.3.7 Where appropriate, more detail relating to specific legislation, guidance or policy is provided in the corresponding technical appendix for each specialist input supporting this chapter (i.e. Appendices 8.1 to 8.4).

8.4 Consultation

8.4.1 Table 8.1 provides details of consultations undertaken with relevant stakeholders, together with actions undertaken by the Applicant in response to consultation comments.

Table 8.1 – Consultation Relevant to Non-avian Ecology

Consultee	Key Consultee Comments	Applicant Action
Orkney Islands Council (OIC); scoping opinion received 26/04/19	Noted a requirement for: ▪ A description of the baseline; ▪ Identification of relevant receptors; ▪ A description of likely effects resulting from the development, including cumulative effects; and, ▪ Mitigation measures. Recognised Scottish Natural Heritage's (SNH) (now NatureScot) requirements regarding seals (see below). Recognised Scottish Environment Protection Agency's (SEPA) requirements regarding groundwater-dependent terrestrial ecosystems and pollution prevention (see below).	▪ The ecological baseline presented in Section 8.6; ▪ Relevant receptors are identified in Section 8.8 and 8.9; ▪ Likely effects described in Sections 8.11, 8.13 and 8.14; and, ▪ Mitigation measures are detailed in Sections 8.10 and 8.12.

Consultee	Key Consultee Comments	Applicant Action
OIC Policy Officer: Environment; scoping opinion 14/05/19	Noted the Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) designations for the island and wider area; and the need to avoid works during the seal breeding season. Also noted [Redacted] the presence of cetacean species in the waters off the island.	Informed the survey design, with particular reference to seals [Redacted] (see Sections 8.5 - 8.6 and Technical Appendices 8.1 - 8.4); cetacean presence is noted in Section 8.6.
SNH (now NatureScot); scoping opinion received 15/05/19	Advised that the most significant natural heritage interests likely to be affected by the proposal are the grey seals (*Halichoenus grypus*) of the Faray & Holm of Faray SAC and harbour seals (*Phoca vitulina*) of the Sanday SAC.	Designated sites are identified in Section 8.6; assessment is in Section 8.11 - 8.13.
	Requirement for a HRA to be undertaken for both SACs, though effects are not anticipated. Faray is within the 40-50 km harbour seal foraging distance of the Sanday harbour seal population. Noted: "*The commitment to undertake construction work outwith the grey seal breeding season is particularly important in avoiding any adverse effect on Faray & Holm of Faray SAC.*"	Impacts on the SAC are included in this chapter. The requirement for HRA is fulfilled in a separate report accompanying this EIA Report (see Appendix 8.5).
	Seal count survey required (outline of methodology also provided).	A survey was conducted and is reported in Appendix 8.3.
SEPA; scoping opinion received 21/05/19	Advised to identify and map any groundwater-dependent ecosystem (GWDTE) areas.	GWDTE presence has been considered within Section 8.6 and in Chapter 11 Geology Hydrology and Hydrogeology
SEPA; consultation information received 11/08/20	Provided a standard guidance note, which includes: ▪ A requirement to ensure protection of any GWDTEs within the development area; and ▪ Pollution prevention and environmental management to be included in the mitigation measures.	▪ GWDTE presence has been considered within Section 8.6, below, and in Chapter 11: Geology Hydrology and Hydrogeology; and, ▪ Included within the standard mitigation of Section 8.9.

8.5 Assessment Methodology and Significance Criteria

Ecological Desk Study

8.5.1 In line with the CIEEM (2018) guidelines, an ecological desk study was undertaken; this is presented within Appendix 8.1. This data was used to confirm the presence of any statutory and non-statutory

nature conservation sites and legally protected or otherwise notable species within 10 km of the site.

Field Surveys

8.5.2 As documented within Appendices 8.1 to 8.4, a range of ecology surveys were undertaken for the site and adjacent area:

- Extended Phase 1 habitat survey and National Vegetation Classification (NVC) undertaken in May 2019 and covering the full area of the island of Faray to LWMS (see Appendix 8.1).
- Otter survey of suitable habitat within the island and its shoreline to LWMS, undertaken in August 2019 (see Appendix 8.2).
- Seal survey conducted as a series of monthly visits from April to September 2019, inclusive, and in February and March 2020, avoiding the breeding season. Survey included the island shoreline and the sea to 500m offshore (see Appendix 8.3).
- [Redacted]

Evaluation Methods for Ecological Features

8.5.3 Table 8.2 lists the criteria used to determine the value of the non-avian ecological features in a geographical context.

Table 8.2 – Geographical Evaluation Criteria

Scale of Ecological Value	Criteria	Examples
International	Nature conservation resource, i.e. designated nature conservation area, habitat or populations of species, of international importance. N.B. For designations, such as an SAC, this may also include off-site features on which the qualifying population(s) or habitat(s) are considered, from the best available evidence, to depend.	International nature conservation areas: ▪ Any SAC; and ▪ Any candidate SAC (cSAC). Significant numbers of a designated population outside the designated area. A site supporting more than 1% of the EU population of a species.
National (Scotland)	Nature conservation resource, i.e. designated nature conservation area, habitat or populations of species, of national importance. N.B. For designations, such as a SSSI or a National Nature Reserve (NNR), this may also include off-site features on which the	National nature conservation areas: ▪ Any SSSI or NNR designated for biological feature(s). A site supporting more than 1% of the UK population of a species. Nationally important population/assemblage of an EPS or species listed on Schedule 5 of the WCA.

Scale of Ecological Value	Criteria	Examples
	qualifying population(s) or habitat(s) are considered, from the best available evidence, to depend.	
Council area (Orkney)	Nature conservation resource, i.e. nature conservation designation, habitat or species, of importance on a council area scale.	Statutory and non-statutory nature conservation designations: ▪ Any Local Nature Reserve (LNR); ▪ Any Local Nature Conservation Site (LNCS); ▪ Any Scottish Wildlife Trust (SWT) reserve; and ▪ Any Local Biodiversity Site (LBS). A council area-scale important population / area of a species or habitat listed on the SBL (Scottish Government, 2013) as requiring conservation action. A council area-scale important population/area of a species or habitat listed on the local Biodiversity Action Plan (LBAP). A council area-scale important population / assemblage of an EPS or species listed on Schedule 5 of the WCA.
Local (i.e. within 2 km of the site)	Nature conservation resource, e.g. a habitat or species of importance in the context of the local district.	A breeding population of a species or a viable area of a habitat that is listed in a LBAP because of its rarity in the locality. An area supporting 0.05-0.5 % of the UK population of a species. A breeding population of a species on the SBL. All breeding populations of EPS or species listed on Schedule 5 of the WCA.
Less than local	Unremarkable, common and widespread habitats and species of little/no intrinsic nature conservation value.	Common, widespread, modified and/or impoverished habitats. Common, widespread, agricultural and/or exotic species.

8.5.4 Where a feature qualifies under two or more criteria, the higher value is applied to the feature.

8.5.5 In this chapter any ecological feature of local or higher value is considered an Important Ecological Feature (IEF).

Impact Assessment Methods

8.5.6 The approach to the EcIA follows the CIEEM guidelines (CIEEM, 2018) and considers the factors described below.

Ecological Zone of Influence

8.5.7 The Ecological Zone of Influence (EZoI) is defined as the area within which there may be ecological features subject to effects from the Proposed Development. Such effects could be direct [Re), or indirect (e.g. noise or visual disturbance causing a species to move out of the EZoI). The EZoI was determined through:

- Review of the existing baseline conditions based on desk study results, field surveys and information supplied by consultees;
- Identification of sensitivities of ecological features, where known;
- The outline design of the Proposed Development and approach to construction; and
- Through liaison with other technical specialists involved in the assessment, e.g. hydrologists and noise specialists.

Temporal Scope

8.5.8 Likely impacts on ecological features have been assessed in the context of how the predicted baseline conditions within the EZoI might change between the surveys and the start of construction.

Characterising Ecological Impacts

8.5.9 In accordance with the CIEEM (2018) guidelines, the following definitions are used for the terms 'impact' and 'effect':

- Impact – Actions resulting in changes to an ecological feature. For example, the construction activities of a Development removing a hedgerow.
- Effect – Outcome to an ecological feature from an impact. For example, the effects on a species population from loss of a hedgerow.

8.5.10 In accordance with the CIEEM (2018) guidelines, when determining impacts on IEFs, reference is made to the following:

- Beneficial or adverse – i.e. whether the impact has a beneficial or adverse effect in terms of nature conservation objectives and policy;
- Impact magnitude – i.e. the size of an impact, in quantitative terms where possible;
- Extent – i.e. the area over which an impact occurs;
- Duration – i.e. the time for which an impact is expected to last;
- Timing and frequency – i.e. whether impacts occur during critical life stages or seasons; and
- Reversibility – i.e. a permanent impact is one that is irreversible within a reasonable timescale or for which there is no reasonable chance of action being taken to reverse it. A temporary impact is one from which a spontaneous recovery is possible.

8.5.11 Both direct and indirect impacts are considered. Direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action but affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. fencing of a development site may cause scrub to invade marshy grassland.

8.5.12 Impact magnitude refers to size, amount, intensity and volume. The CIEEM (2018) guidelines state that it should be quantified, if possible, and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population. That approach has been followed here, where possible. However, following the language of other chapters in the EIA Report, impact magnitude has also been categorised with reference to the definitions in Table 8.3, below.

Table 8.3 – Impact magnitude

Level of impact	Definition
No impact	No detectable impacts on the ecological resource, even in the immediate term
Negligible	Detectable impact but reversible within 12 months. Not expected to affect the conservation status of the nature conservation designation, habitat or species under consideration
Minor	Detectable impacts, and may be irreversible, but either of sufficiently small scale or of short-term duration to have no material impact on the conservation status of the nature conservation designation, habitat or species population
Moderate	Detectable impact on the status of the nature conservation designation, habitat or species population in the medium term but is reversible/replaceable given time, and not a threat to the long-term integrity of the feature
Major	Irreversible impact on the status of the nature conservation designation, habitat or species and likely to threaten the long-term integrity of the feature. Not reversible or replaceable. Will remain detectable in the medium and long term
The following definitions have been applied in respect to timescales: Immediate: Within approximately 12 months; Short term: Within approximately 1-5 years; Medium term: Within approximately 6-15 years; and Long term: More than 15 years.	

Determining Ecologically Significant Effects

8.5.13 An EcIA is undertaken in relation to the baseline conditions that would be expected to occur in the absence of a proposed development and, therefore, may include possible predictions of future changes to baseline conditions, such as environmental trends and other completed or planned development. Both adverse and beneficial impacts/effects are possible.

8.5.14 A significant effect, in ecological terms, is defined as an effect (whether adverse or beneficial) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area, including cumulative and in-combination impacts. In accordance with the CIEEM guidelines, the approach adopted in this chapter aims to determine if the effect of

an impact is significant or not based on a discussion of the factors that characterise it, i.e. the ecological significance of an effect is not dependent on the value of the feature in question. Rather, the value of a feature that will be significantly affected is used to determine the geographical scale at which the effect is significant.

8.5.15 In accordance with the CIEEM (2018) guidelines, effects of impacts are assessed in the presence of standard mitigation measures. Additional mitigation may be identified where it is required to reduce a significant effect.

8.5.16 Any significant effects remaining post-mitigation (the residual effect), together with an assessment of the likelihood of success of the mitigation, are the factors to be considered against legislation, policy and development control in determining the application.

8.5.17 In addition to determining the significance of effects on valued ecological features, this chapter also identifies any legal requirements in relation to wildlife.

Limitations to Assessment

8.5.18 The habitat, otter and bat surveys were carried out according to current recommended guidelines, at appropriate times of year, and during favourable weather conditions, and with full access across the site. As such, no significant limitations have been identified for these surveys.

8.5.19 The seal survey programme relied on good weather conditions, resulting in some delays to survey; however, this is not considered a significant limitation, as the general monthly pattern of use was still possible to ascertain. The breeding season was also avoided, to prevent unduly disturbing animals at this particularly sensitive time, an avoidance which will mirror the construction programme. Additionally, Covid 19 restrictions prevented further survey beyond March 2020.

8.6 Baseline Conditions

8.6.1 This Section of the chapter details the results of the desk study and field surveys conducted across the site and respective Study Areas, which provides the baseline conditions from which the impact assessment is based.

Desk Study

Statutory Nature Conservation Designations

8.6.2 Five statutory nature conservation designations, two of which overlap, and which are designated for non-avian ecological features, are present within 10 km of the site. There are no statutory local designations, such a Local Nature Reserves, within the 10 km search area. These designations are shown in Figure 8.1 and described in

8.6.3 Table 8.4, below. It should be noted that designations for ornithological interests are described within Chapter 7: Ornithology.

8.6.4 Consideration of the marine designations was extended to 20 km. In addition to the Faray and Holm of Faray SAC and SSSI, designated for grey seal presence, the Sanday SAC is designated for harbour seals. Though this area is c.11 km east of the site boundary at its closest point, harbour seals are noted to forage in a range of 40-50 km (SNH, 2011, SCOS, 2019), therefore the Sanday SAC requires to be included within development effect considerations. Following this logic, the East Sanday Coast SSSI is also included in consideration, as this also covers the seal haul-out areas of the Sanday SAC.

Table 8.4 – Designated Sites (terrestrial ecology) within 10 km of the Proposed Development

Site	Designation	Distance to Site	Non-ornithological Reasons for Designation
Faray and Holm of Faray	SAC	Partly overlaps with the site	Species: Grey seal

Site	Designation	Distance to Site	Non-ornithological Reasons for Designation	
	SSSI	Partly overlaps with the site	Species:	Grey seal(noted as an important breeding and haul-out site)
Sanday	SAC	10.7 km east	Habitats: Species:	Intertidal mudflats and sandflats, reefs and subtidal sandbanks Harbour seal
East Sanday Coast	SSSI	11.4 km east	Habitats: Species:	Vascular plant assemblage, rocky shore and sandflats Harbour seal
Wyre and Rousay Sounds	Marine Protected Area (MPA)	6.3 km south-west	Habitats:	Kelp and seaweed communities on sublittoral sediment and maerl beds
Muckle and Little Green Holm	SSSI	7.8 km south	Species:	Grey seal
Rousay	SSSI	8.2 km south-west	Habitats: Species:	Blanket bog, maritime cliff, mesotrophic loch and subalpine wet heath. Vascular plant assemblage

8.6.5 With grey seal presence identified by the SAC and SSSI citations (including the SSSI noting the importance of the islands as a haul-out location), no individually designated haul-outs are on or immediately adjacent to Faray. As described in Appendix 8.3, 15 designated haul-out sites are present within 10 km of the site. Of these, only four are within 5 km and two, Rusk Holm and South Westray, within relatively close proximity to Faray and the Holm of Faray (at 0.92 km west and 1.8 km north, respectively). A further 15 haul-out sites are within 20 km, with five of these on the likely route between Kirkwall Hatston Quay and Faray.

Non-statutory Nature Conservation Designations

8.6.6 Two Local Nature Conservation Sites (LNCS) are located within 2 km of the site boundary. In terms of non-avian interests, Braehead LNCS, which is located c.1.31 km east of the site, on the west of Eday, is designated for nationally important upland heath, blanket bog and oligotrophic and dystrophic lake habitats. Resting Hill LNCS is located c.1.66 km east of the site, and adjacent to Braehead LNCS; non-avian interests for this designation include are nationally important upland heath and blanket bog habitats (OIC, 2017b).

Protected or Otherwise Notable Species

Invasive Species

8.6.7 No records were identified for non-native, invasive species within a 2 km search radius of the site boundary.

Terrestrial/Marine Animals

8.6.8 Data provided by the Orkney Wildlife Information and Records Centre (OWIRC) include records of eleven protected or otherwise notable faunal species from locations within 10 km of the site boundary and dating from within the last 10 years, as summarised in Table 8.5, which shows the highest level of legal protection: there are no offences under the other protections not already covered. A note of national and local biodiversity interest is also included, as appropriate.

Table 8.5 – Records of Protected or Otherwise Notable Species from within 10 km of the Site

Common Name	Scientific Name	Legal / Conservation Status	Records
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	EPS SBL priority species Orkney LBAP priority species	Single record, 2014, Warness Sound, off Eday, 5 km south of Faray.
Bottle-nosed dolphin	*Tursiops truncatus*	EPS SBL priority species Orkney LBAP priority species	Single record, 2009, Westray.
Common porpoise	*Phocoena phocoena*	EPS SBL priority species Orkney LBAP priority species	Seventy-two records, 2009-17; x1 record south of Faray and x67 records in Warness sound, Eday.
Common dolphin	*Delphinus delphis*	EPS SBL priority species Orkney LBAP priority species	Single record, 2009, Westray.
Grey seal	*Halichoenus grypus*	Protected under the Marine (Scotland) Act 2010 Orkney LBAP priority species	Four records, 2012: x1 record of a harbour seal near Braeswick, Sanday, c. 7.6 km east; and x3 records for grey seals: Point of Geldibist, Rapness, Westray, c.2.6 km north-west; Bay of Stove, Sanday, c.4.5 km east; and just south of Braeswick, Sanday, c.6.6 km east.
Long-finned pilot whale	*Globicephala melaena*	EPS SBL priority species Orkney LBAP priority species	Single record, 2012, Twiness, Westray, 4.5 km north-west.

Common Name	Scientific Name	Legal / Conservation Status	Records
Minke whale	*Balaenoptera acutorostrata*	EPS SBL priority species Orkney LBAP priority species	Twenty-four records, 2009-17; x20 off Warness sound, Eday. Other records Eday, Westray, Sanday, Egilsay all >5 km from Faray.
Orca	*Orcinus orca*	EPS SBL priority species Orkney LBAP priority species	Seventeen records, 2013: x4 off Eday, c.4.0 km, x9 records Warness Sound, Eday, c.5.5 km south, x4 off Sanday, x1 each off Egilsay, Rousay, Papa Westray, Green Holm. All records >5 km from Faray.
[Red	[Redacte	[R ed act ed]	[Redacted]
Risso's dolphin	*Grampus griseus*	EPS SBL priority species Orkney LBAP priority species	Fourteen records, 2009-17; x9 Warness Sound, Eday, x3 off Sanday and x2 at Rapness, Westray. All records >5 km from Faray.
White-beaked dolphin	*Lagenorhynchus albirostris*	EPS SBL priority species Orkney LBAP priority species	Four records 2009-15; x3 off Warness Sound and x1 off Westray. All records >5 km from Faray.

Seals

8.6.9 The 2018 aerial survey of the Outer Hebrides, Orkney and the North Coast Mainland colonies was abandoned due to bad weather (SCOS, 2019). A full survey of the grey and harbour seal populations of the northern isles was being completed in 2019 (Duck and Morris, 2019), with the data yet to be published (only the scientific advice was updated by The Special Committee on Seals in 2019)). The following is, therefore, based on the most recent available data.

8.6.10 Data from The Special Committee on Seals (SCOS) (2019) for the grey seal population indicated the last survey to have been in 2016. Due to movements, i.e. dispersal of the grey seal population throughout the year, population counts are based on pup production. Pregnancy typically lasts for c.11.5 months, due to a period “delayed implantation” of c.3.5 months, when the embryo does not attach. This ensures that the annual timing of mating and pupping remains constant, with this covered by the term “breeding season”.

8.6.11 Orkney pup production since 2000 is noted as relatively stable, but low in comparison to the rest of the UK (+0.2 % increase since 2014). Through data modelling, the overall 2018 UK grey seal population was estimated at 152,000 (SCOS, 2019), including infrequently monitored colonies; however, estimated pup production for 2016 indicated 65,378. Using the estimated pup production figures, the Orkney population was estimated at c. 23,849 animals, representing c.43.6 % of the Scottish population (54,741) and a significant 36.5 % of the UK total (SCOS, 2019). Specifically, for the Faray and Holm of Faray SAC, and indicating its importance to the Orcadian grey seal population, the SAC accounted for c.15% (c.3,578 animals) of Orkney grey seal pup production in 2010 (Russel *et al*., 2019).

8.6.12 In addition to the above, the harbour seal is also present across the Orkney Islands. Over the past 15 years, Scottish Mammal Research Unit surveys have recorded a continuing decline of more than 75% in counts of harbour seals in Orkney (Duck and Morris, 2019). Of a total of 1,349 animals recorded in the 2016 count for North Coast Scotland and Orkney, the vast majority (c.1,200 animals or c.89 %) were recorded on haul-outs around the islands (SCOS, 2019; Duck and Morris, 2019). The UK population appears to have increased, with the 2015-18 numbers almost back to the levels recorded in the 1990s, with a total of 26,864 noted for Scotland and a UK total of 32,971.

[Redacte

8.6.13 [Redacted]

Field Surveys

Habitats

8.6.14 The results of the extended Phase 1 habitat survey and NVC are outlined in this section and shown on Figure 8.2, which illustrates the location and extent of habitat types recorded within the Study Area. For a full description of the habitat survey results, please refer to Appendix 8.1.

8.6.15 The island is currently uninhabited but previously supported farmsteads, some of which remain, and the effects of past practises, including drainage and agricultural improvement, remain evident, and the island continues to be grazed by sheep. The land use is therefore predominantly agricultural grazing, which extends to the coastal cliff or beaches, and little natural or semi-natural vegetation is present. A total of twelve habitats, including two boundary features, were recorded within the Study Area. Only four habitats could be assigned to an NVC community; NVC results are described within the relevant broad Phase 1 sections below. Table 8.6 presents the cover of each habitat.

Table 8.6 – Area Cover of site and Study Area Phase 1 Habitats

Phase 1 Habitat/NVC Code	Phase 1 Habitat Description	Extent in Study Area
B1.2	Semi-improved acid grassland	42.21 ha
B4	Improved grassland	81.80 ha
B5	Marshy grassland (two areas: 1.49 ha near the main borrow pit search area and 0.4 ha in the south of the island)	1.89 ha
G1	Standing water	0.70 ha
G2	Running water	1.89 km
H1.1	Intertidal sand	7.18 ha
H1.3	Intertidal boulders/rocks	32.46 ha
H8.1	Maritime cliffs	3.35 km

Phase 1 Habitat/NVC Code	Phase 1 Habitat Description	Extent in Study Area
J1.4.1	Exposed rock	1.23 ha
J2.4	Post and wire fence	4.76 km
J2.5	Drystone wall	0.43km
J2.6	Dry ditch	0.31 km
J3.6	Buildings	0.42 ha
J5	Track Graveyard	2.33 km 0.15 ha

8.6.16 A description of the Phase 1 habitats recorded within the Study Area is presented below: for full descriptions, scientific names and target notes please refer to Appendix 8.1 and Figure 8.2.

Semi-improved acid grassland

8.6.17 Short-grazed semi-improved acid grassland was recorded in three distinct locations: on the northern and southern tips of the island and eastern fringes of the island. Most of the habitat occurs in mosaic with improved grassland, with only one discrete (i.e. larger) area not present within a mosaic. Dominant grasses include short-grazed meadow-grass, Yorkshire fog, common bent and creeping bent. The range of associated forb species is locally modestly high.

8.6.18 The vegetation shows no clear affinity to any NVC type, reflecting the history of agricultural improvement and high level of sheep grazing. The vegetation locally resembles MC10 *Festuca rubra-Plantago spp*. maritime grassland, but some typical species of MC10, such as red fescue and plantain species were not recorded, whereas some of the species recorded, e.g. tufted hair-grass and marsh ragwort, are not associated with MC10 grassland.

Improved acid grassland

8.6.19 Improved grassland, used for grazing sheep is present across much of the island and forms the dominant habitat type. The dominant grass species recorded are perennial rye-grass, with meadow-grass, Yorkshire fog and sweet vernal-grass also present. Within the grassland are locally dense patches of sea mayweed, silverweed, common nettle, common daisy and tormentil. Sections of the improved grassland grade into semi-improved acid grassland, notably towards the coast and cliff edges.

8.6.20 The vegetation shows some affinity to MG11 *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland, the *Lolium perenne* sub-community. This community is relatively common as pasture near the coast that has been subject to agricultural improvement.

Marshy grassland

8.6.21 Two areas of marshy grassland were recorded in the west and south-west of the island; the western area is associated with two springs and the southern area with a ditch. The larger section was recorded adjacent to an area of rock exposure, close to the mid-point of the western side of the island and associated with a pond and drainage channels which lead to the western coast. This area comprises a range of grass species but is dominated by tufted hair-grass and Yorkshire fog, with

yellow iris being the dominant forb species. A variety of other forbs are also present. The vegetation is a best fit with M28 *Iris pseudacorus-Filipendula ulmaria* mire, a widespread oceanic community.

8.6.22 The smaller section contains many of the same species, but is dominated by reed canary-grass. This vegetation keys out as S28 *Phalaris arundinacea* tall-herb fen.

Standing water

8.6.23 Pools are present throughout the island, including in a number of areas where they are linked with drainage channels, which were dry at the time of the habitat survey. In subsequent site work, a spell of heavy rainfall was observed to have created more pools in the area of mosaic semi-improved acid grassland at the north of the Island. The northern fringes of the island contained several small areas of standing water, with channels linking the pools which flood during heavy rain. The area of improved acidic grassland in the south-east of the site is presumed to have an increase in ephemeral pools following rainfall, as dry bare patches of cracked soil were evident on the slopes at the time of survey. Further areas of standing water were noted in the centre (including the largest of these features) and centre-west of the island, with further small pools noted in the centre-north and east of the island.

Running water

8.6.24 Two drainage ditches run across Faray, from coast to coast, and are effectively modified burns. They are approximately 0.3-0.7 m wide and flow from the centre of the island to the coast, both to the east and to the west. The ditches are overgrown with silverweed and other species characteristic of semi-improved grassland. A number of other wet (i.e. with a perceptible flow) ditches are also present around several field boundaries. Small burns/overflow ditches link standing water on the island and one was flowing during the survey. As identified in Chapter 11: Geology, Hydrology and Hydrogeology, surface water found on the island is mainly rainwater-derived and flows through a number of drainage channels. There are two springs located in the marshy grassland of the west-centre of the site, from which a small stream flows towards the western coast (i.e. located within the SAC and SSSI-designated area).

Intertidal mud/sand

8.6.25 Sand and shingle beaches are present along the south-west and south-east of the island. The sections of beach are made up of white sand, with large boulders and rocks above the high tide.

Intertidal boulders/rocks

8.6.26 Most of the shoreline (i.e. the site boundary) comprises exposed rock and cliffs. Macro algal cover on the western shoreline includes a range of fucoid species typical of a high-energy rocky shore. Other typical algal species include green algae, such as gut weed, on more sheltered parts of the upper shore and reds, such as the coralline alga *Corallina officinalis*, found on the lower and mid-shore. The bladder wrack growth is generally larger/longer on the more sheltered eastern shore, with egg/knotted wrack also part of the species mix. Kelp species are present on the rocks beyond the low tide line on both sides of the island.

Cliffs

8.6.27 Cliffs are a common feature of both the east and western coastlines of the island. The foreshore and intertidal zones beyond the cliffs frequently include tidal boulders and rocks.

Exposed rock (inland)

8.6.28 A section of exposed rock is present inland from the western shore, north of the marshy grassland in the centre of the site.

Fencing

8.6.29 Post and wire and electric fencing covers much of the centre of the island, following the fringes of the south and east of the island and also crossing the island east to west in two places. Fencing also surrounds many of the structures on the island and is used for managing the sheep.

Stone wall

8.6.30 A drystone wall is present around the north of the island, between the Holm of Faray causeway and the northern field of semi-improved grassland. A wall also surrounds the graveyard.

Dry ditch

8.6.31 A dry ditch extending approximately north-northwest to south-southeast, is present in the southern semi-improved grassland. Further dry ditches are also present around several field boundaries.

Buildings

8.6.32 There are 10 general clusters of buildings on the island, in various states of repair, ranging from roof-less walls through to an old school building with secure corrugated sheet metal roof and a plastic-roofed wooden lean-to shed on its northern side. Seven buildings were recorded as having part of or all of the roofing present; several of the older structures have parts of the original stone slab roofs in place to a certain degree (from c.25 % to 90 % coverage), while in addition to the old school building (used for storage), there are a further three structures with sound roofs – one with corrugated metal sheeting and two apparently with corrugated cement fibre panels. Vegetation around these structures typically comprises a mix of grasses and abundant common nettle, broad-leaved dock and silverweed.

8.6.33 A walled graveyard is located on the western side of the island, at the bottom of a slope, west of the marshy grassland.

Track

8.6.34 A grassed-over track, effectively connecting the majority of the buildings, runs from the south-east of the island in a northerly direction until it reaches the beginning of the mosaic of improved and semi-improved acid grassland at the north of the site.

Graveyard

8.6.35 A small walled graveyard is located on the western edge of the island. Moss cover is present on the drystone walling and the ground between the stone grave markers is covered by a grass sward of a mix similar to the adjacent improved grassland. The graveyard is gateless and therefore accessible to sheep, and it is consequently grazed.

Groundwater Dependent Terrestrial Ecosystems

8.6.36 The underlying geology indicates presence of an aquifer: British Geological Survey (BGS) hydrogeology mapping indicates that this is Old Red Sandstone, a moderately productive aquifer in which flow is virtually all in fractures and other discontinuities.

8.6.37 Following standard guidance (SEPA, 2017), one of the habitats on the island, the marshy grassland surrounding two springs, was identified as GWDTE; the vegetation immediately surrounding the springs will be groundwater dependent. The presence of the springs is indicative of groundwater seepage at the surface and this habitat is therefore fed by groundwater. As noted in Chapter 11, the bedrock is a moderately productive aquifer, dominated by fracture flow. The springs are likely the result of fracture flow reaching the surface at this specific location, providing water that sustains the marshy grassland in the immediate vicinity.

8.6.38 With the exception of the vicinity of the springs, the wetland area of the western part of the island appears to be surface water-fed, with a number of drainage ditches present in the immediate vicinity, crossing east-west (see Chapter 11: Geology, Hydrology and Hydrogeology for further information).

8.6.39 The second area of marshy grassland, to the south of the island and west of Ness, appears to be closely associated with a drainage ditch and believed to be sustained by rainwater and surface flows, rather than by groundwater.

Fauna

[Red

8.6.40 [Redacted]

8.6.41 [Redacted]

8.6.42 [Redacted]

Seals

8.6.43 As documented in Appendix 8.3 and shown on Figure 8.4, seals were recorded all around the coastline, with animals apparently present on any suitable haul-out surface. Out of the 1,461 animals recorded, only one harbour seal was noted (in June 2019), with all other animals being grey seals. While harbour seals are present in the wider area, the survey results indicate that Faray is unlikely to be of any particular importance to this species, possibly due to the presence of the larger grey seal species.

8.6.44 The survey results indicate grey seals use of much of the island's shoreline year-round. However, observations indicate both a locational preference and a seasonal influx to these preferred areas ahead of the breeding season, before an apparent dispersal to their favoured birthing locations. Recorded numbers suggest an overall preference for the more sheltered east coast. There is also a difference in the use of the northern and southern extents of Faray, which appear to be particularly favoured by this species in the run-up to the breeding season (July-September), with the highest numbers congregating on the shorelines between Faray and the Holm of Faray in August and similarly for the southern part of Faray from late July to August (both Muckle and Little Skerry and the wider Scammalin Bay area). For both areas, the overall numbers dropped in September, with the inference that many of the seals then moved on elsewhere to give birth. Without the survey programme extending across late September to November/December (i.e. avoiding the grey seal breeding season), it is not possible to determine how many use Faray for pupping and precisely which areas are used; however, approximately 50% the animals recorded in August 2019 appeared to stay in the area for September. Notably, seal numbers appear significantly lower in late winter and into early spring, as seals move to low-lying islands such as Rusk Holm and also Muckle Green Holm and Little Green Holm (both south of Eday) to moult.

Bats

8.6.45 As documented in Appendix 8.1, only four structures on the island have competent roofing, but this is all in the form of corrugated sheeting, which is generally unsuitable for roosting bats. While the stone slabs used to roof some of the older ruined cottages are still partially in place in a number of locations, the interior of these structures is open to the elements, and conditions in the roof spaces are therefore not suitable for roosting bats. [Redacted]

[Redacted]

8.6.46 However, as described in Appendix 8.4, no bat activity was recorded in the survey programme, which demonstrates that the structures are not used by roosting bats and that bats may be absent or rare on Faray.

8.6.47 Though potential roosting habitat is available on Faray, due to the lack of evidence of bat presence, lack of suitable foraging habitat, high level of exposure and limited connectivity, bat species have been scoped out of the impact assessment and are not discussed further.

8.7 Do Nothing Scenario

8.7.1 In the absence of development, baseline conditions are unlikely to change significantly in the foreseeable future, because the existing land use and marine activities are anticipated to continue. Slipway maintenance and/or upgrade would be expected, but would be limited to the farmer's requirements and the temporary disturbance to [Red and non-breeding seals limited.

8.8 Evaluation of Recorded Features

8.8.1 The evaluation of recorded ecological features is presented in Table 8.7, below.

Table 8.7 – Evaluation of Ecological Features

Feature	Evaluation Reasoning	Level of Importance
Faray and Holm of Faray SAC & SSSI	Grey seal colonies. The level of value follows the level of designation.	International
Sanday SAC	Harbour seal colonies. The level of value follows the level of designation.	International
East Sanday Coast SSSI	Harbour seal colonies. The level of value follows the level of designation.	National
Wyre and Rousay Sounds MPA	Kelp and seaweed communities on sublittoral sediment and maerl beds. The level of value follows the level of designation.	National
Muckle and Little Green Holm SSSI	Grey seal colonies. The level of value follows the level of designation.	National
Rousay SSSI	Blanket bog, maritime cliff, mesotrophic loch and subalpine wet heath. Vascular plant assemblage. The level of value follows the level of designation.	National

Feature	Evaluation Reasoning	Level of Importance
Braehead LNCS	Nationally important habitats: upland heath; blanket bog; and oligotrophic and dystrophic lakes. (For avian interests please see Chapter 7: Ornithology). The level of value follows the level of designation.	Council
Resting Hill LNCS	Nationally important habitats: upland heath and blanket bog. (For avian interests please see Chapter 7: Ornithology). The level of value follows the level of designation.	Council
Semi-improved acid grassland (B1.2)	The vegetation locally resembles MC10 *Festuca rubra-Plantago spp*. maritime grassland, but some typical species of MC10 are absent, whereas some species present are not associated with MC10 grassland. Assessed as having relatively limited biodiversity value, due to grazing pressure and past land management practices and does not align with either SBL or LBAP priorities.	Less than local
Improved grassland (B4)	The vegetation shows some affinity to MG11 *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland, the *Lolium perenne* sub-community. This community is relatively common as pasture near the coast and has been subject to agricultural improvement. Assessed as having relatively limited biodiversity value, due to grazing pressure and past land management practices and does not align with either SBL or LBAP priorities.	Less than local
Marshy grassland (B5) with springs; western side of the island	Vegetation comprises a range of grass species, but is dominated by tufted hair-grass and Yorkshire fog, with yellow iris being the dominant forb species. A variety of other forbs are also present. The vegetation is a best fit with the oceanic M28 *Iris pseudacorus-Filipendula ulmaria* mire community. A generally low value and common habitat in the wider area, with no clear alignment with either the SBL or LBAP priorities; however, the springs indicate GWDTE presence. GWDTEs are specifically protected under the Water Framework Directive and are sensitive receptors to the pressures that are potentially caused by development (SEPA, 2017).	Local
Marshy grassland (B5); southern area, west of Ness	The vegetation is a best fit with M28 Iris *pseudacorus-Filipendula ulmaria* mire, a widespread oceanic community, but areas dominated by reed canary-grass	Less than local

Feature	Evaluation Reasoning	Level of Importance
	align withS28 *Phalaris arundinacea* tall-herb fen. Not a GWDTE; no clear alignment with either the SBL or LBAP priorities.	
Standing water (G1)	Small and generally either associated with drainage ditches or ephemeral rainwater pools. Standing water is a priority on the SBL and the LBAP and is a limited resource on the island.	Local
Running water (G2)	Small modified burns are present, with two running across the island and a few channels are linked to pool drainage. Not priorities on the SBL or the LBAP.	Less than local
	Two small springs are located within the marshy grassland area within the SAC and SSSI-designated area. Springs are priorities on the SBL and the LBAP and protected as GWDTEs.	Local
Intertidal sand (H1.1)	Intertidal sands, though a relatively limited resource on Faray, are common in the wider area. Typically supporting a relatively limited range of marine fauna.	Less than local
Intertidal boulders/rocks (H1.3)	A very common resource around the island and wider area. Typically supporting a wide range of macrocalgae and fauna, and used by the local seal population. Intertidal boulder communities are priorities on the SBL and the LBAP.	Local
Maritime cliffs (H8.1)	A very common resource around the island and wider area and not conservation priorities on the SBL or the LBAP.	Less than local
Exposed rock (J1.4.1)	Rock exposures are a common feature of the wider area, and are not conservation priorities on the SBL or the LBAP.	Less than local
Post and wire fencing (J2.4)	The island's fences are a common feature of the wider area and are not conservation priorities on the SBL or the LBAP.	Less than local
Drystone wall (J2.5)	The wall features, though providing shelter to grey seals when on land, are not conservation priorities on the SBL or the LBAP.	Less than local
Dry ditch (J2.6)	Dry ditches are not conservation priorities on the SBL or the LBAP.	Less than local

Feature	Evaluation Reasoning	Level of Importance
Buildings (J3.6)	The buildings are not supporting roosting bats and are not conservation priorities on the SBL or the LBAP.	Less than local
Track (J5)	The gravel track does not align with conservation priorities on the SBL or the LBAP.	Less than local
Graveyard (J5)	The graveyard is of limited ecological value, although the walls and markers provide some shelter and the habitat is grazed by sheep. Not a conservation priority on the SBL or the LBAP.	Less than local
Cetacean species	All recorded cetaceans are EPS and priorities on the SBL and LBAP. Present in the wider area, but with very limited presence within the Study Area.	Council
Non-breeding harbour seals	Protected as EPS and priorities on the SBL and LBAP. Declining in the wider area, non-breeding harbour seals have very limited presence within the study (see Sanday SAC and East Sanday Coast SSSI for breeding colony assessment).	Council
Non-breeding grey seals	Protected under the Marine (Scotland) Act 2010. LBAP priority species. Non-breeding grey seals are generally common in the wider area (see Faray and Holm of Faray SAC & SSSI for breeding colony assessment).	Council
[Red	[Redacted]	[Re

8.9 Receptors Brought Forward for Assessment

8.9.1 As noted in Section 8.5, above, ecological features of local and higher value are considered IEFs. However, due to a range of factors, including some standard embedded mitigation measures, certain IEFs can be scoped-out of further consideration.

8.9.2 It should be noted that construction works below Mean High Water Springs (MHWS) associated with the new extended slipway and landing jetty are subject to separate consents, marine licences under the Marine (Scotland) Act 2010. However, the onshore effects of this work are assessed as the site is considered to extend to the MLWS line. Use of the landing facilities during construction and operation of the Proposed Development is also included in the following assessment.

8.9.3 The below assessments apply only to the terrestrial habitats and species of the island, extending to the MWLS line (i.e. including marine species); effects beyond this are assessed in Chapter 16: Underwater Noise; disturbance of the seabed as a result of slipway and landing jetty construction is covered in Chapter 18: Other Issues.

Scoped Out IEFs

Designated Sites

Sanday SAC and East Sanday Coast SSSI

8.9.4 The habitats of the Sanday SAC and East Sanday Coast of SSSI designations have no or very limited connectivity to the Proposed Development and, given the high separation distance (>10 km), are very unlikely to experience any significant direct or indirect effects. The breeding harbour seal qualifying interests are also very unlikely to be significantly impacted by the Proposed Development because construction of the Proposed Development will be timed to occur outwith the seals' breeding season, though foraging harbour seals may be present in the waters around Faray (see *Species*, below). As such the Sanday SAC and East Sanday Coast designations are not considered any further below.

Wyre and Rousay Sounds MPA, Muckle and Little Green Holm SSSI and Rousay SSSI

8.9.5 The Wyre and Rousay Sounds MPA, Muckle and Little Green Holm SSSI and Rousay SSSI are over 6 km distant from the site and the nearest proposed infrastructure. The physical separation from the island by large tracts of sea means that, while there is aquatic connectivity between the designated habitat features and the site, these designations are sufficiently buffered from any activity on the island of Faray.

Local Nature Conservation Sites

8.9.6 The Braehead LNCS and Resting Hill LNCS, as land-based designations on Eday, are also buffered from works on Faray by the Sound of Faray and have no direct habitat connectivity. As such these designations are not considered any further below.

Designated Seal Haul-outs

8.9.7 Designated seal haul-outs over 5 km distant from the island are also considered sufficiently far from the works area to be undisturbed by the Proposed Development and are therefore also not considered further. However, transportation of plant and materials will be by sea and likely to pass a number of haul-out sites; this is included for consideration in the scoped-in section, below.

Habitats

8.9.8 Adverse direct impacts on terrestrial habitats will include permanent land-take for the footprint of the Proposed Development, including borrow pits, turbine foundations, tracks and other infrastructure, such as the new extended slipway and landing jetty.

8.9.9 Adverse temporary impacts include the land-take for the construction site compounds as well as construction-phase disturbance of habitats within a 10 m buffer around works areas. However, because these areas comprise grazing land, they are expected to recover quickly after construction works are complete.

8.9.10 In addition, there is potential for site drainage to affect wetland habitats. This is assumed to occur within a worst-case 10 m zone, where the wetlands abut works areas (i.e. with no dry habitat in between). See Chapter 11: Geology, Hydrology and Hydrogeology for further details.

8.9.11 For clarity, Table 8.8 presents the predicted losses for all the habitat types on site, including non-IEFs (excluding field boundaries and track; no buildings will be affected), for both permanent loss to the Proposed Development footprint and temporary loss to works compounds, etc., plus associated disturbance.

Table 8.8 – Summary of Habitat Losses to Development Footprint

Phase 1 habitat	NVC community or habitat types	Permanent loss (ha)	Temporary loss (ha)	Drainage effects (ha)
B1.2	Semi-improved acid grassland	1.08	1.80	n/a
B4	Improved grassland	3.39	2.97	n/a
B5	Marshy grassland with springs (potential GWDTE)	n/a	n/a	<0.01
	Marshy grassland (southern area)	n/a	n/a	n/a
G1	Standing water	n/a	n/a	n/a
G2	Running water	n/a	n/a	n/a
H1.1	Intertidal sand	0.05	n/a	n/a
H1.3	Intertidal boulders/rocks	0.05	n/a	n/a
H8.1	Maritime cliffs	n/a	n/a	n/a
J1.4.1	Exposed rock	n/a	n/a	n/a
J5	Graveyard	n/a	n/a	n/a
Total		**4.58**	**4.77**	**<0.01**

8.9.12 Of the site habitats recorded, only standing water, marshy grassland with springs and intertidal boulders have been identified as IEFs; the other habitats are therefore scoped-out of the assessment.

Species

Cetacean species

8.9.13 Cetacean species have been identified to be present within the waters surrounding Faray. However, these species use the wider area of the archipelago and North Sea/Atlantic for foraging and therefore only pass the area on an occasional basis. Though presence at time of development works is possible, the construction works will be principally limited to the land (i.e. with the exception of a brief period of landing facility works; see Chapter 16). Standard mitigation measures will reduce likely impacts. Borrow pit rock-breaking will be by use of a hydraulic attachment to an excavator, rather than by use of explosives (see Chapter 3: Proposed Development); this will reduce the disturbance levels of the operation. There will be no blast shockwave with the potential to propagate through the marine habitat and cause an immediate avoidance reaction. While shipping movements will be temporarily increased, direct impacts are considered insignificant and possible to control through method statements and the application of standard mitigation of using low noise/vibration plant and techniques to ensure propagation of acoustic disturbance through the adjacent waters is minimised (see *Standard Mitigation*, below). This species group has therefore been scoped out of the impact assessment.

Harbour Seal

8.9.14 Harbour seal presence around Faray has been demonstrated to be limited, with only one individual recorded during the seal survey programme (see Section 8.6, above, and Appendix 8.3). Grey seal predation on harbour seal (particularly during the pupping/mating season) and also competition between the two species over the same foraging resources has been reported (ICES, 2017; Wilson and Hammond, 2019) and are likely key factors in the general absence of harbour seal from an area with a sitting grey seal population. Harbour seals are therefore scoped out of the impact assessment.

Scoped In IEFs

8.9.15 The following IEFs are brought forward for detailed assessment:

- Designated sites
  - Faray and Holm of Faray SAC and SSSI;
  - Designated seal haul-outs within 5 km of the site; and
  - Designated seal haul-outs on the potential shipping route for delivery of plant and materials.
- Habitats
  - Standing water;
  - Marshy grassland with springs; and
  - Intertidal boulders/rocks.
- Species
  - Otter; and
  - Non-breeding grey seal.

8.10 Standard Mitigation

8.10.1 In line with the current CIEEM (2018) guidelines, the assessment process assumes the application of standard mitigation measures. These measures are intended to prevent, reduce or offset any likely significant effects of the Proposed Development on identified IEFs. This approach is in accordance with best practice guidance and UK, Scottish and Local Government environmental, planning and sustainability policies.

8.10.2 The principles and objectives for mitigation associated with the Proposed Development have been developed through an iterative process with the Applicant's design team and through discussion with NatureScot and other stakeholders.

8.10.3 During the iterative design process, the following decisions have been implemented to reduce the potential for impacts on IEFs:

- Existing tracks have been used, where possible, in order to reduce the footprint of the Proposed Development. Some localised upgrading will be required to ensure a minimum 4.5 m running width.
- Electrical infrastructure cabling will be installed alongside tracks, wherever possible, to further minimise habitat loss.
- Turbines have been sited at least 50 m from the shoreline and drainage channels, where practical.

- No site works will be undertaken during the seal breeding season (15th September to 31st December inclusive).

8.10.4 Mitigation includes best practice methods and principles applied to the Proposed Development as a whole (generic measures) as well as site-specific mitigation measures applied to individual locations (specific measures).

8.10.5 All ecological mitigation will be incorporated into a Construction Environmental Management Plan (CEMP); see Chapter 3: Proposed Development and Appendix 3.2: Outline CEMP for details. The final CEMP is to be agreed with OIC, in consultation with NatureScot and SEPA, post-consent, but prior to development commencing. It will outline all required mitigation and provide details on timelines for undertaking mitigation for each identified ecological receptor. The CEMP will also outline a timetable of actions and form part of the contract documents to ensure delivery of mitigation specified in this chapter. In addition, the CEMP will incorporate the provision of an Ecological Clerk of Works (ECoW) to oversee the implementation of recommended mitigation and include Method Statements and Species Protection Plans to ensure delivery of the mitigation commitments contained in this planning application submission.

8.10.6 Standard mitigation also includes the following:

- Adherence to current environmental protection policies and guidance, including but not limited to:
  - Good Practice During Wind Farm Construction (SNH, 2019);
  - WAT-SG-75 (SEPA, 2018);
  - The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended; i.e. the CAR regulations) A Practical Guide (SEPA, 2019); and
  - LUPS-GU31 (SEPA, 2014).
- Development of Method Statements for use during construction (i.e. part of the CEMP), to include current good practice and prescribed use of low noise and vibration plant and construction techniques to reduce potential for acoustic disturbance to the surrounding marine habitats, including “soft-start” procedures (i.e. gradually increasing a disturbance activity up to full operation over a c.10-20 minute period) to limit wildlife avoidance behaviours when working near the shore.
- Development of Method statements to control dust-generating activities, such as aggregate extraction and vehicle movements. Standard mitigation includes damping-down surfaces.
- A suitably qualified ECoW will be present and oversee construction activities, as well as providing toolbox talks to all site personnel with regards to priority species and habitats, as well as undertaking monitoring works and briefings to relevant staff and contractors, as appropriate.
- [Redacted]
- [Redacted]
  - [Redacted]
  - [Redacted]
  - [Redacted]

[Redacted]

- Development of a Species Protection Plan for seals.
- In order to prevent pollution of watercourses/field drains and waterbodies within the site (particulate matter or other pollutants, such as fuels), best practice techniques will be employed; for example:
  - Establishment of drainage measures (e.g. cut-off ditches, bunds, silt fencing) around the tracks and hard-standings prior to formation;
  - Application of best practice methodologies for water channel crossings, in order to prevent pollution during construction and operation (design capacity of culverts; use of silt fencing and sediment mats, etc.), in accordance with the CAR regulations;
  - Designated fuel and chemical stores, using appropriately bunded and maintained facilities;
  - Application of best practice methods for concrete batching, to prevent potential for pollution and contamination of ground waters and soils (with particular regard to storage of materials and wash-out facilities);
  - Use of appropriate alternative products where possible, to reduce the number of environmentally hazardous products on site (with particular reference to hydraulic fluid and lubrication oils/grease required for heavy plant such as excavators and dump trucks);
  - Designated fuelling areas and method statement-controlled fuelling procedures;
  - Spill kits to be carried on all site vehicles;
  - Storage of spill kits at each works location; and
  - Controlled storage and disposal of all COSHH (i.e. materials listed under the Control of Substances Hazardous to Health Regulations) and environmentally hazardous waste materials (including method statements).
- Regular monitoring of watercourses/field drains will be required during construction. The monitoring will include a responsive element, with an on-site ECoW checking areas where active works are taking place and areas where sediment run-off may be a concern during periods of high rainfall.

8.10.7 As part of the Proposed Development proposals it will be necessary to develop and implement a Site Restoration Plan (SRP) as part of the CEMP to ensure the regeneration of those areas of habitat that have been temporarily lost through development (i.e. materials lay-down, works compound areas, etc.).

8.10.8 In order to facilitate restoration, including of the borrow pits, disturbed ground will be restored as soon as practicably possible using materials removed during the construction of access tracks, excavation of cable trenches and turbine foundations. To achieve this, any excavated soil will need to be stored in such a manner that is suitable to facilitate retention of the seed bank.

8.10.9 Additionally, as part of this process, there will be development of an Operational Site Management Plan (OSMP) and maintenance task Method Statements.

8.11 Likely Effects

The Proposed Development

8.11.1 As described in Chapter 3, the Proposed Development will consist of six turbines with a maximum blade tip height of up to 149.9 m. The British National Grid coordinates denoting where each of the turbines are proposed to be located are listed in Chapter 3 and shown on Figure 1.2.

8.11.2 The main elements of the Proposed Development which have the potential to impact on IEFs, both during construction and operation are:

- landing facility works (new extended slipway and landing jetty construction; see below);
- temporary borrow pit operations (to extract material for track, laydown and compound surfacing), including potential for dust generation;
- track construction, including excavation to a competent surface, lay-down of material from the island's borrow pits to form an appropriate running surface, bridging/culverting of two drainage ditches, mobile plant traffic movements and potential for dust generation;
- met mast installation;
- turbine foundation creation (including excavation, pile-driving (if required), etc.);
- crane pad and permanent hardstanding construction;
- cable-laying and grid connection infrastructure (including substation);
- temporary lay-down and site compound areas;
- temporary materials storage (soils and turves);
- site water management; and
- site restoration (track batters, compounds, etc.).

8.11.3 As noted in Chapter 3 Proposed Development, the turbine foundations are anticipated[1] to be a gravity base design of an inverted "T" in section, consisting of a reinforced central concrete pedestal with a reinforced concrete slab. The tower is proposed to be attached to the foundations via an anchor cage which is then tension anchored to the tower. Until detailed ground investigations have been undertaken the exact size and depth of foundations required cannot be determined. Materials for the majority of the works associated with the construction of the access track and crane hardstands will be won from on-site borrow pits. Material for the initial works will, however, need to be imported from quarries on the Mainland of Orkney. Concrete will be batched on-site. For the purposes of this EIA Report, the following approximate dimensions have been used:

- Reinforced concrete slab c.12 m - 15 m in diameter; and
- Depth of the foundations approximately 3 m - 3.5 m.

8.11.4 The above activities have the potential to cause the following construction impacts to the IEFs identified for the site:

- Direct loss of habitat;
- Disturbance to GWDTE habitat;

[1] The actual foundation design will be specific to the site conditions as verified during detailed site investigations undertaken before construction commences. In the unlikely event that ground conditions are unsuitable for the standard foundation design described above, a piled foundation design may be required, involving the installation of a series of concrete piles per turbine, with each pile being bored or driven until the underlying bedrock is reached.

- Direct loss of foraging habitat and/or breeding habitat for protected species; and
- Indirect loss of foraging and/or breeding habitats for species, through disturbance of habitats and displacement of species due to construction works, including noise, vibration and pollution. Disturbance of ground vegetation may affect a 5 m zone around all infrastructure. Noise levels (in decibels, dB) as a result of borrow pit extraction works have been predicted[2] to be:
    - 66 dB at 70 m;
    - 61 dB at 100 m; and
    - 49 dB at 300 m.

8.11.5 The potential adverse operational impacts have been identified as:

- Direct and indirect loss of species foraging or breeding habitat, due to displacement or avoidance; and
- Cumulative adverse impacts of the Proposed Development in the context of other developments (operational and consented).

Landing Facilities

8.11.6 The extant slipway is c.20 m long by 3.5 m wide, though this was originally longer. This is to be upgraded to a maximum 36 m long and 8 m wide (a total of 288 m^2). The new landing jetty will comprise a causeway up to 55 m long by 10 m wide (550 m^2), terminating in square structure for docking measuring up to 20 m by 20 m (400 m^2). The indicative works programme has been defined as a two-phase approach. See Chapter 3: Proposed Development, Chapter 9: Noise and Chapter 12: Traffic and Transport, for more details; marine works impacts to the IEFs of the area are assessed in Chapter 16: Underwater Noise; seabed disturbance, as a result of slipway and landing jetty construction, is covered in Chapter 18: Other Issues.

Mobile Plant

8.11.7 A range of mobile plant will be required for the construction programme. It is assumed the following plant will be used: hydraulic breaker, rock crusher, 35 t and 7.5 t excavator, wheeled loader, roller compactor, mobile batching plant, concrete pump and cement truck. A variety of small generators and plate compactors are also likely to be required.

Disturbance of Seals

8.11.8 The grey seal breeding season extends from 15th September to 31st December, inclusive, with presence of mothers and pups present on favoured parts of the shore at this time (Duck, 2010). Due to an embedded design commitment to avoiding the breeding season, the key focus of the seal disturbance assessment of this chapter is on the non-breeding seal population associated with the island of Faray. It should be noted that, while in-water effects are discussed below, this aspect is fully assessed in Chapter 16: Underwater Noise and seabed disturbance is discussed in Chapter 18: Other Issues.

8.11.9 A review of the literature suggests that, due to general global distribution, more studies have been conducted into harbour seal behaviour than for grey seals. Most of the research relating to renewable energy production is focused on offshore wind turbine developments, with a lesser focus on tidal power infrastructure. However, this research provides insights into seal behaviour that is also relevant to an installation of turbines on a small island.

[2] Based on the following assumptions: 1 x concrete batching plant; 1 x shovel; 1 x hydraulic breaker; 1 x 35T excavator; 1 x 7.5T excavator; 1 x concrete pump; and 1 x cement truck.

8.11.10 Assessment of potential effects experienced by the Faray area non-breeding seal population relate to both direct and indirect effects. Direct effects include habitat loss and physical injury (e.g. from collision with marine traffic), while indirect effects include visual, noise and vibration disturbance as a result of anthropogenic actions. Wilson (2011) states "*Disturbance is considered to occur if the human activity disrupts or alters the animals' normal behaviour. This includes increased alertness or movement on haul-out sites and flushing to the water*…" It is important to note that, in general, both seal species are sensitive to anthropogenic disturbance and hence their choice of remote locations to haul out, moult and breed (Duck, 2010).

8.11.11 UK grey seals tend to spend long periods hauled out during their annual moult (December to April) and so are more susceptible to human disturbance at haul-out sites at this time of the year (Scottish Government, 2011b; SCOS, 2017). Use may be made of the land beyond the high shore during this annual occurrence, and this is true for the grassland to either side of the Lavey Sound shoreline of Faray and the Holm of Faray.

8.11.12 Various studies (as cited in Thompson *et al*., 2013) for the Scroby offshore wind farm construction works suggested that harbour seals are more sensitive to disturbance than grey seals, with a decline in the presence of the former on the nearby shoreline, while grey seal numbers increased during the construction phase. Of note is that the presence of both species increased in the observed areas during the operational phase.

8.11.13 The distance at which seals show such signs of disturbance is highly variable, depending on their location, how they are approached, whether the animals are habituated to the presence of humans and the time of year; in particular, whether or not they are accompanied by pups (Marine Scotland, 2014). The sensitivity of seals on haul-outs can also be site-specific: a relatively close approach may be tolerated at one site while animals on an adjacent site might not cope with a similar disturbance. TfL (2016) indicates only mild and localised behavioural effects in response to small vessel movements inshore. Research conducted into harbour seal response to both pedestrian and boat disturbance (Andersen *et al*., 2012) indicates a higher sensitivity to boat traffic; boat traffic caused a flight response at 560-850 m and pedestrians prompted seals to flee at 200-425 m. Wilson (2011) indicates a similar distance of 200 m for both grey and harbours seals, when approached by a boat. With particular reference to the impact of anthropogenic activity associated with marine renewable developments on harbour seals, Paterson *et al*. (2019) used controlled disturbance trials: hauled-out seals were approached by boat until all seals had entered the water and then their return timed. Results indicated 52% of disturbed seals returning to a haul-out within 30 minutes, with up to 94% returned by four hours post-disturbance. Tagging animals with GPS trackers also indicated site fidelity, despite repeated disturbance at a given location (also supported by the work of Lewis, 2006). The findings of this study have implications for the monitoring of the Faray seals. The authors concluded that, as there was no large-scale redistribution after disturbance, when a project requires monitoring effort to determine the effects of short-term increases in levels of disturbance caused by boat activity, this can be spatially localized. However, they recommend that, where longer term disturbance is likely, or the impact is on important haul-out sites for breeding and/or moulting, monitoring may be required over a larger geographical area.

8.11.14 Assessment of the efficacy of non-lethal deterrents (MMO, 2018 and 2020) indicates that seals can become habituated to repeated disturbances: it is therefore possible that, once the shore works have been completed, the seals will become accustomed to higher levels of human activity in the area, as long as this is tightly controlled, i.e. disturbance activities are carefully timed and restricted in location to reduce the effects. The potential for habituation to sensitive human activity is supported by Duck (2010), Wilson (2011) and Marine Scotland (2014); though a flight response may still be initiated by an approaching vessel, it may mean that distance of flight is reduced and a return to shore made sooner, if the approach is conducted quietly and sensitively.

8.11.15 Review of the available literature suggests that research into the impacts of wind farm construction is focused on offshore projects. These studies indicate that pile-driven base construction is the single most disruptive element for seals during construction and operation, with such activities causing avoidance of an area, though there is likely to be no significant displacement during construction overall (Edren *et al*., 2010; Russell *et al*., 2016). Russell *et al*. (2016) note that displacement during piling was identified as extending up to 25 km from the operation; however, seal use of the area

returned to normal within two hours. An underwater noise impact assessment has been undertaken and is detailed in Chapter 16. This assesses the impacts of underwater noise from piling on marine mammals, including seals. It takes the specifics of the area into consideration, including water depth and sediment type.

8.11.16 The key aspect of the impact driven piling process is the release of a large amount of energy in the form of high sound pressure waves and these across a broad range of frequencies (TfL, 2016). During piling, the noise disturbance is not limited to the water column; however, in-air propagation will attenuate more quickly by comparison to in-water propagation. Southall *et al*. (2007) highlight that behavioural disturbance is difficult to quantify, due to highly variable reactions and specific context making the reactions less predictable. For Faray, this has implications for any seals hauled-out on the shoreline in relatively close proximity to the new landing jetty piling works, as disturbance will likely cause animals to take to the water where the noise levels will be higher and therefore more potentially damaging (see Chapter 16: Underwater Noise). A soft-start, to initiate a dispersal of any nearby hauled-out and in-water animals, is therefore necessary.

8.11.17 As sheet piling is required for the construction of the landing jetty, the JNCC piling protocol (2010) will be followed. This includes, a 500 m mitigation zone where a Marine Mammal Observer (MMO) will undertake a pre-piling search of the area. The MMO will monitor the area for a period of at least 30 minutes and piling will not commence if a marine mammal has been detected within the mitigation zone or until 20 minutes after the last detection. Once the pre-piling search is completed, soft start will also be implemented, where the piling power is gradually increased over a period of a minimum of 20 minutes, to allow marine mammals to move away from the noise source, which will reduce the likelihood of exposure to sound levels that could cause injury. Further details of the in-water works are provided in Chapter 16.

8.11.18 The use of artificial lighting on a shore can often impact the marine environment, disrupting the behaviour of animals in the adjacent area, including the commuting behaviour of nocturnal mammals and disruption of predator–prey relationships for species that forage in low light levels. For example, harbour seals will often remain in the sea longer during periods of full moon, apparently using the increased ambient light for extended periods of foraging (Greer *et al*., 2010), but will also congregate to feed in artificially illuminated areas (Depledge *et al*., 2010) outwith the natural lunar cycle. It is therefore important that task lighting is directed to where it is needed and light spillage (whether direct and/or in-direct) onto the shoreline and beyond is avoided, particularly within the vicinity of the seal haul-outs.

8.11.19 Russel (2016) also indicates that operational wind farms and other man-made structures are not overtly avoided by grey seals, with GPS-tagged animals shown apparently foraging within these areas. With the Proposed Development being land-based, the only additional man-made structures within the water will be the extended slipway and new landing jetty and these are therefore unlikely to be avoided by seals. It should also be noted that responsible use of the landing facilities would not be judged harassment of hauled-out seals under Section 117 of the Marine (Scotland) Act 2010 as described in Marine Scotland's (2014) guidance.

8.11.20 Operational noise and vibration will be buffered by the island, leaving the maintenance visits the only directly comparable elements of wind farm operation. The Proposed Development would, therefore, be expected to have a significantly reduced overall effect on the seal population, by comparison to a similarly-sized off-shore wind farm installation.

Construction

Faray and Holm of Faray SAC and SSSI

8.11.21 The Faray and Holm of Faray SAC and SSSI are both designated for grey seals, with the SSSI citation description noting that the site is "*one of the most important breeding and haul out sites for grey seals in Orkney*" (SNH, 2010) and the two islands are noted to "*support the second-largest breeding colony of grey seals in the UK, contributing around 9% of annual UK pup numbers*" (MCS, 2020).

8.11.22 The permanent footprint of the Proposed Development does not overlap with the SAC and SSSI designated areas, although access is necessarily gained across the designated coastline. The main

borrow pit is outwith the SAC and SSSI boundaries on the west of the island; the secondary borrow pit location is also outwith the designated areas, at the top of what is essentially a cliff, close to Ness.

Main borrow pit

8.11.23 The Proposed Development is to be programmed outwith the breeding season of 15th September to 31st December and will therefore avoid causing disturbance via noise and vibration to the SAC and SSSI qualifying feature (see *Grey seal*, below for non-breeding seal assessment). In addition, the borrow pit would not result in loss of supporting habitats for grey seals as they tend to stay near the shore. Working of the borrow pit is therefore considered to have **no impact** to the designated features.

Secondary borrow pit

8.11.24 The chosen location is above the shoreline, within an area previously worked as a quarry and behind the coastal cliffs of this part of the eastern shore. As with the main borrow pit, this will not be worked during the seal breeding season. Extraction of material from this borrow pit on the qualifying feature of the SAC and SSSI is therefore considered to have **no impact**.

Landing jetty and extended slipway

8.11.25 Construction impacts out to MLWS are assessed here, impacts beyond this are assessed in Chapter: 16: Underwater Noise and Chapter 18: Other Issues (for seabed disturbance).

8.11.26 Construction will be across the designated area of the intertidal zone. Construction of the landing jetty out to MLWS will involve the permanent loss of intertidal rock habitat, for the full length of the causeway, plus a small part of the docking structure (which commences close to the limit of the MLWS and extends out into the bay; see Chapter 16 Underwater Noise, Figure 16.1). The land-take of the intertidal rocky shore habitat is detailed under "Intertidal rocks/boulders", below. The overall magnitude of the impact to the SSSI shoreline is limited to the immediate location and is permanent in nature; however, this new structure is not expected to change the dynamics of the SSSI habitats, assessed as a permanent **negligible** adverse impact to the shoreline. With regards to breeding seals above MLWS (i.e. the qualifying interests of the designations), **no impact** is anticipated as a result of the timing of the works.

8.11.27 The slipway works will be to replace and extend the extant slipway structure on the shore, which has been shortened by the erosive forces of wave action over the years since it was first installed. Operational requirements for wind farm construction necessitate an increased footprint and, therefore, an additional land-take of the rocky shore to MLWS (detailed under "Intertidal rocks/boulders", below). The new extended slipway is not expected to change the dynamics of the SSSI habitats, assessed as a permanent **negligible** adverse impact to the shoreline; however, as with the landing jetty construction, there will be **no impact** to breeding seals above MLWS (i.e. the qualifying interests of the designations) as a result of the timing of the works.

8.11.28 With regard to the potential for disturbance to breeding seals, embedded design mitigation means that this works will be timed outwith the seal breeding season, so will not impact the designation qualifying interests. Works above the MLWS will, therefore, not have any effect on the designated feature of the SAC and SSSI resulting in an assessment of **no impact**. See below for consideration of the habitat loss and species impacts.

Extended slipway and landing jetty use during construction

8.11.29 Delivery of staff, plant and materials will be via the new extended slipway and landing jetty. As identified for the borrow pit operations, above, no work will occur during the seal breeding/pupping season. The deliveries of staff and material to the site will, therefore, not have any effect on the designated feature of the SAC and SSSI resulting in an assessment of **no impact**.

General construction works

8.11.30 Works will involve a range of operations/processes, including vehicle movements and track and base construction, etc. While each will have a potential for disturbance, all will be conducted outwith the breeding season and, therefore, not have any effect on the designated features of the SAC and SSSI, resulting in an assessment of **no impact**. Should works over-run, then no further works will be undertaken until after the next breeding period has completed.

Designated haul-out sites

8.11.31 A number of designated seal haul-outs are located within 5 km of the island. The haul-out of the Calf of Eday is buffered by Eday, the Weather Ness site on Westray is buffered by the presence of the Holm of Faray in between it and the Proposed Development and Seal Skerry, off the coast of Eday is buffered by the western expanse of the island. The closest designated haul-out area of Rusk Holm is c.1 km from the west coast of Faray, with the distance considered sufficient for any noise, including burrow pit blasting, to have attenuated sufficiently to be drowned-out by wave noise.

Borrow pit operations

8.11.32 Material extraction is considered the single most disturbing terrestrial operation that will be carried out; as noted above, the attenuation of noise will mean that the level, as a result of rock extraction, are predicted to be c.61 dB at 100 m and attenuated down to 49 dB at 300 m (for comparison, the level for normal human speech is 60 dB). All other land-based operations will be lower impact in terms of noise generation and therefore will have no effect on the haul-outs beyond Faray's shores. As such there will be **no impact** on designated haul-out sites during borrow pit operations.

General construction works

8.11.33 There is a potential for noise disturbance from works on the island. However, applying the noise levels estimated for borrow pit extraction (as a worst-case scenario) to the turbine hardstandings and access tracks, due to the distances involved, noise levels will be sufficiently attenuated that they will be drowned-out by the baseline of wave noise. With the exception of the landing area, very little of the Proposed Development infrastructure is within 100 m of the shore and therefore beyond a likely visual disturbance zone and beyond the edge of where noise will have any discernible effect. General construction disturbance to MLWS is therefore assessed as **no impact** for the haul-out locations within 5 km of the Proposed Development.

Extended slipway and jetty use during construction

8.11.34 Potential disturbance impacts will be sheltered from Rusk Holm by the body of the island and the c.1.8 km distance. This is assessed as **no impact**.

Transportation of staff, plant and materials

8.11.35 Marine traffic movements through the sounds north of Kirkwall are generally a mix of fishing (both inshore and offshore vessels) and ferry traffic, with occasional cargo vessels, forming a baseline of disturbance to the seal populations of the area.

8.11.36 Deliveries to Faray will, of necessity, be by sea and likely to pass a number of haul-out sites *en route* to the island, potentially including Seal Skerry. How many haul-outs are passed will depend upon the port involved; assuming Kirkwall (Hatston Quay) as the port of origin (see Chapter 12: Transport), then potentially up to seven haul-out sites will be passed, though the distance between vessel and haul-out will be variable, e.g. the Gairsay haul-outs are c.1.28 km from those of Taing Skerry & Green Holm; while the ferry route passes through the sound between Green Holm and Shapinsay, which is c.855 m at its narrowest point. The entrance to Fersness Bay is c.720 m wide, with the navigation channel (also used by the North Ronaldsay ferry service) likely to come within 500 m of the island's shoreline; and the Seal Skerry haul-out is likely to be passed at a minimum of 1 km distance.

8.11.37 During the initial site establishment period, there may be numerous shipping movements per day: due to the vessel size restrictions of the extant slipway, 2-3 movements will be needed at both the commencement and end of day for staff transport until the new extended slipway is complete, after which a larger vessel will be possible to be employed, thus reducing staff transport to one

navigational movement each way for the majority of the earthworks and turbine erection programme. Delivery of plant and construction materials will also require more movements per day, possibly up to a potential May 2025 peak of 32 movements (i.e. 16 round-trips, for vessels carrying both staff and construction materials), with this being possible to reduce with the completion of the extended slipway and an increased capacity achieved (see Chapter 12: Transport, *Construction Phase*).

8.11.38 With reference to the apparent baseline of ferry movements, fishing and cargo vessels, etc., such disturbances caused by landing staff and equipment will be an immediate temporary and short-term adverse effect on any hauled-out seals on areas passed closely (i.e. within 200 m) by the transport vessels, with the effect magnitude considered low, as this is a daily occurrence and therefore part of the established baseline for the resident seal population to which they will have habituated (see *Disturbance of Seals*, above). With particular regard to staff movements, such a disturbance will be daily for the duration of the programme. Deliveries of supplies and material will be less frequent, made as required by the construction programme, once the site has been established.

8.11.39 Daily shipping movements for the Proposed Development will be against a pre-existing baseline of maritime traffic in the northern sounds, including ferries, fishing and cargo vessels. As noted above, the ferry route passes to the east of Grass Holm, within a channel c.855 m wide at its narrowest point between Grass Holm and the Shapinsay coast. There are c.12 ship movements/day through the sound, Monday-Friday, with fewer movements Saturday-Sunday (Orkney Ferries, 2020). Construction phase shipping movements will increase this disturbance by up to c.32 movements per day at the peak of the construction phase (as noted above and taken as a "worst-case", given the potential to use higher capacity vessels once the landing jetty has been completed), though the navigational route is likely to be the same as used by the ferry services and therefore the disturbance distances will be similar. Disturbed seals would be expected to return to their haul-outs shortly after passage of the craft, similar to what they currently do. Assessed as a daily immediate short-term (reversible) adverse effect, shipping movements are considered to have a potential **negligible** adverse and therefore **not significant** impact on the designated haul-out sites of the navigation route for the duration of the construction project.

Standing water

8.11.40 The iterative design and use of the existing track have ensured that the main (i.e. those that are either permanent or semi-permanent) ponds have been avoided by a minimum of at least 15 m and application of standard measures, such as designated fuel stores and fuelling areas, carrying of spill kits on each vehicle, storage of spill kits at each works location, etc., will reduce the risk of pollution reaching these waterbodies (see Section 8.10 Standard Mitigation, above). As such there will be **no impact** on these features of local importance.

Marshy grassland with springs

8.11.41 The two springs and their associated short burn are in excess of c.70 m south-west of the southern extent of the proposed main borrow pit and therefore outwith a zone of influence regarding pit operation. However, part of the marshy grassland cover extends upslope to within 10 m of the main borrow pit search area; only 34.60 m^2 (0.00346 ha) of this area is potentially within the worst-case hydrological disturbance zone of the main borrow pit. This tract appears associated with a ditch at its upper end and is separated from the spring area by further drainage ditches across the lower slope, which prevent surface flows from reaching the area around them.

8.11.42 SEPA (2017) guidance indicates there should not be deep excavations within 250m, or shallow excavations within 100m, of GWDTE without further detailed risk assessment. This guidance is in response to the Groundwater Directive which is focused on the protection of groundwater, rather than the habitats found at seeps/springs (the habitat is useful as an indicator of groundwater being at or near the surface and therefore susceptible to impact from construction-related drawdown, pollution, etc.). This marshy grassland, in the context of the island habitats, has not been identified to be of any particular intrinsic value.

8.11.43 Chapter 11 notes the groundwater resource to have been assessed as being of medium sensitivity, due to the moderately productive aquifer status, but absence of active private water supplies (PWS). Deep excavations within or close to the identified GWDTE area could result in localised water table drawdown, potentially affecting the groundwater flow that sustains the marshy grassland. However, given the interpretation of likely fracture flow, this potential is limited; even with excavation of the shallow bedrock within the borrow pit area, fractures providing flow pathways would be expected to extend to significant depth and would therefore continue to provide a flow pathway to the surface. Therefore, there is low potential for the groundwater flow regime to be substantially affected. Employment of suitable construction good practice pollution controls would minimise potential for impacts to groundwater quality via leaks and spills, etc.

8.11.44 In the presence of standard mitigation (see Chapter 11: Geology, Hydrology and Hydrogeology), impacts to the springs, and therefore the GWDTE, are unlikely. As such, it is considered that at most, there will be potential locally significant **negligible impact** on these features of local importance.

Intertidal boulders/rocks

8.11.45 The construction of the jetty will involve the loss of 550 m^2 of this habitat to the causeway footprint (55 m long by 10 m wide). A small section of the of the 20 x 20 m docking structure will also be within the tidal range (i.e. above MLWS), this is estimated at a maximum of 74 m^2 in area. A total loss of 624 m^2 or 0.06 ha above MLWS, while permanent, is considered a minor change within an area of predominantly rocky shore habitat; this change is therefore assessed to be a **negligible** adverse and **not significant** effect.

8.11.46 A proposed upgrade (an increase to both width and length) to the extant slipway used for landing will see the loss of a small amount of rock to the side of the current structure. The extant slipway is c.20 m long by 3.5 m wide, though this was originally longer. This would be upgraded to a maximum 36 m long and 8 m wide. This will involve a permanent loss of a small additional area of the shoreline rock habitat to either side of the extant structure, to a maximum of c.90 m^2, plus an additional 128 m^2 for the 16 m extension (a total of c.218 m^2 or 0.02 ha). Such a change, while permanent, is a minor change to the baseline, given the extant structure already in place and the resource available. A low magnitude affect, limited to an already hard habitat, is therefore assessed to be a **negligible** adverse and **not significant** effect.

8.11.47 Total footprint of the structures (including impacts below MLWS) is assessed in Chapter:18.

Otter

8.11.48 Otters rely on the aquatic environment, although they will also track across watercourse catchments within their territories. The potential indirect noise and vibration impacts of construction activities could potentially change behaviours and cause avoidance of areas within their ranges for the duration of the disturbance event. Once the disturbance is complete, or the animals concerned have habituated to the disturbance, use of the habitat will likely resume at the same level.

8.11.49 [Redacted]

<u>Borrow pit operations</u>

8.11.50 There is a lack of otter presence recorded near either proposed borrow pit location or within the maximum exclusion zone of 100 m, as generally considered appropriate between an extraction site works area and a sensitive ecological feature (NatureScot, 2020b; Gardner Pllu, 2017).

8.11.51 As already noted above, at 100 m from the main borrow pit, extraction noise (from rock breaking) will have attenuated to c.61 dB and to c.49 dB by 300 m; there will be a sufficient attenuation of noise to minimise the potential for disturbance to animals on the western shore, c.200 m distant.

[Redacted]

8.11.52 For the secondary borrow pit location, there are no records of otter presence in the vicinity. [Redacted]

General construction works

8.11.53 While a NatureScot-endorsed exclusion zone of 30 m (NatureScot, 2020a) would normally be applied to any resting sites near construction works, none of the otter records indicate use of the island within 100 m of any of the Proposed Development infrastructure (which is generally set back a minimum of c.70-100 m from the shoreline), including the borrow pit locations; this may be as a result of the presence of sheep, dissuading otter from tracking across the island.

8.11.54 An assessment of **no impact** is predicted for the overall construction programme.

Extended slipway and landing jetty construction

8.11.55 Construction works will create a potential for disturbance; however, there is no evidence of otter use of this part of the island. If preconstruction surveys suggest otters are present during the works, it is likely that they would be temporarily displaced from the area. No habitat in close proximity to the landing site was identified as suitable for otter resting site use during the survey programme, though the bay could be used for foraging. As such, the effect magnitude would be anticipated to be no more than low, with at most a temporary (reversible) and **negligible** adverse impact which would be only **locally significant**.

Extended slipway and landing jetty use

8.11.56 Use of the landing facilities during construction will also create a potential for disturbance; however, there is no evidence of otter use of this part of the island. Should otters be present during the arrival of a vessel, it is likely that they would be displaced from the area and subsequently be unlikely to return owing to the daily presence of construction staff there. As such, the effect magnitude would be anticipated to be no more than low, with at most an immediate, temporary (reversible) and **negligible** adverse impact which would be only **locally significant**.

Construction traffic interactions

8.11.57 Otters are also potentially vulnerable to mortality or injury due to collision with construction traffic or construction methods (i.e. large mobile plant stripping the surface and deep excavations). However, with the presence of otter inland or within 100 m of the works areas generally unlikely and implementation of a 10 mph speed limit, the probability of collisions occurring is considered to be very low; a low magnitude, immediate, **negligible** adverse impact is therefore possible, which would constitute a **not significant** effect at the local scale.

Non-breeding grey seals

8.11.58 As described in Appendix 8.3, grey seals use of much of the island coastline outwith the breeding season. Numbers are variable, but show a bias for use of both the northern and southern ends of Faray and also a preference for the more sheltered east coast.

8.11.59 Though there is potentially access from the shore immediately adjacent to the walled burial ground, no seals have been recorded in the middle of the island close to the main borrow pit site (>230 m east). At its closest, the main borrow pit is located c.290 m from the east coast and c.230 m from the western shore; the small borrow pit is c.7 m from the top of the cliffs, at its closest point. With regards to the proposed small borrow pit on the eastern side of the island, close to Ness, none of the seal survey records indicate use of the adjacent rocks as haul-outs (the closest identified location from the survey is c.70 m to the south-east).

8.11.60 Due to the iterative design process, there will be no direct loss of terrestrial habitat beyond the shoreline which is used by seals during the moulting period; survey results indicate preferential use of the low-lying land to either side of Lavey Sound during this period (see Figure 8.4). The Proposed Development infrastructure is located south of the Lavey sound haul-out area and, additionally, turbine installations 1, 2, 3 and 5, located at the closest points to the shoreline, are backed by sea cliffs and therefore their hardstandings are not accessible from the shore; turbines 4 and 6 also have limited accessibility from the shore.

Borrow pit operation

8.11.61 Where blasting techniques are used to extract rock material, application of a disturbance buffer of at least 100 m is generally considered appropriate between the works area and a sensitive ecological feature (NatureScot, 2020b; Gardner Pllu, 2017); however, the Proposed Development borrow pits are likely to be worked by use of a hydraulic rock-breaker mounted on an excavator[3]. This technique will cause short bursts of disturbance of longer duration, but of significantly less magnitude than when using a blasting methodology. As previously stated, noise levels as a result of borrow pit extraction works have been predicted to be 66 dB at 70 m from the point source, 61 dB at 100 m and 49 dB at 300 m.

8.11.62 Applying a precautionary approach, a 100 m buffer is considered an appropriate EZoI for hydraulic rock-breaking, as the disturbance will attenuate with distance.

8.11.63 The main borrow pit search area for the Proposed Development is c.200 m from the west coast and over 250 m from the eastern shore. As noted above, the noise will attenuate, with c.61 dB experienced at 100 m from the point source (normal conversational speech is c.60 dB). This level of noise would be insignificant against the background of waves against the shore, but by the time extraction noises propagate to the nearest haul out area at >200 m from the main borrow pit, a decibel level range in the mid-fifties would be unlikely to be discernible for any seals present.

8.11.64 The effects of main borrow pit works are likely to be of a medium magnitude in terms of noise and vibration immediately adjacent to the works area, but, with a separation of at least 200 m, will not propagate out into the littoral and marine environments. The works are therefore unlikely to result in any avoidance/displacement reaction for any seals on either the west or eastern shores; an at most **negligible** adverse impact is anticipated for non-breeding grey seals as a result of main borrow pit operation

With regards to the location of the secondary borrow pit, near Ness, the seal survey records show use of Scammalin Bay and, in particular, use of the rocks to either side of the current slipway by low numbers of seals: c.2-6 animals were recorded close to the extant slipway on five occasions (i.e. representing 0.14%-0.41% of the total seals recorded at any given time). Numbers noted in the wider bay area were 6-69 animals across the same period (representing 0.41%-4.66% of the total seals recorded). The secondary borrow pit is within c.7 m at its closest point to the shore and over 200 m from the landing facility. This borrow pit will only provide a relatively small amount of material, so the working of this pit will be limited to track works in the landing area and therefore of short duration. The location, at the back of a sea cliff will provide some limited buffering for the shoreline immediately below the cliff, but any animals within 100 m would be disturbed. Survey records noted only two animals hauled-out at approximately 100 m from the borrow pit location (March survey). This suggests that, under normal operational conditions, there are unlikely to be more than a few individual animals within a potential EZoI of pit operations. An immediate avoidance/displacement reaction would be expected as a result of a medium magnitude effect in terms of noise and vibration immediately adjacent to the works area. As a temporary and short-

[3] If detailed ground investigations suggest that blasting is required for rock extraction, then a blasting assessment will be undertaken and submitted to OIC prior to construction commencing.

The blasting assessment (should it be required) would require detailed calculations to be undertaken to determine the permissible maximum charge.

term effect at the start of the construction programme, a **minor** adverse and therefore **not significant** effect is predicted for individual seals at this location.

Extended slipway and landing jetty construction

8.11.65 Displacement behaviours are to be expected during the new extended slipway and landing jetty construction works, due to the mix of noise, vibration and human presence.

8.11.66 As described under *Disturbance of Seals* (see paragraphs 8.11.8 to 8.11.20, above), disturbance distances have been noted as variable, with harbour seals being generally more sensitive than grey seals, especially when approached by a boat. A quiet approach, either by pedestrians or boat traffic has been shown to reduce the distance. With regards to the grey seals of Faray and the Scammalin Bay area, there is already a baseline of passing ferry traffic and regular landing on the island by the farmer, ensuring a degree of habituation to human activity in this area. The 200 m disturbance distance taken as the EZoI and used for the following assessment is based on Wilson (2011) and return behaviour noted by Lewis (2006) and Paterson *et al*. (2019).

8.11.67 Numbers present vary, from zero to six animals observed at any given time in the vicinity of the landing area and more animals in proximity to the south (noted as zero-21); and from zero up to 69 animals near the Point of Scaraber (a maximum of 71 animals were recorded in the bay area for the August count). Based on survey results (see Appendix 8.3) from zero to 27 animals (i.e. 0%-38 % of all animals likely to be in the bay) may be within 200 m of the landing sites at any given time and therefore within the landing facilities EZoI; the navigation channel passing the Point of Scaraber is likely to be well in excess of the 200 m flight behaviour stimulating distance for any animals hauled out in this area.

8.11.68 With the extant slipway to be upgraded, physical damage to the shoreline will be limited to loss of a small additional area under the slipway and to the footprint of the new landing jetty. While seals appear to use parts of the Scammalin Bay, these animals have generally been recorded to either side of the current landing area/slipway: no loss to a haul-out area is likely. Additionally, no loss to the foraging habitat of the bay is anticipated, as the jetty will only extend a short distance beyond the MLWS tide line. Limited in magnitude to seals in the Scammalin Bay area, the impact is assessed to have a short-term temporary (reversible) and **negligible** adverse and **not significant** impact on this feature of local importance.

8.11.69 Displacement behaviours are to be expected during construction and then use of the landing jetty, i.e. of the up to 69 seals normally using the Scammalin Bay area. The present baseline of disturbance includes visits by the farmer to check on his sheep; however, construction deliveries will increase this disturbance to a daily occurrence. This will potentially result in avoidance for the duration of any activity, with return shortly after cessation, i.e. c.52 % of animals returned within 30 minutes and up to c.94 % by four hours as determined by Paterson *et al*. (2019) for the more sensitive harbour seal; see *Disturbance of Seals* (see paragraphs 8.11.8 to 20, above). There is, however, a potential for habituation to vessel movements. The impact of the construction programme is therefore considered to be of a low magnitude, with an intermittent temporary (i.e. reversible) **minor** adverse impact at a local level and therefore **not significant**.

Operation

Faray and Holm of Faray SAC and SSSI

Habitat

8.11.70 Operation will cause no further changes to the habitats of the designated area, other than the likely groyne-effect of the jetty stabilising the sand in this part of the bay, as already assessed under Construction. No further effects are anticipated: effects on the habitats during the operation phase are assessed as having **no impact**.

Breeding seals: maintenance

8.11.71 Once the construction process has transitioned into the operational phase, a potential for disturbance to the seal population exists during the breeding season.

8.11.72 As noted under *Disturbance of Seals*, above, the change in the noise baseline, caused by turbine operation, is not considered to be an issue, as this will become a new background against which the seals will use the island. As already noted in paragraph 8.11.23, above, attenuation of sound over distance will cause operational noise to be lost into the background of wave action against the shore. The turbines will be 70 m - 100 m from the intertidal zone, meaning that this addition to the soundscape will likely only be discernible on the calmest of days. Disturbance impacts as a result of ground borne vibration or the introduction of large moving structures is not considered likely based on evidence of the effects on seal behaviour gathered at offshore wind farm developments. Operational disturbance effects are therefore more likely to be as a result of maintenance visits, which are anticipated to be up to once a week (see Chapter 3: Proposed Development). Such visits would be anticipated to typically comprise a small boat landing one or two personnel, with appropriate equipment not otherwise stored on the island. With regular maintenance required for all turbines, it would be expected that a quad bike, or similar, would be maintained on the island to facilitate transport around the facility. While the sheep remain on the island all year, farmer presence is irregular over the winter months prior to lambing, due to weather conditions preventing access.

8.11.73 While breeding use of Scammalin Bay is not fully understood, due to careful avoidance of surveying during breeding season to minimise disturbance to grey seals (as per consultation with NatureScot on survey scope), the majority of haul-out use of the island is to the north, away from the landing area, which is already subject to regular use by the farmer. Scammalin Bay is apparently only used by low numbers of seals throughout the rest of the year, by comparison the Lavey Sound shorelines. While there is a potential for low numbers of animals to be affected (0-71 animals use the bay area outside the breeding season; see Non-breeding seals, below), this would not be expected to cause any overall damage to the wider colony's breeding success, due to the habituation to human presence in this part of the island. Impacts occur if the parent is forced to flee the haul-out repeatedly and this can cause disruption of suckling, energetic costs and energetic deficit to individual pups (Wilson, 2011; Duck, 2010). It should be noted that a flight response is generally more unwilling at this time than outwith the breeding season and the seals are therefore more tolerant to disturbance due to the mother's reluctance to abandon her pup. Such abandonment action is taken only in extreme cases of persistent/repeated disturbance (Westcott, 2008; Andersen *et al*., 2012).

8.11.74 Maintenance visits scheduled during the breeding season would not cause the repeated disturbance within a short time-frame associated with pup abandonment, because the turbines are not within the likely 200 m disturbance distance. There is the potential for disturbance via vessels arrival, as discussed below. In a worst-case scenario, a significant disturbance impact resulting in flight could be experienced by any breeding individual in close proximity to the landing facilities; however, given the likely habituation to anthropogenic activities in this area (including the daily ferry operations), it is considered more likely to be a lower level of response to landings on the island, resulting in a temporary **minor** adverse and **not significant** effect of medium magnitude. Based on the use patterns observed during the rest of the year, this would only affect a very small number of the c.3,578 strong population, as estimated in 2010. This would therefore be a **negligible** adverse and therefore **not significant** effect on the SAC breeding population, as a whole.

8.11.75 Minor maintenance work (such as routine inspections) would involve one vessel and, as such, would not be dissimilar to the current, regular visits the farmer makes to Faray. In addition, there is a ferry route through Scammalin Bay. Thus, seals are expected to have a level of habituation to human disturbance. As such minor maintenance is considered to have a temporary, **minor** and localised **not significant** effect on breeding animals present within the vicinity.

8.11.76 Maintenance work during the breeding season will be avoided wherever possible. Repair works to the turbines, including large operations such as replacing a blade, required within the breeding season would be considered as a major, unplanned procedure.

8.11.77 Most maintenance works would be located at the turbine sites and, therefore, out with the SAC/SSSI boundary. As such, the main risk to seals would be vessels arriving to site and transporting materials to the turbine locations. If major unplanned works were required during the breeding season, the landing jetty would be used as opposed to the slipway, as it is less likely to support breeding seals.

8.11.78 While not affecting the seal population as a whole (i.e. a not significant effect on the SAC breeding population), a major landing operation would likely have a medium magnitude, temporary **moderate** and localised **significant** effect on breeding animals present within the vicinity of the landing facilities (i.e. a minimum of 200 m, but with a likely greater reluctance to take to the water). The Operation Environmental Management Plan (OEMP) will include method statements for such unplanned major maintenance events and the required mitigations. These method statements will be discussed and agreed with NatureScot prior to works commencing. Regular, detailed inspections will be undertaken during the non-breeding season, this will reduce the likelihood of major maintenance works occurring during the breeding season. In the very unlikely event that major unplanned maintenance work is required during the breeding season, NatureScot will be notified in accordance with the method statement.

8.11.79 In terms of turbine operational impacts, this is discussed in paragraphs 8.11.8 to 8.11.20, above and for non-breeding seals in paragraph 8.11.85 and maintenance in paragraphs 8.11.86 to 8.11.90, below.

Standing water

8.11.80 Once the construction process has transitioned into the operational phase, the land will experience no further disturbance outwith the previous baseline. An assessment of **no impact** therefore applies during the operational phase.

Marshy grassland with springs

8.11.81 Due to the likely route of the ground water feed, i.e. via fractures (as noted in Chapter 11: Geology, Hydrology and Hydrogeology), no changes to the preconstruction baseline are anticipated. An assessment of **no impact** therefore applies during the operational phase.

Intertidal boulders/rocks

8.11.82 No further effects are anticipated once construction of the slipway has been completed. As such there will be **no impact** on this feature of local importance during the wind farm operation.

[Red

8.11.83 [Redacted]

8.11.84 [Redacted]

Non-breeding grey seals

<u>Wind farm operation</u>

8.11.85 As noted in *Disturbance of Seals* (see paragraphs 8.11.8 to 8.11.20, above), evidence indicates that operational off-shore wind farm installations have no significant effect on the seal populations in the surrounding areas (Edren *et al*., 2010; Russell *et al*., 2016). The Proposed Development will be inland-based, therefore the operation is not expected to have any effect on the seal population using the island's shores. The areas particularly favoured during the moulting season are to the north of the turbine area and the turbines themselves are not be readily accessible for animals which

use the land beyond the shore, so use of the turbine hard standings is considered highly unlikely. An assessment of **no impact** therefore applies for the general operation of the turbines.

Maintenance

8.11.86 As previously noted, the island is used for grazing sheep. The sheep are present year-round, with access to parts of the island rotated to permit the grass to recover. Farmer presence is variable, with regular visits across the summer and these becoming infrequent in the winter, due to reliance on good weather conditions to permit landing. During the lambing season, the farmer resides for up to two months. Two quad bikes are retained on the island for use by the farmer and farm hand(s). This pattern of presence means that a low-level, regular to occasional disturbance is part of the baseline conditions experienced by the local seal population.

8.11.87 As described under Faray and Holm of Faray SAC and SSSI, above, the operational wind farm will require relatively frequent, i.e. up to once a week (see Chapter 3: Proposed Development) maintenance visits. Typically, such visits will just require engineers to be landed, with their appropriate equipment. It is anticipated that transportation will be maintained on the island, i.e. quadbike(s) or similar, as used by the farmer.

8.11.88 During the up to two months of the lambing season (April-May), human presence is continual, so while navigational movements to/from the slipway are reduced, human presence on the island is increased during the latter stages of the seal moulting season.

8.11.89 Standard maintenance visits are considered as more disturbing than the visits undertaken to check on the island's sheep. Arrival of a vessel at the landing facilities may cause individual seals to take to the water from adjacent haul-outs, with a low level of avoidance behaviour displayed. With some habituation possible as a result of frequent visits (see *Disturbance of Seals*, paragraphs 8.11.8 to 8.11.20, above), disturbance, while likely, is not expected to be of any significance, due to the low numbers using the bay, i.e. up to c.69 animals, with only up to c.21 likely to be close to the landing area. Standard maintenance works are therefore assessed as having a low magnitude, immediate and temporary **minor** adverse and therefore **not significant** effect.

8.11.90 More major maintenance operations, such as replacement of turbine parts, which require delivery of materials and use of plant would, of necessity, be planned outwith the seal breeding season. While likely to prolong the disturbance period of landing facility use, this would also be anticipated to be of a similar effect to the normal maintenance visit and so assessed as having a low magnitude, immediate and temporary **minor** adverse and therefore **not significant** impact.

Decommissioning

8.11.91 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the effects would be similar in nature, but of a lower level than those during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

8.12 Additional Mitigation and Enhancement

8.12.1 A habitat protection plan will be developed that will include demarcation of no-go areas in sensitive habitats, e.g. the marshy grassland within the Faray and Holm of Faray SAC and SSSI boundary.

8.12.2 Specific habitat and species mitigation measures for the construction and operational phases of this Proposed Development will be defined within the CEMP documentation. Additional mitigation measures include:

Construction Phase

- Designated seal haul-outs:

- Delivery of staff, plant and materials to the island will be controlled though development of method statements to provide the least-disturbing route to site; this could potentially include varying the route from the port of origin.

- Habitats:
  - Identification of appropriate exclusion zones around sensitive features (e.g. waterbodies), to prevent construction vehicles tracking through these areas;
  - Operative awareness education, in the form of toolbox talks, to ensure the value of the island and its coastal environment is understood;
  - Careful wash-down of plant and other equipment will be mandatory prior to access to (i.e. before embarking on the vessel for transport to the island) or egress from the Proposed Development site, to prevent potential biosecurity risks associated with plant movements; potentially contaminated materials will be identified and the handling of such strictly controlled. A biosecurity Plan is detailed in Chapter 7, Section 7.10.

- [Red
  - [Redacted]
  - [Redacted]

- Seals:
  - Landing facilities construction Method Statement.
  - The potential for collision with marine traffic will require consideration when planning navigation routes from port to site and procedures. Navigational Method Statements will be developed to cover port to Faray transport and use of the island landing facilities. In the case of seals using the extended slipway and landing jetty area, the approach of a vessel is likely to cause an unavoidable dispersal. Given the use of the area, visual, olfactory and acoustic deterrents, such as those described in MMO (2018 & 2020) for use with fishing gear are considered unsuitable. Consultation will be undertaken with NatureScot with regards to the possibility of disturbance licence requirements;
  - Control of borrow pit works to limit duration of disturbance events caused by material extraction. This will be covered through development of a borrow pit operations Method statement;
  - Use of sound barriers along the coastal edge of the secondary borrow pit to reduce noise propagation from extraction operations;
  - Construction plant will be selected for the lowest noise output possible, with sound barriers also to be available for deployment around stationary plant, such as generators;
  - Restrict extraction of material from the secondary borrow pit to periods when no seals are present within the landing facility and Scammalin Bay area. Where this is not possible, use of a standard “soft-start” procedure (i.e. slowly increasing the level of noise in the works area, prior to commencing full operations), to avoid causing a potentially stressful

"scare" reaction to a sudden noise, may reduce the intensity of any such disturbance events;

- With the Proposed Development to be constructed onshore, the impact of any piling activity on the surrounding marine habitat is likely to be reduced (i.e. insulated by the surface geology), but low impact methodologies will be selected for base construction and use of these methodologies will be programmed such that there are no sustained periods of disturbance. Formation of any piled foundations will also be programmed, as far as possible, for the earliest part of the construction "season" as possible, in order to avoid the times of highest seal presence;
- Though of a lower potential for disturbance impact, use of vibromatic compaction will also be limited to short periods of time, with a minimum of two hours between any compaction operations, if displacement behaviour is observed in any nearby seals; and
- Strict control of potential for human presence near hauled-out seals. In general, no personnel should approach within 50 m of a seal resting on the shore. However, Method Statements and site staff protocols/toolbox talks will be in place prior to all construction activities commencing, with the sensitivities of the adjacent habitats and their wildlife (and how to reduce/avoid impacts) explained to site personnel prior to commencement.

Operation Phase

- Faray and Holm of Faray SAC/SSSI and designated haul-outs:
  - Maintenance checks, including normal repair works/replacement of parts timed to avoid the seal breeding season (15th September to 31st December inclusive), where possible; if visits are still required, then these will be limited to the minimum, in order to reduce the potential for adverse impacts to any breeding seals close to the landing facility;
  - Any major planned maintenance will be programmed to avoid the seal breeding season. In the unlikely event that unplanned major maintenance is required (e.g. turbine failure), the OEMP, which will include emergency plans and appropriate mitigations, will be followed. This will include method statements for such unplanned major maintenance events and the required mitigations. These method statements will be discussed and agreed with NatureScot prior to works commencing. Regular, detailed inspections will be undertaken during the non-breeding season, this will reduce the likelihood of major maintenance works occurring during the breeding season. In the very unlikely event that major unplanned maintenance work is required during the breeding season, NatureScot will be notified in accordance with the method statement; and
  - Maintenance check vessel routing to follow the same method statement as applied to the construction phase, in order to minimise disturbance to the seal populations on the haul-outs passed *en route* to the island.
- Habitats:
  - Exclusion of sheep from the restored borrow pit areas to permit habitat recovery free from grazing pressure (which otherwise has the potential to degrade the surface).
- Species
  - Maintenance check vessel routing and final approach to the island landing facility to follow the same method statement as applied to the construction phase, in order to minimise

disturbance and collision risk, with particular reference to the seals present within Scammalin Bay; and

- Application of a site driving Method Statement for maintenance works, should vehicles be required to facilitate completion of tasks, including application of speed limits.

8.13 Residual Effects

8.13.1 With implementation of the specific mitigation measures described in Sections 8.10 and 8.12, all impacts would reduce to at most **barely perceptible** and no significant residual effects are predicted during construction or operation on all IEFs (see Table 8.9).

8.14 Cumulative Assessment

8.14.1 The main reason for assessing cumulative impacts is to identify whether effects, which may not be significant from individual developments, are likely to be significant when combined with nearby existing or proposed schemes. The main projects likely to cause similar impacts to those associated with the Proposed Development are other developments, operational wind farms, those under construction or those consented. Several other wind farms are present within the wider area, in planning, under construction and operational.

8.14.2 It should be noted that there is no published NatureScot guidance for cumulative impact assessment on terrestrial ecological receptors. NatureScot *Guidance: Assessing the Cumulative Impact of Onshore Wind Energy Developments* (SNH, 2012) is confined to landscape and visual impacts and to those affecting birds. The key principle of NatureScot's cumulative impact assessment guidance for birds is to focus on any significant effects and, in particular, those that are likely to influence the outcome of the consenting process. Application of the outlined principles to terrestrial ecological features leads to a focus on the potential cumulative impacts to the Proposed Development's IEFs, i.e. the designated areas (i.e. the Faray and Holm of Faray SAC and SSSI and seal haul-outs) standing and running water, [Red and non-breeding seals.

8.14.3 Wind farm projects at the scoping stage have been scoped out of the cumulative assessment, because they generally do not have sufficient information on likely impacts to be included, as the baseline survey period is ongoing, or results have not been published. Projects that have been refused or withdrawn have also been scoped out. For the purpose of this assessment it is considered that all other developments included in cumulative calculations remain as they were at installation and remain so for the assessment (25 year) period.

8.14.4 There are approximately 500 single turbine wind energy developments on Orkney, which are primarily domestic scale developments and these therefore generally have limited data and, given the large number those outside of the immediate vicinity to the site, these are not considered within this assessment. Thirteen wind farms, at application through to operational status, are located within 50 km of the Proposed Development. However, due to the limits of connectivity between the terrestrial and marine ecological features, this assessment has considered a conservative 10 km radius (see Figure 8.5); this is the distance typically used when assessing the terrestrial interests of a land-based wind farm development; the cumulative effects on marine species are considered in Chapter 16 Underwater Noise. A single wind farm is located within this distance: The operational five-turbine Spurness Wind Farm, located 7 km east south-east of the Proposed Development, on Sanday. All the installed turbines are a minimum of c.150 m from the shoreline to either side of the Spurness peninsula.

8.14.5 Similar to Faray, [Re use of the coastline of the Spurness peninsula, adjacent to the Spurness Wind Farm site, was recorded during site survey, though the absence of suitable habitat inland ensured that no evidence of presence was identified within the wind farm area. However, while identified around the Spurness peninsula, no effects were predicted and therefore seal presence was not considered a constraint to development. Construction plant and materials were to arrive via the island's ferry port and construction disturbance would be temporary and limited in duration. No additional species-specific mitigation was considered to be required for [Re and no cumulative

impacts were identified for the ecological interests of the site. No operational impacts were identified for either [Red or seal species (Dulas, 2002).

8.14.6 Due to the physical separation and similarly small scale, the Spurness installation is not considered to have any direct impact on, or in-combination impacts with, the IEFs of the Proposed Development.

8.14.7 No other developments of any type were identified within the 10 km search radius.

8.15 Summary

8.15.1 The Proposed Development is located on the uninhabited island of Faray off the western shore of Eday. The site is currently used for sheep grazing. The Faray and Holm of Faray SAC and SSSI, designated for grey seals, wraps around the coastline of Faray. Two LNCS, Braehead and Resting Hill, are located due east of the Proposed Development, but on Eday, across the Sound of Faray and therefore out of the potential EZoI.

8.15.2 An assessment of terrestrial ecology effects arising from the construction and operation of the Proposed Development was undertaken, based on the current Proposed Development layout and turbine dimensions. A range of ecological studies were undertaken, to identify the terrestrial ecological interests of the Proposed Development and to establish the ecological baseline for the EcIA. This included identification of existing wildlife records, nearby sites designated for nature conservation and survey of the habitats and faunal interests of the site. Field surveys undertaken were an Extended Phase 1 habitat and NVC survey, otter and seal survey.

8.15.3 The primary habitats identified above the shoreline (listed in order of size) are: improved grassland, semi-improved acid grassland and marshy grassland. A number of small waterbodies and two springs with a short burn are present within the Study Area, plus both flowing and dry field drains.

8.15.4 Of the features carried forwards to be assessed in terms of impacts, all likely direct and indirect effects on the Faray and Holm of Faray SAC and SSSI were considered. With the application of all mitigation identified for the construction phase, an assessment of **no impact** is applied to the qualifying features of these sites (i.e. grey seals) or the habitats present. For the operational phase, a potential **moderate** adverse and **significant** effect may, however, be experienced by individual seals close to the landing facilities, if maintenance is required during the breeding season. However, for the wider breeding population of the SAC, this would be a **negligible** adverse and **not significant** effect. A major repair event in-season would be likely to have a similarly **negligible** adverse and **not significant** effect, though for any breeding individuals, this would be a potential **minor** adverse and **not significant** effect.

8.15.5 No impacts are anticipated for the designated sea haul-out sites within 5 km of the Proposed Development.

8.15.6 With the application of Method Statements covering responsible operational procedures, impacts to designated seal haul-outs as a result of shipping movements are anticipated to be **negligible** adverse at most, with the effects being short-term, temporary and reversible and therefore **not significant**.

8.15.7 Direct and indirect habitat losses, due to land take and as a result of drying land are anticipated during the construction phase and then considered likely to continue during the operation phase. No further adverse impacts are predicted during the operational phase. Overall, the permanent habitat loss to the Proposed Development is 8.02 ha, which comprises 7.93 ha of improved and semi-improved grazing and 0.09 ha of grazed marshy grassland. An additional 3.28 ha of improved and semi-improved grassland will be temporarily lost or disturbed during the construction process, but this will be subsequently restored. None of this loss is to habitats of nature conservation value.

8.15.8 Habitats identified as IEFs were standing water intertidal boulders rock and marshy grassland with springs.

8.15.9 No impacts to standing water are anticipated, with the application of industry standard mitigation and pollution controls, in addition to design mitigation.

8.15.10 The new extended slipway works involve loss of intertidal rock habitat (N.B. sand lost to the landing jetty causeway footprint is not assessed as an IEF). A worst-case loss of up to 0.05 ha of intertidal rock habitat has been identified for the slipway, a permanent impact which is assessed as **negligible** adverse and **not significant**.

8.15.11 Though the island is primarily surface water or rain-fed, groundwater dependence was determined for one area of marshy grassland on the western side of the island, associated with two springs. These springs and their associated marshy grassland are considered to be outwith the construction disturbance zone. An assessment of **negligible** adverse and **no impact** are identified for the construction and operational phases of the Proposed Development, respectively.

8.15.12 [Redacted] With application of all defined mitigation measures, construction impacts to [Redact non-breeding seals have been identified as short-term, temporary **negligible** adverse (and **not significant**) at most, for all construction activities. [Redacted]

8.15.13 Non-breeding grey seals are likely to be present around the shoreline of the island at any given time, though use of the Scammalin Bay area appears generally low and sporadic. While there is potential for seals to be within a 200 m EZoI of the works, a **negligible** adverse and **not significant** residual impact is anticipated for operation of the secondary borrow pit in the presence of suitable mitigation. Extended slipway and landing jetty construction works followed by construction phase use are also anticipated to have a **negligible** adverse and **not significant** residual impact on non-breeding seals within a 200 m EZoI. Operational maintenance visits are anticipated to have a **negligible** adverse and **not significant** residual impact in the presence of all mitigation.

8.15.14 During the operational phase, maintenance visits within the breeding season have been identified with a potential for a **minor** effect on individual animals within the vicinity of the landing facilities, though for the overall population this would be a **negligible** effect.

8.15.15 No cumulative (in-combination) effects with nearby developments (to a radius of 10 km) were identified; no significant cumulative effects are anticipated (Table 8.10).

8.15.16 The assessment concludes that there will be no significant residual effects on any of the terrestrial ecological interests of the site, resulting from the construction and operation of the Proposed Development.

Table 8.9 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Designated sites: Faray and Holm of Faray SAC and SSSI. Main borrow pit operation	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated sites: Faray and Holm of Faray SAC and SSSI. Secondary borrow pit operation	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated sites: Faray and Holm of Faray SAC and SSSI. Landing jetty and Extended slipway construction – habitat changes	Negligible	Adverse	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated sites: Faray and Holm of Faray SAC and SSSI. Landing jetty and Extended slipway – breeding grey seals	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Designated sites: Faray and Holm of Faray SAC and SSSI. Extended slipway and landing jetty operation	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated sites: Faray and Holm of Faray SAC and SSSI. General construction	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated haul-outs, Calf of Eday, Weather Ness, Seal Skerry and Rusk Holm: Borrow pit operations	No impact	n/a	Borrow pit operations Method statement to control works to limit duration of disturbance events caused by material extraction; use of sound barriers along the coastal edge of the secondary borrow pit to reduce extraction noise propagation; selection of plant for the lowest noise and vibration output possible, with sound barriers also to be available for deployment around stationary plant, such as generators	No impact	n/a

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Designated haul-outs, Calf of Eday, Weather Ness Seal Skerry and Rusk Holm: General site operations	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated haul-outs, Calf of Eday, Weather Ness Seal Skerry and Rusk Holm: General site operations	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated haul-outs: shipping route/s from Hatston Quay/other ports used for transportation of staff, plant and materials	Negligible and not significant	Adverse	Method Statement to ensure the least-disturbing route to site	Negligible and not significant	Adverse
Disturbance to standing water	No impact	n/a	Establishment of exclusion zones around waterbodies; operative awareness education to ensure the value of the island and its coastal environment is understood; development and application of a biosecurity plan	No impact	n/a

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Intertidal boulders/rocks: habitat loss	Negligible and not significant	Adverse	Loss not possible to reverse. No further mitigation required beyond the embedded mitigation described	Negligible and not significant	Adverse
Disturbance to GWDTE marshy grassland with springs	Negligible and not significant	Adverse	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Intertidal boulders/rocks	Negligible and not significant	Adverse	Loss not possible to reverse. No further mitigation required beyond the embedded mitigation described	Negligible and not significant	Adverse
[Redacted]	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
[Redacted]	Negligible and not significant	Adverse	In addition to the embedded mitigation described, use of sound barriers around the shoreward side of the secondary borrow pit; soft start procedures	No impact	n/a
[Redacted]	No impact	n/a	[Redacted]	No impact	n/a
[Redacted]	Negligible, local level and only locally significant	Adverse	[Redacted]	Negligible, local level and not significant	Adverse

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
			sunset. This can be reduced to one hour between January and February, due to limited daylight, should construction be required at this point in the year (N.B. no works will occur during the seal breeding season (15th September to 31st December inclusive)		
[Redacted]	Negligible, local level and locally significant	Adverse	Method Statements for vessel movements and Extended slipway and landing jetty operations	Negligible, local level and not significant	Adverse
[Redacted]	Negligible and not significant	Adverse	[Redacted]	No impact	n/a
Non-breeding grey seal: main borrow pit operation	Negligible and not significant	Adverse	Restrict extraction of material from the secondary borrow pit to periods when no seals are present within the landing facility and Scammalin Bay area. Where this is not possible,	No impact	n/a

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
			use of a standard "soft-start" procedure and Species Protection plan		
Non-breeding grey seal: secondary borrow pit operation	Minor and not significant	Adverse	Restrict extraction of material from the secondary borrow pit to periods when no seals are present within the landing facility and Scammalin Bay area.; where this is not possible, use of a standard "soft-start" procedure and sound barriers around the shoreward side of the secondary borrow pit	Negligible	Adverse
Non-breeding grey seal: Extended slipway and landing jetty construction – habitat loss (haul-out and foraging resource)	Negligible and not significant	Adverse	Method Statement for responsible construction; Strict control of potential for human presence near hauled-out seals.	Negligible and not significant	Adverse
Non-breeding grey seal: Extended slipway and landing jetty construction and use during the construction phase – disturbance/ displacement	Minor and not significant	Adverse	Method Statement for responsible construction and landing facility operation; Strict control of potential for human presence near hauled-out seals.	Negligible and not significant	Adverse
Operation					
Designated sites: Faray and Holm of Faray SAC and SSSI. Disturbance of breeding grey seals during maintenance visits	Negligible and not significant in terms of the overall SAC population;	Adverse	Maintenance checks, including normal repair works/replacement of parts timed to avoid the seal breeding season (15th September to 31st December inclusive), where possible; if visits are still required, then these will be limited to	Negligible effect to SAC population and individual	Adverse

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
	moderate and significant to individual animals within the EZoI		the minimum, in order to reduce the potential for adverse impacts to any breeding seals close to the landing facility	animals; not significant	
Designated sites: Faray and Holm of Faray SAC and SSSI. Disturbance of breeding seals during unplanned major maintenance	Negligible and not significant in terms of the overall SAC population; minor and not significant to individual animals within the EZoI	Adverse	Method Statements and timing controls to reduce potential disturbance if in-season repair works are required: emergency plans and appropriate mitigations to be Method Statement controlled, with these agreed with NatureScot prior to works commencing. Maintenance check vessel routing to follow the same method statement as applied to the construction phase, in order to minimise disturbance to the seal haul-out populations	Negligible and not significant in terms of the overall SAC population; minor and not significant to individual animals within the EZoI	Adverse
Disturbance to standing water	No impact	n/a	None required	No impact	n/a
Disturbance to GWDTE marshy grassland with springs	No impact	n/a	None required	No impact	n/a
Intertidal boulders/rocks	No impact	n/a	None required	No impact	n/a
[Redacted]	Negligible and not significant	Adverse	Application of maintenance and driving Method Statements	No impact	n/a

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Non-breeding grey seals: general wind farm operation	No impact	n/a	None required	No impact	n/a
Non-breeding grey seals: maintenance disturbance	Minor and not significant	Adverse	Application of maintenance Method Statement; Maintenance check vessel routing to follow the same method statement as applied to the construction phase, in order to minimise disturbance to the seal haul-out populations	Negligible and not significant	Adverse
Non-breeding grey seals: major maintenance works disturbance	Minor and not significant	Adverse	Application of maintenance Method Statement; maintenance check vessel routing to follow the same method statement as applied to the construction phase, in order to minimise disturbance to the seal haul-out populations	Negligible and not significant	Adverse
Decommissioning					
To be assessed in the future					

Table 8.10 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Terrestrial ecology	None	None	**No impact**	-

8.16 References

Andersen SM, Teilmann J, Dietz R, Schmidt NM and Miller LA (2012). *Behavioural responses of harbour seals to human-induced disturbances.* In *Aquatic Conserv: Mar. Freshw. Ecosyst. 22*: 113-121

BCT (2015). *Developing Scottish bat population trends through the National Bat Monitoring Programme. Scottish Natural Heritage Commissioned Report No. 796. Commissioned Report No. 796 Developing Scottish bat population trends through the National Bat Monitoring Programme*. Bat Conservation Trust. Available online at: https://www.nature.scot/sites/default/files/2017-07/Publication%202015%20-%20SNH%20Commissioned%20Report%20796%20-%20Developing%20Scottish%20bat%20population%20trends%20through%20the%20National%20Bat%20Monitoring%20Programme.pdf

BCT (2019). *Bats in Scotland*. Bat Conservation Trust. Available online at: https://cdn.bats.org.uk/pdf/Scottish-bats-2019.pdf

Chanin P (2003a). *Monitoring the Otter Lutra Lutra.* Conserving Natura 2000 Rivers Monitoring Series No. 10. English Nature, Peterborough

Chanin P (2003b). *Ecology of the European Otter*. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough

CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland*. Chartered Institute of Ecology and Environmental Management. Available online at: https://www.cieem.net/data/files/ECIA%20Guidelines.pdf

Collins J (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. 3rd Edn, Bat Conservation Trust, London. Available online at: https://www.gov.uk/guidance/bats-surveys-and-mitigation-for-developmentprojects#mitigation-and-compensation-methods

Depledge MH, Godard-Codding CAJ and Bowen RE (2010). *Editorial. Light pollution in the sea*. Marine Pollution Bulletin V60 (2010) 1383-1385

Duck C (2010). Charting Progress 2 Healthy and Biological Diverse Seas Feeder Report: Section 3.5: Seals. Published by Department for Environment Food and Rural Affairs on behalf of UKMMAS. p506-539. In: UKMMAS (2010) Charting Progress 2 Healthy and Biological Diverse Seas Feeder Report (Eds. Frost, M & Hawkridge, J). Available online at: https://www2.gov.scot/resource/doc/295194/0119667.pdf

Duck CD and Morris CD (2019). *Aerial survey of harbour (Phoca vitulina) and grey seals (Halichoerus grypus) in Scotland in August 2017: the Western Isles, part of West Scotland and part of East Scotland. Scottish Natural Heritage Research Report No. 1143.* Available online at: https://www.nature.scot/sites/default/files/2019-09/Publication%202019%20-%20SNH%20Research%20Report%201143%20-%20Aerial%20survey%20of%20harbour%20and%20grey%20seals%20in%20Scotland%20in%20August%202017.pdf

Dulas (2002). *Spurness Wind Farm Sanday. Environmental Statement, Volume 2 Written Statement*, September 2002.

Edren, SMC, Andersen, SM, Teilmann, J and Cartensen, J. (2010). *The effect of a large Danish offshore wind farm on harbor and gray seal haul-out behavior*. In Marine Mammal Science 26(3): 614–634. February 2010.

EEC (1992). Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna. Available online at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992L0043

Gardner Pllu A (2017). *Species protection Plan. HSEN-PL-3002*. Aberdeen Western Peripheral Route. May 2017

Greer RD, Day RH, Bergman RS, Dirks T, Anderson B, Attanas L, Lamar R, Heintz J and Holt L (2010). *Literature review, synthesis and design of monitoring of ambient light intensity on the OCS regarding potential effects on resident marine fauna*. Golder Associates, ABR & Rolf Bergman Consulting; report prepared for U.S. Department of Interior, Minerals Management Service (MMS), July 2010. Available online at: https://www.boem.gov/sites/default/files/uploadedFiles/BOEM/BOEM_Newsroom/Library/Publications/BOEM-2007-055.pdf

ICES. 2017. Report of the Workshop on Predator-prey Interactions between Grey Seals and other marine mammals (WKPIGS), 30 April 2017, Middelfart, Denmark. ICES CM 2017/SSGEPD:18. 24 pp. Available online at: https://www.ices.dk/sites/pub/Publication%20Reports/Expert%20Group%20Report/SSGEPD/2017/01%20WKPIGS%20-%20Report%20of%20the%20Workshop%20on%20Predator-prey%20Interactions%20between%20Grey%20Seals%20and%20other%20marine%20mammals.pdf

JNCC (2010). *Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise August 2010*. Joint Nature Conservation Committee. Available online at: https://data.jncc.gov.uk/data/31662b6a-19ed-4918-9fab-8fbcff752046/JNCC-CNCB-Piling-protocol-August2010-Web.pdf

JNCC (2020). *Marine mammals and offshore industries.* Joint Nature Conservation Committee. Available online at: https://jncc.gov.uk/our-work/marine-mammals-and-offshore-industries/#underwater-noise-sources-of-noise

Lewis KM (2006). *Habitat Use, Haul-Out Behaviour & Site Fidelity of Grey Seals (Halichoerus grypus) along the Ceredigion Marine Heritage Coast, Wales*. A dissertation presented in partial fulfilment of the requirements for the degree of Master of Science in Marine Mammal Science of the University of Wales. Available online at: https://www.seawatchfoundation.org.uk/wp-content/uploads/2012/08/Kate-Lewis-thesis.pdf

Marine Scotland (2014). *Guidance on the Offence of Harassment at Seal Haul-out Sites*. June 2014. Available online at: https://consult.gov.scot/marine-environment/possible-designation-of-a-seal-haul-out-site/user_uploads/guidance-on-the-offence-of-harassment-at-seal-haul-out-sites.pdf-1

MCS (2020). *Faray and Holm of Faray SAC*. Marine Conservation Society. Available online at: https://mcsuk.org/mpa/show-UK0017096

MMO (2018). *Assessing Non-Lethal Seal Deterrent Options: Literature and Data Review*. A report produced for the Marine Management Organisation. MMO Project No: 1131, October 2018, 45 pages. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/753773/Report_-_Assessing_non-lethal_seal_deterrent_options_literature_and_data_review.pdf

MMO (2020). *Assessing Non-Lethal Seal Deterrent Options: Summary Report. A report produced for the Marine Management Organisation*. MMO Project No: 1131, February 2020, 28 pages. Marine Management Organisation. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/873273/MMO1131_Summary_Report_Pub_200203.pdf

Nature Scot (2020a). Standing Advice for Planning Consultations. Protected Species: Otter. Available online at: https://www.nature.scot/sites/default/files/2020-06/Species%20Planning%20Advice%20-%20otter.pdf

Nature Scot (2020b). Standing Advice for Planning Consultations. Protected Species: Badger. Available online at: https://www.nature.scot/sites/default/files/2020-06/Species%20Planning%20Advice%20-%20badger.pdf

Orkney's Biodiversity Steering Group (2018). The Orkney Local Biodiversity Action Plan. Available online at: http://www.orkney.gov.uk/Files/Planning/Biodiversity/Orkney_LBAP_2018_2022_FINAL_Oct_2018.pdf

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

OIC (2017b). *Supplementary Guidance: Natural Environment Annex 1 Local Nature Conservation Sites, Local Nature Reserves and un-notified Geological Conservation Review Sites.* March 2017, Orkney Islands Council. Available at: http://www.orkney.gov.uk/Files/Committees-and-Agendas/Development%20and%20Infrastructure/DI2017/01-03-2017/I06_App2_Ann1A_Local_Nature_Conservation_Sites.pdf

Orkney Ferries (2020). *Published Timetables. Winter/Spring 20/21. Northern Isles Integrated*. Available online at: http://www.orkneyferries.co.uk/pdfs/timetables/winterspring/ni_integrated_winterspring.pdf

Paterson W, Russell D, Wu G-M, McConnell B, Currie J, McCafferty D and Thompson D (2019). *Post-disturbance haulout behaviour of harbour seals*. In *Aquatic Conservation: Marine and Freshwater Ecosystems.* 29. 144-156. 10.1002/aqc.3092

Russell, DJF (2016). *Movements of grey seal that haul out on the UK coast of the southern North Sea*. Report for the Department of Energy and Climate Change (OESEA-14-47)

Russell DJF, Hastie GD, Thompson D, Janik VM, Hammond PS, Scott-Hayward LAS, Matthiopoulos J, Jones EL and McConnell BJ (2016). *Avoidance of wind farms by harbour seals is limited to pile driving activities*. In *Journal of Applied Ecology* 2016, 53, 1642-1652

Russel DJF, Morris CD, Duck CD, Thompson D and Hiby H (2019). *Monitoring long-term changes in UK grey seal pup production.* In *Aquatic Conservation: Marine and Freshwater Ecosystems. 2019;29(S1):24–39*

SCOS (2017). *Scientific Advice on Matters Related to the Management of Seal Populations: 2017.* Special Committee on Seals. Available online at: http://www.smru.st-andrews.ac.uk

SCOS (2019). *Scientific Advice on Matters Related to the Management of Seal Populations: 2019*. Special Committee on Seals. Available at: http://www.smru.st-andrews.ac.uk/files/2020/08/SCOS-2019.pdf

Scottish Bats (2014). *Scottish BATS Volume 6 – October 2014*. Available online at: https://cdn.bats.org.uk/pdf/Our%20Work/In-Scotland/print-version-scottish-bats-volume-6.pdf?mtime=20190708102118

Scottish Government (2004). *Nature Conservation (Scotland) Act 2004.* Available online at: https://www.legislation.gov.uk/asp/2004/6/contents

Scottish Government (2008). *Planning for Natural Heritage: Planning Advice Note 60***.** Available online at: https://www2.gov.scot/Publications/2000/08/pan60-root/pan60

Scottish Government (2010). *Marine (Scotland) Act 2010.* Available online at: https://www.gov.scot/publications/marine-scotland-act/

Scottish Government (2011a). *Wildlife and Natural Environment (Scotland) Act 2011.* Available at: http://www.legislation.gov.uk/asp/2011/6/enacted

Scottish Government (2011b). *Habitats Regulations Appraisal of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Appropriate Assessment Information Review. Section 6. Potential for Adverse Effects on Marine Mammal Features*. March 2011. Available online at: https://www2.gov.scot/Publications/2011/03/04165857/17

Scottish Government (2013). *Scottish Biodiversity List. Version 1.5.* Available online at: http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL

Scottish Government (2014a). *The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014.* Available online at: https://www.legislation.gov.uk/ssi/2014/185/contents/made

Scottish Government (2014b). *National Planning Framework*. Available at: https://www.gov.scot/publications/national-planning-framework-3/

Scottish Government (2014c). *Scottish Planning Policy*. June 2014. Available at: https://beta.gov.scot/publications/scottish-planning-policy/pages/2/

Scottish Natural Heritage, Natural England, Natural Resources Wales, RenewableUK, Scottish Power Renewables, Ecotricity Ltd, the University of Exeter and the Bat Conservation Trust (2019). *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation.* Version: January 2019. Available online at: https://www.nature.scot/bats-and-onshore-wind-turbines-survey-assessment-and-mitigation

SEPA (2014). LUPS-GU31. Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Windfarm Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Version 2, 27 October 2014. Scottish Environment Protection agency. Available at: https://www.sepa.org.uk/media/143868/lupsgu31_planning_guidance_on_groundwater_abstractions.pdf

SEPA (2017). Land Use Planning System SEPA Guidance Note 31: Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Scottish Environment protection Agency, September 2017. Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf

SEPA (2018). *Supporting Guidance (WAT- SG-75) Sector Specific Guidance: Construction Sites. Version 1, February 2018*. Scottish Environment Protection Agency. Available online at: https://www.sepa.org.uk/media/340359/wat-sg-75.pdf

SEPA (2019). *The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) A Practical Guide. Version 9.3, February 2019*. Scottish Environment Protection Agency. Available online at: https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf

SNH (2010). *Citation: Faray and Holm of Faray Site of Special Scientific Interest. Orkney Islands Site code: 1683. Notification reviewed under the 2004 Act: 27 August 2010.* Scottish Natural Heritage. Available online at: https://sitelink.nature.scot/site/1683

SNH (2011). *Guidance on Survey and Monitoring in Relation to Marine Renewables Deployments in Scotland Volume 3: Seals*. Scottish Natural Heritage. Available online at: https://www.nature.scot/sites/default/files/2017-07/A585082%20-%20Guidance%20on%20survey%20and%20monitoring%20in%20relation%20to%20marine%20renewables%20deployments%20in%20Scotland%20-%20Vol%203%20Seals.pdf

SNH (2012). Assessing the Cumulative Impact of Onshore Wind Energy Developments. Scottish Natural Heritage. Available online at. https://www.nature.scot/sites/default/files/2017-09/Guidance%20note%20%20-%20Assessing%20the%20cumulative%20impact%20of%20onshore%20wind%20energy%20developments.pdf

SNH (2015). *Scottish Natural Heritage TREND NOTE Trends of Bats in Scotland*. SNH and Bat Conservation Trust. Available online at: https://www.nature.scot/sites/default/files/A1759538%20-%20Trend%20Note%20024%20-%20Bats%20in%20Scotland%202015.pdf

SNH (2019). *Good Practice During Wind Farm Construction. Version 4, 2019*. Scottish Natural Heritage. Available online at: https://www.nature.scot/sites/default/files/2019-05/Guidance%20-%20Good%20Practice%20during%20wind%20farm%20construction.pdf

Southall BL, Bowles AE, Ellison WT, Finneran JJ, Gentry RL, Greene Jr CR, Kastak D, Miller JH, Nachigall PE, Richardson WJ, Thomas JA and Tyack PL (2007). *Marine mammal noise exposure criteria: initial scientific recommendations.* Aquatic Mammals 33:411–521. Available online at: https://tethys.pnnl.gov/publications/marine-mammal-noise-exposure-criteria-initial-scientific-recommendations

TfL (2016). *Silvertown Tunnel Appendix 10.C Underwater Noise Assessment.* April 2016, Mayor of London/Transport for London. Available online at: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010021/TR010021-000202-6.3%20ES%20Appendix%2010.C.pdf

Thompson D, Hall AJ, Lonergan M, McConnell B and Northridge S. (2013). *Current status of knowledge of effects of offshore renewable energy generation devices on marine mammals and research requirements*. Edinburgh: Scottish Government.

UK Government (1981). *The Wildlife and Countryside Act 1981*. Available online at: https://www.legislation.gov.uk/ukpga/1981/69

UK Government (1994). *The Conservation (Natural Habitats &c.) Regulations 1994*. Available online at: https://www.legislation.gov.uk/uksi/1994/2716/contents/made

UK Government (2010). *The Conservation of Habitats and Species Regulations 2010*. Available online at: https://www.legislation.gov.uk/uksi/2010/490/contents/made

Wilson SC (2011). *The impact of human disturbance at seal haul-outs. A literature review for the Seal Conservation Society*. Tara Seal Research. Available online at: https://www.pinnipeds.org/seal-information/human-interaction

Westcott SM (2008). *Natural England Research Report NERR017 Procedural guidelines for studying grey seals in southwest England, 2006.* Published on 24 September 2008. Available online at: http://publications.naturalengland.org.uk/file/59045

Wilson LJ and Hammond PS (2019). *The diet of harbour and grey seals around Britain: Examining the role of prey as a potential cause of harbour seal declines.* In *Aquatic Conserv: Mar Freshw Ecosyst*. 2019; 29(S1):71–85. Available online at: https://onlinelibrary.wiley.com/doi/full/10.1002/aqc.3131

This page is intentionally blank

9 Noise

Contents

9.1	Executive Summary	9-1
9.2	Introduction	9-1
9.3	Legislation, Policy and Guidelines	9-2
9.4	Consultation	9-10
9.5	Assessment Methodology and Significance Criteria	9-12
9.6	Baseline Conditions	9-25
9.7	Receptors Brought Forward for Assessment	9-30
9.8	Standard Mitigation	9-31
9.9	Likely Effects	9-31
9.10	Additional Mitigation and Enhancement	9-35
9.11	Residual Effects	9-35
9.12	Cumulative Assessment	9-36
9.13	Summary	9-38
9.14	References	9-41

This page is intentionally blank.

9 Noise

9.1 Executive Summary

9.1.1 This chapter considers potential noise effects associated with the construction and operation of the Proposed Development. No potential vibration effects have been identified and consideration of vibration has therefore been scoped out. Potential noise effects to ecological receptors arising from marine construction and piling operations are outside the scope of this chapter and are considered separately in Chapter 16 (Underwater Noise Assessment).

9.1.2 The assessment of noise comprised consultation with Orkney Islands Council (OIC) Environmental Health Department, characterisation of the baseline noise environment, prediction of noise levels associated with construction activities, construction traffic, operation of wind turbines and operation of other non-turbine fixed plant, and evaluation of predicted levels against derived criteria, taking into account potential cumulative effects.

9.1.3 Initial predictions to determine the extent of the 35 dB noise contour used to define the study area identified Noise Sensitive Receptors (NSRs) on the western side of Eday. NSRs on Westray were beyond the 35 dB contour and were scoped out of the assessment.

9.1.4 Noise effects from construction, including on-site activities and construction traffic, were found to be not significant. Noise effects from fixed non-turbine plant have been evaluated and determined to be not significant. Likely significant effects associated with operational wind turbine noise were identified at a small number of NSRs at 6 m/s and 7 m/s wind speeds associated with predicted noise levels marginally above derived noise limits.

9.1.5 The Applicant has committed to noise levels associated with operation of the Proposed Development meeting the development-specific noise limits to be agreed through the consenting process at all NSRs. Where necessary, and subject to final turbine selection, a noise management plan will be produced, identifying the curtailment to be enacted at wind speeds and directions at which predicted operational noise levels exceed the consented noise limits. The requirement to implement the noise management plan will be subject to the findings of compliance monitoring. Residual noise effects due to operation are therefore not significant.

9.2 Introduction

9.2.1 This chapter considers the potential noise effects of the Proposed Development on receptors sensitive to noise during the construction phase and the operational phase.

Scope of assessment

9.2.2 The scope of this assessment has comprised the following:

- scoping consultation with OIC Environmental Health Department;
- evaluation of noise effects associated with construction of the Proposed Development;
- evaluation of noise effects associated with operation of the Proposed Development in isolation;
- evaluation of noise effects associated with the operation of the Proposed Development cumulatively with other wind turbines in the study area;
- specification of appropriate mitigation, where necessary; and
- evaluation of residual effects.

9.2.3 Given the separation distances involved between sources and NSRs, vibration associated with construction and operation of the Proposed Development at the closest sensitive receptors will be negligible, therefore vibration has been scoped out of further assessment.

9.2.4 There will be negligible road traffic movements within the study area associated with the Proposed Development, therefore road traffic noise has been scoped out of this assessment.

9.3 Legislation, Policy and Guidelines

9.3.1 Details of relevant legislation, policy and guidelines that have been taken into consideration during the assessment are provided below.

Legislation

9.3.2 For a development of this nature, there is no specific all-encompassing legislation relating to the standards associated with noise emission/effects. Noise legislation, where it does exist, tends to be either EU-derived and focussed on specific items of noise-emitting plant or on more general nuisance, such as that addressed by the provisions of the Environmental Protection Act 1990 and Control of Pollution Act 1974 (UK Government, 1974).)

Environmental Protection Act 1990

9.3.3 Section 79 of the Act defines statutory nuisance with regard to noise and determines that local planning authorities have a duty to detect such nuisances in their area.

9.3.4 The Act also defines the concept of "Best Practicable Means" (BPM):

- 'practicable' means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications;
- the means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and structures;
- the test is to apply only so far as compatible with any duty imposed by law; and
- the test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances.

9.3.5 Section 80 of the Act provides local planning authorities with powers to serve an abatement notice requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence.

Control of Pollution Act 1974

9.3.6 Section 60 of the Act provides powers to Local Authority Officers to serve an abatement notice in respect of noise nuisance from construction works.

9.3.7 Section 61 provides a method by which a contractor can apply for 'prior consent' for construction activities before commencement of works. The 'prior consent' is agreed between the Local Authority and the contractor and may contain a range of agreed working conditions, noise limits and control measures designed to minimise or prevent the occurrence of noise nuisance from construction activities. Application for a 'prior consent' is a commonly used control measure in respect of potential noise impacts from major construction works.

9.3.8 In lieu of any specific legislation, assessing the effect of such a development during the construction, operational and decommissioning phases must draw on information from a variety of sources. Therefore, this assessment makes reference to a number of British Standards, official planning policy and advice notes and national guidance.

Planning Policy

Scottish Planning Policy

9.3.9 The latest Scottish Planning Policy (Scottish Government, 2014a) details policies relating to renewable energy. The SPP recognises the need to facilitate the transition to a low carbon economy

and supports the development of a diverse range of electricity generation from renewable energy sources, noting:

"*Development plans should seek to ensure an area's full potential for electricity and heat from renewable sources is achieved, in line with national climate change targets, giving due regard to relevant environmental, community and cumulative impact considerations.*"

9.3.10 The SPP provides guidance on where wind farms will and will not be acceptable, according to a spatial framework as follows:

- Group 1 – Areas where wind farms will not be acceptable, comprising National Parks and National Scenic Areas;
- Group 2 – Areas of significant protection where wind farms may be appropriate in some circumstances, with consideration required to demonstrate that any significant effects on the qualities of these areas can be substantially overcome by siting, design or other mitigation; and
- Group 3 – Areas with potential for wind farm development, where wind farms are likely to be acceptable, subject to detailed consideration against identified policy criteria, which may include noise.

Regional and Local Planning Policy

9.3.11 Local planning policy is discussed in Chapter 5 of this EIA Report.

Planning Advice Note 1/2011 Planning and Noise

9.3.12 Published in March 2011 and last updated in 2014, the Planning Advice Note (PAN) provides advice on the role of the planning system in helping to prevent and limit adverse effects of noise (Scottish Government, 2014b). Information and advice on noise assessment methods are provided in the accompanying Technical Advice Note (TAN): Assessment of Noise. Included within the PAN document and the accompanying TAN are details of the legislation, technical standards and codes of practice for specific noise issues.

9.3.13 With regard to noise from wind turbines, paragraph 29 of PAN 1/2011 states the following:

"There are two sources of noise from wind turbines – the mechanical noise from the turbines and the aerodynamic noise from the blades. Mechanical noise is related to engineering design. Aerodynamic noise varies with rotor design and wind speed, and is generally greatest at low speeds. Good acoustical design and siting of turbines is essential to minimise the potential to generate noise. Web based planning advice on renewable technologies for onshore wind turbines provides advice on 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97) published by the former Department of Trade and Industry (DTI) and the findings of the Salford University report into Aerodynamic Modulation of Wind Turbine Noise."

9.3.14 With regard to appropriate assessment methods, the 'web-based planning advice' referred to in PAN 1/2011 is contained in an online document entitled 'Onshore wind turbines', published by the Scottish Government (updated 2014). The document is summarised in the corresponding section below, and also refers to the use of ETSU-R-97 assessment guidance (discussed in paragraphs 9.3.21 to 9.3.34 below).

9.3.15 The accompanying TAN to PAN 1/2011 also refers to ETSU-R-97, including a summary of the associated assessment approach (Scottish Government, 2011b). The TAN points out that the ETSU-R-97 report presents a consensus view of a group of experts, who between them have a breadth and depth of experience in assessing and controlling the environmental impact of noise from wind farms.

9.3.16 With regards to the assessment and control of noise from construction sites the use of BS 5228: 2009 (Parts 1 and 2) is discussed. BS 5228 has been superseded by BS 5228 1:2009+A1:2014: *Code of practice for noise and vibration control on construction and open sites. Noise*. The standard is summarised in paragraphs 9.3.58 to 9.3.64.

9.3.17 Of relevance to the assessment of development generated road traffic noise, it is stated that a change of 3 dB(A) is the minimum perceptible under normal conditions, and that a change of 10 dB(A) corresponds roughly to a halving or doubling of the perceived loudness of a sound.

9.3.18 Neither PAN 1/2011 nor the associated TAN provide specific guidance on the assessment of noise from fixed plant, but the TAN includes an example assessment scenario for '*New noisy development (incl. commercial and recreation) affecting a noise sensitive building*', which is based on BS4142:1997: Method for rating industrial noise affecting mixed residential and industrial areas. This British Standard has been superseded by BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. The standard is summarised in paragraphs 9.3.48 to 9.3.54.

9.3.19 In summary, national planning policy on assessment of operational noise impacts from wind farms stipulates the use of the ETSU-R-97 assessment method and application of the Institute of Acoustics' Good Practice Guide (IoA GPG), whilst construction noise and vibration should be assessed with reference to BS 5228. These guidance documents, and others relevant to the assessment of possible noise and vibration impacts generated by the Proposed Development, are summarised below.

Guidance

9.3.20 Cognisance has been taken of the following guidance and best practice guidelines.

ETSU-R-97: The Assessment and Rating of Noise from Windfarms

9.3.21 As referenced for use in PAN 1/2011 and the online planning advice for renewable technologies: Onshore wind turbines, this document was written by a Noise Working Group including developers, noise consultants and environmental health officers, set up in 1995 by the Department of Trade and Industry through ETSU (the Energy Technology Support Unit).

9.3.22 ETSU presents a consensus view of the working group and was prepared to present a common approach to the assessment of noise from wind turbines. The document states that noise from wind turbines or wind farms should be assessed against site specific noise limits.

9.3.23 Noise limits are derived based on a series of acceptable lower limits and based on an allowable exceedance above the prevailing background noise level, including consideration to a variety of different prevailing wind speed conditions. The noise limits should be derived for external areas used for relaxation, or areas where a quiet noise environment is highly desirable. Separate limits are required for night-time and daytime periods. Night-time limits are derived drawing upon measured night-time background noise levels, whilst daytime limits are derived drawing upon the background noise levels arising during 'quiet daytime' periods.

9.3.24 Night-time is defined as the period between 23:00 and 07:00 hours, whilst quiet daytime periods are defined as 18:00 to 23:00 hours on all days, as well as 13:00 to 18:00 hours on Saturdays and Sundays, and 07:00 to 13:00 hours on Sundays.

9.3.25 For daytime, the suggested limits are 5 dB above the prevailing background noise level determined during quiet daytime periods, or 35 dB(A) to 40 dB(A), whichever is the higher. The absolute criterion between the 35 dB(A) to 40 dB(A) range is selected taking account of three factors:

- The number of dwellings in the neighbourhood of the wind farm;
- The effect of noise limits on the kilowatt hours (kWh) generated; and
- The duration and level of exposure (to noise).

9.3.26 No specific criteria are provided in ETSU for the evaluation of the above factors, however, and the Applicant is required to justify the application of the lower noise limit based on these factors.

9.3.27 During night-time, the suggested limits are 5 dB above the prevailing night-time background noise level or 43 dB(A), whichever is the higher. The absolute criterion for the night-time is higher than that for the daytime, as the derivation of this limit is based on preventing sleep disturbance within

a building whereas for the daytime, limits are based on occupation of external spaces used for relaxation.

9.3.28 It is required that the prevailing background noise levels be determined in terms of the $L_{A90,10min}$ noise index for both quiet daytime and night-time periods, for wind conditions ranging from 2 ms^{-1} to 12 ms^{-1}.

9.3.29 The noise limits are calculated by undertaking a regression analysis of the $L_{A90,10min}$ noise levels and the prevailing average wind speed for the same 10 minute period, when measured or determined at 10 m above ground at the location of the proposed turbines. The allowable limit is then defined at +5 dB above the average noise level at each wind speed (as defined by the regression analysis), or the absolute noise level lower limit, whichever is the higher (assuming no financial involvement within the scheme).

9.3.30 Where a property has a financial involvement in the scheme, the document allows a relaxation of the derived noise limits, stating that "*It is widely accepted that the level of disturbance or annoyance caused by a noise source is not only dependent upon the level and character of noise but also the receiver's attitude towards the noise source in general. If the residents at the noise-sensitive properties were financially involved in the project then higher noise limits will be appropriate'*. The guidance goes on to state that it is '*recommended that both the day and night-time lower fixed limits can be increased to 45 dB(A) and the consideration should be given to increasing the permissible margin above background where the occupier of the property has some financial involvement in the windfarm*". The amount by which the permissible margin above background can be relaxed is not specified, but the allowable relaxation to 45 dB(A) of the lower limits is an increase of (at least) 5 dB during the daytime and 2 dB during the night-time, so similar levels of relaxation might also be applied to the background related element of the noise level limits.

9.3.31 The ETSU guidance states that the derived limits should be applied to noise from the proposed wind farm or turbines in terms of the $L_{A90,T}$ index, and that the $L_{A90,T}$ of the wind farm noise is typically 1.5 dB to 2.5 dB less than the $L_{Aeq,T}$ measured over the same period.

9.3.32 The derived noise limits are applicable to both the aerodynamic (e.g. 'blade swish') and mechanical (e.g. generator related) components of wind farm noise.

9.3.33 Where noise from the wind farm is tonal, a correction of between 2 dB and 5 dB is to be applied to the wind farm noise. Guidance is provided on how to determine the level of correction required, but typically, for proposed developments, the need for any applicable correction is confirmed by the turbine manufacturers.

9.3.34 It is stated within this document that "*The Noise Working Group is of the opinion that absolute noise limits and margins above background should relate to the cumulative effect of all wind turbines in the area which contribute to the noise received at the properties in question. It is clearly unreasonable to suggest that, because a windfarm was constructed in the vicinity in the past which resulted in increased noise levels at some properties, that residents of those properties are now able to tolerate still higher noise levels. The existing windfarm should not be considered as part of the prevailing background noise*". Accordingly, where an existing wind farm contributes to the prevailing background noise levels, it is necessary to either include for the contribution of this wind farm when comparing against the allowable noise limit, or correct for this contribution when deriving a limit applicable to the proposed development acting alone.

Good Practice Guide to the Application of ETSU-R-97

9.3.35 The IoA GPG presents the report of a 'noise working group' (NWG) assembled in response to a request from the former Department of Energy & Climate Change (DECC). The guide is intended to represent current good practice in applying the ETSU-R-97 method to assessing the noise impact of wind turbine developments with a power rating of over 50 kW.

9.3.36 In addition to detailed consideration of various issues and factors concerned with current 'state of the art' knowledge of UK wind turbine noise assessment, a series of 'summary boxes' (SBs) highlighting key guidance points are included.

9.3.37 The SBs provide clarification and updated guidance on a range of matters relating to ETSU R-97 noise assessments, including consultation with relevant stakeholders, background noise survey methodology, noise survey data analysis, derivation of noise limits, noise prediction model input data, algorithms and parameters, cumulative impact assessment procedures, assessment reporting, planning conditions and amplitude modulation.

9.3.38 The detail of the IoA GPG has been considered in the preparation of this assessment. Some of the key considerations relevant to this assessment are summarised as follows:

- Background noise surveys should be carried out for sufficient duration to obtain a suitably-sized dataset; as a guideline, it is suggested that no fewer than 200 data points be obtained within each of the night-time and amenity hour periods for a given survey location, with no fewer than five data points within each contiguous wind speed integer interval. Where the data have been filtered by wind direction the guideline values are reduced.
- Background noise survey data should be analysed and anomalous periods of noise removed from the dataset; anomalous noise might include rain-affected periods and increased noise from water courses following rainfall, seasonal effects such as early-morning birdsong ('dawn chorus'), atypical traffic movements and other unusual noise sources affecting measured levels.
- Due to the potential for non-standard site-specific wind shear (i.e. differences in wind speed at different heights above the ground – a 'standard' profile increases logarithmically with height) background noise levels should be correlated with 10 m height wind speeds derived using a method that 'standardises' the wind speeds using the assumed shear profile. Since wind turbine sound power levels are determined using the same shear profile, this procedure ensures a link between the predicted sound levels at a given hub height wind speed and the background noise levels at receptors near the ground under the same wind speed conditions (obtained using the 'standardised' 10 m height wind speed).
- Derivation of the prevailing background noise levels should be carried out using polynomial regression analysis, of order one to four, depending on the nature of the noise environment. The regression curve used should reach minimum and maximum values at the lowest and highest wind speeds for which the dataset is valid, respectively.
- Calculations of predicted wind turbine noise may be carried out using ISO 9613-2: *Acoustics – Attenuation of Sound during Propagation Outdoors* (International Organization for Standardization, 1996); preferred receptor heights, meteorological and ground absorption input parameters for this calculation procedure are given.
- Turbine sound power level source data should include appropriate uncertainty corrections. Guidance is given for determining when such uncertainty corrections have been inherently included in turbine source emission data.
- A correction for topographic screening of a maximum -2 dB may be applied where there is no line of sight between the turbine (tip) and the receptor (4 m above ground level).
- A correction for constructive reflection within valleys of +3 dB should apply where concave topography is determined to lie between the turbine and the receptor point.
- 'Excess amplitude modulation' (i.e. where the wind turbine noise has higher variability with momentary time than the 2 dB(A) – 3 dB(A) considered within ETSU-R-97) is still the subject of research; current practice (at the time of publishing of the IoA GPG) in relation to determining applications for wind turbine developments is to not impose a planning condition specific to this phenomenon.

9.3.39 In addition to the above, the IoA GPG confirms that the ETSU-R-97 noise level limits should be applied cumulatively and provides guidance on appropriate assessment methods for a variety of different cumulative scenarios. These scenarios include '*concurrent applications*', '*existing wind farm consented with less than total ETSU-R-97 limits*', '*existing wind farm/s consented to the total ETSU-R-97 limits currently operating'*, and '*permitted wind farms consented to total ETSU-R-97 limits but not yet constructed*'.

9.3.40 This guidance in relation to cumulative effects is relevant to the assessment of noise from the Proposed Development because it is proposed in the vicinity of a number of other operational wind turbines.

9.3.41 In the section titled '*existing windfarm/s, consented to the total ETSU-R-97 limits, currently operating*' it is stated that "*In the first instance, the consented noise limits should be used within the cumulative noise impact calculations unless otherwise agreed with the local authority. Provided the sum of the noise limits derived for the proposed site when added to those already consented for the operational sites does not exceed the limits that would otherwise be within the requirements of ETSU-R-97 for the cumulative impact, then the noise limits derived for the proposed site can be applied directly*".

9.3.42 In practical terms this can be achieved by ensuring that the noise limit for the Proposed Development is set 10 dB or more below that permitted to be generated by the existing development. In most cases this approach will result in a highly restrictive noise limit.

9.3.43 It is, however, then discussed that this may not always be necessary, e.g. where there is a '*controlling property*', whereby compliance with the noise limit at that controlling property would result in noise levels never realising the noise level limit 'in full' at another property (e.g. because the second property is further removed from the existing development), thereby leaving a proportion of the limits available for use at the second property by the subsequently proposed development. Additionally, this can apply where there is no realistic prospect of the existing wind farm producing noise levels up to the consented limit, again thereby leaving a proportion of the limit available for the subsequently proposed development.

9.3.44 In the section entitled '*concurrent applications*' it is stated that where there are no pre-existing wind farms, this scenario permits the apportionment of the ETSU-R-97 limits between the concurrent developments, i.e. each of the developments could be subject to noise limits below the full ETSU-R-97 guidance, such that even if the individual limits applied to each development were utilised 'in full', the combined effect would be that the ETSU-R-97 guidance would not be exceeded cumulatively.

9.3.45 A method is provided for determining the effect of directivity, such that reductions attributable to individual turbines at specific receptors may be determined for when the receptor is under cross-wind or up-wind orientation with respect to the turbine.

9.3.46 A set of supplementary guidance notes (SGNs) also form part of the IoA GPG and include further specific detail for different technical areas. SGN6 addresses prediction of noise via propagation over water and provides the following equation to calculate noise levels at receptors when water accounts for more than 700 m of the distance between source and receptor:

$$L = Ls - 20.Log(r) - 11 + 3 - \Delta La + 10.Log(\frac{r}{700})$$

9.3.47 Where:

- L = L_{A90} sound pressure (noise) level at receptor location
- Ls = sound power level of turbine
- ΔLa = integrated frequency-dependent absorption coefficient, which is a function of r
- r = distance from turbine hub to the receptor location

BS4142:2014+A1:2019 – Methods for rating and assessing industrial and commercial sound

9.3.48 BS4142 is applicable for use in the assessment of control building / substation and transformer noise. It sets out a method for rating and assessing sound of an industrial and/or commercial nature, including "*sound from fixed installations which comprise mechanical and electrical plant and equipment*".

9.3.49 The assessment procedure contained within BS4142 requires that initially the 'rating level' ($L_{Ar,Tr}$) that is (or would be) generated by the source under assessment is determined, externally, at the assessment location. Where this source does not include any acoustic features, such as tonality, impulsivity or intermittency etc., then the rating level ($L_{Ar,Tr}$) equals the specific sound level (L_s), which is the sound pressure level produced by the source using the $L_{Aeq,T}$ noise index. Where the source under assessment does include acoustic characteristics, then a series of corrections are added to the specific sound level to determine the rating level. The degree of correction applied to determine the rating level depends upon the results of either subjective or objective appraisals.

9.3.50 The background sound level at the assessment location, measured using the $L_{A90,T}$ index, is then subtracted from the rating level. The result provides an indication of the magnitude of impact, where the greater the difference, the greater the magnitude of impact.

9.3.51 The following guidance is presented regarding the difference between the rating and background levels:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

9.3.52 It can be seen from the above that the degree of impact is also dependent upon the context in which the sound arises. Factors that are considered with respect to context include: the absolute level of sound, and the character and level of the residual sound (that in absence of the source under assessment) compared to the character and level of the specific sound.

9.3.53 With regard to the absolute level, it is stated, amongst other points, that *"where background sound levels and rating levels are low, absolute levels might be as, or more relevant than the margin by which the rating level exceeds the background. This is especially true at night".*

9.3.54 The 1997 version of BS4142 stated that rating levels below 35 dB and background noise levels below 30 dB(A) were considered to be "*very low*".

Design Manual for Roads and Bridges (DMRB)

9.3.55 DMRB (Highways England, 2020) provides standards and advice regarding the assessment, design and operation of roads in the UK. DMRB provides screening criteria, by which percentage changes in traffic flow can be related to a predicted change in road traffic noise and vibration. The guidance also provides significance criteria, by which the percentage of people adversely affected by traffic noise can be related to the total noise or vibration level due to road traffic, or the increase over an existing level.

9.3.56 Previous iterations of DMRB provided screening criteria whereby a change in noise level of 1 $dBL_{A10,18hr}$ is equivalent to a 25% increase or 20% decrease in traffic flow, and a change in noise level of 3 $dBL_{A10,18hr}$ is equivalent to a 100% increase or 50% decrease in traffic flow.

9.3.57 The threshold criteria used for traffic noise assessment during the daytime is a permanent change in magnitude of 1 dB $L_{A10,18hr}$ in the short term (i.e. on opening) or a 3 dB $L_{A10,18hr}$ change in the long term (typically 15 years after project opening). For night time noise impacts, the threshold criterion

of a 3 dB $L_{night,outside}$ noise change in the long term should also apply but only where an $L_{night,outside}$ greater than 55 dB is predicted in any scenario.

BS5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites – Part 1 (noise) and Part 2 (vibration)

9.3.58 Part 1 of the standard sets out techniques to predict the likely noise effects from construction works, based on detailed information on the type and number of plant items being used, their location and the length of time they are in operation.

9.3.59 The noise prediction methods can be used to establish likely noise levels in terms of the $L_{Aeq,T}$ over the core working day. This standard also documents a database of information, including previously measured sound pressure level data for a variety of different construction plant undertaking various common activities.

9.3.60 Three example methods are presented for determining the significance of construction noise impacts. In summary, these methods adopt either a series of fixed noise level limits, are concerned with ambient noise level changes as a result of the construction operations or a combination of the two.

9.3.61 With respect to absolute fixed noise limits, those detailed within *Advisory Leaflet 72: 1976: Noise control on building sites* are presented. These limits are presented according to the nature of the surrounding environment, for a 12-hour working day. The presented limits are:

- 70 dB(A) in rural, suburban and urban areas away from main road traffic and industrial noise; and
- 75 dB(A) in urban areas near main roads and heavy industrial areas.

9.3.62 The above noise level limits are applicable at the façade of the receptor in question (not free-field).

9.3.63 The standard goes on to provide methods for determining the significance of construction noise levels by considering the change in the ambient noise level that would arise as a result of the construction operations. Two example assessment methods are presented, these are the 'ABC method' as summarised within Table 9.1 and the '5 dB(A) change' method as described in paragraph 9.3.64.

Table 9.1 – Example threshold of potential significant effect at dwellings (construction noise) – ABC method

Assessment Category and Threshold Value Period	Threshold Value, in Decibels (dB) ($L_{Aeq,T}$)		
	Category (A)	Category (B)	Category (C)
Night-time (23:00 – 07:00)	45	50	55
Evenings and weekends (D)	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
NOTE 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. *NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.* *NOTE 3: Applied to residential receptors only*			
A) Category A: threshold values to use when ambient levels (when rounded to the nearest 5 dB) are less than these values. *B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values.* *C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values.* *D) 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays*			

9.3.64 With respect to the '5 dB(A) change' method, the guidance states:

"Noise levels generated by construction activities are deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB L_{Aeq}, from construction noise alone, for the daytime, evening and night-time periods, respectively; and a duration of one month or more, unless works of a shorter duration are likely to result in significant impact."

9.4 Consultation

9.4.1 Table 9.2 provides details of consultations undertaken with relevant regulatory bodies, together with action undertaken by the Applicant in response to consultation feedback. Copies of relevant consultation correspondence are included in Appendix 9.1.

Table 9.2 – Consultation undertaken

Consultation sent	Consultation response	Applicant action
8th August 2018 Orkney Islands Council Scoping Opinion (refer to Appendix 4.2)	Proposed location on an uninhabited island means noise and vibration impacts are unlikely to cause significant concern to human receptors. Environmental Health required the use of ETSU-R-97 (including Institute of Acoustics GPG/SGN) based methodology and general approach. OIC Environmental Health note that the propagation of noise between turbines and noise sensitive receptors will predominately be over water, as such the developer should have due regard to 'IoA SGN 6: Noise propagation over water for on-shore Wind Turbines'.	Accepted comments and agreed approach
28th February 2020 Email to Environmental Health Department at OIC. Proposed baseline survey locations on Eday and Westray and set out proposed approach to assessment	**2nd March 2020** Noted that baseline measurements on Westray may not be required if predicted levels below 35 dB at receptor locations Accepted proposed monitoring locations and specified that two rain gauges would be required, given the geographical separation of monitoring positions on Eday and Westray Noted other potential noise sources on Eday which should be considered when reporting baseline conditions.	Accepted comments and agreed approach
22nd January 2021 Email to Environmental Health Department at OIC. Provided details of approach to apportionment of cumulative noise limits, including calculation detail for comment	**31st March 2021** Agreed approach to derivation of noise limits is acceptable/appropriate – caveated that detailed checking of the arithmetic not yet completed.	Accepted comments and agreed approach

Consultation sent	Consultation response	Applicant action
7th August 2020 Email to Environmental Health Department at OIC. Proposed revised baseline survey locations following response from residents to requests to site monitoring equipment on Eday, scoped out monitoring on Westray and set out proposed approach to treatment of baseline data	**7th August 2020** Accepted monitoring locations and outline approach	Accepted comments and agreed approach

9.5 Assessment Methodology and Significance Criteria

Consultation

9.5.1 Details of consultation with OIC are provided in Section 9.4.

Study Area

9.5.2 The study area for this assessment has been informed by maps and aerial images of the Proposed Development site and its surroundings, as well as site visits undertaken during the baseline noise survey. A sample of the closest, and therefore potentially worst-affected, NSRs to the Proposed Development have been identified and adopted for the evaluation of noise impacts. These have been selected to represent a geographic spread across the local area, including those located between the Proposed Development and the considered cumulative developments. NSRs at which noise limits have been set for cumulative developments have been identified for the evaluation of potential cumulative effects. NSRs identified are either single dwellings or representative of a group or cluster of dwellings.

9.5.3 Determination of the study area for a wind farm typically requires that the 35 dBL_{A90} noise contour is predicted, and NSRs which lie beyond the contour are assumed to meet the most stringent ETSU noise limit, and are therefore scoped out and discounted from further consideration. NSRs which are identified within the 35 dBL_{A90} noise contour are scoped in, and noise impacts are assessed further.

9.5.4 The 35 dBL_{A90} operational noise contour for the Proposed Development in isolation (i.e. without cumulative developments) at the wind speed at which the proposed turbines generate their maximum sound power level, is shown in Figure 9.1. The contour relies on predictions in accordance with ISO9613 over an acoustically reflective surface (representative of water), rather than the propagation over water method provided in SGN6 the IoA GPG and has therefore been used as a screening tool only.

9.5.5 The 35 dB contour in Figure 9.1 demonstrates that predicted noise levels are below 35 dB at all NSRs. The NSRs considered in this assessment lie outside the 35 dBL_{A90} noise contour but are included to account for potential cumulative effects and the more conservative prediction method provided in the IoA GPG SGN6. The representative NSRs considered in the assessment are listed in Table 9.3.

Table 9.3 – Identified representative NSRs

NSR name	NSR ID	Grid reference (OSGB)	
		X	Y
Crowber	NSR1	355216	1037385
Lesshamar	NSR2	355146	1037057
North Guith	NSR3	354993	1036574
Mid Guith	NSR4	355265	1036568
Benstonhall	NSR5	355369	1036359
Bredakirk	NSR6	355497	1036256
Shoehall	NSR7	355623	1036225
Newark	NSR8	355815	1036031
Fers Ness	NSR9	353042	1033772
High Hill	NSR10	354005	1033336

9.5.6 The island of Westray lies to the north-west of Faray and the Proposed Development. All potential NSRs on Westray are outside the preliminary 35 dB contour, and a supplementary calculation undertaken in accordance with the IoA GPG SGN6 confirmed that predicted worst-case noise levels at the closest NSR on Westray to the Proposed Development will not exceed 32.6 dBL_{A90}. As such, the Proposed Development will meet the simplified ETSU 35 dB noise limit at all NSRs on Westray.

9.5.7 As noted in Table 9.2, this was confirmed with OIC's EHO, and they confirmed that no baseline monitoring was therefore required on Westray, and that noise limits applicable to the Proposed Development at Westray NSRs would be the 'flat' simplified ETSU 35 dB noise limit. Further evaluation of potential noise effects at Westray NSRs has therefore been scoped out of this assessment.

Baseline Noise Survey

9.5.8 A baseline survey was undertaken at two locations to characterise baseline noise levels at representative NSRs within the study area. The noise monitoring positions (NMPs) used are provided in Table 9.4 and shown on Figure 9.2.

Table 9.4 – Baseline noise monitoring positions

NMP name	NSR ID	Grid reference (OSGB)	
		X	Y
Shoehall	NMP1	355650	1036251
Fers Ness	NMP2	353070	1033775

9.5.9 The baseline survey was completed over the period 18th August to 29th September 2020.

9.5.10 The sound level meters (SLMs) used were compliant with Class 1 specification, as described in BS EN 61672-1:2003. The calibration of the SLMs was checked in the field before and after each measurement and no significant drift in calibration was noted. The SLMs and the calibrator used were within their accredited laboratory calibration period of two years and one year, respectively. Calibration certificates for the SLMs and calibrator are provided in Appendix 9.2.

9.5.11 The SLMs were installed at the monitoring positions each with a microphone at a height of approximately 1.5 m above ground in a free-field location, i.e. at least 3.5 m from any vertical sound reflective surfaces. The microphones were fitted with double-skin outdoor wind shields with a minimum 200 mm diameter.

9.5.12 There is an existing small turbine at Fers Ness, and the monitoring location at Shoehall is within 350 m of two small turbines; one at Bredakirk and one at Newark. When micro-siting the noise monitoring positions, consideration was given to making use of screening by buildings, such that noise from existing turbines at the NMPs was minimised. The treatment of baseline data to account for the noise contribution of existing turbines is discussed in para. 9.5.17 - 9.5.38. The locations of the existing turbines are shown in Figure 9.2.

9.5.13 The monitoring locations are described as follows:

- NMP1 Shoehall – SLM installed within the curtilage of a steading, in a paddock to the north of the property. The SLM was sited more than 3.5 m from any façades, and the house and its associated outbuildings were used to provide screening to noise from the closest existing turbine, sited at Bredakirk. There was line of sight from the NMP to the more distant turbine at Newark. A rain gauge was installed adjacent to the SLM. Weather conditions during installation were dry, foggy, with moderate wind speeds. The NMP was down-wind of the Bredakirk turbine during the installation, and the turbine was audible at nearby locations, but as a result of the screening provided by the steading it was inaudible at the NMP.
- NMP2 Fers Ness – SLM installed within a paddock immediately to the south of the farmhouse, positioned such that the SLM is at least 3.5 m away from any facades and protected from livestock. Weather conditions during installation were dry, foggy, with moderate wind speeds. The SLM was sited such that the steading and associated barns provided screening to noise from the single turbine to the north of the farm. The turbine was not audible at the monitoring position during the site visit.

9.5.14 Full details of the monitoring locations and photographs of the equipment in-situ are provided in Appendix 9.3.

9.5.15 With reference to Figure 9.2, NMP1 has been used to represent baseline noise levels at NSR1 – NSR8, and NMP2 has been used to represent baseline noise levels at NSR9 and NSR10.

9.5.16 Wind speed data was gathered using a Lidar device, sited on Faray close to the centre of the island (refer to Figure 9.2). Wind speeds were measured at multiple heights above the local ground level of 25 m, including at the candidate turbine hub height of 80 m.

Derivation of Representative Background Noise Levels

9.5.17 There are numerous small turbines on Eday, and exclusion of noise from these turbines from the measured baseline noise levels was necessary to derive a representative background noise level for the setting of appropriate noise limits. The baseline data has therefore been corrected by screening, and screened levels have been compared with predicted noise levels for the existing small turbines. The processes followed to derive a background level which excludes noise from existing turbines is described below.

9.5.18 Measured wind-speed data required to be ‘cleaned’ before further evaluation of baseline data was undertaken. The LIDAR device recorded erroneous data during poor visibility weather conditions, and also suffered occasional power outages during the measurement campaign. Following data cleaning the total number of datapoints met the minimum requirements of the IoA GPG.

9.5.19 Turbines with the potential to influence noise levels in the vicinity of the monitoring locations were identified using OIC’s planning portal and, where possible, confirmed visually during the commissioning and decommissioning visits. Details of the turbines, including their sound power levels and coordinates were also obtained from the planning portal.

9.5.20 Wind turbines are directional noise sources and the IoA GPG provides a method whereby the reduction attributable to the sound pressure level at a given location can be determined for situations where a receptor is in cross-wind to up-wind orientation to turbines. The scale of reduction is dependent on the proximity of the turbine to the receptor location, determined using a ratio of the tip height of the turbine to separation distance between the turbine and receptor. Both NMP1 and NMP2 were located such that the separation distance to tip height ratio was 12 or greater, at which the applicable reduction to turbine noise in up-wind conditions is approximately 9 dB[1].

9.5.21 To minimise the effect of noise from existing turbines, baseline data was screened to exclude wind directions when the NMPs were down-wind of the turbines. The identified turbines and the wind directions excluded are shown in Figure 9.3. With reference to Figure 9.3, NMP1 is potentially affected by noise from turbines at Bredakirk to the south-west and Newark to the south-east. Baseline data from NMP1 was split between down-wind conditions, collected under wind directions 35° - 340° and up-wind conditions, collected under wind directions 340° – 35°.

9.5.22 NMP2 is potentially affected by noise from a single turbine at Fers Ness to the north of the NMP. Baseline data from NMP2 was split between down-wind conditions, collected under wind directions 270° - 90° and up-wind conditions, collected under wind directions 90° – 270°.

9.5.23 The background noise level under up-wind conditions and down-wind conditions were then compared to determine the potential contribution of wind turbines. Charts showing the comparison are provided in Appendix 9.4. The charts show background noise relative to the measured 10 m height wind speed[2], therefore are not directly comparable to the ETSU derived noise limits which use hub height wind speeds corrected to 10m.

NMP1

9.5.24 With reference to Figure 9.2, when NMP1 was down-wind of the existing turbines it was also down-wind of the sea, but also received screening of noise and wind by the buildings of Shoehall. Conversely, when NMP1 was up-wind of the turbines it received no screening from the buildings and was therefore exposed to the wind. When the NMP would be expected to receive the most noise from the sea, it also received maximum screening by the buildings.

9.5.25 With reference to Chart 9.1 in Appendix 9.4, the daytime background noise level at NMP1 showed a difference of up to 3 dB between up-wind and down-wind conditions. Chart 9.2 shows the night-time period, for which there are more datapoints at lower wind speeds than during the daytime. In Chart 9.2 a difference of up to 5 dB between up-wind and down-wind conditions is evident at wind speeds of 5 – 7 m/s. The difference is primarily attributed to wave noise.

9.5.26 NSRs for which baseline data collected at NMP1 is a proxy will only ever be down-wind of the Proposed Development and the sea simultaneously, therefore exclusion of conditions when the NMP was down-wind of the sea is a highly robust measure to defining representative background noise levels.

NMP2

9.5.27 With reference to Figure 9.2, NMP2 lies on a peninsula and was therefore down-wind of the sea under most wind directions. NMP2 was screened from noise and wind by the buildings of Fers Ness under northerly wind directions, when the NMP was down-wind of the turbine. When the NMP would be expected to receive the most noise from the turbine, it also received maximum screening by the buildings.

9.5.28 With reference to Chart 9.3 in Appendix 9.4, the daytime background noise level at NMP2 showed little difference between up-wind and down-wind conditions. During the night-time period

---

[1] IoA GPG Figure 6 a) – assumed relationship of change of noise levels with wind direction, flat landscapes.

[2] Measured 10 m height wind speed given that that existing turbines have hub heights of 15 m – 17.8.

(Chart 9.4 in Appendix 9.4), where there are more datapoints at lower wind speeds, a difference of up to 5 dB is evident at wind speeds of 4 - 8 m/s.

Findings of Screening Process

9.5.29 Both NMPs were positioned such that buildings would provide maximum screening to turbine noise under down-wind conditions. Comparison between background noise levels showed a difference of up to 5 dB between up-wind and down-wind conditions, with the greatest difference at wind speeds of approximately 4 m/s – 8 m/s.

Verification by Prediction

9.5.30 The potential contribution of the small turbines to measured background noise levels was determined using the following process:

- Using details for existing turbines obtained from the OIC planning portal, a noise model was constructed within CadnaA noise prediction software.
- Noise levels arising due to the small turbines during down-wind (i.e. worst case) conditions were predicted at the NMPs. The effect of screening by the closest buildings was included within the noise model, based on the surveyor's observations of the audibility of turbines at the monitoring locations.
- The predicted level due to the turbines was then logarithmically subtracted from the derived background noise level under down-wind conditions (i.e. when the contribution from the turbines was at a maximum) to derive a 'corrected background level', with the contribution of the turbines removed.
- The potential contribution of the small turbines to background noise levels was then determined by subtraction of the corrected background noise level from the derived un-corrected level.

9.5.31 The results of the process are provided in Appendix 9.5. At NMP2 the potential contribution of the small turbines to the background level was determined to be less than 0.5 dB across the range of wind speeds (up to 10 m/s), both during the daytime and the night-time. This is considered to be within the range of prediction and measurement error, and no further correction has been made to background noise levels.

9.5.32 At NMP1 the potential contribution of the small turbines to the background level was determined to be less than 0.5 dB across the range of wind speeds (up to 10 m/s) during the night-time period. Accordingly, no further correction has been made to background noise levels.

9.5.33 At NMP1 during the daytime period, the potential contribution of small turbines to the background level ranged from 0.6 dB at 8 m/s and 9 m/s, up to a maximum of 4.5 dB at 12 m/s. In the mid wind speeds of 6 – 10 m/s the difference was ≤1 dB and is considered to be within the range of prediction and measurement error, and no further correction has been made to background noise levels.

9.5.34 At low wind speeds of 4 and 5 m/s the potential contribution of small turbines to measured levels was 1.4 dB and 1.3 dB, respectively. The measured background level at these wind speeds was substantially below the daytime Fixed Minimum Limit of 35 dB, and any correction would result in no change to the overall noise limit.

9.5.35 No correction has been made at wind speeds of 11 m/s and above, as the larger differences at these wind speeds are attributed to the smaller number of datapoints captured at higher wind speeds and the nature of the sound power data for the small turbines, which is quoted as a single value at 8 m/s, and a rate of change per 1 m/s wind speed above and below this value.

9.5.36 Given the remote, rural nature of the study area and the low prevalence of non-turbine anthropogenic noise, this assessment considers that the contribution of the existing turbines to background noise levels may be most accurately determined by reference to the night-time period,

where there were more datapoints captured and trends are therefore more clearly evident. At both NMP1 and NMP2, the contribution has therefore been determined to be negligible.

9.5.37 On the basis of the above, no corrections have been applied to standardised 10 m wind speed data collected under up-wind conditions in the derivation of the representative background noise level.

Corrections applied to baseline data

9.5.38 The directional filters described above have been applied to baseline data derived from hub height wind speeds to 10 m to determine the representative background noise level. The results of this analysis are provided in Section 9.6.

Construction Phase Noise

On-site Construction Activities; Method of Prediction

9.5.39 A detailed breakdown of the construction schedule and plant for the Proposed Development is not yet available. Drawing on experience of previous wind farm development, and preliminary information available, the following assumptions have been made in the prediction of construction noise:

Working hours

9.5.40 The proposed hours of operation for the construction phase are 07:00 – 20:00, 7 days a week.

Construction plant:

Site origination

- 4 x 7.5T excavators (BS 5228 Table C2, Item 8)
- 4 x tractors and trailers (BS 5228 Table C4, Item 75)

Slipway works

- 1 x barge-mounted piling rig for sheet pile (BS 5228 Table C3, Item 2)
- 1 x 35T excavator (BS 5228 Table C3, Item 23)
- 1 x concrete pump (BS 5228 Table C4, Item 26)
- 1 x cement truck (BS 5228 Table C4, Item 21)

Access tracks and turbine hardstandings

- 1 x 32T excavator (BS 5228 Table C2, Item 15)
- 3 x 7T dump trucks (BS 5228 Table C4, Item 3)
- 1 x 18T roller (BS 5228 Table C2, Item 38)

Turbine bases and borrow pits

- 1 x concrete batching plant (BS 5228 Table C4, Item 22)
- 1 x hydraulic breaker (BS 5228 Table C1, Item 9)
- 1 x 32T excavator (BS 5228 Table C2, Item 15)
- 1 x 7.5T excavator (BS 5228 Table C2, Item 8)
- 1 x concrete pump (BS 5228 Table C3, Item 26)
- 1 x cement truck (BS 5228 Table C4, Item 20

Turbine installation

- 1 x 400T crane (BS 5228 Table C4, Item 38)
- 1 x road wagon (BS 5228 Table C11, Item 4)

Other assumptions

- all plant has been assumed to operate continuously (100 % utilisation) throughout the working hours;
- all plant has been placed at the closest distance of approach of each construction activity to the closest NSR, within the area of proposed construction activity;
- noise levels have been predicted in accordance with the BS 5228 prediction method;
- Ground absorption of G=0, representative of an acoustically reflective surface has been assumed for all areas of water, G=1 for all areas of land; and
- construction plant has been assumed to have an effective height of 2 m above local ground level.

9.5.41 The closest NSR to the assumed worst-case construction activities is NSR3 North Guith. Noise levels, and therefore the magnitude of impacts associated with construction activities, will be lesser at NSRs further from the Proposed Development, therefore noise impacts associated with the construction phase have been evaluated using predicted levels at NSR3.

Derivation of Construction Phase Noise Limits

9.5.42 The predicted site preparation / construction noise levels have been assessed based on noise level criteria determined following a worst-case interpretation of the guidance contained within BS5228. As detailed within Section 9.3, BS5228 details three example methods for determining the significance of potential construction noise impacts. With regard to the presented absolute noise level criteria (example method 1), following a worst-case approach, the lowest absolute noise level criterion for the daytime period (07:00 to 19:00) is 70 dB(A) façade, (equivalent to 67 dB(A) free field), which is stated to apply in rural areas.

9.5.43 Following the ABC assessment method, and noting the low levels of ambient noise, the most stringent assessment criterion (Category A) applies during the daytime, evening and night-time periods (refer to Table 9.1).

9.5.44 Criteria have been derived drawing on the above and are provided in Table 9.8 within the Impact Magnitude section.

Operational Phase Noise

General Method of Prediction

9.5.45 Given that the island of Faray is uninhabited, and the surface between turbines and NSRs is predominantly water, all predictions have been undertaken using the prediction method provided in the IoA GPG SGN6 (refer to para. 9.3.46 - 9.3.47).

9.5.46 SGN6 of the IoA GPG does not specify how the sound power level of the turbine should be treated with regard to derivation to 10 m or uncertainty, therefore this assessment assumes that both of these aspects should be undertaken, in accordance with the wider application of the IoA GPG method.

9.5.47 With reference to 9.3.47 the ΔLa corrections were obtained from ISO9613 for an air temperature of 10°C and relative humidity of 70%.

9.5.48 Given the generally flat-lying topography of Faray and the extent of water between the turbines and NSRs, no corrections for concave topography or topographic screening apply.

Proposed Development

9.5.49 The Proposed Development comprises six turbines. This noise assessment is based on the Vestas V136 candidate turbine, which has a hub height of 80 m and a serrated trailing edge of the turbine blades to reduce noise. The source noise terms of the Vestas V136 have been provided by Vestas as 1/3 octave band data, quoted as sound power levels over a range of operational hub-height wind speeds. This may not be the final turbine chosen for the Proposed Development, but the Applicant will ensure any change in turbine meets the noise levels detailed within this assessment.

9.5.50 The 1/3 octave band data has been accumulated into octave-band data and standardised to 10 m height wind speeds, and an appropriate uncertainty correction of 2 dB has been applied to the sound power levels in accordance with the requirements of the IoA GPG. The resultant source noise terms for the Vestas V136 are provided in Table 9.5.

Table 9.5 – Sound power levels of the Vestas V136

Wind speed, m/s	Sound power level standardised to 10 m height wind speed, dB(A)
3	93.4
4	96.7
5	101.5
6	105.3
7	105.9
8	105.9
9	105.9
10	105.9
11	105.9
12	105.9

9.5.51 The Vestas V136 operates at its maximum sound power level at wind speeds of 7 m/s and above.

9.5.52 Octave-band data for the turbine at height of 10 m for a wind speed of 9 m/s is provided for reference in Table 9.6.

Table 9.6 – Octave band sound power levels at 9 m/s wind speed

Octave band centre frequency, Hz	31.5	63	125	250	500	1000	2000	4000	8000
Sound power level, dB(A)	76.2	86.8	94.5	99.2	101.0	99.9	95.8	88.9	78.8

9.5.53 The proposed turbine layout is shown in Figure 9.1.

Cumulative Noise

Identification of Cumulative Developments

9.5.54 A review was undertaken of existing and proposed wind energy developments in the vicinity of the site, using information available on the OIC planning portal and in consultation with Environmental Health. This review has been completed to identify those developments which have the potential

to give rise to a cumulative noise impact when operating simultaneously with the Proposed Development. The results of this desk-based review have been used to inform the assessment of operational turbine noise. The identified cumulative developments are as follows:

- Newark Wind Turbine
  - Planning reference 11/727/TPP
  - Evance R9000
  - Height 15 m
  - Operational
  - Noise limits – simplified ETSU: 35 $dBL_{A90,10min}$ at the nearest noise sensitive property
- Bredakirk Wind Turbine
  - Planning reference 13/430/TPP
  - Evance R9000
  - Height 17.8 m
  - Operational
  - Noise limits – simplified ETSU: 35 $dBL_{A90,10min}$ at the nearest noise sensitive property
- Fers Ness Wind Turbine
  - Planning reference 11/487/TPP
  - Evance R9000
  - Height 15 m
  - Operational
  - Noise limits – simplified ETSU: 35 $dBL_{A90,10min}$ at the nearest noise sensitive property
- Heritage Centre Wind Turbine
  - Planning reference 07/583/PPF
  - 6 kW
  - Height 15 m
  - Operational
  - Noise limits – simplified ETSU: 35 $dBL_{A90,10min}$ at the nearest noise sensitive property
- New Brimbanks Wind Turbine
  - Planning reference 13/422/TPP
  - Evance R9000
  - Height 17.8 m
  - Operational
  - Noise limits – simplified ETSU: 35 $dBL_{A90,10min}$ at the nearest noise sensitive property
- South House Wind Turbines
  - Planning reference 11/694/TPP

- Evance R9000
- Height 18 m
- Operational
- Noise limits – simplified ETSU: 35 $dBL_{A90,10min}$ at the nearest noise sensitive property

- North Panhouse
  - Planning reference 11/234/TPP
  - Evance R9000
  - Height 18 m
  - Operational
  - Noise limits – simplified ETSU: 35 $dBL_{A90,10min}$ at the nearest noise sensitive property

9.5.55 Cumulative turbines considered in this assessment are shown in Figure 9.2.

9.5.56 Where it is not explicitly stated in the planning conditions that the financially involved (FI) noise limit of 45 $dBL_{A90,10min}$ applies at the associated property, this assessment assumes that the FI limit applies.

Review of Cumulative Noise Limits

9.5.57 Consented noise limits for the identified cumulative developments are in accordance with the 'simplified ETSU' approach, whereby noise levels due to small individual turbines or clusters of small turbines are conditioned to a simplified noise limit of a 'flat' 35 $dBL_{A90,10min}$ across the range of wind speeds at all properties not FI with the turbines.

Derivation of Noise Limits at NSRs where Potential Cumulative Effects Identified

9.5.58 The evaluation of operational wind turbine noise is a multi-stage process, which is necessarily highly technical in nature. The process is particularly complex where cumulative noise from existing or proposed/consented turbines requires consideration. The stages are summarised as follows:

- **Identify potentially cumulative developments** – refer to para. 9.5.54 and Figure 9.2;
- **Identify NSRs at which cumulative effects may occur** – Review worst-case predicted noise levels from existing turbines at all NSRs, and screen out NSRs at which significant cumulative effects will not occur (i.e. predicted noise levels from existing turbines are not within 10 dB of consented noise limits and/or are not within 10 dB of predicted noise levels from Proposed Development) from further consideration of cumulative effects;
- **Derive Overall Noise Limits (ONLs) from measured background noise levels for the daytime and night-time period** – refer to para. 9.5.17 - 9.5.23. Note that the noise limits are derived using background noise levels which exclude the contribution of noise from existing wind turbines at the baseline noise monitoring locations to determine 'true' baseline.
- **Apportion the ONL to determine the applicable site-specific Residual Noise Limit (RNL) at each NSR, accounting for the Consented Noise Limits (CNLs) of existing and consented cumulative developments and their predicted contribution to cumulative noise levels –** RNLs have been derived from ONLs using the following process:
  - Where the predicted level from cumulative turbines is ≥10 dB below the simplified ETSU 35 dBL_{A90} CNL, the RNL is the same as the ONL;
  - Where the predicted level from cumulative turbines is <10 dB below the simplified ETSU 35 dBL_{A90} CNL, the RNL is equal to the ONL minus the CNL;

- Where the CNL and the ONL are very similar (i.e. <2 dB different), the available RNL as determined using the process described above is highly restrictive, and results in noise limits substantially below the 35 dB simplified ETSU limit. The following additional stage has been taken in such instances:
- Where significant headroom (≥5 dB) is available between the predicted noise level of cumulative turbine and its CNL, the RNL has been determined by subtracting a 'cautious prediction' (predicted noise level of cumulative turbines +2 dB[3]) from the ONL;
- At NSRs which are assumed to be FI with one or more of the existing cumulative turbines, but not with the Proposed Development (FI NSRs), noise limits have been set using the same process, where the cautious prediction excludes the contribution of the NSR's own turbine(s).
- At these FI NSRs the RNL of the FI ONL (FI RNL) has also been derived; and
- The applicable RNL at FI NSRs is the lower of the RNL and the FI RNL, such that neither the FI nor the non-FI ONLs are exceeded at these properties.

9.5.59 The approach to deriving the RNLs described above has been complicated by the presence of existing small turbines with 'flat' 35 dB noise limits. Initial predictions for these turbines based on the available information showed that these turbines were producing noise levels at or above 35 dB at the owning NSRs, such that there would be limited headroom for the Proposed Development to operate.

9.5.60 The applicable overall noise limit at NSRs which operate their own turbines could be assumed to be the FI noise limit of 45 dB, however, the Proposed Development cannot rely on FI noise limits at NSRs with which it is not FI, as the operation of the wind farm would then rely on matters outside of the operator's control. For example; should RNLs be set for the Proposed Development be set on the basis of a FI ONL, these would cease to be appropriate if the small turbines were to be decommissioned and the RNL would have to be revised.

9.5.61 At NSRs which have their own turbine, the RNL derivation process followed in this assessment determines the headroom available within the non-FI ONL to the Proposed Development, accounting for other cumulative turbines but excluding noise from the turbines with which the NSR is FI.

9.5.62 This allows an appropriate noise limit to be set for the Proposed Development, which does not rely on FI limits at properties affected by noise from their own turbines, and means that should their own turbines be decommissioned then noise limits at these NSRs would not need to be revised.

9.5.63 The final stage of the process considers the cumulative noise level including the contribution of the turbines owned by the FI NSRs. RNLs have been calculated such that the assumed background-derived FI ONL is not exceeded, for the protection of residential amenity. Where this FI RNL is lower than the non-FI RNL, the lower of the two RNLs has been selected.

Assessment of Potential Effect Significance

9.5.64 The impact magnitude and effect significance have been determined following the criteria described in the assessment of potential effect significance section below.

Receptor Sensitivity

9.5.65 The guidance contained within Technical Advice Note to PAN 1/2011 has been drawn upon in the generation of an appropriate set of significance criteria. The receptor sensitivity criteria for the construction, operational and decommissioning phases of the Proposed Development are

[3] *Where the cautious prediction exceeds the simplified ETSU 35 dB noise limit at non-FI NSRs, the noise level due to existing turbines has been assumed to meet the 35 dB CNL*

considered to be the same. These are presented within Table 9.7 and are applicable to both noise and vibration effects.

Table 9.7 – Noise and vibration receptor sensitivity criteria

Receptor Sensitivity	Description	Examples
High	Receptors where people or operations are particularly susceptible to noise and/or vibration.	Residential, quiet outdoor recreational areas, schools and hospitals.
Medium	Receptors moderately sensitive to noise and/or vibration, where it may cause some distraction or disturbance.	Offices and restaurants.
Low	Receptors where distraction or disturbance from noise and/or vibration is minimal.	Buildings not occupied, factories and working environments with existing levels of noise.

Impact Magnitude - Construction Noise

9.5.66 The construction noise impact magnitude has been determined according to the threshold levels provided in Table 9.8.

Table 9.8 – Evaluation criteria for noise from construction activities (predicted façade level), weekday daytimes (08:00 – 18:00) and Saturdays 08:00 – 12:30

Difference (d) between predicted construction noise level and applicable limit, dB	Impact magnitude
d ≥+5	High
0 ≤ d < +5	Medium
-10 ≤ d < 0	Low
d <-10	Negligible

Impact Magnitude - Operational Wind Turbine Noise

9.5.67 For noise from the proposed wind turbines once operational, the impact magnitude scale has been derived based on the guidance contained with ETSU-R-97. It is considered that where cumulative wind turbine noise meets the applicable noise limits (and is up to 10 dB below the limits), an impact magnitude of low would arise. Where cumulative wind turbine noise falls ≥10 dB below the applicable limits, the impact magnitude is considered to be negligible. Where cumulative wind turbine noise exceeds the applicable limits by up to 5 dB, an impact magnitude of medium is considered to arise. Where the there is an exceedance of a limit by >5 dB, an impact magnitude of high is considered to arise. These criteria are summarised in Table 9.9.

Table 9.9 – Impact magnitude scale – wind turbine noise

Difference (d) between predicted turbine noise level and applicable limit, dB	Impact magnitude
d ≥+5	High
0 ≤ d < +5	Medium

Difference (d) between predicted turbine noise level and applicable limit, dB	Impact magnitude
-10 ≤ d < 0	Low
d <-10	Negligible

Impact Magnitude - Fixed (Non-turbine) Plant Noise

9.5.68 For noise from any fixed (non-turbine) plant such as any transformers, control buildings or substations, it is appropriate to determine significance criteria based on the guidance contained within BS4142, i.e. by consideration of the difference between the rating level from the plant noise and the prevailing background sound levels, but also with respect to context and the resulting sound levels in absolute terms.

9.5.69 The impact magnitudes associated with noise generated from fixed plant are presented in Table 9.10.

Table 9.10 – Impact magnitude for fixed (non-turbine) plant noise

Difference between Rating Level ($L_{Ar,Tr}$) and Background Sound Level (L_{A90})	BS4142 Guidance	Impact Magnitude
≥+10	Indication of significant adverse impact	High
+5	Indication of adverse impact	Medium
0	Indication of low Impact	Low
-10	-	Negligible
Where the rating level ($L_{Ar.Tr}$) is below 35dB the impact magnitude is classified as 'Negligible' regardless of the relationship to the background noise level. *+ indicates rating level above background noise level* *- indicates rating level below background noise level*		

Effect Significance

9.5.70 The effect significance has been determined by consideration to both the receptor sensitivity and the impact magnitude according to the matrix detailed in Table 9.11.

Table 9.11 – Effect significance matrix

Impact Magnitude	Receptor Sensitivity		
	High	**Medium**	**Low**
High	Major	Moderate	Minor
Medium	Moderate	Minor	Neutral
Low	Minor	Neutral	Neutral
Negligible	Neutral	Neutral	Neutral

9.5.71 This assessment considers all identified NSRs to be of 'high' sensitivity in accordance with Table 9.7, given that they are residential dwellings. This assessment considers that effects with a significance

of 'moderate' and 'major' are significant and effects with a significance of 'neutral' and 'minor' are not significant.

Requirements for Mitigation

9.5.72 Consideration has been given to available mitigation measures to reduce adverse effects and enhance beneficial effects. Where mitigation measures are detailed, these are committed to by the Applicant and have been determined through professional judgement and the implementation of best practice.

Assessment of Residual Effect Significance

9.5.73 Residual effects have been assessed following the methods described above but taking into account the committed mitigation measures.

Limitations to Assessment

9.5.74 Detailed information on techniques and equipment for the construction phase of the Proposed Development is not currently available. Consequently, appropriate and robust assumptions have been made regarding the nature of likely construction activities and plant, and noise predictions made accordingly. It is therefore anticipated that predicted noise levels represent the "worst case" potential construction noise levels.

9.5.75 The assessment of operational impacts associated with the wind turbines has been undertaken adopting source noise levels for the Vestas V136. Following completion of the tendering process, it is possible that the precise turbine make / model adopted and / or the operational mode will change from that adopted within the assessment. It should be noted, however, that the final turbine model chosen will be selected to ensure compliance with the derived noise level limits.

9.6 Baseline Conditions

Wind Conditions

9.6.1 Wind speed data was checked for quality on receipt and it was identified that when the Lidar device was displaying an error (e.g. temporary shut-down arising from battery outage), then a wind speed of 999 or 0 m/s was displayed. All wind speeds <1 m/s and other erroneous data (e.g. 999) were therefore excluded from further analysis.

9.6.2 A wind rose of measured wind speeds and directions derived to 10 m above ground level over the period of the baseline survey is provided in Chart 9.5 in Appendix 9.4. The wind rose shows that the most commonly occurring wind speeds were in the range 5 m/s – 10 m/s and the most prominent wind directions were south-south-easterly and south-westerly.

Description of Baseline Noise Environment

9.6.3 Time-history charts of the measured ambient[4] (L_{Aeq}) and background[5] (L_{A90}) noise levels for each monitoring location are provided in Appendix 9.4. Periods of rainfall-affected data, which have been screened out of subsequent analysis, are shown in dark blue.

---

[4] *Ambient level – the equivalent continuous sound pressure level of the totally encompassing sound in a given situation at a given time, usually from multiple sources, at the assessment location over a given time interval, T.*

[5] *Background level - the A-weighted sound pressure level that is exceeded for 90 percent of a given time interval, T. The background level is unaffected by short-duration, noisy events, and is therefore representative of the lowest-occurring noise levels in a given noise environment. This noise index is used in the evaluation of the baseline noise environment and predicted noise levels from wind turbines in wind farm noise assessments.*

9.6.4 Charts showing the measured background noise levels correlated with wind speed, and divided into Quiet Daytime and Night-time periods, in accordance with ETSU, are provided in Appendix 9.4 for both NMPs. The proposed hub height of 80 m was used to derive the 10 m wind speed for correlation with background noise levels. The charts show the wind-dependent background noise level, the 'background +5 dB' criterion and the derived noise limits. Rainfall-affected data has been screened out, in accordance with the IoA GPG (i.e. with the periods preceding and after the recorded rainfall also excluded).

NMP1 – Shoehall

9.6.5 The dominant noise source observed during the installation was the wind, with lesser contributions from wind-induced rustling of vegetation, bird calls and distant waves. The small wind turbine at Newark, which was up-wind of the NMP during installation, was barely audible.

9.6.6 A time-history graph of measured ambient and background levels and rainfall events is provided as Chart 9.6 in Appendix 9.4. The following observations are noted regarding measured baseline noise levels:

- the ambient and background levels show a close correlation throughout the majority of the measurement period; this is indicative of a fairly constant noise source such as wind-induced noise, rather than intermittent anthropogenic activities;
- the variation in ambient and background levels closely tracks the variation in wind speed;
- there is no clear diurnal variation and the primary control on noise levels is attributed to weather and sea conditions, rather than time of day;
- straight lines in the chart during the period 18th – 21st September are representative of gaps in the data, caused by errors with the LIDAR device; and
- there were relatively few rainfall events.

9.6.7 This was the closer of the two NMPs to Eday (London) Airport, however, no evidence of noise from aircraft was evident in the data.

9.6.8 The measured quiet daytime and night-time background noise levels for NMP1 correlated to wind speed are provided in Appendix 9.4. Chart 9.7 shows the quiet daytime period and Chart 9.8 the night-time period. The datasets have been split between 'up-wind' and 'down-wind' conditions, using the process described in para. 9.5.21 and only the up-wind data is shown. Given the very limited rainfall during the survey, excluded rainfall-affected data is not shown on the chart.

9.6.9 The following observations are noted regarding the correlation of noise and wind speed data, and the derivation of noise limits:

- There are a substantial number of datapoints across the range of operational wind speeds up to the wind speed at which the turbine reaches its maximum sound power level (7 m/s at 10 m), both during the daytime and night-time period. The data fulfils the minimum requirements of the IoA GPG;
- The datapoints in Chart 9.7 (daytime) generally lie close to the trendline. There is no banding of the data, and no outliers;
- Overall Noise Limits (ONLs) for NSRs which are not FI with the Proposed Development have been derived based on the 35 dB ETSU fixed minimum daytime limit up to the maximum wind speed for which data is available (10 m/s);
- The datapoints in Chart 9.8 (night-time) show slightly greater variability, however, this is attributed to the greater number of datapoints. There is no banding of the data, and no obvious outliers; and
- ONLs for NSRs which are not FI with the Proposed Development have been derived based on the 43 dB ETSU fixed minimum night-time limit up to the maximum wind speed for which data is available (10 m/s).

NMP2 – Fers Ness

9.6.10 The dominant noise source observed during the installation of the NMP was cattle in the adjacent field, with lesser contributions from bird calls including farm geese and wild birds and distant farm machinery operating. The small wind turbine at Fers Ness was inaudible at the monitoring position during commissioning under up-wind conditions. This was the closer of the two NMPs to the Enercon E44 and the hydrogen production facility mentioned by the EHO, however, the NMP was determined to be substantially beyond the distance at which either of these would be audible.

9.6.11 A time-history graph of measured ambient and background levels and rainfall events is provided as Chart 9.9 in Appendix 9.4. The following observations are noted regarding measured baseline noise levels:

- the ambient and background levels show a close correlation throughout the majority of the measurement period; this is indicative of a fairly constant noise source such as wind-induced noise, rather than intermittent anthropogenic or animal activities;
- the variation in ambient and background levels closely tracks the variation in wind speed;
- there is no clear diurnal variation and the primary control on noise levels is attributed to weather and sea conditions, rather than time of day;
- straight lines in the chart during the period 18th – 21st September are representative of gaps in the data, caused by errors with the LIDAR device; and
- there were relatively few rainfall events.

9.6.12 The measured daytime and night-time background noise levels for NMP2 correlated to wind speed are provided in Appendix 9.4. Chart 9.10 shows the daytime period and Chart 9.11 the night-time period. The data has been split between 'up-wind' and 'down-wind' conditions, using the process described in para. 9.5.21 and only the up-wind data is shown. Given the very limited rainfall during the survey, excluded rainfall-affected data is not shown on the chart.

9.6.13 The following observations are noted regarding the correlation of noise and wind speed data, and the derivation of noise limits:

- There are a substantial number of datapoints across the range of operational wind speeds up to the wind speed at which the turbine reaches its maximum sound power level (7 m/s at 10 m), both during the daytime and night-time period. The data fulfils the minimum requirements of the IoA GPG;
- Datapoints in Chart 9.11 approximately 10 dB above the trendline at wind speeds of approximately 4.5 m/s to 8 m/s are attributed to noise from the sea and are not considered to be significant outliers. There is no banding of the data which may indicate the influence of non-representative noise sources;
- ONLs for NSRs which are not FI with the Proposed Development have been derived based on the 35 dB ETSU fixed minimum daytime limit up to the maximum wind speed for which data is available (10 m/s);
- The datapoints in Chart 9.11 (night-time) show slightly greater variability, however, this is attributed to the greater number of datapoints. There is no banding of the data, and no obvious outliers; and
- ONLs for NSRs which are not FI with the Proposed Development have been derived based on the 43 dB ETSU fixed minimum night-time limit up to the maximum wind speed for which data is available (10 m/s).

Adopted Noise Limits

Construction and decommissioning noise limits

9.6.14 With reference to Appendix 9.4 the daytime baseline ambient levels shown in Chart 9.7 and Chart 9.10, were below 65 dB throughout the survey. During the night-time period, as shown in Chart 9.8 and Chart 9.11 night-time ambient levels were below 45 dB at low wind speeds. The construction phase noise limits in accordance with the ABC method provided in BS5228 therefore fall within Category A, and are as follows:

- **Weekday daytimes, Saturday mornings** – 65 $dBL_{Aeq,T}$;
- **Evenings and weekends** – 55 $dBL_{Aeq,T}$; and
- **Night-time** – 45 $dBL_{Aeq,T}$

Operational noise limits – fixed non-turbine plant

9.6.15 Operational noise limits for fixed non-turbine plant, such as transformers and substations, have been derived in accordance with BS4142, with reference to measured background noise levels at NMP1, which is representative of the closest NSRs to proposed items of plant. It is assumed that such plant will operate at a constant level, therefore noise limits will be determined by the night-time background level, when noise from road traffic and other anthropogenic sources is at a minimum. At wind speeds lower than 5 m/s and in the absence of rainfall (as required by BS4142), as shown in Appendix 9.4 Chart 9.8, the measured background level during the night-time period at NMP2 was approximately 25 $dBL_{A90,T}$. In accordance with BS4142, a rating level of up to 5 dB above the representative background level is indicative of a 'low' impact, therefore the adopted noise limit for the rating level of fixed non-turbine plant at the closest receptor is 30 dB.

Operational noise limits – wind turbine noise

9.6.16 Noise limits for the Proposed Development have been derived using measured background noise levels. The noise levels have been used to determine an Overall Noise Limit (ONL), shown as a red line in Chart 9.7, Chart 9.8, Chart 9.10 and Chart 9.11. In the absence of noise from cumulative turbines, the ONL would apply directly to the Proposed Development.

9.6.17 Where potential cumulative effects have been identified, the process described in 9.5.58 has been used to determine a NSR-specific RNL which applies to the Proposed Development only.

9.6.18 The ONLs derived from baseline data collected at NMP1 and NMP2 are provided in Table 9.12 for the range of operational wind speeds. ETSU allows that the daytime Fixed Minimum Limit (FML) may be set within the range 35 dB – 40 dB. In consultation, OIC Environmental Health requested that the daytime FML for the Proposed Development should be 35 dB, at the lower end of the ETSU range.

9.6.19 The noise limits derived from measurements at NMPs have been allocated to NSRs on the basis of observations of the noise environment while setting up the SLMs, the proximity of NSRs to the NMPs and the predicted contribution of existing turbines.

Table 9.12 – Derived ONLs, $dBL_{A90,10min}$

Wind speed, m/s	Derived noise limit, $dBL_{A90,10min}$								
	4	5	6	7	8	9	10	11	12
NMP1 – Shoehall – ONL derived from 'background +5 dB' measured when NMP under up-wind conditions relative to existing turbines									
Daytime period	35.0	35.0	35.7	37.9	40.3	43.0	46.4	46.4	46.4
Daytime period – FI	45.0	45.0	45.0	45.0	45.0	45.0	46.4	46.4	46.4
Night-time period	43.0	43.0	43.0	43.0	43.0	45.3	45.9	45.9	45.9
Night-time period FI	45.0	45.0	45.0	45.0	45.0	45.3	45.9	45.9	45.9
Overall limit applicable at: NSR1, NSR2, NSR3, NSR4, NSR5, NSR6, NSR7 and NSR8									
NMP2 – Fers Ness – ONL derived from 'background +5 dB' measured when NMP under up-wind conditions relative to existing turbine									
Daytime period	38.3	40.3	42.5	44.7	46.7	48.2	49.0	49.0	49.0
Daytime period – FI	45.0	45.0	45.0	45.0	46.7	48.2	49.0	49.0	49.0
Night-time period	43.0	43.0	43.0	44.5	46.6	47.5	47.8	47.8	47.8
Night-time period FI	45.0	45.0	45.0	45.0	46.6	47.5	47.8	47.8	47.8
Overall limit applicable at: NSR9, NSR10									

9.6.20 None of the identified NSRs will be Financially Involved (FI) with the project, however, several NSRs are considered to be FI with their own turbines.

9.6.21 The ONLs have been used to derive RNLs for each NSR, accounting for consented noise limits according to the process described in 9.5.58. The process of deriving the RNLs is shown in Appendix 9.6, and the adopted RNLs are shown in Table 9.13.

Table 9.13 – Derived RNLs, $dBL_{A90,10min}$

Wind speed, m/s	Derived noise limit, $dBL_{A90,10min}$								
	4	5	6	7	8	9	10	11	12
Daytime period (07:00 – 23:00)									
NSR1	35.0	35.0	35.7	37.9	38.7	42.3	46.1	46.1	45.9
NSR2	35.0	35.0	35.7	37.9	40.3	43.0	46.1	46.3	46.3
NSR3	35.0	35.0	35.7	37.9	40.3	43.0	46.1	46.3	46.3
NSR4	35.0	35.0	35.7	37.9	38.7	42.3	46.1	46.2	46.1
NSR5	35.0	35.0	34.7	36.9	38.7	42.3	46.1	45.5	44.7
NSR6*	35.0	35.0	35.7	37.9	40.3	43.9	45.1	44.0	41.3
NSR7	35.0	35.0	34.9	37.1	38.7	42.3	46.1	45.6	44.4
NSR8*	35.0	35.0	35.7	37.9	44.0	43.2	44.2	41.9	45.7
NSR9*	38.3	40.3	42.5	44.7	46.4	47.9	48.6	48.3	47.8
NSR10	38.3	40.3	42.5	44.7	46.7	48.2	49.0	49.0	49.0
Night-time period (23:00 – 07:00)									
NSR1	43.0	43.0	43.0	43.0	43.0	45.3	45.9	45.9	45.9
NSR2	43.0	43.0	43.0	43.0	43.0	45.3	45.9	45.9	45.9
NSR3	43.0	43.0	43.0	43.0	43.0	45.3	45.9	45.9	45.9
NSR4	43.0	43.0	43.0	43.0	43.0	45.3	45.9	45.9	45.9
NSR5	43.0	43.0	43.0	43.0	43.0	44.9	45.5	44.8	44.0
NSR6*	43.0	43.0	43.0	43.0	43.0	44.3	44.4	43.1	39.4
NSR7	43.0	43.0	43.0	43.0	43.0	45.3	45.5	45.9	45.9
NSR8*	43.0	43.0	43.0	44.4	44.0	43.6	43.3	40.3	47.8
NSR9*	43.0	43.0	43.0	44.5	46.3	47.2	47.2	46.8	46.1
NSR10	43.0	43.0	43.0	44.5	46.6	47.5	47.8	47.8	47.8

Note – at NSRs marked * the adopted RNL is the lower of the non-FI RNL and the FI RNL. Refer to Appendix 9.6 for derivation of RNLs at all NSRs, including NSRs which are FI with their own turbines.

9.7 Receptors Brought Forward for Assessment

9.7.1 All of the NSRs listed in Table 9.3 have been brought forward for assessment.

9.8 Standard Mitigation

Construction phase

9.8.1 The following good practice measures will be implemented during construction to limit unnecessary noise:

- avoid unnecessary revving of engines and switching off plant when not required (i.e. no idling);
- haul routes to be kept well maintained;
- minimising the drop height of materials during delivery to, and movement around, site;
- starting up plant and vehicles sequentially, rather than all together;
- specification of plant with white-noise or directional reversing alarms, rather than beeper type alarms;
- where possible, selection of quiet / noise reduced plant;
- vehicles accessing the site will have regard to the normal operating hours of the site and the location of nearby NSRs; and
- use and siting of equipment will be considered such that noise is minimised. For example, any generators or powered cabins within the construction compound will be sited such that noise from the generator exhaust is directed away from the closest NSRs, and cabins and other infrastructure are used to screen noise from such plant wherever possible.

The measures outlined above, plus additional measures put in place relating to specific construction challenges associated with access to the island will be formalised in a Construction Environmental Management Plan (CEMP).

Operational phase

Fixed (non-turbine) plant noise

9.8.2 Noise from non-turbine operational plant will comprise noise from substations only. The sound power level and final location of the substation(s) are yet to be finalised, however, noise from the final type and location of the substation will be attenuated by acoustic enclosure (if required), such that it meets the derived non-turbine noise limits (see para. 9.6.15). A total sound power level of 93 dB(A), equivalent to a sound pressure level of 75 dB(A) at 10 m, would enable the noise limit to be met. The installed plant will meet these criteria.

9.9 Likely Effects

Construction

9.9.1 The predicted noise levels at NSR3, the closest property to construction activities for the Proposed Development site, are provided and evaluated against the adopted noise limits in Table 9.14 for each of the stages of construction considered. Negative numbers indicate predicted levels meet the adopted criteria.

Table 9.14 – Evaluation of worst-case construction phase noise levels at closest NSR (NSR3)

Scenario	Predicted level, $dBL_{Aeq,T}$	Comparison of predicted level with noise limits (predicted level minus limit), $dBL_{Aeq,T}$	
		Weekday daytime, Saturday mornings	Evenings and weekends
Site origination	40	-25	-15
Slipway works	43	-22	-12
Construction of access tracks and turbine hardstandings	37	-28	-18
Excavation of borrow pits and construction of turbine bases	46	-19	-9
Installation of turbines	39	-26	-16

9.9.2 At NSR3, predicted worst-case noise levels due to construction activities during the daytime and evening periods meet the derived noise limits by a margin of 9 dB or more. No night-time working is proposed.

9.9.3 With reference to Table 9.8 the impact magnitude ranges from **negligible** to **low**, therefore with reference to Table 9.11 the effect significance ranges from **neutral** to **minor**. Noise impacts associated with the construction phase are therefore **not significant**.

Operation

Fixed (non-turbine) plant noise

9.9.4 The Proposed Development will include a substation which will generate noise, which will potentially be tonal in nature. No details are currently available on the source noise levels of the substation, and it is therefore considered appropriate that suitable noise control limits will be set to which any such ancillary plant items will be required to conform. The noise limits apply to the rating level, which includes any corrections for acoustic characteristics, such as tonality and intermittency, in accordance with the BS4142 method.

9.9.5 This assessment adopts the rating level noise limit of 30 dB at any identified NSR, equivalent to the baseline background noise levels at NMP1 at wind speeds of 5 m/s and below (refer to Appendix 9.4 Chart 9.7 and Chart 9.8). Provided that the noise limit is met by all non-turbine plant, including the substation, with reference to Table 9.10 the impact magnitude will be **low**. At high sensitivity NSRs, the resultant effect significance will be **minor** and therefore **not significant**.

Wind turbine noise

9.9.6 Predicted noise levels due to operation of the Proposed Development with all turbines operating in power-optimised mode (i.e. not in noise-reduced modes), are provided in Table 9.15 across the range 4 m/s – 12 m/s. Predictions have been calculated in accordance with SGN6 of the IoA GPG.

Table 9.15 – Predicted wind turbine noise levels due to Proposed Development

NSR ID	Wind Speed, m/s								
	4	5	6	7	8	9	10	11	12
	Predicted noise level, dBL_{A90}								
NSR1	27.2	32.1	35.8	36.4	36.4	36.4	36.4	36.4	36.4
NSR2	28.5	33.3	37.1	37.7	37.7	37.7	37.7	37.7	37.7
NSR3	29.0	33.9	37.6	38.2	38.2	38.2	38.2	38.2	38.2
NSR4	28.2	33.1	36.8	37.4	37.4	37.4	37.4	37.4	37.4
NSR5	27.8	32.7	36.4	37.0	37.0	37.0	37.0	37.0	37.0
NSR6	27.4	32.2	36.0	36.6	36.6	36.6	36.6	36.6	36.6
NSR7	27.0	31.8	35.6	36.2	36.2	36.2	36.2	36.2	36.2
NSR8	26.3	31.1	34.9	35.5	35.5	35.5	35.5	35.5	35.5
NSR9	26.5	31.4	35.1	35.7	35.7	35.7	35.7	35.7	35.7
NSR10	24.9	29.7	33.5	34.1	34.1	34.1	34.1	34.1	34.1

9.9.7 The predicted operational noise levels are evaluated against the derived daytime and night-time RNLs (i.e. accounting for the contribution of cumulative turbines) in Table 9.16. Negative numbers indicate predicted compliance with the RNL. Where predicted noise levels are above the noise limits, the result is shown in **bold** text.

Table 9.16 – Comparison of predicted wind turbine noise levels due to Proposed Development with RNLs

NSR ID	Wind Speed, m/s								
	4	5	6	7	8	9	10	11	12
	RNL minus predicted noise level, dBL_{A90}								
Daytime period									
NSR1	-7.8	-2.9	**0.1**	-1.5	-2.3	-5.9	-9.6	-9.7	-9.5
NSR2	-6.5	-1.7	**1.3**	-0.2	-2.6	-5.4	-8.4	-8.7	-8.6
NSR3	-6.0	-1.1	**1.9**	**0.3**	-2.1	-4.8	-7.9	-8.1	-8.1
NSR4	-6.8	-1.9	**1.1**	-0.5	-1.3	-4.9	-8.7	-8.8	-8.7
NSR5	-7.2	-2.3	**1.7**	**0.1**	-1.7	-5.3	-9.0	-8.4	-7.7
NSR6	-7.6	-2.8	**0.3**	-1.3	-3.7	-7.3	-8.5	-7.4	-4.7
NSR7	-8.0	-3.2	**0.6**	-0.9	-2.6	-6.1	-9.9	-9.5	-8.3
NSR8	-8.7	-3.9	-0.8	-2.4	-8.5	-7.7	-8.7	-6.4	-10.2
NSR9	-11.8	-8.9	-7.4	-9.0	-10.7	-12.2	-12.9	-12.6	-12.1
NSR10	-13.4	-10.6	-9.1	-10.6	-12.6	-14.1	-14.9	-14.9	-14.9

NSR ID	Wind Speed, m/s								
	4	5	6	7	8	9	10	11	12
	RNL minus predicted noise level, dBL_{A90}								
Night-time period									
NSR1	-15.8	-10.9	-7.2	-6.6	-6.6	-8.9	-9.5	-9.5	-9.0
NSR2	-14.5	-9.7	-5.9	-5.3	-5.3	-7.6	-8.2	-8.2	-8.2
NSR3	-14.0	-9.1	-5.4	-4.8	-4.8	-7.1	-7.7	-7.7	-7.7
NSR4	-14.8	-9.9	-6.2	-5.6	-5.6	-7.9	-8.5	-8.5	-8.5
NSR5	-15.2	-10.3	-6.6	-6.0	-6.0	-7.8	-8.5	-7.8	-7.0
NSR6	-15.6	-10.8	-7.0	-6.4	-6.4	-7.7	-7.8	-6.5	-2.8
NSR7	-16.0	-11.2	-7.4	-6.8	-6.8	-9.1	-9.4	-9.7	-9.7
NSR8	-16.7	-11.9	-8.1	-8.9	-8.5	-8.1	-7.8	-4.8	-12.3
NSR9	-16.5	-11.6	-7.9	-8.8	-10.6	-11.5	-11.5	-11.1	-10.4
NSR10	-18.1	-13.3	-9.5	-10.4	-12.5	-13.5	-13.7	-13.7	-13.7

9.9.8 The comparison provided in Table 9.16 demonstrates that operational noise from the Proposed Development will meet the derived RNLs at all NSRs across the full range of wind speeds during the night-time period.

9.9.9 During the daytime period the Proposed Development can operate within the RNLs at all NSRs at all wind speeds, with the exceptions of NSR1, NSR2, NSR3, NSR4, NSR5, NSR6 and NSR7 at 6 m/s, where predicted noise levels are up to 1.9 dB above the derived RNLs, and with further exceptions at NSR3 and NSR5 at 7 m/s where predicted levels are up to 0.3 dB above the RNL.

9.9.10 The impact magnitude and effect significance associated with operational wind turbine noise have been derived with reference to Table 9.9 and Table 9.11 and are summarised as follows:

- The impact magnitude at all NSRs during the night-time period ranges from **negligible** to **low**, dependent on wind speed. The resultant effect significance ranges from **neutral** to **minor**. Operational wind turbine noise effects during the night-time period are therefore **not significant**.
- The impact magnitude at NSR8, NSR9 and NSR10 during the daytime period ranges from **negligible** to **low**, dependent on wind speed. The resultant effect significance ranges from **neutral** to **minor**. Operational wind turbine noise effects during the daytime period at these receptors are therefore **not significant**.
- The impact magnitude at NSR1, NSR2, NSR4, NSR6 and NSR7 during the daytime period ranges from **low** at wind speeds 4 – 5 m/s and 7 – 12 m/s, to **medium** at 6 m/s. The resultant effect significance ranges from **minor** to **moderate** and is therefore **significant**.
- The impact magnitude at NSR3 and NSR5 during the daytime period ranges from **low** at wind speeds 4 – 5 m/s and 8 – 12 m/s, to **medium** at 6 m/s and 7 m/s. The resultant effect significance ranges from **minor** to **moderate** and is therefore **significant**.

Decommissioning

9.9.11 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that noise levels would be similar to noise levels during construction, however, given the lower intensity of works, noise levels would be lower. Considering predicted noise levels for construction provided in Table 9.14, and with reference to Table 9.8 the impact magnitude ranges from **negligible** to **low**, therefore with reference to Table 9.11 the effect significance ranges from **neutral** to **minor**. Noise impacts associated with the decommissioning phase are therefore **not significant**. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

9.10 Additional Mitigation and Enhancement

9.10.1 Beyond the commitment to produce and implement a CEMP, no significant noise effects have been identified associated with the construction or decommissioning phases and no additional mitigation is proposed.

9.10.2 Similarly, no significant noise effects have been identified associated with non-turbine plant during the operational phase, and no additional mitigation is proposed.

9.10.3 Predicted operational wind turbine noise levels exceed the derived noise limits at NSR1, NSR2, NSR3, NSR4, NSR5, NSR6 and NSR7 at 6 m/s wind speed and at NSR3 and NSR5 at 7 m/s during the daytime period. No mitigation is required during the night-time period.

9.10.4 Given the relatively small margin by which predicted noise levels exceed the daytime noise limits and the degree of conservatism in the prediction method, it is possible that measurable exceedances would not occur in practice. The Applicant commits to meeting the noise limits, however, and subject to the sound power level of the installed turbine model, mitigation will be put in place such that the noise limits are met.

9.10.5 The predicted levels consider the 'worst-case' scenario, when NSRs lie down-wind of the Proposed Development, which will occur under westerly wind conditions. Under cross-wind conditions and up-wind conditions the effect of directivity will result in lower noise levels from the Proposed Development, and compliance with the RNL at all NSRs. Any noise management plan would therefore only be required under a specific sector of wind directions and would likely have a limited impact on the generating capacity of the Proposed Development.

9.10.6 As required, a noise management plan will be enacted under specific wind speeds and directions, when operational wind turbine noise exceeds the noise limits. Potential options to control wind turbine noise will comprise curtailment of the closest turbines to the affected NSRs, either by operation in low-noise modes, or switching individual turbines off. Given the relatively small margin of predicted exceedance of the noise limits and limited range of wind speeds under which mitigation may be required, the loss of energy yield associated with any such mitigation would be limited.

9.11 Residual Effects

Construction

9.11.1 Residual effects will remain unchanged and are **not significant**.

Operation

9.11.2 Residual effects associated with non-turbine plant will remain unchanged and are **not significant**.

9.11.3 Following implementation of mitigation, if mitigation is determined to be required based on the specific characteristics of the installed model of turbine, residual effects associated with operational wind turbine noise during the daytime period will range from **negligible** to **low**, with resultant effect significance of **neutral** to **minor,** and are therefore **not significant**.

9.11.4 Residual effects associated with operational wind turbine noise during the night-time period will remain unchanged and are **not significant**.

Decommissioning

9.11.5 Residual effects will remain unchanged and are **not significant**.

9.12 Cumulative Assessment

9.12.1 The predicted worst-case cumulative noise levels including the Proposed Development and existing cumulative turbines within the study area are provided in Table 9.17. Actual noise levels will be lower, given the effects of directivity.

Table 9.17 – Predicted worst-case cumulative wind turbine noise levels

NSR ID	Wind Speed, m/s								
	4	5	6	7	8	9	10	11	12
	Predicted noise level, dBL_{A90}								
NSR1	27.7	32.3	36.0	36.7	36.8	37.0	37.4	37.9	38.5
NSR2	28.6	33.4	37.1	37.7	37.8	37.8	37.9	38.0	38.2
NSR3	29.1	33.9	37.6	38.3	38.3	38.3	38.4	38.5	38.7
NSR4	28.4	33.2	36.9	37.5	37.6	37.7	37.9	38.2	38.6
NSR5	29.0	33.3	36.9	37.7	38.0	38.5	39.2	40.2	41.4
NSR6	29.8	33.7	37.0	38.0	38.6	39.5	40.7	42.1	43.7
NSR7	28.1	32.5	36.0	36.8	37.1	37.6	38.3	39.3	40.5
NSR8	30.1	33.6	36.7	37.9	38.9	40.1	41.6	43.3	45.1
NSR9	28.5	32.5	35.9	36.8	37.4	38.2	39.2	40.5	42.0
NSR10	24.9	29.7	33.5	34.1	34.1	34.1	34.2	34.2	34.3

9.12.2 The predicted cumulative operational noise levels are evaluated against the 35 dB daytime ONL and 43 dB night-time ONL in Table 9.18. Negative numbers indicate predicted compliance with the ONL. Where predicted noise levels are above the noise limits, the result is shown in **bold** text.

Table 9.18 – Comparison of predicted cumulative wind turbine noise levels with ONLs

NSR ID	Wind Speed, m/s								
	4	5	6	7	8	9	10	11	12
	ONL minus predicted noise level, dBL_{A90}								
Daytime period									
NSR1	-7.3	-2.7	**0.3**	-1.2	-3.5	-6.0	-9.0	-8.5	-7.9
NSR2	-6.4	-1.6	**1.4**	-0.2	-2.5	-5.2	-8.5	-8.4	-8.2
NSR3	-5.9	-1.1	**1.9**	**0.4**	-2.0	-4.7	-8.0	-7.9	-7.7
NSR4	-6.6	-1.8	**1.2**	-0.4	-2.7	-5.3	-8.5	-8.2	-7.8
NSR5	-6.0	-1.7	**1.2**	-0.2	-2.3	-4.5	-7.2	-6.2	-5.0

NSR ID	Wind Speed, m/s								
	4	5	6	7	8	9	10	11	12
	ONL minus predicted noise level, dBL_{A90}								
NSR6	-5.2	-1.3	**1.3**	**0.1**	-1.6	-3.5	-5.7	-4.3	-2.7
NSR7	-6.9	-2.5	**0.3**	-1.1	-3.1	-5.4	-8.1	-7.1	-5.9
NSR8	-4.9	-1.4	**1.0**	0.0	-1.4	-2.9	-4.8	-3.1	-1.3
NSR9	-9.8	-7.8	-6.6	-7.9	-9.3	-10.0	-9.7	-8.5	-6.9
NSR10	-13.4	-10.6	-9.0	-10.6	-12.6	-14.1	-14.8	-14.8	-14.7
Night-time period									
NSR1	-15.3	-10.7	-7.0	-6.3	-6.2	-8.3	-8.5	-8.1	-7.4
NSR2	-14.4	-9.6	-5.9	-5.3	-5.2	-7.5	-8.0	-7.9	-7.7
NSR3	-13.9	-9.1	-5.4	-4.7	-4.7	-7.0	-7.5	-7.4	-7.2
NSR4	-14.6	-9.8	-6.1	-5.5	-5.4	-7.6	-8.0	-7.8	-7.3
NSR5	-14.0	-9.7	-6.1	-5.3	-5.0	-6.8	-6.7	-5.7	-4.5
NSR6	-13.2	-9.3	-6.0	-5.0	-4.4	-5.7	-5.2	-3.8	-2.2
NSR7	-14.9	-10.5	-7.0	-6.2	-5.9	-7.7	-7.6	-6.6	-5.4
NSR8	-12.9	-9.4	-6.3	-5.1	-4.1	-5.2	-4.3	-2.6	-0.8
NSR9	-14.5	-10.5	-7.1	-7.7	-9.2	-9.4	-8.5	-7.3	-5.7
NSR10	-18.1	-13.3	-9.5	-10.4	-12.5	-13.4	-13.6	-13.6	-13.5

9.12.3 The comparison provided in Table 9.18 demonstrates that cumulative worst-case noise levels will meet the derived noise limits at all NSRs across the full range of wind speeds during the night-time period.

9.12.4 During the daytime period, predicted noise levels meet the noise limits at all NSRs at all wind speeds, except for NSR1, NSR2, NSR3, NSR4, NSR5, NSR6, NSR7 and NSR8 at 6 m/s and at NSR3 and NSR6 at 7 m/s. At 6 m/s the predicted worst-case cumulative noise level is up to 1.9 dB above the ONL and at 7 m/s the predicted level is up to 0.4 dB above the ONL.

9.12.5 The impact magnitude and effect significance associated with cumulative operational wind turbine noise have been derived with reference to Table 9.9 and Table 9.11 and are summarised as follows:

- The impact magnitude at all NSRs during the night-time period ranges from **negligible** to **low**, dependent on wind speed. The resultant effect significance ranges from **neutral** to **minor**. Operational wind turbine noise effects during the night-time period are therefore **not significant**.
- The impact magnitude at NSR9 and NSR10 during the daytime period ranges from **negligible** to **low**, dependent on wind speed. The resultant effect significance ranges from **neutral** to **minor**. Operational wind turbine noise effects during the daytime period at these receptors are therefore **not significant**.

- The impact magnitude at NSR1, NSR2, NSR4, NSR6, NSR7 and NSR8 during the daytime period ranges from **low** at wind speeds 4 – 5 m/s and 7 – 12 m/s, to **medium** at 6 m/s. The resultant effect significance ranges from **minor** to **moderate** and is therefore **significant**.
- The impact magnitude at NSR3 and NSR6 during the daytime period ranges from **low** at wind speeds 4 – 5 m/s and 8 – 12 m/s, to **medium** at 6 m/s and 7 m/s. The resultant effect significance ranges from **minor** to **moderate** and is therefore **significant**.

9.12.6 Comparing the results presented in Table 9.18 with those in Table 9.16 it is clear that a similar pattern is present; where predicted noise levels are above the noise limits this occurs at broadly the same set of NSRs, at the same wind speeds and by a similar margin. It is therefore apparent that the Proposed Development is the dominant contributor to predicted exceedances of the noise limits. Mitigation put in place to prevent the exceedance of the RNLs by the Proposed Development will therefore be effective in preventing cumulative exceedance of the ONLs where this can be attributed to the Proposed Development.

9.12.7 Following implementation of appropriate mitigation, the Proposed Development will meet the derived noise limits, therefore the resultant impact magnitude at all wind speeds will be negligible to low, with a resultant effect significance of neutral to minor. Cumulative noise effects are therefore **not significant**.

9.13 Summary

9.13.1 This chapter has considered potential noise effects associated with construction, operation and decommissioning of the Proposed Development. No potential vibration effects have been identified and consideration of vibration has therefore been scoped out.

9.13.2 The assessment of noise comprised consultation with OIC Environmental Health, characterisation of the baseline noise environment, prediction of noise levels associated with construction activities, construction traffic, operational wind turbines and operation of other non-turbine fixed plant, and evaluation of predicted levels against derived criteria.

9.13.3 Baseline noise levels in the study area are typically dominated by the wind and the sea. Existing small wind turbines are the greatest anthropogenic contributor to overall noise levels, however, the effect of these has been screened out of baseline noise levels by directional filtering.

9.13.4 Predicted noise levels associated with construction activities meet threshold noise levels set out in the relevant guidance at all identified representative NSRs, during weekday daytimes, evenings and weekends. Noise effects from construction activities are therefore not significant.

9.13.5 Noise limits have been derived for non-turbine fixed plant associated with operation of the Proposed Development. Items of fixed plant will be specified such that they meet the derived noise limits at all representative NSRs. Noise effects from fixed plant are therefore not significant.

9.13.6 The Applicant has committed to meeting the derived noise limits for the Proposed Development. Predicted wind turbine noise levels associated with operation of the Proposed Development can meet derived noise limits during the daytime period at all identified representative NSRs, with minimal requirement for mitigation. Noise effects from wind turbine operation are therefore not significant.

Table 9.19 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Noise from construction activities	Minor and not significant	Adverse	Implementation of appropriate noise controls regarding hours of work, timing of site deliveries, and use of best practice to minimise unnecessary noise.	Minor and not significant	Adverse
Operation					
Noise from non-turbine fixed plant	Minor and not significant	Adverse	Selection of plant which complies with specified maximum sound power level such that the derived noise limits are met.	Minor and not significant	Adverse
Noise from wind turbines	Neutral to moderate and not significant to significant	Adverse	A noise management plan may be required such that Residual Noise Limits are met at all NSRs at all wind speeds under down-wind conditions, however, predicted exceedances of noise limits are minor (≤1.9 dB).	Neutral to minor and not significant	Adverse
Decommissioning					
Noise from construction activities	Minor and not significant	Adverse	Implementation of appropriate noise controls regarding hours of work, timing of site deliveries, and use of best practice to minimise unnecessary noise.	Minor and not significant	Adverse

Table 9.20 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
All NSRs	Cumulative wind turbine noise	Multiple small turbine developments on Eday.	Minor and not significant	Adverse

9.14 References

AECOM. (2011). Wind Farm Noise Statutory Nuisance Complaint Methodology. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69222/pb-13584-windfarm-noise-statutory-nuisance.pdf

BSi. (1997). BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

BSi. (2009/2014). BS 5228-1:2009+A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites, Noise.

BSi. (2009/2014). BS 5228-1:2009+A1:2014: Code of Practice for Noise and Vibration Control on Construction and Open Sites, Vibration.

BSi. (2013). Electroacoustics, Sound Level Meters Specifications.

BSi. (2014). BS4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound.

BSi. (2014b). Guidance on Sound Insulation and Noise Reduction for Buildings.

Control of Pollution Act. (1974). UK Government.

Department of Transport. (1988). Calculation of Road Traffic Noise.

Hayes McKenzie. (2011). Analysis of How Noise Impacts are Considered in the Determination of Wind Farm Planning Applications. Retrieved from https://www.gov.uk/government/publications/analysis-of-how-noise-impacts-are-considered-in-the-determination-of-wind-farm-planning-applications

Highways Agency. (1989). Design Manual for Roads and Bridges.

IOA. (2013). A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise. Retrieved from https://www.ioa.org.uk/sites/default/files/IOA%20Good%20Practice%20Guide%20on%20Wind%20Turbine%20Noise%20-%20May%202013.pdf

ISO. (1996). Acoustics. Attenuation of Sound During Propagation Outdoors - Part 2.

Scottish Government. (2008). PAN 45 Renewable Energy , Annex 2 - Spatial Frameworks and Supplementary Planning Guidance for Wind Farms. Retrieved from https://www2.gov.scot/Publications/2006/10/03093936/0

Scottish Government. (2011a). PAN1/2011: Planning for Noise. Retrieved from https://www.gov.scot/publications/planning-advice-note-1-2011-planning-noise/

Scottish Government. (2011b). Technical Advice Note 1/2011. Retrieved from https://www.gov.scot/publications/technical-advice-note-assessment-noise/

Scottish Government. (2014a). Scottish Planning Policy. Retrieved from https://www.gov.scot/publications/scottish-planning-policy/

Scottish Government. (2014b). Onshore Wind Turbines: Planning Advice. Retrieved from https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/

The Working Group on Noise from Wind Turbines. (1996). The Assessment and Rating of Noise from Wind Farms. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/49869/ETSU_Full_copy__Searchable_.pdf

UK Government. (1990). Environmental Protection Act. Retrieved from https://www.legislation.gov.uk/ukpga/1990/43/contents

This page is intentionally blank

10 Cultural Heritage

Contents

10.1	Executive Summary	10-1
10.2	Introduction	10-2
10.3	Legislation, Policy and Guidelines	10-2
10.4	Consultation	10-4
10.5	Assessment Methodology and Significance Criteria	10-7
10.6	Baseline Conditions	10-15
10.7	Receptors Brought Forward for Assessment	10-26
10.8	Standard Mitigation	10-32
10.9	Likely Effects	10-33
10.10	Additional Mitigation and Enhancement	10-40
10.11	Residual Effects	10-40
10.12	Cumulative Assessment	10-41
10.13	Summary	10-44
10.14	References	10-49

This page is intentionally blank.

10 Cultural Heritage

10.1 Executive Summary

10.1.1 This chapter identifies the archaeological and cultural heritage significance of the site and assesses the potential for direct and settings effects on archaeological heritage assets resulting from the construction and operation of the Proposed Development. This chapter also identifies measures that should be taken to mitigate predicted adverse effects.

10.1.2 This assessment has identified 88 non-designated heritage assets and one designated asset within the site. The Proposed Development has been designed to avoid directly impacting upon the Scheduled Quoy Chambered Cairn (Site 1).

10.1.3 The Proposed Development has also been designed so as to avoid impacts upon known heritage assets where possible. Given the extent and density of recorded remains it has not been possible to avoid all impacts and there would be direct impacts on seven non-designated heritage assets. All of these assets are of post-medieval date and comprise the sites of former buildings (Sites 5 and 12) and a well (Site 109) recorded from historic mapping, areas of former rig cultivation (Sites 73 and 74) and a road (Site 114) and a slipway (Site 119) of 20th century date. Assets recorded and known only from historic mapping are judged to be of negligible importance. The remaining assets are judged to be of low importance. The Proposed Development would remove any deposits associated with the assets known from historic mapping evidence and the slipway. The Proposed Development would impact upon only part of the remaining assets leading to some loss of information content. A **minor** and not significant direct effect has been predicted in each case.

10.1.4 Planning policies and guidance require that account is taken of potential effects upon heritage assets by proposed developments and that where possible such effects are avoided. Where avoidance is not possible, effects on any significant remains should be minimised or offset. Given the potential for presently unknown archaeological remains, in particular of prehistoric and post-medieval date, to survive within the site, a programme of archaeological works designed to avoid inadvertent damage to known remains and to investigate and mitigate against the possibility of uncovering hitherto unknown remains will be undertaken.

10.1.5 The implementation of the above outlined mitigation measures will prevent inadvertent damage to known heritage assets; investigate the potential for previously unknown assets and disseminate the results of archaeological works to the public. Following the implementation of mitigation measures there may be a slight loss of overall information content and as such a marginal magnitude of residual impact is anticipated. The residual direct effect would be **negligible** and not significant.

10.1.6 Potential operational effects on the settings of designated heritage assets within the 5 km and 10 km study areas and selected assets within the 15 km study area have been considered in detail as part of this assessment. **Moderate** and significant effects have been predicted upon the setting of the Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Vinquoy Hill Chambered Cairn (Site 40) and the Faray post-medieval landscape.

10.1.7 A programme of Historic Building Recording will be undertaken within the site as compensatory mitigation to create a baseline record of the condition of the upstanding buildings on the site and partially offset potential impacts of the Proposed Development on the setting of the post-medieval landscape of Faray.

10.1.8 There would be **moderate** and significant residual effects on the setting of the Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Vinquoy Hill Chambered Cairn (Site 40) and the Faray post-medieval landscape, although the core components and integrity of the setting of these assets would not be adversely affected.

10.1.9 The possibility of cumulative effects has been considered and assessed. A **minor** and not significant cumulative effect has been predicted on the setting of the Burn of Musetter standing stone (Site 22) and the chambered cairns at The Manse (Site 23), Eday Church Hall (Site 24), Calf of Eday (Site 28)

Bay of London (Site 33), Vinquoy Hill (Site 40), Fitty Hill (Site 124) and Howa Tower (Site 125). No additional cumulative effects have been predicted.

10.2 Introduction

10.2.1 This chapter considers the issues associated with the potential cultural heritage effects of the Proposed Development at Faray, Orkney. The Proposed Development is for a wind farm of six turbines with a maximum tip height of up to 149.9 m and is described in detail in EIA Report Chapter 3.

10.2.2 This chapter identifies the archaeological and cultural heritage significance of the site and known heritage assets within its boundary (refer to Figures 10.1 and 10.2). The assessment also identifies all designated heritage assets up to 5 km from the site and all nationally important designated heritage assets up to 10 km from the site with the potential for significant effects on their setting (Figures 10.3 and 10.4). The assessment includes descriptions of the context of the assessment; methodology; baseline conditions; likely effects (both direct and setting) and mitigation proposals as necessary. The assessment considers the effects of the construction and operational phases of the Proposed Development in detail. An assessment of potential cumulative effects is also made.

Statement of Capability

10.2.3 This chapter has been produced by Lynne Roy (BA (Hons), MSc, MCIfA, FSA Scot) of AOC Archaeology Group. AOC is a Registered Organisation of the Chartered Institute for Archaeologists (CIfA). This chapter conforms to the standards of professional conduct outlined in the Chartered Institute for Archaeologists' Standards and Guidance for Historic Environment Desk Based Assessments (CIfA 2017); Commissioning Work or Providing Consultancy Advice on the Historic Environment (CIfA 2014) and follows IEMA's EIA Guidelines (as updated) (IEMA, 2016).

10.3 Legislation, Policy and Guidelines

Legislation

10.3.1 Relevant legislation documents have been reviewed and taken into account as part of this cultural heritage assessment. Of particular relevance are:

- The Ancient Monuments and Archaeological Areas Act 1979 (as amended);
- The Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (as amended);
- The Planning etc. (Scotland) Act 1997 (as amended);
- Historic Environment (Amendment) (Scotland) Act 2011;
- Historic Environment (Scotland) Act 2014;
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended);and
- Town and Country Planning (General Development Procedure) (Scotland) Order 1992 (as amended 2001

Planning Policy

10.3.2 Full details of the relevant planning policy are provided in Chapter 5. The most relevant planning policy relevant to this chapter are contained within:

- Scottish Planning Policy (Scottish Government, 2014a);
- The National Planning Framework for Scotland (NPF3) (Scottish Government, 2014b);
- Historic Environment Policy for Scotland 'HEPS' (HES, 2019a);

- - Our Place in Time. The Historic Environment Strategy for Scotland (Scottish Government, 2014c);
- The adopted Orkney Local Development Plan (Orkney Islands Council (OIC), 2017a); and
- PAN2/2011 'Planning and Archaeology' (Scottish Government, 2011).

10.3.3 SPP (Scottish Government, 2014), HEPS (HES, 2019a), PAN 2/2011 'Archaeology and Planning' (Scottish Government, 2011) and Policy 8 of the adopted Orkney Local Development Plan (LDP) (OIC 2017a) deal specifically with planning policy and guidance in relation to heritage which collectively expresses a general presumption in favour of preserving heritage remains in situ. Their 'preservation by record' (i.e. through excavation and recording, followed by analysis and publication, by qualified archaeologists) is a less desirable alternative.

10.3.4 OIC's approach to proposals which effect the historic environment is set out in Policy 8(A) of the LDP which states that:

"*Development which preserves or enhances the archaeological, architectural, artistic, commemorative or historic significance of cultural heritage assets, including their settings, will be supported. Development which would have an adverse impact on this significance will only be permitted where it can be demonstrated that:*

i. Measures will be taken to mitigate any loss of this significance; and

ii. Any lost significance which cannot be mitigated is outweighed by the social economic, environmental or safety benefits of the development" (OIC, 2017a, 31).

10.3.5 The setting of Scheduled Monuments is also an important consideration when determining applications. This principle is outlined in paragraph 145 of SPP and Policy 8 of the Local Development Plan for Orkney. These policies express the importance of preservation of the integrity of the setting of Scheduled Monuments and also the preservation of the special interest and character of Listed Buildings and their settings.

10.3.6 The Historic Environment Policy for Scotland (HES, 2019a) sets out the Scottish Government's policy for the sustainable management of the historic environment. Key principles of the policy note that "*Changes to specific assets and their context should be managed in a way that protects the historic environment…If detrimental impact on the historic environment is unavoidable, it should be minimised. Steps should be taken to demonstrate that alternatives have been explored, and mitigation measures should be put in place*" (HEP4).

Guidance

- Consideration has been taken of the following best practice guidelines/guidance in preparing this assessment:
- OIC Supplementary Guidance; Historic Environment and Cultural Heritage (OIC, 2017b) and the further information which accompanies it; OIC Planning Policy Advice: Historic Environment (Topics and Themes) (OIC, 2017c);
- OIC Supplementary Planning Guidance: The Heart of Neolithic Orkney World Heritage Site (OIC, 2010);
- Orkney Islands Council Energy Supplementary Guidance (OIC, 2017);
- Chartered Institute for Archaeologists (CIfA) Standards and Guidance for Historic Environment Desk Based Assessments (CIfA, 2017) and Commissioning Work or Providing Consultancy Advice on the Historic Environment (CIfA, 2014);
- HES "Managing Change in the Historic Environment" guidance note series, particularly Historic Environment Scotland's Managing Change in the Historic Environment: Setting (HES, 2020);

- SNH (now NatureScot) published guidance for 'Assessing the Cumulative Impact of Onshore Wind Energy Developments' (SNH 2012); and
- Scottish Natural Heritage & Historic Environment Scotland Environmental Impact Assessment Handbook v5 (SNH & HES 2018).

10.3.7 HES's setting guidance defines setting as "*the way the surroundings of a historic asset or place contribute to how it is understood, appreciated, and experienced'* (HES, 2016a). The guidance further notes that *'planning authorities must take into account the setting of historic assets or places when drawing up development plans and guidance, when considering various types of environmental and design assessments/statements, and in determining planning applications"* (*ibid*). It advocates a three-stage approach to assessing potential impacts upon setting:

- Stage 1: identify the historic asset.
- Stage 2: define and analyse the setting.
- Stage 3: evaluate the potential impact of the proposed changes.

10.3.8 OIC's Planning Policy Advice on the Historic Environment (Topics and Themes) contains further guidance on setting which it notes "*usually consists mainly of* [a site's] *visual relationships*[1] *with the surrounding landscapes and other sites, such as the views to and from the site*', observing that '*a site's setting may have changed over time, and is likely to be made up of a combination of:*

- *It's original extent, functional relationships and design.*
- *Associations, relationships and meanings which it has accumulated since it was created.*
- *How the site is experienced now"* (OIC, 2017c, 10, 2.03).

10.4 Consultation

10.4.1 Table 10.1 summarises the responses from statutory and non-statutory consultation bodies in regard to cultural heritage and the Proposed Development.

Table 10.1 – Consultation

Consultee	Summary of Response	Where and how addressed
Historic Environment Scotland (HES)	In their response to scoping, dated the 11th of June 2019, HES stated that they considered a potential for significant adverse impacts on heritage assets within their remit including the Quoy Broch 270m NW of (Scheduled Monument, Index no.1440). Assessment should consider the potential for impacts on the setting of heritage assets located on nearby islands and should include the following heritage assets located on Eday and Rapness [sic]: • Muckle Hill of Linkataing, chambered cairn, homestead and field system (Scheduled Monument, Index no. 1355)	No direct impacts on Scheduled Monument. Buffer applied around the Scheduled Monument and design altered to move turbines away from immediate setting of monument. Site visits to these monuments and others in the ZTV were undertaken and where relevant detailed

[1] OIC also acknowledge the role that non-visual settings can play highlighting the relationship between the sunken HMS Hampshire and the memorial to those lost on it which overlooks it from the shore (OIC, 2017c), 10, para 2.07.

Consultee	Summary of Response	Where and how addressed
	• Carrick House, chambered cairn NW of, Eday (Scheduled Monument, Index no. 1432) • Vinquoy Hill, chambered cairn, Eday (Scheduled Monument, Index no.1410) • Huntersquoy, chambered cairn 480m SW of Carrick Farm, Eday (Scheduled Monument, Index no. 1250) • Carrick Farm, chambered cairn and cairn 500m SSW of (Scheduled Monument, Index no.1251) • Fold of Setter, enclosure, Eday (Scheduled Monument, Index no. 1441) • Stone of Setter, Eday (Scheduled Monument, Index No. 4299) • Mill Hill chambered cairn, Millbounds (Scheduled Monument, Index no.1321) • Sangar Crofthouse including adjoining threshing barn, windmill tower, kiln and byre, and detached house to southeast, Rapness, Westray (Category A listed Building, LB48010)	assessment is presented in Section 10.9 or in Appendix 10.2. Note that Carrick Farm, chambered cairn and cairn 500m SSW of (Scheduled Monument, Index no. 1251); Fold of Setter, enclosure, Eday (Scheduled Monument, Index no. 1441); and Huntersquoy, chambered cairn 480m SW of Carrick Farm, Eday (Scheduled Monument, Index no. 1250) fall outwith the ZTV. Where applicable, views towards these monuments are considered as part of the settings of nearby monuments that would have visibility of the Proposed Development.
	HES also requested sight of any ZTV (Zone of Theoretical Visibility) analysis, provisional wireframe views and photomontages prior to submission of any planning application and EIA Report for the proposals. It noted that provision of a large scale ZTV with heritage assets clearly marked on it would be particularly useful.	Proposed list of visualisations and a copy of provisional ZTV sent to HES on the 13th September and 22nd October 2019 respectively.
	HES agreed a list of proposed visualisations on 11th November 2019 and confirmed they had no further advice to add at this stage. HES wrote to the Applicant on 30th October 2019 to notify them of their intention to amend the existing entry in the schedule of monuments for 'Quoy, broch 270m NW of' to 'Chambered cairn, 280m NW of Quoy, Faray'.	It is agreed that the monument north-west of Quoy is a chambered cairn and not a broch and the monument is referred to as a chambered cairn throughout the assessment.
	On 22nd November the amended schedule of monuments was duly updated On 12th March 2020, following issue of draft wireline visualisations, and subsequent clarification by AOC that locations of draft viewpoints at Doggerboat showed views of the turbines in all directions and a query as to	Photomontage visualisation (Figure 10.13) accordingly situated at Doggerboat to demonstrate the worst-case scenario.

Consultee	Summary of Response	Where and how addressed
	HES's preferred location for a visualisation which showed views towards the Quay Chambered Cairn HES advised that visualisations should be produced to demonstrate the worst-case scenario i.e. the most adverse potential impact. The locations of other visualisations were agreed HES also noted that they remained of the view that the Proposed Development would raise such issues of national interest that they would likely object to the proposals. Of particular concern is the potential significant adverse impact on the setting of Chambered cairn, 280m NW of Quoy, Faray (SM 1440). HES noted that they had considered mitigation that would lessen this impact, such as amending the turbine layout, restricting the number of turbines or restricting the height of the turbines but concluded that it was difficult to understand how such measures would be likely to reduce the impact for their interests.	The Proposed Development has been designed to maximise space between the chambered cairn, 280m NW of Quoy, Faray and a buffer of 500 m has been applied between the cairn and the nearest proposed turbine.
Orkney Islands Council (OIC) Planning Manager	OIC note in their Scoping Opinion that the entire island is of historical importance as a landscape, bearing 6,000 years of habitation, culminating in abandonment in the mid 20th century. Due to its recent use primarily as a sheep run, the preservation of standing building, and archaeological remains in the landscape is good. The island has not been subject to any extensive archaeological survey, so few items are currently recorded. In support of the EIA, an assessment should be undertaken of the historic environment/archaeology of both Faray and the Holm of Faray up to and including the 20th century remains, including the intertidal zone. The assessment should include a walkover survey and desk-based assessment and this should inform the design layout of the proposal to avoid any direct impact on physical remains of significance. Furthermore, the EIA should include a viewshed analysis to identify historic environment assets that may be effected by the proposal and an assessment	A walkover and desk-based assessment of the island of Faray have been undertaken and include 20th century remains. A total of 75 previously unrecorded assets have been identified. The survey informed the design layout of the Proposed Development. Survey of the intertidal zone focussed on the south-east coast of the island where impacts on potential buried remains from construction of landing areas and associated infrastructure are possible (10.5.28). Survey of the Holm of Faray and intertidal zone of other areas of the island were not undertaken as they will not be impacted by the Proposed Development.

Consultee	Summary of Response	Where and how addressed
	that considers impacts on the setting of the identified sites.	Impact on the setting of heritage assets has been undertaken alongside ZTV analysis (See Figures 10.3-10.5, Section 10.9 and Appendix 10.2).
Orkney County Archaeologist (OIC)	AOC attended a meeting with the Orkney County Archaeologist on the 7th of October 2019. Faray is relatively poorly understood in terms of archaeological remains. The current layout avoids known remains but there are likely to be well preserved buried remains across island. Given the clear potential for further remains to be present the Orkney County Archaeologist stated that she would wish to see a structured programme of mitigation that would include geophysics. The geophysics would be followed by trial trench evaluations and if necessary, mitigation excavations and would be in accordance with a Written Scheme of Investigation (WSI) which would contain a clear method statement for post-excavation analysis and reporting. AOC consulted the Orkney County Archaeologist in February 2020 with regards to proposed visualisations. Additional visualisations were requested from St Magnus Church, Egilsay and approaches from the ferry. The list of proposed visualisations was agreed.	Walkover survey and detailed map regression has been undertaken and 75 previously unrecorded assets identified. Layout avoids these where possible. The potential for previously unrecorded remains to be present on the site is also acknowledged and a detailed mitigation strategy, which would include geophysics, trial trenching and, if needs be, further investigations is included in Section 10.8 of this chapter. Additional wirelines showing view of the Proposed Development from these locations are included (Figures 10.24 and 10.25) and discussed in detail in Appendix 10.2

10.5 Assessment Methodology and Significance Criteria

Consultation

10.5.1 An EIA Scoping Opinion was received from OIC on the 21st of June 2019. AOC met with the Orkney County Archaeologist on the 7th of October 2019 to discuss the project. Setting assessment visits were undertaken to designated assets within 10 km of the site over the course of October 2019 and in August 2020. AOC consulted directly with Historic Environment Scotland (HES) with regard to the potential implications on nationally important heritage assets and a proposed list of visualisations was agreed with the OIC County Archaeologist in February 2020 and with HES in March 2020. Detail regarding consultation responses and how points raised by consultees are addressed is presented in Table 10.1 above.

Study Area

10.5.2 Four study areas were identified for this assessment:

- A core study area (the site) which includes all land within the site boundary which is subject to assessment for potential direct effects. This study area was subject to walkover survey and was used to identify cultural heritage features which may be directly affected by the Proposed Development (Figures 10.1 and 10.2).
- A 5 km study area for the assessment of potential effects on the settings of all designated heritage assets including Scheduled Monuments; Listed Buildings; Inventoried Gardens and Designed Landscapes; Inventoried Battlefields and Conservation Areas within 5 km of the proposed turbines (Figure 10.3).
- A 10 km study area for the assessment of potential effects on the settings of all nationally important designated heritage assets including Scheduled Monuments; Category A Listed Buildings; Inventoried Gardens and Designed Landscapes, Inventoried Battlefields and World Heritage Sites within 10 km of the proposed turbines. This study area is covered by the ZTV (Figure 10.4).
- A 15 km study area for the assessment of selected assets identified as potentially sensitive to changes in their settings and within the ZTV (Figure 10.5)

10.5.3 Each heritage asset referred to in the text is listed in the Gazetteer in Technical Appendix 10.1. Each has been assigned a 'Site No.' unique to this assessment, and the Gazetteer includes information regarding the type, period, grid reference, NRHE number, SMR number, statutory protective designation, and other descriptive information, as derived from the consulted sources.

Desk Study

10.5.4 The following sources were consulted for the collation of data:

- The Orkney County Archaeologist;
- The National Record for the Historic Environment (NRHE) as held by HES;
- The Historic Land-use Assessment Data (HLAMap) for Scotland as hosted by HES;
- Spatial data and descriptive information for designated assets held on Historic Environment Scotland Data website;
- Ordnance Survey maps (principally First and Second Edition), and other published historic maps held in the Map Library of the National Library of Scotland;
- Online aerial satellite imagery, Google Earth, Bing, ESRI aerial mapping;
- Scottish Remote Sensing Portal for LiDAR data;
- The Scottish Palaeoecological Database (Coles et al., 1998);
- Unpublished historic maps and documents held by Orkney Library and Archive, Kirkwall;
- Vertical and oblique aerial photographs held by the National Collection of Aerial Photographs (NCAP, as held by HES); and
- Published bibliographic sources, including historical descriptions of the area (Statistical Accounts, Parish Records).

Site Visit

10.5.5 An archaeological walkover survey of the site was undertaken on 17th August 2020 with the aim of identifying any previously unknown archaeological remains. All known and accessible heritage assets were assessed in the field to establish their survival, extent, significance and relationship to other sites. Weather and any other conditions affecting the visibility during the survey were also

recorded. All heritage assets encountered were recorded and photographed. The location of features noted in the field was recorded using ArcGIS Collector and cross-referenced with hand-held GPS and mapping to record and confirm the position of each asset and to record the route of the survey. All features were marked on plans, at a relevant scale, and keyed by means of Grid References to the Ordnance Survey mapping.

Assessment of Likely Effect Significance

10.5.6 This assessment distinguishes between the term 'impact' and 'effect'. An impact is defined as a physical change to a heritage asset or its setting, whereas an effect refers to the significance of this impact. The first stage of the assessment involves establishing the value and importance of the heritage asset and assessing the sensitivity of the asset to change (impact). Using the proposed design for the Proposed Development, an assessment of the impact magnitude is made and a judgement regarding the level and significance of effect is arrived at.

Criteria for Assessing Sensitivity of Heritage Assets

10.5.7 The definition of cultural significance is readily accepted by heritage professionals both in the UK and internationally and was first fully outlined in the Burra Charter, which states in article one that 'cultural significance' or 'cultural heritage value' means aesthetic, historic, scientific, social or spiritual value for past, present or future generations (ICOMOS, 2013, Article 1.2). This definition has since been adopted by heritage organisations around the world, including HES. HEPS notes that to have cultural significance an asset must have a particular "aesthetic, historic, scientific or social value for past, present and future generations" (HES, 2019a). Heritage assets also have value in the sense that they "...create a sense of place, identity and physical and social wellbeing, and benefit the economy, civic participation, tourism and lifelong learning" (Scottish Government, 2014). All heritage assets have significance; however, some heritage assets are judged to be more important than others. The level of that importance is, from a cultural resource management perspective, determined by establishing the asset's capacity to contribute to our understanding or appreciation of the past (HES, 2019b). In the case of many heritage assets their importance has already been established through the designation (i.e. Scheduling, Listing and Inventory) processes applied by HES.

10.5.8 The rating of importance of heritage assets is first and foremost made in reference to their designation. For non-designated assets importance will be assigned based on professional judgement and guided by the criteria presented in Table 10.2; which itself relates to the criteria for designations as set out in Designation Policy and Selection Guidance (HES, 2019b) and Scotland's Listed Buildings (HES, 2019c).

Table 10.2 –Criteria for Establishing Importance of Heritage Assets

Importance	Receptors
Very High	World Heritage Sites (As protected by SPP, 2014). Other designated or non-designated assets with demonstrable Outstanding Universal Value.
High	Scheduled Monuments (as protected by the Ancient Monuments and Archaeological Areas Act 1979 (the "1979 Act"). Category A Listed Buildings (as protected by the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997) (the "1997 Act"). Inventory Gardens and Designed Landscapes (as protected by the 1979 Act, as amended by the Historic Environment (Amendment) (Scotland) Act 2011).

Importance	Receptors
	Inventory Battlefields (as protected by the 1979 Act, as amended by the 2011 Act). Outstanding examples of some period, style or type. Non-Designated assets considered to meet the criteria for the designations as set out above (as protected by SPP, 2014).
Medium	Category B and C Listed Buildings (as protected by the 1997 Act). Conservation Areas (as protected by the 1997 Act). Major or representative examples of some period, style or type. Non-designated assets considered to meet the criteria for the designations as set out above (as protected by SPP, 2014).
Low	Locally Listed assets. Examples of any period, style or type which contribute to our understanding of the historic environment at the local level.
Negligible	Relatively numerous types of features. Findspots of artefacts that have no definite archaeological remains known in their context. The above non-designated features are protected by Paragraph 137 of SPP, 2014.

10.5.9 Determination of cultural heritage significance can be made with reference to the intrinsic, contextual and associative characteristics of an asset as set out in HEPS (HES, 2019a) and its accompanying Designation Policy and Selection Guidance (HES, 2019b). HEPS Designation Policy and Selection Guidance (HES, 2019b) indicates that the relationship of an asset to its setting or the landscape makes up part of its contextual characteristics. The Xi'an Declaration (ICOMOS, 2005) set out the first internationally accepted definition of setting with regard to heritage assets, indicating that setting is important where it forms part of or contributes to the significance of a heritage asset. While SPP does not differentiate between the importance of the asset itself and the importance of the asset's setting, HES's Managing Change Guidance, in defining what factors need to be considered in assessing the impact of a change on the setting of a historic asset or place, states that the magnitude of the proposed change should be considered *"relative to the sensitivity of the setting of an asset"* (HES, 2020, 11); thereby making it clear that assets vary in their sensitivity to changes in setting and thus have a relative sensitivity. The EIA Handbook suggests that cultural significance aligns with sensitivity but also states that *"the relationship between value and sensitivity should be clearly articulated in the assessment"* (HES and SNH, 2018, 184). It is therefore recognised (ibid;) that the importance of an asset is not the same as its sensitivity to changes to its setting. Elements of setting may make a positive, neutral or negative contribution to the significance of an asset. Thus, in determining the nature and level of effects upon assets and their settings by the development, the contribution that setting makes to an asset's significance and thus its sensitivity to changes to setting need to be considered.

10.5.10 This approach recognises the importance of preserving the integrity of the setting of an asset in the context of the contribution that setting makes to the experience, understanding and appreciation of a given asset. It recognises that setting is a key characteristic in understanding and appreciating

of some, but by no means all, assets. Indeed, assets of high or very high importance do not necessarily have high sensitivity to changes to their settings (e.g. do not necessarily have a high relative sensitivity). An asset's relative sensitivity to alterations to its setting refers to its capacity to retain its ability to contribute to our understanding and appreciation of the past in the face of changes to its setting. The ability of an asset's setting to contribute to an understanding, appreciation and experience of it and its significance also has a bearing on the sensitivity of that asset to changes to its setting. While heritage assets of high or very high importance are likely to be sensitive to direct effects, not all will have a similar sensitivity to effects on their setting; this would be true where setting does not appreciably contribute to their significance. HES's guidance on setting makes it clear that the level of effect may relate to *"the ability of the setting* [of an asset] *to absorb new development without eroding its key characteristics"* (HES, 2020, 11). Assets with very high or high relative sensitivity to settings effects may be vulnerable to any changes that affect their settings, and even slight changes may erode their key characteristics or the ability of their settings to contribute to the understanding, appreciation and experience of them. Assets whose relative sensitivity to changes to their setting is lower may be able to accommodate greater changes to their settings without having key characteristics eroded.

10.5.11 The criteria used for establishing an asset's relative sensitivity to changes to its setting is detailed in Table 10.3. This table has been developed based on AOC's professional judgement and experience in assessing setting effects. It has been developed with reference to the policy and guidance noted above including SPP (Scottish Government, 2014), HEPS (HES, 2019a) and its Designation Policy and Selection Guidance (HES, 2019b), the Xi'an Declaration (ICOMOS, 2005), the EIA Handbook (SNH & HES, 2018) and HES's guidance on the setting of heritage assets (HES, 2020).

Table 10.3 - Criteria for Establishing Relative Sensitivity of a Heritage Asset to Changes to its Setting

Relative Sensitivity	Criteria
Very High	An asset, the setting of which, is critical to an understanding, appreciation and experience of it should be thought of as having Very High Sensitivity to changes to its setting. This is particularly relevant for assets whose settings, or elements thereof, make an essential direct contribution to their cultural significance (e.g. form part of their Contextual Characteristics (HES, 2019b, Annex 1)).
High	An asset, the setting, of which, makes a major contribution to an understanding, appreciation and experience of it should be thought of as having High Sensitivity to changes to its setting. This is particularly relevant for assets whose settings, or elements thereof, contribute directly to their cultural significance (e.g. form part of their Contextual Characteristics (HES, 2019b, Annex 1)).
Medium	An asset, the setting of which, makes a moderate contribution to an understanding, appreciation and experience of it should be thought of as having Medium Sensitivity to changes to its setting. This could be an asset for which setting makes a contribution to significance but whereby its value is derived mainly from its other characteristics (HES, 2019b).
Low	An asset, the setting of which, makes some contribution to an understanding, appreciation and experience of it should generally be thought of as having Low Sensitivity to changes to its setting. This may be an asset whose value is predominantly derived from its other characteristics

Relative Sensitivity	Criteria
Marginal	An asset whose setting makes minimal contribution to an observer's understanding, appreciation and experience of it should generally be thought of as having Marginal Sensitivity to changes to its setting.

10.5.12 The determination of a heritage asset's relative sensitivity to changes to its setting is first and foremost reliant upon the determination of its setting and the key characteristics of setting which contribute to its cultural significance and an understanding and appreciation of that cultural significance. This aligns with Stage 2 of the HES guidance on setting (HES, 2020, 9). The criteria set out in Table 10.3 are intended as a guide. Assessment of individual heritage assets is informed by knowledge of the asset itself; of the asset type if applicable and by site visits to establish the current setting of the assets. This will allow for the use of professional judgement and each asset is assessed on an individual basis.

Criteria for Assessing Magnitude of Impact

10.5.13 Potential impacts, that is the physical change to known heritage assets, and unknown buried archaeological remains, or changes to their settings, in the case of the Proposed Development relate to the possibility of disturbing, removing or destroying in situ remains and artefacts during the construction phase or the placement of new features within their setting during the operational phase.

10.5.14 The magnitude of the impacts upon heritage assets caused by the Proposed Development is rated using the classifications and criteria outlined in Table 10.4.

Table 10.4 - Criteria for Criteria for Classifying Magnitude of Impacts

Impact Magnitude	Criteria
High	Substantial loss of information content resulting from total or large-scale removal of deposits from an asset. Major alteration of an asset's baseline setting, which materially compromises the observer's ability to understand the contribution that setting makes to the significance of the asset and erodes the key characteristics (HES, 2020) of the setting.
Medium	Loss of information content resulting from material alteration of the baseline conditions by removal of part of an asset. Alteration of an asset's baseline setting that effects the observer's ability to understand the contribution that setting makes to the significance of the asset to a degree but whereby the cultural significance of the monument in its current setting remains legible. The key characteristics of the setting (HES, 2020) are not eroded.
Low	Detectable impacts leading to minor loss of information content. Slight alterations to the asset's baseline setting, which do not affect the observer's ability to understand the contribution that setting makes to the asset's overall significance.

Impact Magnitude	Criteria
Negligible	Loss of a small percentage of the area of an asset's peripheral deposits. A reversible alteration to the fabric of the asset. A marginal alteration to the asset's baseline setting.
None	No effect predicted.

Criteria for Assessing Significance

10.5.15 The predicted level of effect on each heritage asset is then determined by considering the asset's importance and/or relative sensitivity in conjunction with the predicted magnitude of the impact. The method of deriving the level of effect is provided in Table 10.5.

Table 10.5 - Level of Effect based on Inter-Relationship between the Sensitivity of a Heritage Asset and/or its setting and the Magnitude of Impact

Magnitude of Impact	Importance and/or Sensitivity				
	Negligible	*Low*	*Medium*	*High*	*Very High*
High	Minor	Moderate	Moderate	Major	Major
Medium	Negligible /Neutral	Minor	Moderate	Moderate	Major
Low	Negligible /Neutral	Negligible/ Neutral	Minor	Minor	Moderate
Negligible	Negligible /Neutral	Negligible /Neutral	Negligible/ Neutral	Minor	Minor

10.5.16 The level of effect is judged to be the interaction of the asset's importance and/or relative sensitivity (Tables 10.2 and/or 10.3) and the magnitude of the impact (Table 10.4). In order to provide a level of consistency, the assessment of importance and relative sensitivity, the prediction of magnitude of impact and the assessment of level of effect is guided by pre-defined criteria. However, a qualitative descriptive narrative is also provided for each asset to summarise and explain each of the professional value judgements that have been made in establishing importance and/or sensitivity and magnitude of impact for each individual asset.

10.5.17 Using professional judgment and with reference to the Guidelines for Environmental Impact Assessment (as updated) (IEMA, 2017), and the EIA Handbook (SNH & HES, 2018) the assessment considers **moderate** and greater effects to be significant (shaded grey in Table 10.5), while **minor** and lesser effects are considered not significant.

Integrity of Setting

10.5.18 SPP notes that where there is potential for a proposed development to have an adverse effect on a Scheduled Monument or on the integrity of its setting, permission should only be granted where there are 'exceptional circumstances'. Adverse effects on integrity of setting are judged here to relate to whether a change would adversely affect those attributes or elements of setting which contribute to an asset's significance to the extent that the ability to understand and appreciate the asset is diminished.

10.5.19 In terms of effects upon the setting of heritage assets, it is considered that only those effects identified as 'significant' in the assessment will have the potential to adversely affect integrity of setting. Where no significant effect is found it is considered that the integrity of an asset's setting

will remain intact. This is because for many assets, setting may make a limited contribution to their significance and as such changes would not affect integrity of their settings. Additionally, as set out in Table 10.4, lower ratings of magnitude of change relate to changes that would not obscure or erode key characteristics of setting.

10.5.20 Where significant effects are found, a detailed assessment of adverse effects upon integrity of setting is made. Whilst non-significant effects are unlikely to affect integrity of setting, the reverse is not always true. That is, the assessment of an effect as being 'significant' does not necessarily mean that the adverse effect to the asset's setting will harm its integrity. The assessment of adverse effect upon the integrity of an asset's setting, where required, will be a qualitative one, and will largely depend upon whether the effect predicted would result in a major impediment to the ability to understand or appreciate the heritage asset and therefore reduce its cultural significance.

Cumulative Effect Assessment

10.5.21 It is necessary to consider whether the effects of other schemes in conjunction with the Proposed Development would result in an additional cumulative change upon heritage assets, beyond the levels predicted for the Proposed Development alone. However, only those assets which are judged to have the potential to be subject to significant cumulative effects will be included in the detailed cumulative assessment provided.

10.5.22 The cumulative assessment will have regard to the guidance on cumulative effects upon heritage assets as set out in Environmental Impact Assessment Handbook V5 (SNH & HES, 2018) and will utilise the criteria for assessing setting impacts as set out above. The assessment of cumulative effects will consider whether there would be an increased impact, either additive or synergistic, upon the setting of heritage assets as a result of adding the Proposed Development to a baseline, which may include operational, under construction, consented or proposed developments as agreed with OIC.

10.5.23 In determining the degree to which a cumulative effect may occur as a result of the addition of the Proposed Development into the cumulative baseline a number of factors are taken into consideration including:

- the distance between wind farms;
- the interrelationship between their Zones of Theoretical Visibility (ZTV);
- the overall character of the asset and its sensitivity to wind farms;
- the siting, scale and design of the wind farms themselves;
- the way in which the asset is experienced;
- the placing of the cumulative wind farm(s) in relation to both the individual proposal being assessed and the heritage asset under consideration; and
- the contribution of the cumulative baseline schemes to the significance of the effect, excluding the individual proposal being assessed, upon the setting of the heritage asset under consideration.

10.5.24 This assessment is based upon a list of operational or consented developments along with developments where planning permission has been applied for. Cumulative developments are listed in EIA Report Chapter 6. While all have been considered, only those which contribute to, or have the possibility to contribute to, cumulative effects on specific heritage assets are discussed in detail in the text. Additionally, given the emphasis NatureScot place on significant effects, and the requirements of the EIA Regulations, cumulative effects have only been considered in detail for those assets where the impact on setting from the Proposed Development, alone, has been judged to be of **low** magnitude or greater. The setting of assets which would have a magnitude of impact of **negligible** or less are judged to be unlikely to reach the threshold of significance as defined in Table 10.5.

Requirements for Mitigation

10.5.25 National and local planning policies and planning guidance outlined in Section 10.3 of this report, require a mitigation response that is designed to take cognisance of the possible impacts upon heritage assets by a proposed development and avoid, minimise or offset any such impacts as appropriate. The planning policies and guidance express a general presumption in favour of preserving heritage remains in situ [wherever possible]. Their 'preservation by record' (i.e. through excavation and recording, followed by analysis and publication, by qualified archaeologists) is a less desirable alternative (SPP, 2014, paras 137, 150; OIC, 2017a, Policy 8).

10.5.26 The Proposed Development has been designed where possible to avoid direct impacts upon known heritage assets through careful siting of infrastructure. Where possible, impacts upon the setting of heritage assets have been avoided or minimised during the iterative design process.

Assessment of Residual Effect Significance

10.5.27 The residual effect is what remains following the application of mitigation and management measures, and construction has been completed and is thus the final level of impact associated with the Proposed Development. The level of direct residual effect is defined using criteria outlined in Tables 10.2, 10.3 and 10.4. No direct mitigation, beyond that inherent in the Proposed Development design, is possible for setting effects of the Proposed Development and therefore residual effects on the setting of heritage assets will be the same as predicted without mitigation.

Limitations to Assessment

10.5.28 This assessment is based upon data obtained from publicly accessible archives as described in the Data Sources in Section 10.5.4 as well as a walkover survey. NRHE data and HES Designation data were downloaded from HES in September 2020. This assessment does not include any records added or altered after this date. The walkover survey included survey of the intertidal zone down to the Mean Low Water at the south-east coast of Faray where impacts on potential buried remains are possible. Walkover survey of the Holm of Faray and the intertidal zone of other areas of the island to Mean Low Water were not undertaken as they will not be impacted by the Proposed Development. The search of databases and historical records included the Holm of Faray and all land down to Mean Low Water.

10.5.29 No intrusive archaeological evaluation has been undertaken to inform this assessment, as such there is the potential for hitherto unknown archaeological remains to survive within the site and to be disturbed by the works associated with the Proposed Development. This limitation is taken account of in the Mitigation Section where measures to avoid or minimise any such effects on hitherto unknown remains are provided for.

10.6 Baseline Conditions

Designations

10.6.1 A Scheduled cairn known as chambered cairn, 280m NW of Quoy, Faray (Site 1) (hereafter 'Quoy Chambered Cairn' extends within the north western site boundary (Figure 10.1). It is visible as a low, grass-covered mound with exposed structural stone features. The mound of the cairn is around 14 m in diameter and stands to 1.3 m at its maximum height (HES, 2019d).

10.6.2 There are no further designated assets within the site. Within 5 km of the site, there are 16 Scheduled Monuments (Sites 17, 22-25, 27-29, 33-35, 38-41 & 45), all of which date to the prehistoric period and the majority of which are ritual or funerary monuments. The Scheduled area of The Manse (Site 23) also includes a 19th century church and its associated enclosure walls. There are two Category B Listed Buildings (Sites 46 & 50), to the east and north of the site respectively and three Category C Listed Buildings (Sites 47-49).

10.6.3 Between 5 km and 10 km from the site, there are a further 15 Scheduled Monuments (Sites 15, 16, 18-21, 26, 30-32, 36, 37 & 42-44); which include 11 prehistoric funerary and burial monuments (Sites 18-21, 6, 32, 36, 37 & 42-44), two ecclesiastical buildings (Sites 16 & 31), a castle (Site 30) and a

Norse settlement (Site 15). Six Scheduled Monuments (Sites 123-128) located between 10 km and 15 km from the site are judged to be particularly sensitive to changes in their settings and/or representative of views from island locations beyond the 10 km study area.

Archaeological and Historical Background

Context

10.6.4 Faray has a spine of high ground running roughly north-south down the length of the Island, which rises to a maximum height of 32 m AOD, with land on either side of the spine falling gradually to the coast which varies from 3 m AOD to 18 m AOD depending on the coastal edge of the island.

10.6.5 The island is occupied by grassland and is subdivided by rectilinear drainage ditches. The greater proportion of the land has been improved, although limited areas of unimproved grassland survive along the coastal edge. The island is uninhabited and is currently used for sheep grazing. The upstanding remains of nine farm complexes, a former school, a boathouse, and jetty are located on the island.

10.6.6 Comparison between modern and historical maps of Faray show subtle changes and reduction in the coastline with land evidently lost to the sea since the 19th century. This loss is also apparent in comparison between survey photographs taken by the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) from 1981 and photographs taken to inform this assessment in 2020. Cultural heritage assets located on the coastal edge of Faray are highly vulnerable to erosion due to their proximity to coastal processes.

10.6.7 Descriptions of the Orkney Islands written in the 16th and 17th centuries refer to the island as “Faray” or "Fara.” In the 18th century these spellings continue to be found, but also “Faira” and “Fairay” occur. “Pharay” appears in the census records from 1841. In some cases the name was preceded by the word “North.” This was in an effort to distinguish the island from another Orkney island of similar name in the parish of Walls and Flotta, which was then called “South Faray” or “Fara.”

Prehistoric Evidence

10.6.8 The NRHE[2] records four prehistoric sites (Sites 1, 4, 6 and 9) within the site, one of which is a Scheduled Monument (Site 1). The Scheduled Quoy Chambered Cairn (Site 1) extends into the north-western site boundary. Dating evidence from similar chambered cairns indicates that it is likely to have been in use between 3600 BC and 2500 BC. Four horns, facing north-west, north-east, south-west and south-east were recorded when the cairn was visited in 1928, although only three were noted as being visible in 1981. The cairn was originally defined as an Orkney-Cromarty type short horned cairn, although the projections are now interpreted as later features and the cairn is now identified as a round cairn (Henshall, 1963, 198-9). Within the cairn (Site 1), which survives to c.14 m in diameter and approximately 1.3 m in height, is a stalled chambered aligned east north-east to west south-west and measuring 4.5 m long; and is characteristic of Orkney-Cromarty group round cairns (Richards, 1992). No evidence of human remains are recorded by the NRHE; however it is historically noted that a hollow in the cairn (Site 1) may be evidence of earlier investigations or interventions in the monument. Midden deposits containing burnt material, animal bones and pottery found by the presumed entrance to the cairn (Site 1) have been interpreted as evidence of secondary use of the monument. As the only known chambered cairn on Faray it may represent the single focus for burial and ritual for a prehistoric island community (HES, 2019d). The chambered cairn is indicative of an early prehistoric presence on the island.

10.6.9 The NRHE record a mound (Site 4) in the south-western area of the site. The mound (Site 4) is described as being shapeless, 25 m in diameter and surviving up to 1.5 m in height. The mound was first recorded in 1981 when it was noted that it may conceal earlier remains (RCAHMS, 1984). However no further work to discover the origin of the mound (Site 4) is known to have taken place.

[2] National Record of the Historic Environment (HES)

The mound was surveyed by AOC in August 2020 and found to be as described in 1981 and heavily overgrown with nettles and thistles. Occasional small stones are visible protruding from the mound.

10.6.10 Settlement remains were reportedly found at Site 6, in the western portion of the site. The settlement has been described as a "pictish house", in association with a midden deposit composed of limpet shells, although no datable evidence was recovered. Limpets have been documented as being eaten as a famine food, although they are also eaten by island and coastal communities throughout time. No evidence of Site 6 now exists as the stone was quarried for building material and therefore without further information, Site 6 may date to any period of time from the prehistoric period onwards.

10.6.11 There are no further prehistoric remains recorded on Faray, although to the north, on the Holm of Faray, a potential Bronze Age site (Site 9) comprising stone covered mounds, historically recorded as "graves" are currently considered to be evidence of Bronze Age settlement.

10.6.12 Within 5 km of the site, prehistoric activity, largely in the form of ritual, funerary and/or burial monuments abounds on the islands Eday to the east, Westray to the north-west, Rousay to the west and Egilsay to the south-west, which indicates a high level of activity in the northern isles of Orkney during the prehistoric period.

Early Historic Evidence

10.6.13 No known early historic remains or artefacts are recorded on the site. However, the potential "pictish house" (Site 6) may be of Early Historic date and several nausts (Site 11), or boat moorings often ascribed to the Norse period, have been identified on the south-east coast of Faray. An area known as 'Kirk Noust' is marked on Ordnance Survey mapping from 1881 and may denote the location of a former naust or boat landing place adjacent to the site of the former chapel at Site 8.

10.6.14 Approximately 9 km to the north-west, on the southern coast of Westray, lies the remains of what has been interpreted as a high-status Viking settlement (Site 15). The settlement remains are Scheduled. Approximately 7.7 km south-east of the site, the Scheduled Stackel Brae castle (Site 30) or defensive structure is also thought to date from the Norse period. Therefore, there is evidence of Early Historic activity in the northern Orkney Islands, albeit limited.

Medieval Evidence

10.6.15 No medieval remains or artefacts are recorded on the site.

10.6.16 In the wider 10 km study area the Scheduled medieval church of Cross Kirk, c.9.4 km north-west on the southern coast of Westray, and St Magnus' Church (Site 31), c.8.35 km to the south-west on Egilsay, are thought to date from the 12th century.

10.6.17 St Magnus church is dedicated to a local earl who was murdered by a rival Orkney earl (Haakon) on the island of Egilsay around AD 1116. It is one of three sites established in Orkney around 1136 to actively commemorate and promote a local saint who was the uncle of the ascending claimant to the earldom, Rognvald. The church at Egilsay is reflective of the wealth and sophistication of the Orkney Islands' 12th-century Golden Age, and the close relationship between the earldom and the church. The church tower is a unique survival of a small group of distinctive Norse towers in Orkney and Shetland with architectural parallels in North Germany and around the North Sea. It provides evidence for the far-flung, maritime trading and political contacts of the Orkney earldom (HES, 2004).

10.6.18 Faray and the associated parish of Eday appear to have been conjoined at an early date with Stronsay (Cowan, 1967, 58). The parsonage revenues of Faray and Eday pertained to the mensa of the Bishop of Orkney from a similarly early date and remained so at the time of the Reformation (1534) (Cowan, 1967, 58). In 1544, the vicarage teinds were assigned to the treasurer of Orkney. Faray was part of the Bishopric lands and the feu granted to Gilbert Balfour, the first of the Orkney Balfour family, in 1560. The Statistical Account of 1795 (Anderson, 1795) notes that 'the church on Faray, which has been in existence since the Reformation is dedicated to an unknown saint'. A mound in the south-east corner of the burial ground (Site 8), in the western area of the site, is thought to represent the remains of the chapel (RCAHMS, 1946, 72). Leslie (Leslie, 1998a) records

that Mary Groat from Lackquoy (1871-1940) remembered that part of the church was still standing in the late 19th century and that the remains of a stone fountain or urn used for baptism lay beside the ruins of a house known as 'the Bu' and may have come from the chapel.

10.6.19 An early traveller, generally given the name Jo Ben, described Faray in 1529 and noted that *"this island is very good for beasts, especially cows which crop the thickets there with great melody, and the children here sing to the brutes. The whole island is full of grain and fish"* (Ben, 1529).

10.6.20 It is possible that the structure at Site 6 dates from the medieval period. In addition, it is likely that at least some of the post medieval settlement remains (Sites 3, 5, 7, 10, 12 & 13) recorded across Faray have earlier antecedents.

Post-Medieval Evidence

10.6.21 Until 1724, Faray and the Holm of Faray remained with the Balfour family. With the marriage in 1724 of Isabel Balfour to Archibald Stewart of Brugh in Westray, it then became part of the Stewart Estate (Leslie, 1998a). The Old Statistical Account (OSA), written in 1795, notes that due to the exposure to sea spray the corn crop was regularly damaged. It is noted that Faray was well adapted to the pasture of cattle and sheep; and that tang (seaweed) was grown on some of its shores, for the manufacture of kelp (Anderson, 1795). Prior to 1852 Faray had no landing pier and no formal land divisions. Households had no official land division and the island operated a runrig system whereby each household was allocated and farmed rigs all across the island split according to relative fertility of land and between family groups creating a mosaic landscape typical of 19th century farming (Lee, 2015). The sheep were given free reign across the island in winter but in summer, when the crops started to grow, they were confined to the Holm of Faray. The sheep were prone to trying to cross from the Holm of Faray to Faray at each low tide and thus households were required to take turns at herding them back across to the Holm of Faray twice a day (Leslie, 1998a).

10.6.22 In 1802, the rental for 'Pharay' was £24 10/- Scots with additional payments of malt, butter, bere meal, geese, cabbages and hanks of spinning wool from the sheep grazing on the Holm of Faray. Cabbages were grown for the laird in quoys (enclosure for cabbage plants) and rent was paid to the factor who came twice a year. In 1810 Faray was under the ownership of James Stewart of Brugh in Westray and the rental returns of that year provide details of the tenants and the houses they occupied. The main occupations on the island were farming and fishing and a number of households were recorded at each croft. The censuses tend to indicate one man as the farmer while another would be a fisherman and others were farmer / fishermen and all the houses would have had a boat (Leslie, 1998a). Further details regarding the tenants at the farmsteads as noted in the census returns is recorded against the relevant entry in the Site Gazetteer in Appendix 10.1.

10.6.23 By 1845, the New Statistical Account (NSA) records Faray as "*Pharay"* and notes that there were 65 inhabitants, 40 acres of arable land and that the main produce was bere (a type of oat), oats, potatoes and cabbages. Animal husbandry on Faray consisted of sheep, pig, and oxen with horses also recorded. Only four boats are mentioned, two being described as herring boats and two as lobster boats. Kelp production is also documented (Simpson, 1845). There were also three stone quarries on the island (Leslie, 1998b).

10.6.24 A farmstead or house at "Bull" or "Bu"(Site 67) appears in the 1810 rental and the census for 1841. In 1810, the tenant of Bull was William Hercus who also had the tenancy of Lakequoy (Lackquoy) (Site 57). The lands of the Bu were located between Hamar (Site 55) and Lackquoy (Site 57). Bu is an old Norse word for a farmstead of high status. Leslie (Leslie, 1998a) describes the Bu as 'the head house' and notes that it was a two storey house in the centre of the island, close to Hamar, and enclosed by a stone dyke. It was used by the laird for his summer holiday accommodation. The Bu land became part of both Hamar and Lackquoy at the time of the "planking" and the building was demolished sometime between 1841 and 1851. The Bu is not mentioned or recorded in the OS Name Books of 1879-80. Another farmstead known as Mounthoolie is noted by a genealogy website relating to Faray which records field names associated with each farmstead and in relation to Windywall (Site 58) notes a field called Mounthoolie '*where the old house of Mounthoolie stood'* (Genealogy Northern-skies.net, N.D) No further references to a farm at Mounthoolie are made in rent returns, census records or historic mapping.

10.6.25 In 1852 Faray was 'planked' and boundaries were created between each farm. The planks were larger cultivated strips and divided regularly (Lee, 2015) unlike the small irregular strips of runrig land visible on aerial photographs and satellite imagery (Sites 69-72). At the time of the planking there were seven houses on the island and from north to south these were; Quoy (Site 51), Cott (Site 52), Doggerboat (Site 53), Hamar (Site 55), Lackquoy (Site 57), Windywall (Site 58) and Holland (Site 59). There were generally two dwelling houses on each farm although three are recorded at Lackquoy. The Groat family are recorded living at 'Lakequoy' in the mid-19th century. In 1866 a Mr Groat is recorded as having built a new dwelling at Roadside to accommodate himself and his new wife (Leslie, 1998a).

10.6.26 The house and farm at Ness (Site 60) in the south of the island were established in 1852 at the same time as the land divisions. A large wall or sheep dyke (Site 65) across the north of the island was also constructed in 1852 in order to keep sheep from crossing over the Lavey Sound at low tide from the Holm of Faray during the summer months when they were prone to eating crops. The construction of the sheep dyke negated the need for island inhabitants to monitor the Lavey Sound and herd sheep back to the Holm of Faray at each low tide (Leslie, 1998a).

10.6.27 Within the site, three unroofed buildings (Sites 5, 12 and 13) and two enclosures (Sites 7 and 10) are depicted on the first edition OS map and within 1 km of the site a further unroofed structure (Site 3) is recorded on the Holm of Faray. The old schoolhouse survives as the only roofed structure on Faray (Site 54). The school master in 1879-80 was Mr Harcus (OS1/23/4/68) who was resident of Doggerboat (Site 53) (OS1/23/4/83). He worked the farm at Doggerboat as well as teaching in the school. At this time, it was recorded that the roof in the school had started to leak so badly that people refused to send their children to the school. This prompted the laird to erect a new school on the island and rent it out to the school board. The new school was a combined house and school with a door from the dwelling house into the classroom. Masons came from Smitlady in Westray to build the school (Leslie, 1998a).

10.6.28 The OS Name Books of 1879-80 provides a record of the eight farms on Faray at that time. The island is described as being the property of the late Mr Stewart and having been left to the Church of Scotland. A 'brough' or broch is noted at the north end of the island and refers to the site of Quoy Chambered Cairn (Site 1) which throughout the 19th century was described as, and thought to be, a broch. All farms excepting Windywall, Holland, Ness and Doggerboat are described as encompassing single stone built dwelling houses. Holland, Windywalll and Ness are described as comprising two small dwelling houses whereas Doggerboat is described as a small farm house with cottages adjoining. Each house is described as single storey, stone built with thatched roofs with the majority being noted to be in 'good' or 'fair' repair. The small farm houses at The Hill and The Cott and the farm complex at Doggerboat are all described as being in 'poor' repair. The schoolhouse is noted as being in good repair with a slate roof. Stoves were likely installed in most houses in Faray by the time of the 19th century. The peats burned in the fireplace or stove would have come from the Holm of Faray or possibly Eday. Those from the Holm of Faray were not of particularly good quality (Ordnance Survey Books of Reference 1879-1880).

10.6.29 Fishing was a key part of the Faray economy in the 19th century and two big herring boats are noted by Leslie (Leslie, 1998a) as fishing off the coast of Faray and being hauled up at 'the West Geo'. Leslie also notes that there was also a lot of cod fishing and that "*all the south end shore was covered with split cod drying*". The fish was purchased by an Adam Finstown who had a shop in Beuth, Eday and bought the dried cod for shipping south. There was a salt store north of the boat house which was then also in use as a kelp store (Leslie, 1998a). Fishing for sillocks was also undertaken (sillocks are small coal fish/saithes or ceuthes). The fish were dried in the chimney of the open fires with peats and when they were so far dried they were put in the roof in nets. When they were so dry that they would break over they were tied in bundles of 100 and sent to Kirkwall. The remains of six nausts are recorded in the south of the island (Site 11). A naust was shelter above high water mark where a vessel could be safeguarded from storms. They were generally unroofed boat shaped stone settings open at the seaward end to admit the craft. Equipment such as ores were kept in the boats whereas other equipment such as sails, buoys and ropes required indoor storage. A bod or boathouse was therefore common close to the landing point with the gable seaward end bearing the door (Tait, 2012).

10.6.30 Leslie (Leslie, 1998a) notes that the population in Faray in 1852 was 100. The population of Faray fell from 82 in 1861 to 58 in 1891 (The Orcadian, 2018). The ownership of Faray passed down through the Stewart line to the last James Stewart of Burgh, who died unmarried in 1858. By a trust disposition and settlement dated 11th June 1858, it then passed to the Stewart Endowment.

10.6.31 Within the 5 km study area there are five Listed Buildings all of which date from the 17th (Site 46) to the 19th centuries (Sites 47-50). Two of the Listed Buildings; the Category B Carrick House (Site 46) and Category C Listed Eday Church (Site 47) are located on Eday to the west of the site. Rusk Holm house (Site 49), a Category C Listed Building is located on Rusk Holm to the west of the site. The Category A Listed Sangar Crofthouse (Site 50) and Category C Helzie, Rapness Windmill (Site 48) are located on Westray to the north-west.

Modern Evidence

10.6.32 The house known as the Bu (Site 67) was demolished by the late 19th century, however, Leslie (Leslie, 1998a) recalls that as a child the field where the house had stood was known as 'Bu land' and that the plough regularly brought up stones from the Bu. A note in the Orcadian on 3rd February 1938 records a sandstone whorl (Site 68) found by the farmer at Lackquoy in a meadow near the former house site at the Bu (The Orcadian, 1938).

10.6.33 In December 1908, a Peterhead fishing vessel the SS Hope ran aground on the Holm of Faray during a storm. Five men from Faray braved the storm in a rowing boat to rescue the crew. They subsequently each received a medal and other gifts from Edward VII and were referred to as the 'Faray Heroes' (The Orcadian, 2018).

10.6.34 One of the last burials in Faray is thought to have been that of Ann Drever, wife of William Wallace at the Ness. The gravestone in the burial ground (Site 8) notes that she died on 22nd October 1907. Subsequent burials would have been in the Old Kirkyard on Eday. In 1925, mason Alex Costie from Westray came over and built a dyke around the burial ground, which had not been enclosed previously. The remains of the chapel were incorporated within the dyke.

10.6.35 In 1933, only one house had the fields fenced and fencing of fields in grass was primarily undertaken after this time. In 1935 the council built a large concrete jetty on the west coast of Faray. This made a great difference to boating and allowed much easier shipping of cattle (Leslie, 1999b).

10.6.36 In November 1942, an aeroplane caught fire and was abandoned over the sea. The pilot was rescued after being in the water for 30 minutes by Mr Leslie of Holland. The pilot was taken to Faray and then transferred to Kirkwall. In June 1944 a Spitfire developed engine problems and the pilot, Flight Sergeant Miller, had to make a forced landing in a field at Lackquoy. The plane just missed a deep ditch and hit some new fencing that had been put up before coming to a halt. Parts of it were spread over two small fields. Flight Sergeant Miller was unharmed, and the plane was later dismantled and shipped off the island to be reassembled (McNeill, 2015).

10.6.37 Sustaining the small population of Faray in the 20th century, where much physical labour was required to move people, animals and supplies on and off the island, transportation and communication were difficult, and services such as a shop and post office were non-existent, was becoming increasingly difficult. The land became more difficult to let and crofts were amalgamated, the land at Quoy going in with Cott around 1931. Following the Second World War, it proved difficult to get a teacher for the island and the school closed in July 1946. The two remaining pupils from Windywall and Cott were sent to school in Westray with the intention that they would get back to the island at weekends. In view of the difficulty of transportation in winter, this did not necessarily happen and parents were unhappy with the arrangement and subsequently left the island (Leslie, 1998a).

10.6.38 Of the eight houses on Faray, only six were occupied by the end of the Second World War. The population at this time was around 20. The last inhabitants left over a short period of time, going to different parishes both on The Mainland of Orkney and in the North Isles. The Orcadian of 11th April 1947 carried an article on the evacuation of the island noting that "*Extensive advertising of the island holdings has failed to attract new inhabitants"* and that "*the troubles arising out of bad weather*

conditions and indicates the drop in manpower has made the hauling up of boats a serious handicap" (The Orcadian, 1947).

10.6.39 The islands of Faray and Holm of Faray were acquired by Orkney Islands Council in 2019.

Cartographic Evidence

10.6.40 Blaeu's first atlas of Scotland, published in 1654, includes a description of Faray noting that…"…*in a very savage and boundingly rising sea, lies North Fara, about three miles long, but restricted with few buildings, and not unfortunate in commodities".* Blaeu's 1654 map of Orkney and Shetland (not illustrated) is highly schematic and annotates an island as "*Fara"*, as the largest island between Westray and "*Eda"* in a shape not comparable to later records. Adairs' map of 1682 (not illustrated) is similar to Blaeus' although the island is annotated as *"Farra"*. Moll's map of 1745 (not illustrated) documents Faray as "*Faira"* and records the presence of a dwelling in the southern area of the island.

10.6.41 Mackenzie's charts of the Orkney Islands of 1750 (not illustrated) show a more accurate depiction of Faray in relation to surrounding islands and also shows a pictogram of a 'farmers house' showing that the island was occupied and used for agriculture but provides no further detail regarding land use. Sayer and Bennet's nautical map of the Orkney Islands dated 1781 records the island of Faray although no reference is made to the landmass nor are there any depictions to suggest activity on the island. Eunson's map of 1795 similarly shows no information about the land use on the site. Whilst Thomson's map of 1822 was not a nautically focused undertaking, the map records no further information about the land use on Faray in the early 19th century.

10.6.42 Large-scale (25 inch) Ordnance Survey (OS) maps are available for the site reflecting the fact that it was considered an inhabited area and thus targeted for detailed survey in the 19th century. The Ordnance Survey (OS) 25 inch maps were published in 1881 with a less detailed six inch map published in 1882 (Figure 10.6). The 1882 map provides a useful overview of the island showing areas of enclosed improved land in irregular and regular fields associated with farmsteads or crofts which are depicted and annotated (north to south) as Quoy (Site 51); Cott (Site 52); Doggerboat (Site 53), Hamar (Site 55); The Hill (Site 56), Roadside (Site 14); Lackquoy (Site 57); Windywall (Site 58); Holland (Site 59); and Ness (Site 60). The map also shows tracks such as Site 107 providing access between the farmsteads on the island. Numerous wells (Sites 109, 112 and 116-118) are also annotated. A crane (Site 130) is marked on the six inch OS map of Faray dated 1882 but rather curiously is not shown on the earlier large-scale OS map of 1881. Conversely cranes at Torhelia Geo (Site 129) and Rammy Geo (Site 131) are shown on the 1881 map but not the OS map of 1882. The cranes are all shown to be located on the coastal/cliff edge and were likely related to the fishing industry and/or boat landings. The variation in records of these features between maps of such close publication date may indicate that they were mobile or in use for only short periods of time. To the north of the site, the Holm of Faray is depicted as being joined to Faray, although the two are recorded as being separated at high tide. To the south, of the site, several arable fields are depicted, although no further structures are recorded on the OS maps of 1881 and 1882.

10.6.43 Extracts from the large-scale Ordnance Survey maps of 1881 are presented in Figures 10.7-10.11. Figure 10.7 shows the detail of the north part of the island. The Scheduled cairn (Site 1) which extends into the north-western boundary of the site is annotated as "*the site of Brough"*. The farmsteads of Quoy (Site 51) and Cott (Site 52) are also shown. Both farmsteads are shown to comprise extensive complexes of roofed structures with Quoy comprising six buildings and Cott comprising two parallel building ranges with ancillary structures to the north. Figure 10.8 shows the farmstead complex at Doggerboat (Site 53) north of the school (Site 54) which in turn is shown north of Hamar (Site 55). The farmsteads at Hamar and Doggerboat are shown to be connected by a track. Figure 10.9 shows the farmstead of Lackquoy located east of rectilinear fields with a spring shown to the north-west and a small pond to the south-west. North-east of Lackquoy the farmsteads of Roadside and The Hill are shown. Figure 10.10 shows the farmsteads of Windywall (Site 58) and Holland (Site 59) with associated irregular plots of enclosed land and tracks linking the land and farmsteads as well as a small pond. Figure 10.11 shows the farmstead at Ness (Site 60) and the boat shed (Site 75) to the south-east. No indication of the nausts at Scammalin (Site 11) are shown indicating that they were no longer in use at this time.

10.6.44 A disused graveyard (Site 8) and a school (Site 54) are also annotated within the site on OS mapping from 1881 and 1882.

10.6.45 Only the central portion of Faray is record on the OS 25 inch edition published in 1900. This map records the expansion of arable fields in the southern portion of the island between Windywall (Site 58), Holland (Site 59) and Ness (Site 60). Between 1881 and 1900 the tracks on the island and within the site appear to have been straightened and improved, potentially to better facilitate transport on the island.

10.6.46 There are no maps of Faray between 1900 and 1972. The OS Plan of 1972 records reduced and unroofed settlements at Quoy (Site 51), Cott (Site 52) Doggerboat (Site 53), The Hill (Site 56) and Lackquoy (Site 57). The structures at Hamar (Site 55), Windywall (Site 58), Roadside (Site 14), Holland (Site 59) and Ness (Site 60) are depicted as partially roofed. This indicates that Hamar, Windywall, Roadside and Ness had deteriorated in condition less than the other structures on the island and may have continued in some use for storage of equipment as part of the management of the island as a sheep farm.

10.6.47 By 1981, only the former school (Site 54), one of the buildings at Holland (Site 59) and buildings at Windywall (Site 58) are depicted as being roofed, which suggests that the structures on the site were not intensively used and were being left to deteriorate.

Aerial Photographic Evidence

10.6.48 A search of aerial photographs held by HES's National Collection of Aerial Photography (NCAP) revealed nine vertical sorties dating from 1946 to 1987 that covered the site.

10.6.49 A list of all photographs consulted is included in Section 10.14 of this chapter. The aerial photographs revealed numerous features relating to past land management practices across the site. Features visible on historical aerial photographs include runrig cultivation, rectilinear field boundaries and ditches, enclosures, farmsteads and the routes of former trackways linking farms. Areas of runrig identified from aerial photography includes Sites 69-74 and these areas are plotted on Figure 10.1 The features largely correspond with features that can be seen on modern aerial photography and satellite imagery and the majority of features identified corresponded to assets recorded during map regression. Features recorded during aerial photographic consultation were cross-referenced to historic mapping records and checked on the ground during the walkover survey.

Walkover Survey

10.6.50 The walkover survey was undertaken on 17th August 2020 in variable weather. Visibility varied from poor to very good and survey transects were adapted to visibility conditions accordingly throughout the day.

10.6.51 The most numerous asset types recorded during the walkover survey were clearance cairns. These cairns abound throughout the island and are variable in their size, style and likely function. The most numerous clearance cairn types are those found adjacent to large drainage ditches and are representative of stones cleared out of the ditch and placed adjacent to it such as Site 79 (Appendix 10.3; Plate 1). There are also numerous cairns placed close to, or at, the coastal edge such as Site 90 (Appendix 10.3 Plate 2). It is assumed that these represent stones removed from fields onto the least productive land on the edge of the island. It is likely that some also contain stones from previous built structures such as sheep enclosures, quoys, dykes and possible earlier prehistoric structures. Quoys or plantiecrubs were used for growing kale and cabbages and were a vital resource for providing crops and animal feed over the winter in the 18th and 19th centuries but would have been less frequently used and thus probably removed in the 20th centuries. Stone structural remains vary from coherent upstanding remains with plan form still visible and likely to be the remains of sheep enclosures or quoys such as at Site 111 (Appendix 10.3; Plate 3), to subtle semi-buried piles of stones which may be prehistoric in date such as Site 61 (Appendix 10.3 Plate 4). The presence of remains of quoys and enclosures across the island may be suggestive of earlier structures and/or settlement because the structures will have been placed on small patches of good

soil and were often sited adjacent to or on sites with availability or rubble from prehistoric ruins (Tait, 2012).

10.6.52 A distinct difference was observed in the style of cairns located on the east and west coast of the island. Cairns on the east coast predominantly comprise small tumbled mounds of stones arranged in relatively haphazard fashion (Sites 76 and 77) (Appendix 10.3 Plates 5-6). By contrast many (although by no means all) of the cairns on the west coast are neatly stacked in sub rectangular piles and often within a small dug out recess (Appendix 10.3 Plates 7-8). This difference in style and appearance of cairn may in part reflect differing geologies on the west and east coast of the island but may also reflect a cultural preference.

10.6.53 In the west of the island is a large mound (Site 4; Appendix 10.3; Plate 9) measuring 25 m across and up to 1.5 m high. It was first recorded by the RCAHMS in 1981 who noted that it may contain an ancient structure (RCAHMS, 1984). It comprises a large grass and thistle covered mound with a depression in the centre. Occasional stones are visible protruding through the mound bank.

10.6.54 The remains of a prehistoric chambered cairn (Site 1) are located in the north of the island. The cairn survives as a grass covered mound around 14 m in diameter 1.3 m at its maximum height (Appendix 10.3; Plate 10). The chamber is visible as a hollow in the centre of the mound in which three pairs of stalls divided by orthostats can be identified (Appendix 10.3; Plate 11). The cairn has evidently been partially excavated in the past and two linear features radiate from the north-east and south-west sides of the cairn. The remains of an extensive length of drystone walling (Site 65; Appendix 10.3 Plates 12-13) are located north of the cairn. The wall was constructed as a sheep dyke in the mid 19th century at the time of the planking and may incorporate some stones from the cairn. However, it is unlikely that the cairn was robbed extensively for building stone as its form and mound appear to survive relatively intact.

10.6.55 The remains of a burial ground and the site of a former chapel (Site 8) are located in the west of Faray. The burial ground is surrounded by a drystone wall with gate piers on its eastern end (Appendix 10.3 Plate 14). The burial ground enclosure was constructed in 1925 and is reported to contain stones from the remains of the former chapel. A long-term danger of erosion undermining the south-west corner of the graveyard was identified in 1981. Gabions in the south-west corner were recorded during the walkover survey and appear to be protecting the burial ground from erosion (Appendix 10.3; Plate 15). The burial ground contains c.30 upstanding or partially upstanding gravestones. Details of their inscriptions are included in the Site Gazetteer in Appendix 10.1. A small pile of indistinct rubble (Site 108; Appendix 10.3; Plate 16) partially overgrown is located south of the burial ground and may mark the location of a former structure.

10.6.56 The upstanding remains of nine farm complexes survive on Faray. Each farmstead survives in a state of disrepair and none could be entered or surveyed in detail due to health and safety concerns.

10.6.57 Quoy (Site 51; Appendix 10.3, Plate 17) is the most northerly house on Faray, lying closest to Lavey Sound, which separates Faray from the Holm. It was found to comprise a complex of five unroofed and partially ruined stone structures surrounded by dense nettle vegetation. All are of drystone flagstone rubble construction with dressed blocks for window and door lintels. All survive above wall height with most surviving to full gable height. The remains of large flagstone roof tiles survive on some structures and tumbled around the centre.

10.6.58 Cott (Site 52; Appendix 10.3, Plate 18) lies in the north end of Faray, between Quoy (the most northerly house) and Doggerboat. It comprises the remains of three rectangular buildings associated with a large walled sub rectangular enclosure to the north. Buildings are of drystone construction and built from flagstone rubble with dressed blocks for window and door lintels. The northernmost building is aligned east to west and is roofed with large flagstone tiles. Some gaps in tiles show wooden roof trusses beneath. The central building is aligned north-east to south-west and appears to be the remains of a dwelling house with a chimney surviving on its north-east elevation. Walls, gables and chimney are partially harled/consolidated with mortar. Remains of wooden window frames are also in place in the central building. The southern structure survives to gable height and is smaller and ancillary to the main house. Remains of partial walls hint at previous additional adjoining structures. The complex is in a partial state of collapse and surrounded by dense nettle vegetation.

10.6.59 Doggerboat (Site 53) is the third house from the north end of Faray, lying between Cott (Site 52) and the school (Site 54). The farmstead of Doggerboat (Appendix 10.3, Plate 19) is a late-18th or early 19th century single-storey, roughly rectangular-plan crofthouse built from grey flagstone rubble with lighter dressed blocks at corners and for window and door lintels. The principle range is aligned east south-east to west south-west with a large sub rectangular walled enclosure to the north. The range consists of three sub compartments, unroofed but with some partially collapsed wooden roof trusses surviving and rare flagstone roof tiles. A modern trailer is stored at the eastern end of the range. A separate structure is set off to the south-west and comprises a single room single storey sandstone unroofed structure. Both gable ends are intact.

10.6.60 The school (Site 54; Appendix; 10.3 Plate 20) is of drystone construction with a corrugated iron roof. It has a wooden extension, also with a corrugated iron roof, to its north elevation. The former school is used by the crofter for accommodation during lambing and for shelter during rough weather when it is not possible to leave the island. There is a fenced enclosure to north, partially constructed from large rectangular flagstone tiles and used for controlling sheep during shearing (Appendix 10.3 Plate 21).

10.6.61 Hamar (Site 55; Appendix 10.3; Plate 22) lies on the north end of the island with the school (Site 54) to the north and Lackquoy (Site 56) to the south. It lies on the east side of the road. It comprises the remains of a post-medieval farmstead complex with later alterations. Buildings are of drystone construction and built from red sandstone rubble with occasional darker sandstone dressed blocks. Two principal ranges of buildings are aligned roughly east to west with a large sub rectangular stone enclosure to north. The easternmost structure has a corrugated iron roof and is consolidated with mortar. All other buildings are unroofed. A slightly tapering, circular-plan kiln (Appendix 10.3; Plate 23) adjoins the south-east gable of the barn. The farmstead is located within an enclosure defined by wooden fences and is much overgrown with nettles.

10.6.62 Lackquoy (Site 57 Appendix 10.3; Plate 24) is situated in the middle of the island, to the south of Hamar (Site 55) and north of Windywall (Site 58). It lies on the west side of the road (Site 114) that runs from one end of the island to the other, but on the opposite side from Hamar. It is a late 18th or early 19th century single-storey east to west aligned range roughly rectangular in plan and built from grey flagstone rubble with lighter dressed blocks at corners and for window and door lintels. It is roofless but survives with gables largely intact. East of Lackquoy on the opposite side of the road are the remains of two structures which form part of the former farmstead of Roadside (Site 14 Appendix 10.3; Plate 25). The southern structure is aligned east to west and is unroofed. It is of drystone construction and built from rough red sandstone rubble with lighter dressed sandstone blocks at corners and for window and door lintels. The remains of a smaller structure are attached to the southern elevation with the south-east wall surviving to gable height. Substantial repairs are visible in the centre of the southern gable indicating perhaps a previous collapse or structural fail. The northern structure is partially roofed with large flagstone slabs. Some wooden roof trusses also remain in place as do door and window lintels. The western and northern elevations have been consolidated with mortar. Numerous building phases are visible in the western elevation as well as an infill wall linking the two structures. A small tumbled lean-to stone structure is attached to northern end of the west elevation. The farmstead is surrounded by nettles which probably mask further tumbled stone and roofing tiles. North-east of Roadside is The Hill (Site 56 Appendix 10.3; Plate 26) which survives as a single drystone sandstone structure roughly rectangular in plan. It is roofless but with gables largely intact.

10.6.63 Windywall (Site 58; Appendix 10.3; Plate 27) lies in the southern half of the island to the north of Holland, west of the road. It comprises the remains of two drystone rectangular structures positioned roughly at right angles to one another. One aligned roughly north to south with the other east to west in reverse L-shape. The southern and east to west aligned structure is unroofed but survives to gable height with chimneys intact on the west gable. The north (north-south aligned) building is partially roofed with large sandstone tiles. Large areas of tile are missing, showing wooden roof trusses beneath. A small lean-to structure is attached to the north elevation and is roofed with stone tiles. Both buildings have extended lengths of tumbled wall indicating the presence of previous structures.

10.6.64 Holland (Site 59; Appendix 10.3; Plate 28) lies towards the south end of Faray. It comprises the remains of four rectangular roofless structures with numerous areas of ancillary walling and tumbled stone piles indicating the likely presence of additional structures. All are of grey sandstone rubble drystone construction and survive above wall height but not to full gable height. The interiors of the structure are part infilled with tumbled stone and overgrown with nettles.

10.6.65 The Ness (Site 60; Appendix 10.3; Plate 29) is the most southerly of the houses on Faray and was constructed at sometime between 1841 and 1851. This was at the time of the planking and the end of the old runrig system of agriculture. Ness comprises the remains of five rectangular structures of dry rubble construction. Three of the buildings are arranged in a u-shape with two ancillary structures set off to south and east. The southern part of the U-shape is aligned east to west and has a corrugated iron roof and is used for storage. South of Ness are the remains of another building (Site 115 Appendix 10.3 Plate 30) surviving as tumbled stone walls and roughly rectangular in plan.

10.6.66 The road (Site 114) which runs north to south through the centre of the island is built of stone, wide, cambered and with banks and ditches at either side (Appendix 10.3; Plate 31). It is overgrown with grass and survives as visible grassy track (Appendix 10.3; Plate 32).

10.6.67 The slipway (Appendix 10.3; Plate 33) and boathouse (Appendix 10.3; Plate 34) are located in the south of the island. An alternative landing place for boats is located Djubi Geo (Appendix 10.3; Plate 35).

10.6.68 On the south-east coast of Faray four pointed-ended nausts set in two pairs were recorded by RCAHMS in May 1981 (RCAHMS, 1984). At this time, it was reported that all were truncated by erosion. Photographs by Lamb (Lamb, 1981) (SC 1922729; SC 1922731) show the openings of the nausts hanging 1 m above beach level. The former locations of the nausts were visited by AOC in August 2020. Two subtle depressions at the edge of the cliff possibly mark the locations of the nausts (Appendix 10.3; Plate 36) however the structural remains clearly visible on Lambs 1981 photographs no longer survive. It is concluded that the majority of the features have likely been lost to coastal erosion in the 40 years since they were identified by RCAHMS.

10.6.69 The remains of walling eroding from the north-western coastal edge were recorded at Muller Geo (Site 91) and possibly represent the remains of quoys or sheep shelters (Appendix 10.3; Plate 37). Their location eroding out of the cliff prevented any detailed survey of their extent. An area of stone on the south-east facing cliff at Scammalin (Site 132) possibly represents a structure eroding out into the sea (Appendix 10.3; Plate 38). The location on the coastal edge may indicate the remains of a structure associated with coastal industry such as kelp or fish processing. There are no above ground remains of the structure and it is buried below the surface and thus of some antiquity.

10.6.70 The remains of a large quarry scoop (Site 106) (Appendix 10.3; Plate 39) were recorded in the centre of the island near Kirk Noust and may be related to quarrying for stone for construction of the nearby farmsteads or burial ground wall. A number of later features relating to stock management were also recorded and included a sheep dip (Site 110 Appendix 10.3; Plate 40) and water tank (Site 93 Appendix 10.3; Plate 41). The remains of a small feature (Site 94 Appendix 10.3; Plate 42) of unknown function were recorded adjacent to a drain in the south of the island.

Evolution of the baseline

10.6.71 Future baselines (without the Proposed Development) would largely be expected to mirror the current baseline. Any alteration to the baseline condition of the heritage assets within the site would likely relate to continued deterioration of upstanding structures as a consequence of natural weathering and, in some cases, stock grazing. Analysis of historic mapping and previous archaeological survey photographs has revealed that land on the coastal edge of Faray has been lost to coastal erosion over the last 200 years. Loss of the site of boat nausts (Site 11) on the south-east coast has been documented within the last 40 years. Heritage assets located within the intertidal zone and at the coastal edge are therefore at risk from potential disturbance and/or loss as a consequence of coastal erosion and this risk is increasing due to sea level rises associated with climate change. The current baseline is taken as the basis for the construction effects assessment presented here.

10.6.72 The setting of the site and assets within the wider study area will be altered in the future through the construction of consented turbines and other developments. The effects of consented and proposed turbines on the setting of heritage assets is discussed under cumulative effects.

10.7 Receptors Brought Forward for Assessment

10.7.1 The baseline assessment (Section 10.6) has identified one designated asset and 88 non-designated assets located within the site which could potentially be affected by the Proposed Development. There are no previous modern archaeological interventions recorded on the site although antiquarian investigations have been noted above. Overall, there is considered to be a high potential for further previously unrecorded buried remains to survive on the site.

10.7.2 A Scheduled cairn (Site 1) is located in the north-west of the site. No further designated assets are recorded within 1 km of the site. This assessment has identified five Listed Buildings within 5 km of the site and a further 32 Scheduled Monuments within 10 km of the site. Six Scheduled Monuments (Sites 123-128) located between 10 km and 15 km from the site are judged to be particularly sensitive to changes in their settings and/or representative of views from island locations beyond the 10 km study area.

Receptors Brought Forwards for Assessment of Direct Effects

10.7.3 A total of 89 cultural heritage assets have been identified within the site. Their relative importance has been classified according to the method shown in Table 10.2 and is discussed below and summarised in Table 10.6

10.7.4 Quoy Chambered Cairn (Site 1) is of high importance. The cairn has the potential to contribute to our understanding and appreciation of the nature of prehistoric society in Faray. The cairn also contributes to our understanding of the design and construction of prehistoric burial monuments in the Neolithic period; it retains structural details in the form of its stalled chamber and there is potential for the survival of buried archaeological deposits. Although disturbed, the remains of the cairn have the potential to provide material for dating which when compared with similar monuments could contribute to a better understanding of the chronological development of cairn building during the Neolithic in the Orkney Islands. Additionally, there is the potential for environmental material to survive within the cairn which could provide information on demographics, land use and the Neolithic environment (HES, 2019d). The cairn is the only example of a chambered cairn on the island of Faray and as such was potentially the burial and ritual focus for the island, although the possibility that other cairns were previously located on the island cannot be ruled out.

10.7.5 A grassy mound which may conceal an earlier structure (Site 4) has been identified within the site. There is evidence of prehistoric activity on the site (Sites 1, 6 and 9) and therefore it is possible that the mound may conceal another prehistoric site. Equally the mound may relate to later agrarian practices. No structural remains could be identified and as such the nature and date of the mound remains unknown. It is possible given its location close to an earlier chapel site and nearby post-medieval farmsteads that this represents the remains of a farm mound of which there are also examples on the nearby islands of Papa Westray, North Ronaldsay and Sanday; some of which have been radiocarbon dated to the 7th century to 13th century AD (Davidson et al, 1986). Therefore, the mound (Site 4) is judged to be of medium importance. Similarly, the potential prehistoric settlement remains on Holm of Faray (Site 9) retain evidence for prehistoric settlement in an area in which known settlement and early activity is scarce, the remains of this asset have the potential to inform about early settlement of Faray and as such are judged to be of medium importance.

10.7.6 The potential "Pict's House" (Site 6) is judged to be of low importance. While the asset is described as being largely destroyed during post-medieval quarrying works it is possible that associated archaeological features may survive as buried remains in the vicinity of Site 6. The asset is likely to date prior to the late 19th century and as such if any remains do survive, they will add to the understanding of the long term settlement on the island.

10.7.7 The burial ground and associated site of a chapel (Site 8) within the western area of the site date to at least the 17th century and continued in use until the early 20th century. The former chapel building

is recorded as being quarried for stone to build the burial ground wall and potentially for other post-medieval structures on Faray. Therefore, there is the potential for buried remains associated with the chapel and burial ground to survive in the vicinity of Site 8. Any remains which do survive have the potential to further the understanding of the long term settlement and activity on Faray as well as the pre post-medieval ecclesiastical and burial arrangements of the smaller Orkney Islands and they are judged to be of medium importance.

10.7.8 Post-medieval deserted settlement remains on the Orkney Islands are not uncommon and it is widely accepted that the Orkney Islands had a relatively higher population in the post-medieval period compared to their current populations. Therefore, building remains, and historic field boundaries are relatively common features on the Orkney Islands. The remains identified and recorded across the island provide testimony to post-medieval and early 20th century land management practices.

10.7.9 The remains of the nine farmsteads (Sites 51-53 and 55-60), a former school building (Site 54) and a boathouse (Site 75) survive as visible remains of the 19th and 20th century settlement and eventual abandonment of Faray. The buildings comprise linear arrangements of single-storey, stone buildings with associated outbuildings including livestock sheds, barns and in the case of Hamar a kiln and are typical of traditional Orkney croft complexes which are usually single storey, low profile buildings made up of two or sometimes three rooms with an adjoining byre (Fenton, 1978). The presence of chimney stacks on the gables of the Faray houses indicates that the buildings were constructed or altered after 1830-1840, when flues in the gable end were typical (Newman, 1991) and thus the buildings within the site are likely of 19th century date although they may also incorporate earlier structural elements. The low form, thick and irregular rubble walls with gabled ends is typical of the region in protecting against Atlantic storms. The walls are largely constructed from undressed stone that is likely to have been gathered from surrounding land with dressed elements of stone incorporated for lintels, door and window surrounds and on building corners. Flagstone roofs, as a lapped and seamed underlayer for turf or thatch, is a traditional roofing method in Orkney, because of the abundance of flagstone. The weight of the flagstones were supported on timber rafters, particularly as larger quantities of timber were imported to the Orkney Islands from the Scottish Mainland during the 19th century (Fenton, 1978). Individually the non-designated post-medieval building remains (Sites 5, 7, 10, 12 & 51-60) recorded on the site are judged to be of low importance. However, together they form a corpus of evidence which documents the development of the island throughout the post-medieval and modern periods and preserve a palimpsest of evolving land management methods. The assets thus have a group historic and architectural value which is judged to be of medium importance.

10.7.10 Kilns were common on small crofts but surviving examples are now rare (Fenton, 1987). They were used to dry the grain for grinding and sometimes also the grain for the next years seed and were also used to dry malt as part of the process of making ale. The circular, tapering kiln at Hamar (Site 55) therefore is of medium value.

10.7.11 As shown on Figures 10.1 and 10.2 the site contains a dense concentration of individual assets recorded during the walkover survey. Twenty-nine (Sites 61-64, 78-81, 83-88, 90, 92, 95-100, 102-104, 113, 120, 122) of the 88 non-designated assets comprise the remains of small clearance cairns (Appendix 10.3; Plates 1-2 and 5-8). Individually they provide limited information regarding clearance of stone from the land for cultivation and associated digging of drainage ditches and are of negligible importance. However, together these assets represent the collective effort of the former residents of Faray in dividing and draining the land in the 19th century in an attempt to improve productivity and thus contribute to our understanding of local activity and are of low importance. Similarly the wells (Site 109, 112, 116-118) marked on historic OS maps are individually of negligible importance but are related to the wider management of water resources across the island and have a higher group value.

10.7.12 Numerous sites are known only from documentary evidence and have no above ground associated remains. These include three former cranes recorded from historic mapping (Site 129-130) and the record of the find of a sandstone whorl (Site 68) and are judged to be of negligible importance. The documentary records of the former location of the Laird's House or the Bu are associated with accounts of remains being found in the ploughsoil and are judged to be of low importance. The

remaining identified assets largely relate to historical land division and land management practices, specifically rig cultivation (Sites 69-74) and trackways (Site 105, 114) are typical of abandoned late post-medieval occupation evidence that abounds across the Orkney Islands. They are consequently judged to be of low importance.

10.7.13 It should be noted that some of the assets described above are subtle in nature and have an indistinct form and could thus potentially be of earlier date or natural origin. It is also possible that identified later assets may obscure and/or incorporate earlier features and as such the importance levels in Table 10.6 should be read as indicative.

10.7.14 **Table 10.6 - Archaeological and Cultural Heritage Importance of Features within the Site**

Site No	Name	Description	Importance	Group Value
1	Quoy Chambered Cairn	Scheduled cairn	High	N/A
2	The Castle	Non-designated asset – natural feature	None	N/A
3	Point of Dogs Bones	Non-designated asset - Structure	Low	N/A
4	Faray Mound	Non-designated asset- undated	Medium	N/A
5	Doggerboat	Non-designated asset- Post-medieval structure historic mapping	Negligible	N/A
6	Faray, Settlement (possible)	Non-designated asset- undated	Low	N/A
7	Holland	Non-designated asset- Post-medieval enclosure	Low	Medium
8	Burial Ground	Non-designated asset- Undated burial ground and chapel	Medium	Medium
9	Holm of Faray	Non-designated asset – prehistoric house	Medium	N/A
10	The Nev	Non-designated asset- Post-medieval enclosure	Low	Medium
11	Scammalin	Non-designated asset - nausts	Low	N/A
12	Holland	Non-designated asset- Post-medieval structure historic mapping	Negligible	N/A

Site No	Name	Description	Importance	Group Value
13	Quoy Noust	Non-designated asset- Post-medieval enclosure	Low	N/A
14	Roadside	Non-designated asset- Post-medieval buildings	Low	Medium
51	Quoy	Non-designated asset- Post-medieval buildings	Low	Medium
52	Cott	Non-designated asset- Post-medieval buildings	Low	Medium
53	Doggerboat	Non-designated asset- Post-medieval buildings	Low	Medium
54	School	Non-designated asset- Post-medieval buildings	Low	Medium
55	Hamar	Non-designated asset- Post-medieval buildings	Medium	Medium
56	The Hill	Non-designated asset- Post-medieval buildings	Low	Medium
57	Lackquoy	Non-designated asset- Post-medieval buildings	Low	Medium
58	Windywall	Non-designated asset- Post-medieval buildings	Low	Medium
59	Holland	Non-designated asset- Post-medieval buildings	Low	Medium
60	Ness	Non-designated asset- Post-medieval buildings	Low	Medium
61-64, 78-81, 83-88, 90, 92, 95-100, 102-104, 113, 120, 122	Faray, clearance	Non-designated asset – stone clearance associated with field drainage ditches	Negligible	Low
65	Lavey Sound	Non-designated asset – Sheep dyke	Low	Medium

Site No	Name	Description	Importance	Group Value
66	Lavey Sound, east	Non-designated asset – wall remnants, possibly part of sheep dyke	Low	Medium
67	Bu	Non-designated asset – documentary record Laird's House	Low	N/A
68	Lackquoy	Non-designated asset - Sandstone Whorl	Negligible	N/A
69-74,	Faray, rig cultivation	Non-designated asset – Rig cultivation	Low	Low
75	Ness	Non-designated asset – boat shed	Low	Medium
76	Ness	Non-designated asset – Post-medieval building remains	Low	Medium
77	Torhellia Geo	Non-designated asset – stone mound – possible cairn	Low	N/A
82	Hamar	Non-designated asset – Post-medieval building remains	Low	Medium
89	Point of Tobar	Non-designated asset - very small standing stone	Low	N/A
91	Muller Geo	Non-designated asset – wall remnants (eroding from cliff)	Low	N/A
93	Muller Geo	Non-designated asset – stone tank	Negligible	N/A
94	Quoy Noust	Non-designated asset - stone feature	Low	N/A
101	Roadside	Non-designated asset - Post-medieval buildings	Low	Medium
105	Holland to Ness	Non-designated asset - track	Negligible	Low
106	Kirk Noust	Non-designated asset-quarry scoop	Negligible	Low
107	Roadside to The Hill	Non-designated asset - track	Negligible	Low

Site No	Name	Description	Importance	Group Value
108	Kirk Noust	Non-designated asset – stone remains	Medium	N/A
109, 112, 116-118	Ness	Non-designated assets – well	Negligible	Low
110	Holland	Non-designated asset – trough/sheep dip	Negligible	N/A
111	Holland	Non-designated asset – Post-medieval building remains	Low	Medium
114	Faray Road	Non-designated asset - Road	Negligible	Low
115	Ness	Non-designated asset – Post-medieval building remains	Low	Medium
119	Ness	Non-designated asset - slipway	Low	N/A
121	Djubi Geo	Non-designated asset - slipway	Low	N/A
129-131	Cranes	Non-designated asset - slipway	Negligible	N/A
132	Scammalin	Non-designated asset – structural remains	Low	N/A

Receptors Brought Forwards for Assessment of Settings Effects

10.7.15 The Scheduled area of the only Neolithic chambered cairn (Site 1) on Faray, extends into the north-western site boundary. There are no further Scheduled Monuments recorded on Faray. There are 16 Scheduled Monuments recorded to the east and south of the site, on Eday between 1 km and 5 km from the site. ZTV analysis indicates that there will be no visibility from the five Scheduled Monuments on Eday within 5 km of the site;; Carrick House chambered cairn (Site 27); Sandhill burnt mound (Site 29); Fold of Setter, enclosure (Site 38); Huntersquoy chambered cairn (Site 41); and Carrick Farm chambered cairn (Site 45).

10.7.16 Within 10 km of the site there are a further 15 Scheduled Monuments. Three of which are located to the north-west on the south coast of Westray (Sites 15, 16 & 37); two are located on Egilsay to the west of the site (Sites 31 & 32); seven are located on Rousay to the south-west of the site (Sites 18-21, 36, 43 & 44); and a further three are located on the south coast of Eday (Sites 26, 30 & 42), to the south of the site. ZTV analysis indicates that there will be no visibility from the Scheduled Monuments on the southern coast of Eday (Sites 26, 30 & 42) or from the four Scheduled Monuments on Rousay (Sites 18, 19, 21 & 36) to the south-west of the site. As such, the setting of these Scheduled Monuments would not be significantly affected by the Proposed Development and therefore they have not been brought forward for further assessment further within this EIA Report.

10.7.17 There are five Listed Buildings located between 1 km and 5 km from the site; two of which are Category B Listed, Carrick House (Site 46) c.3.62 km east of the site on Eday, and Sangar (Site 50),

c.4.2 km north-west of the site on the southern coast of Westray. The other three Listed Buildings are Category C Listed and include Rusk Holm House (Site 49), a ruinous house on Rusk Holm c.1.61 km west of the site; Rapness Windmill Stump (Site 48) c.3.3 km north-west of the site on the south coast of Westray; and Eday Church (Site 47), c.4.19 km south-east of the site. ZTV analysis indicates that there will be no intervisibility between the Proposed Development and the Category B Listed Carrick House (Site 46) and the Category C Listed Eday Church (Site 47) on Eday to the east of the site. As such, the setting of these two Listed Buildings would not be significantly affected by the Proposed Development and therefore they have not been brought forward for further assessment further within this EIA Report.

10.7.18 Given the preliminary findings outlined above the following assets have been carried forward for detailed assessment:

- Seven of the 88 non-designated assets that have been identified on the site could potentially be directly impacted by the Proposed Development (Sites 5, 12, 73, 74, 109, 114 and 119) (Figures 10.1 and 10.2).
- The Scheduled Quoy Chambered cairn (Site 1) which extends into the north-western site boundary.
- Eleven Scheduled Monuments located between 1 km - 5 km from the site on Eday and the Calf of Eday (Sites 17, 22-25, 28, 33-35, 39 & 40) (Figure 10.3).
- Located between 1 km - 5 km one Category B Listed Building (Site 50) on Westray to the north of the site; and two Category C Listed Buildings, one on Rusk Holm (Site 49) to the west and one on Westray (Site 48) to the north of the site (Figure 10.3).
- Nine Scheduled Monuments (Sites 15, 16, 18, 20, 31, 32, 37, 43 & 44) located between 5 km and 10 km from the site (Figure 10.5); and
- Six Scheduled Monuments (Sites 123-128) located between 10 km and 15 km from the site judged to be particularly sensitive to changes in their settings and/or representative of views from island locations beyond the 10 km study area.

10.8 Standard Mitigation

10.8.1 National planning policies and planning guidance as well as the local planning policies require that account is taken of potential effects upon heritage assets by proposed developments and that where possible such effects are avoided. Where avoidance is not possible these policies require that any significant effects on remains be minimised or offset.

10.8.2 It is acknowledged that despite the walkover survey undertaken to inform this assessment, there may be further previously unrecorded subtle archaeological features within the site or hitherto unknown buried remains. Given the presence of known assets and the potential for presently unknown archaeological remains, in particular of post-medieval date, to survive within the site, a programme of archaeological works will be undertaken prior to the commencement of construction of the Proposed Development.

Protection of Archaeological Sites

10.8.3 Heritage assets within 50 m of the proposed working areas, including all areas to be used by construction vehicles, will be fenced off where appropriate under archaeological supervision prior to construction. This fencing will be maintained throughout the construction period to ensure the preservation of these assets.

10.8.4 The Applicant is seeking in-perpetuity consent for the Proposed Development. If further groundworks are required in the event of decommissioning, or replacement of turbines then all known sites within 50 m of the proposed working areas will be fenced off where appropriate with a

visible buffer under archaeological supervision. This will be undertaken prior to decommissioning in order to avoid accidental damage by heavy plant movement.

Archaeological Evaluation

10.8.5 A geophysical survey of the proposed access routes, cable routes, turbine locations, crane pads and other infrastructure will be undertaken. The geophysical survey will cover a 60 m buffer on either side of the proposed centrelines for the access tracks and cable routes so as to allow for micro-siting in the event of significant remains being identified during the trial trenching. A 50 m buffer around each of the proposed turbine locations will be covered to allow for micro-siting and the future presence of the turbines, as once constructed their magnetic signatures will prevent further magnetometry geophysical surveys from being undertaken within their vicinity.

10.8.6 The geophysical survey will be followed by trial trenching which will be targeted on any possible anomalies that were identified and will also include a representative percentage of the total footprint of the development infrastructure. Depending on the results of these investigations further works during construction including further excavations and/or an archaeological watching brief may be required. The purpose of the geophysical survey and the archaeological trial trenching will be to identify any archaeological remains threatened by the Proposed Development, to assess their significance and to mitigate any impact upon them either through avoidance or, if preservation in situ is not warranted, through preservation by record. Depending upon the results of the geophysical survey and the trial trenching there is the potential that further works, such as excavation and post-excavation analyses, could be required. Details of mitigation will be agreed with OIC in consultation with the Orkney Country Archaeologist through a Written Scheme of Investigation (WSI).

10.8.7 Any archaeological fieldwork commissioned in order to mitigate direct effects will result in the production and dissemination of a professional archive, which will add to our understanding of the cultural heritage of the island of Faray.

Development Design

10.8.8 The Proposed Development has been designed to present a clearly structured, balanced arrangement which responds positively to key landscape features and local topography. Steps have been taken to promote a simple balanced composition that minimises overlapping turbines, skyline effects and back-grounding (see Chapter 2 for further details). Consideration has also been given to other design issues, including turbine colour, size and siting; the design and form of the substation building; and the alignment of access tracks to ensure these proposed features relate to the key characteristics of the landscape. As setting effects largely result from the visual presence of the turbines within the landscape the same mitigation measures apply to setting effects on cultural heritage assets.

10.9 Likely Effects

Construction

10.9.1 During construction, direct physical impacts are likely to occur from site vegetation clearance, earthmoving operations, creation of the substation, road construction, and all associated infrastructure (turbine bases, compounds, drainage etc.). Setting impacts are likely to occur due to the introduction of construction machinery on site, additional construction traffic and construction of compounds. Settings impacts relating to construction are limited to those assets in close proximity to the proposed works and thus are largely limited to assets within the site.

10.9.2 There would be a medium magnitude of impact on the setting of the Quoy Chambered Cairn (Site 1) during construction of the Proposed Development which would necessitate heavy goods vehicles operating within 1 km of the cairn. The majority of construction activity, including that associated with the slipway, landing jetty, substation, construction compound and borrow pit search areas would be located greater than 1 km from the cairn. There would be no interruption of key views towards the cairn within Faray or of views across the coast from the cairn itself. However the

associated noise and views of large construction vehicles to the south may temporarily interrupt and affect the ability to understand the monument in its remote coastal setting. As a ritual funerary monument the cairn is of high sensitivity to changes in its setting. The temporary level of effect on the setting of the cairn would be **moderate** and significant.

10.9.3 The likely effects of construction activities upon setting would be temporary, short term and reversible, however, direct physical impacts and new infrastructure are usually permanent in nature and therefore have a lasting effect.

10.9.4 The Proposed Development has been designed to avoid direct impacts on known heritage assets where possible. The turbines and associated infrastructure have been sited to avoid directly impacting upon the Quoy Chambered Cairn (Site 1). A buffer of 500 m from the Scheduled Area has also been applied to ensure that there would be no damage to any buried remains associated with the monument from vibrations caused by earthworks required for construction of the Proposed Development.

10.9.5 Seven of the 88 non-designated assets that have been identified on the site could potentially be directly impacted by the Proposed Development (Sites 5, 12, 73, 74, 109, 114 and 119) (Figures 10.1 and 10.2).

10.9.6 Sites 5 and 12, were identified by the First Edition Mapping Survey Project run by RCAHMS in 2000 which recorded the location of two unroofed structures shown on the 1st edition of the OS six-inch map but not shown on later maps. Similarly, Site 109 comprises the site of a well shown on OS maps from 1881 but not shown on current mapping. In all three cases no trace of the structures is visible on the ground and they are judged to be of negligible importance (Table 10.6). The Proposed Development would likely remove any surviving deposits associated with these remains and would thus constitute a high magnitude of impact. The level of effect would therefore be **minor** and not significant in each case.

10.9.7 Two of the assets (Site 73 and 74) were recorded on aerial photographs and satellite imagery as part of this assessment and comprise the remains of rig agriculture. Remains of rig cultivation are commonly encountered across the Orkney Islands and indeed across Faray and these examples are considered to be of low importance (Table 10.6). As shown on Figure 10.2, the Proposed Development would impact upon only part of each recorded area of rig cultivation and thus result in an alteration in baseline conditions caused by removal of part of each asset. The magnitude of impact would therefore be medium in each case. The level of effect would be **minor** and not significant.

10.9.8 Site 114 comprises the remains of a road that runs north to south along the spine of the island. It was constructed by the council in the early 20th century. The road is built of stone but is overgrown with grass and survives as a grassy track with visible banks and ditches at either side. The road connects the main farm complexes along the island and roughly follows the route of an earlier north to south aligned track shown on OS mapping of 1882 (Figure 10.6). The Proposed Development would impact upon part of the road in the centre of the island where the access track would follow the alignment of the road. The construction of the access track would thus remove some deposits associated with the road but would maintain its alignment and thus it would remain legible as the principle access through the island. The road survives best to the south of the farmstead at Ness (Appendix 10.3; Plate 31) where the banks and ditches either side can be seen. This section of the road would not be impacted by the Proposed Development and thus evidence for its construction and form would be preserved. The overall magnitude of impact on the road is judged to be medium. The level of effect would be **minor** and not significant.

10.9.9 Site 119 comprises the remains of the concrete slipway which was constructed in 1935 to improve access to the island. Although of relatively late date and modern construction, the slipway survives as one of the last alterations to the built heritage of the island prior to its abandonment in 1947 and is of relevance in understanding how access has been gained to the island in the 20th and 21st centuries. The Proposed Development would require the removal of the slipway and replacement with a more substantial and modern structure. While the asset will be removed in its entirety it will be replaced by a structure preforming a similar function and thus the ability to understand this part

of the island as the principal historical and modern access point would be retained. On balance the magnitude of impact is judged to be medium. The level of effect would be **minor** and not significant.

10.9.10 Aerial photographic analysis and the walkover survey have shown that the site has been subject to some previous disturbance from ground improvement drainage works in the 19th and early 20th centuries and these works may have disturbed superficial buried deposits on the site. However, study of documentary records relating to past land use in Faray has demonstrated the potential for buried remains relating to earlier land use as evidenced by records of ploughing upturning structural remains of the Bu and the finding of a spindle whorl over 0.3 m below the ground surface. Additionally, ongoing coastal erosion has exposed structural remains (Site 132) on the south-east coast of the island. There remains, therefore, a clear potential for further previously unknown buried remains being disturbed during the construction phase of the Proposed Development.

10.9.11 Given this, a mitigation strategy will be required to safeguard and, where necessary, record any such remains. A four-stage mitigation strategy including survey, archaeological evaluation followed by excavation and/or watching brief and post-excavation analysis will be undertaken as set out in Section 10.8 above.

10.9.12 The level of any potential effect on previously unrecorded remains cannot be quantified at present as the significance of any further assets which may be present on the site is, by their very nature unknown. However, should any previously unrecorded important remains be identified on the site, either through geophysical survey, trial trenching or subsequent works they will be subject to an appropriate archaeological mitigation strategy, the results of which will contribute to our overall understanding of Faray's past and therefore create a beneficial legacy.

Operation

10.9.13 Direct effects upon any previously unknown archaeological remains which may be present on the site would cease with the completion of the groundworks stage of construction and consequently no direct effects are predicted during the operational phase of the Proposed Development. All operational phase effects would thus be limited to impacts upon the settings of assets such as Scheduled Monuments and Listed Buildings as well as the character and setting of the post-medieval agricultural landscape of Faray.

10.9.14 ZTV analysis and mapping have been used to identify those designated assets that could potentially be affected by changes to their settings during the operational phase of the Proposed Development and the assets that have been carried forward for detailed assessment have been outlined in paragraphs 10.7.15 to 10.7.18 (above). The detailed assessments have included a review of the contextual characteristics of each asset using information drawn from their designation documentation, supplemented by observations on the morphology, condition and character of each asset and the nature of their settings made during site visits undertaken in October 2019[3] and August 2020.

10.9.15 The settings assessment found that the effect of the Proposed Development upon the setting of the Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Vinquoy Hill Chambered Cairn (Site 40) and the Faray post-medieval landscape would be **moderate** and significant. The assessment found that the effect of the Proposed Development on the setting of the remaining 27 designated assets brought forward for assessment would not be significant as the effect levels would be **neutral** to **minor**. These findings are listed in Table 1 within Technical Appendix 10.2. A summary discussion for the assets subject to detailed assessment is provided within Appendix 10.2 and has been informed by ZTV modelling, site visits, photomontages and wireframes (Figures 10.12-10.25) as appropriate.

Quoy Chambered Cairn (Site 1)

10.9.16 The Scheduled Quoy Chambered Cairn (Site 1) comprises a low, grass-covered mound recently rescheduled as the remains of a chambered cairn dating from the Neolithic period, probably built

[3] For practical reasons it was not possible to visit those designated assets that are located on islands which are not served by Orkney's scheduled public transport service.

and in use between 3600 BC and 2500 BC. The mound of the cairn is around 14 m in diameter and stands to 1.3 m at its maximum height. The chamber is visible as a hollow in the centre of the mound in which three pairs of stalls divided by orthostats can be identified. Two linear features radiate from the north-east and south-west sides of the cairn. A roughly triangular raised area measuring around 6.7 m long, 2 m wide and 0. 2m high, with one side slab and two smaller stones protruding from it, is visible to the west north-west of the cairn (HES, 2019d). The monument occupies an area of rough pasture set slightly back from the remains of a 19th century sheep dyke which in turn is located on the edge of a low sea cliff on the north-west coast of Faray. Approached from the south and east the monument is visible as a low grassy mound which is legible to an informed observer as a prehistoric monument from approximately 500 m away (it is however noted that the distance where it would become apparent to a layperson is expected to be significantly less). On approach from the north along the narrow strip of land that links Faray with the Holm of Faray, the cairn is visible as a low mound against the skyline with the ground gradually rising behind it.

10.9.17 The cairn has a coastal setting defined by wide open vistas across the sea to west, north and east. To the south, the setting comprises open low gradually rising semi-improved grazing land. The farmstead of Quoy is visible south south-east of the monument and is seen silhouetted against the skyline. The wider setting includes extensive views over coastal waters in a wide arc from the west over Westray Firth to the southern tip of Westray, north over Holm of Faray to Westray and east over the Sound of Faray to Eday. Land rises to the south of the chambered cairn foreshortening views across the island of Faray.

10.9.18 The location of the Quoy Chambered Cairn at the edges of cultivated land suggests that the relationship between the cairn and the agricultural land was actively minimised. Woodman found that the majority of Neolithic monuments in the Orkney Islands are situated on the coast overlooking large areas of seascape (Woodman, 2000) and thus the example at Faray is typical of the regional distribution of cairns and suggests that the siting of such monuments were concerned with relationships between islands and the sea routes that united them rather than the interior of the islands on which they are located. Noble (Noble, 2006, 109) argues that the individual islands of the archipelago are unlikely to have been isolated and divided and that coastal links between communities is signified by the siting of cairns overlooking wide coastal vistas.

10.9.19 The cairn commands wide views across the coast to Westray and Eday and has clear views of Vinquoy Hill and the Hill of Linkataing and thus may have originally been intervisible with the chambered cairns (Sites 40 and 17) located on the shoulders of these hills. HES (HES, 2019d) suggest that as the only chambered cairn on Faray, the monument may represent the single focus for burial and ritual for an island community. However, it remains possible that other prehistoric funerary monuments were once located on the island and that they have been removed by later agriculture and settlement activities. The dense cluster of prehistoric funerary monuments on Rousay and Eday are located on two of the least fertile islands in the Orkney Islands and hence in locations least susceptible to damage by ploughing and the improvement of land (Davidson and Henshall, 1989: 14). Evidence for agricultural improvements abounds around the farms on Faray and thus the possibility that other prehistoric monuments were associated with the Quoy Chambered Cairn cannot be ruled out.

10.9.20 The remote and open coastal setting of the Quoy Chambered Cairn contributes to the understanding of the asset as a funerary monument constructed in an isolated location at the margin of fertile land with excellent surveillance opportunities across the sea and to nearby islands. The low rising hills of the site to the south form part of the wider setting of the cairn and form a contrast to the extensive coastal setting in other directions. The setting of the cairn thus contributes to an understanding of its cultural value and it is of high relative sensitivity to changes within its setting.

10.9.21 As shown on the appended photomontage (Figure 10.12) all of the Proposed Development turbines would be visible to below hub height in views south from the cairn. The nearest turbine would be located 550 m south of the cairn and would be seen to full height and at this distance would be a prominent feature. Aviation obstruction lighting would be fixed to each turbine providing a steady red medium intensity light. In accordance with guidance the lighting would reduce in intensity below the horizontal to minimise the downward spillage of light and thus would be of limited intensity when viewed from ground level. The turbines would be seen offset from the distinctive silhouette

of the Quoy farmstead on the ridge of the island but they would appear as substantial features against the skyline to the east of the farm. Figure 10.13 shows the predicted view of the Proposed Development in views towards Quoy Chambered Cairn from Doggerboat (Site 53) to the north. This location was selected to show a worst-case scenario at a high point of the island where both the Proposed Development and the cairn would theoretically be visible. As shown on Figure 10.13s, it is not possible to distinguish the Quoy Chambered Cairn from the surrounding grass vegetation from this location owing to its low height and the intervening landform. The photomontage shows that a single turbine (Turbine 1) would be visible in views north towards Quoy Chambered Cairn from this location and that it would be a prominent feature in these views. However, as it is not possible to distinguish the cairn at this distance, there would be limited impact on views towards the cairn from across the island. Closer views of the cairn, from where the monument is distinguishable would not be impacted by the Proposed Development.

10.9.22 The Proposed Development would be visible in views towards Quoy Chambered Cairn on approaches to the island by sea from the Westray ferry route to the north-west. From here it is difficult to distinguish the cairn from the surrounding grassland but the turbines would appear in the background as substantial features breaking the skyline. The cairn is not distinguishable from the North Ronaldsay ferry route to the north-east and also cannot be seen from the coast of Eday.

10.9.23 The Proposed Development would thus represent a notable alteration to the setting of the monument beyond those elements which directly contribute to an understanding and appreciation of its cultural value, i.e. the coastal setting, but would encroach upon the wider topographic landscape setting as shown in Figure 10.13 The magnitude of impact would be medium and the level of effect would be **moderate** and significant

10.9.24 The Proposed Development would not adversely affect the ability to understand the cairn's critical relationship with the coast and surrounding islands. The turbines would be located within the island interior at the core of the agricultural land and would thus be separate from the marginal rough grassland in which the cairn is set. There would be a clear separation between the cairn's coastal setting and the Proposed Development. The ability to view the cairn in isolation from the Proposed Development on approach to it from the south would be maintained and views out over the cairn to sea would be unaffected. The key relationship between the monument and the coast would remain legible and thus the overall integrity of its setting would not be adversely affected.

Muckle Hill of Linkataing Chambered Cairn (Site 17)

10.9.25 Muckle Hill of Linkataing, chambered cairn, homestead and field system (Site 17) is set in sloping heather and peat moorland on a north-west facing slope on Eday at approximately 25 m above ordnance datum (AOD). The hill slopes directly down to the sea providing panoramic views over the Sound of Faray to the south-west and the small island of Red Holm and Westray to the north-west. There are no obvious visual relationships with other chambered cairns except for, theoretical intervisibility with the Quoy Chambered Cairn assuming that is was once more conspicuous.

10.9.26 The monument comprises three discrete archaeological entities. The principal monument consists of four stones in a regular setting which may represent the remains of the chamber of a chambered tomb, although no trace of a cairn is visible and no discoveries of human remains are recorded. The second component consists of two, possibly three, low banks with a large, earth fast saddle quern at their centre, interpreted as a dwelling. The third component is a curvilinear stone wall that has been exposed by peat cutting. Neolithic chambered cairns such as Muckle Hill of Linkataing are considered to have a high relative sensitivity to changes to their settings as they were placed purposefully within the landscape, often in relation to topographical features such as ridgelines, watercourses and coastlines or in relation to other monuments. This is particularly true of the Orkney Islands where chambered cairns often have clear visual relationships with bodies of water including the firths and channels which interweave between the islands.

10.9.27 As shown on Figure 10.14 all six turbines of the Proposed Development would be clearly visible from the chambered cairn. The lower portions of turbines T6, T3 and T1 would be hidden from view by the intervening landform which surrounds the turbines and also by the shoulder of the Muckle Hill of Linkataing. Visibility of the Proposed Development would be greatest in the south-west of the

monument closest to the coastal edge and would be reduced in the north of the Scheduled Area where only 1-2 turbine tips would be visible. There would be no visibility of the Proposed Development from the north-east of the Scheduled Area which includes the stone wall. The turbines would be seen at a distance of 3 km from the chambered cairn, where they would be seen to break the skyline and would appear as prominent vertical features in an otherwise open view of low-lying hills. The Proposed Development would be seen beyond the core setting of the monument which is defined by the broad shoulder of the hill upon which it stands and views over the sea to the north-west. The Proposed Development would thus alter the baseline setting of the monument and would draw the eye in the direction of views towards Faray rather than the more extensive views out to Westray. This would have some impact upon an observer's ability to understand and appreciate the monument. However, the cultural significance of the monument in its current setting would remain legible and as such the integrity of its setting would not be affected. The magnitude of impact is judged to be medium. The level of effect would be **moderate** and significant.

Vinquoy Hill Chambered Cairn (Site 40)

10.9.28 Vinquoy Hill, chambered cairn (Site 40) is a Maeshowe type chambered cairn of Neolithic date. It survives as a circular heather-covered mound, measuring approximately 18 m in diameter and standing up to 3 m high. The entrance is on the south side and the 5 m long passage and chamber are partly subterranean, cut back into the hill. The monument has been restored to enable public access and is now part of the Eday Heritage Trail. It has a modern glass dome window and a ventilation pipe set in a concrete slab on its top. This suggests that it has been re-roofed to allow public access to its chamber and it is therefore unclear how much of this conspicuous mound is authentic and how much is a modern reconstruction. A large metal cylindrical modern water tank is located 10 m south-west of the monument and, along with its associated post-and-wire fence enclosure and access track, dominates the setting and views south-west from the monument. All five of the Spurness Point turbines on Sanday are visible in views east of the cairn. Vinquoy Hill chambered cairn is located in a prominent position on the south shoulder of Vinquoy Hill at 74 m AOD just below the highest point of the island, the summit of Vinquoy Hill to the north lies at 76 m AOD. This location is exactly where the cairn becomes visible from most of the northern part of Eday and from the islands of Westray and Sanday (Ritchie, 1995: 48).

10.9.29 The monument commands panoramic views across the landscape the most extensive of which are views over Calf Sound to the north-east and across the Sound of Faray to the west. The placing of a chambered cairn on one of the highest available points of the landform of the island is not coincidental and suggests that value was placed on these views during the Neolithic period. The alignment of chambered cairns is also considered to be a factor in understanding the cultural significance of the monuments and their settings. Vinquoy Hill is aligned with Huntersquoy chambered cairn (Site 41), Carrick Farm chambered cairn (Site 45), Fold of Setter ritual/ceremonial enclosure (Site 38) and the Stone of Setter standing stone (Site 39) all of which are located south-east of Vinqouy Hill within 1.24 km of the monument. The chambers within Neolithic cairns were typically orientated towards their entrances and views from these entrances can often be seen to be focussed on topographical features or watercourses. In some instances, the entrances appear to have been purposefully aligned towards solar events. Archaeological evidence also suggests that feasting or other activities took place in front of the entrances at many chambered cairns. Neolithic chambered cairns are therefore considered to be particularly sensitive to changes along the alignments of their internal chambers, passages and entrances. In the case of Vinquoy Hill with its south facing entrance and key visual links to monuments to the south-east, it can be judged to be of greatest sensitivity to changes in its setting to the south-east and along the north to south aligned ridge of Vinquoy Hill.

10.9.30 Figure 10.18 presents a wireline view of the Proposed Development from Vinquoy Hill chambered cairn. Figure 6.20 presents a photomontage from the summit of the nearby Vinquoy Hill and shows the chambered cairn as a grassy mound north-east of the water tank. Both visualisations show full visibility of the Proposed Development at a distance of 2.9 km west of the monument. The turbines are visible to their full height, backdropped against the low hills of Rousay with the tips of all six turbines breaking the skyline. Aviation obstruction lighting would be fixed to each turbine providing a steady red medium intensity light and would also be visible. At this distance, the Proposed

Development would represent a substantial change to the setting of the monument and would be a prominent feature in views west from the monument. The Proposed Development would also be visible in views towards Vinquoy Hill chambered cairn when viewed from the chambered cairn at the Calf of Eday (Site 28) from where turbine tips would be seen to backdrop the cairn. However, the Proposed Development would occupy only a proportion of the overall view from the monument. It would not interrupt key views along the north-south aligned ridge of Vinquoy Hill nor would it feature in key views south-east from the monument to other prehistoric funerary monuments on Eday. Therefore, these elements of its setting, which directly contribute to our understanding of the monument's cultural significance, would not be impacted. The magnitude of impact is judged to be medium the level of effect would be **moderate** and significant.

10.9.31 The monument's contextual relationship with the coast and the firths will remain clearly legible as will its visual relationship with other prehistoric monuments on Eday and as a consequence the relationship between the cairn and its setting will be preserved. For these reasons, although the Proposed Development would represent a notable alteration to the setting of Vinquoy Hill, those elements of the setting which directly contribute to our understanding of the cairn's cultural significance would remain legible and the overall integrity of the setting would not be adversely affected.

Faray Post-medieval Landscape

10.9.32 As demonstrated by this assessment, the island of Faray preserves evidence of human activity from the Neolithic period onwards. Due to abandonment of the island in the mid-20th century the preservation of standing buildings, and archaeological remains dating to the late 19th century and early 20th centuries is particularly good. The upstanding building remains, taken together with the rectilinear land divisions and associated clearance cairns form a corpus of evidence which documents the development of the island throughout the post-medieval and modern period and preserve a palimpsest of evolving land management methods. The remains of the principle farmsteads on Faray occupy a low ridge which runs north to south along the spine of the island and as a consequence the structures can be seen as distinctive silhouettes in views across the island itself and in views to the island on approach from the sea and also from surrounding islands.

10.9.33 As domestic agricultural dwellings, the setting of the post-medieval farmsteads and their associated land divisions relate primarily to the immediate adjacent associated former cultivated in-field land and the rough grazing out-field land on the costal edge. The landscape is primarily functional and is of low relative sensitivity to changes in its setting. Figure 10.13 shows the predicted views of the Proposed Development from the farmstead of Doggerboat (Site 53). This shows turbines located within the immediate setting of the farmstead from where they would appear to dominate the remains. The turbines would be located within the core setting of the post-medieval farmsteads within areas of former cultivation and would be a substantial alteration to the historic character of the landscape which may affect the way that some observers are able to understand and appreciate these remains. This is particularly true of views towards Faray from the coast and neighbouring islands from where the turbines would be seen to dominate the farmstead buildings replacing them as the most distinctive skyline features in views towards the island. The change in the distinctive profile of the island, in combination of the placement of turbines within the core setting of the farmsteads would constitute a high magnitude of impact. The level of effect would be **moderate** and significant.

10.9.34 The Proposed Development has been designed with reference to the historic farmsteads, road and land divisions and as such all of the core elements of the post-medieval landscape will be retained in situ. It will consequently remain possible to understand the post-medieval abandoned landscape of Faray including relationships between the individual farmsteads, their land divisions and the relationship with the coast. As such the overall integrity of the setting of the post-medieval landscape would not be affected.

Decommissioning

10.9.35 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be

similar but of a lesser level than those predicted during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

10.10 Additional Mitigation and Enhancement

10.10.1 A detailed methodology for addressing direct impacts has been described in Section 10.8 above. Depending on the results, the proposed investigations have the potential to add to our understanding of the Orkney Islands' archaeological and built heritage and could provide opportunities for further academic studies going forward. The publication of the results would therefore constitute a beneficial enhancement.

10.10.2 It is evident from comparison between photographs from archaeological surveys undertaken by RCAHMS in 1981 and today that land on the south-east coast has been lost and continues to be lost to coastal erosion. Loss of archaeological remains to coastal erosion is a problem throughout the Orkney Islands (see Gibson, 2008) and is expected to worsen as a result of sea level rises associated with climate change. The remains of two possible structures (Sites 91 and 132) eroding from the cliff edge were recorded during the walkover survey. Measured survey and recording of these assets as well as other features on the coastal edge will help to preserve a record of their extent and nature before they are lost. Similarly, this assessment has revealed the ongoing deterioration of upstanding building remains across the island. Historic Building Recording including plans and elevations of structures within each farmstead and detailed photographs of the current condition of the buildings would provide a permanent record of these buildings prior to any further loss from structural collapse and weathering. Publication of the records of these buildings would also make Faray's built heritage remains more accessible and engaging for local communities on surrounding islands. As the island is not readily or publicly accessible a permanent and accessible record of its upstanding remains would be a valuable resource and would create a baseline against which any further deterioration could be measured and understood. The ability to enjoy, appreciate, learn from and understand Scotland's historic environment, now and in the future, is one of the key principles outlined in HEPS (HES, 2019; HEP2).

10.11 Residual Effects

Construction

10.11.1 The Proposed Development has been designed, where possible, to avoid direct impacts on known heritage features. The implementation of the above outlined mitigation measures will prevent inadvertent damage to known heritage assets; and investigate the potential for previously unknown assets. Following the completion of construction, no further groundworks would be undertaken. Mitigation will allow for the detailed recording of any remains encountered during the construction phase and the results will therefore enhance our understanding of Faray's archaeological heritage. However, the predicted direct impacts of high magnitude would remain. The Proposed Development has also been designed so as to avoid impacts upon known heritage assets where possible. Given the extent and density of recorded remains it has not been possible to avoid all impacts and there would be direct impacts on seven non-designated heritage assets. All of these assets are of post-medieval date and comprise buildings (Sites 5 and 12) and a well (Site 109) recorded from historic mapping, areas of former rig cultivation (Sites 73 and 74) and a road (Site 114) and slipway (Site 119) of 20th century date. Assets recorded and known only from historic mapping are judged to be of negligible importance. The remaining assets are judged to be of low importance. The Proposed Development would remove any deposits associated with the assets known from historic mapping evidence and the slipway. The Proposed Development would impact upon only part of the remaining assets leading to some loss of information content. A **minor** and not significant direct effect has been predicted in each case.

10.11.2 Following the implementation of mitigation measures there may be a slight loss of overall information content and as such a marginal magnitude of residual impact is anticipated. The residual direct effect would be **negligible** and not significant. Potential effects on unknown previously

unrecorded buried remains cannot be predicted at this stage, although these will be addressed by the proposed mitigation measures.

10.11.3 The predicted residual impacts on the settings of designated heritage assets will be the same as assessed for the construction effects

Operation

10.11.4 The predicted residual impacts on the settings of designated heritage assets will be the same as assessed for the operational and cumulative effects.

10.11.5 No other significant residual operational effects are anticipated.

Decommissioning

10.11.6 In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those predicted during construction.

10.12 Cumulative Assessment

10.12.1 As set out above in paras 10.5.21 – 10.5.24, cumulative effects relating to cultural heritage are for the most part limited to effects upon the settings of heritage assets.

10.12.2 With regard to the likely significant cumulative effects on cultural heritage assets, the assessment considers operational, consented and within-planning wind farm developments at distances up to 40 km from the Proposed Development. The location of cumulative developments is shown on Figure 6.11. Developments at the scoping stage are not considered. A full list of the cumulative developments is included in Chapter 6. The cumulative schemes include the operational Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill Rennibister and Crowness Business Park turbines on Mainland.

10.12.3 Archaeological remains are by their very nature an irreplaceable resource and are subject to threats both within and outwith the planning system. The range of non-development threats is broad and includes deterioration of upstanding structural remains and damage to remains on the coastal edge through coastal erosion (see Gibson, 2008). Any archaeological remains which may be present on the site need to be understood within this context of gradual loss which occurs on an Orcadian, regional and national scale. Archaeological investigations allow any loss to be controlled through programmes of recording, sampling and analysis. The consequence of this is that where direct impacts occur through either development or academic research, then our understanding of these assets is enhanced, and the results of these investigations inform our knowledge of Orkney's past. Indeed, our understanding of Orkney's archaeological heritage is itself the cumulative product of the results of numerous investigations undertaken over many generations. Any direct impacts which may result from the Proposed Development would be addressed through the detailed programme of mitigation that has been set out in Section 10.8, which will include comprehensive investigations should this be required, the results of which will contribute to our overall understanding of Orkney's past and therefore create a beneficial cumulative legacy. The significance of the cumulative effect on archaeology during construction, combined with other developments or causes of loss will thus be **negligible** and not significant. As such this assessment will focus on the likely significant cumulative effects upon the setting of heritage assets which have the potential to occur during the operational phase.

10.12.4 As indicated in the methodology section paras 10.5.21 – 10.5.24 only heritage assets where effects of low magnitude or above have been predicted for the Proposed Development alone are considered in the detailed assessment. Cumulative effects on assets for which effects of negligible magnitude or less have been predicted for the Proposed Development alone are not considered to have the potential to reach the EIA threshold of significance and have therefore been excluded from the detailed assessment.

10.12.5 Moderate significant effects resulting from the Proposed Development alone have been predicted on the settings of three Scheduled Neolithic chambered cairns: Faray (Site 1), Muckle Hill of Linkataing (Site17) and Vinquoy Hill (Site 40) and cumulative visualisations have been prepared for

these assets (Figures 10.12 – 10.14 and 10.18) and character of their settings have been described in paragraphs 10.9.16 – 10.9.31 above.

10.12.6 When viewed from the Quoy Chambered Cairn (Site 1), the Proposed Development would appear as a prominent feature in views to the south which are not currently occupied by wind farm development. The proposed Quanterness wind farm would also be visible in this view from where it would appear offset to the south-east and in the far distance. Views from Quoy Chambered Cairn to the east features the tips of Spurness Point wind farm and Sanday. The extreme tips of Gallowhill and Westray Development Trust and Newark are visible in views to the north-west. All of these turbines would appear substantially smaller than the Proposed Development due to their lower blade tip height and/or the distance of separation. Overall, the developments within this part of the cumulative baseline are smaller and more limited in scale than the Proposed Development which means that the weight of the effect upon the setting of Quoy Chambered Cairn would result from the addition of the Proposed Development rather than from the underlying cumulative baseline and no additional cumulative effects are predicted.

10.12.7 The operational turbines at Rennibister, Kingarly, Hammers Hill and Burgar Hill are all visible in views south-west from Muckle Hill of Linkataing chambered cairn (Site 17). These would be seen in the same view as the Proposed Development. The proposed turbines at Quanterness and Hammers Hill Extension would also be visible in this view. The extreme tips of Gallowhill and Westray Development Trust and Newark are visible in views to the north-west. With the exception of Quanterness, the developments within this part of the cumulative baseline are smaller and more limited in scale than the Proposed Development which means that the weight of the effect upon the setting of Muckle Hill of Linkataing chambered cairn would result from the addition of the Proposed Development rather than from the underlying cumulative baseline and no additional cumulative effects are predicted.

10.12.8 The operational turbines at Rennibister, Kingarly, Hammers Hill and Burgar Hill are visible in views west from Vinquoy Hill Chambered Cairn (Site 40). These would be seen in the same view as the Proposed Development. The proposed turbines at Quanterness and Hammers Hill Extension would also be visible in this view. The extreme tips of Gallowhill and Westray Development Trust and Newark are visible in views to the north-west. The operational turbines at Spurness Point on Sanday are visible in views to the east and appear as relatively prominent features above the low lying landform. The Proposed Development would not be seen in the same view as the Spurness Point turbines but would be visible in the wider panoramic view from the cairn. The Proposed Development would thus introduce a second relatively prominent wind farm development into a view which currently features only very distant views of wind farm development. The increase in the proportion of the overall view that would be occupied by relatively large scale wind farm development would constitute an additional synergistic effect of negligible magnitude. The level of cumulative effect would be **minor** and not significant.

10.12.9 The Burn of Musetter standing stone is set on a plateau at 45 m AOD within rough heather moorland. It commands extensive views across the landscape including views south-east towards the chambered cairn at The Manse (site 23), east towards the chambered cairn at Sandhill (Site 34) and north-east towards the chambered cairn at Eday Church Hall (Site 24). All six turbines of the Proposed Development would be visible in views north-west from the standing stone beyond Ferness Bay. Figure 6.21, which shows the view from the Sands of Musetter, demonstrates that the Proposed Development would appear as a prominent feature against the skyline in views north-west from the standing stone. The operational turbines of Westray Development Trust, Gallowhill and Newark would also be visible in this view. However, owing to the separation distance between these wind farms and the Proposed Development they would appear as very minor and distant components of the view. All five of the Spurness Point wind farm turbines are visible in views east from the standing stone at a distance of 4.95 km beyond the Sandhill chambered cairn. The Proposed Development would thus introduce a second relatively prominent wind farm development into a view which currently features only very distant views of wind farm development. The increase in the proportion of the overall view that would be occupied by relatively large scale wind farm development would constitute an additional synergistic effect of negligible magnitude. The level of cumulative effect would be **minor** and not significant.

10.12.10 The chambered cairns of the Manse (Site 23), Eday Church Hall (Site 24) and Bay of London (Site 33) are located within a wider cluster of prehistoric monuments in south and central Eday which have core visual interrelationships with one another as well as north to other funerary monuments in north Eday. All three of these monuments are positioned to command views east over Eday Sound and all have visibility of Spurness Point wind farm to the east. The Proposed Development would be located north-west of these monuments and would thus not be seen in the same view as the operational turbines. The Proposed Development turbines would be taller and located closer to each monument than those at Spurness Point and thus would appear as larger landscape features albeit beyond the core settings of each monument. The Proposed Development would increase the proportion of the overall view that would be occupied by relatively large scale wind farm development but would not affect the observer's ability to understand the core interrelationship between these monuments and the wider Eday landscape. The magnitude of cumulative impact would be negligible. The level of cumulative effect would be **minor** and not significant.

10.12.11 The Calf of Eday, chambered cairn (Site 28) comprises an Orkney-Cromarty type round cairn with a partly rock-cut Bookan-type chamber. The monument survives entirely below ground level and is covered by a low heather-covered mound the centre of which has been removed together with one of the lintels to give access to the chamber. Access to the Calf of Eday was not gained for the purposes of the assessment and the monument was overlooked from the adjacent east shore of Eday. From here, it was seen to be set in heather moorland overlooking Calf Sound. As a prehistoric ritual burial monument overlooking the coast and with probable key visual links along a north-west to south-east alignment from Vinquoy Hill (Site 40) to the Stone of Setter (Site 39), the monument is judged to be of high relative sensitivity to changes in its setting. All six of the Proposed Development turbines would be seen in views west from this monument at a distance of 4.9 km. The turbines would be visible as blade tips seen against the skyline and beyond the intervening ridges of Vinquoy Hill and Resting Hill. The turbines would be seen to backdrop the chambered cairn at Vinquoy Hill (Site 40) which stands close to the high point on the island of Eday. All other funerary monuments with which the Calf of Eday is intervisible are located at lower points in the landscape and thus the landform would be seen to rise behind them and the Proposed Development would be seen beyond that intervening landform. The Spurness wind farm is theoretically visible c.5.5 km south-east of the cairn from across Lashy Sound and Eday Sound. Neither the Proposed Development nor the Spurness wind farm interrupt key views across Calf Sound and towards the ritual funerary monuments on Eday. The Proposed Development would increase the overall view that would be occupied by relatively large scale wind farm development but would not affect the observer's ability to understand the contribution that the coastal setting makes to the asset's overall significance. The magnitude of cumulative impact would be negligible. The level of effect would be **minor** and not significant.

10.12.12 The burnt mound at Dale, Eday (Site 35) survives as a roughly crescent-shaped grass covered mound, measuring approximately 11 m in diameter and 1.4 m high. The burnt mound is bisected across its northern third by a modern drainage channel and stone dyke. The mound is situated on the west coast of Eday, 70 m from the coastal edge at around 10 m AOD and is surrounded by low-lying boggy ground. The monument commands open and wide views west across Westray Firth to Egilsay and north over rising ground at Fers Ness. The placing of burnt mounds was to a large extent determined by their function and proximity to a local water source, though an allowance has to be made for the positioning of the mounds on a west facing slope which may indicate that it was placed to be prominent within, or exact control over, the adjacent coastal area. The burnt mound is judged to be of low sensitivity to changes in its setting. All six turbine tips of the Proposed Development would be visible in views north from the burnt mound from where it would be seen beyond the intervening low rising ground at Fers Ness and its associated large modern farm complex. The wind farms at Gallowhill, Westray Development Trust and Newark would also be theoretically visible in the same views as the Proposed Development. Views of the Proposed Development turbines, alongside those at Gallowhill, Westray Development Trust and Newark, would be located beyond the prevalent coastal views out from the burnt mound and located on separate land masses beyond the watercourse and land which relates to an understanding of the cultural significance of this monument. As such no additional cumulative effects are predicted.

10.12.13 The chambered cairns at Fitty Hill (Site 124) and Howa Tower (Site 125) have interrelated settings which are key to their understanding and appreciation. Both cairns command wide views across the sea and their relationship with one another and the coast is considered to form the critical part of the setting of both monuments. The operational turbines at Gallowhill stand within 500 m of the Howa Tower chambered cairn and within 1.5 km of the Fitty Hill chambered cairn. The Westray Development Trust turbine is set slightly to the north-west within 700 m of Howa Tower chambered cairn. The operational turbines form prominent features when viewed from these cairns but do not distract from the key visual relationship between the cairns or their key outward seaward views. The Proposed Development would be located south of the cairns and offset from the operational turbines. Owing to the distance separation of over 11 km the Proposed Development turbines would appear as smaller distance features and would not distract from an understanding of the cairns in their landscape setting. The weight of the non-significant effects upon the setting of the cairns would largely result from the operational turbines rather than the Proposed Development although distant views of the turbines in combination with the closer views of the Westray turbines would increase the proportion of views occupied by wind farm development resulting in a negligible magnitude of impact. The level of cumulative effect would be **minor** and not significant

10.12.14 The Category C Listed Helzie windmill stump at Rapness (Site 48) is set in improved pasture on gentle south facing slope overlooking Rapness Sound and Rapness Ferry Terminal. The Category A Listed Building of Sangar croft house (Site 50) is situated prominently at a crossroads of unclassified roads less than 1 km from the ferry pier at Rapness. Numerous modern features are visible in the views from both assets including modern farm buildings, wind turbines and overhead electricity lines. An understanding and appreciation of the windmill tower and the croft buildings in their current setting is gained from an understanding of their relationship with the surrounding arable agricultural land which in turn can inform us about changing settlement patterns and agricultural land-use. The windmill and the croft are judged to be of low relative sensitivity to changes in their settings. Figure 10.15 shows predicted visibility from Sangar croft house and Figure 6.22 shows predicted visibility from the nearby Westray Ferry Terminal at Rapness. These visualisations show that all six of the Proposed Development turbines would be visible from both assets beyond intervening agricultural land to which the setting of the windmill and croft relates and beyond modern farm buildings. A single wind turbine is currently visible in views south from Sangar croft house. Owing to the separation distance of 4.67 km, the Proposed Development would appear similar in size and scale to the small wind turbine south of the croft house. The Proposed Development would thus be seen in a view which already features a modern wind turbine (Sangar) and ferry terminal (Helzie). Views towards the assets from across the landscape would not be affected by the increase in wind farm development and the both assets would remain fully legible in their agricultural settings. As such no additional cumulative effects have been predicted.

10.12.15 ZTV and visualisation evidence suggests that operational developments; Hammars Hill, Burgar Hill and Rennibister, are theoretically visible from Rusk Holm (Site 49) and Faray (Figure 10.13) although these turbines could not be visually detected during the site visit. The extreme tips of Gallowhill and Westray Development Trust and Newark are also theoretically visible in views to the north-west. Given the scale and proximity of the Proposed Development to the post-medieval landscape of Faray and the Category C Listed building at Rusk Holm, the principal effect will come from the Proposed Development rather than the cumulative schemes. For this reason, no additional cumulative effects on the setting of Rusk Holm (Site 49) or the Faray post-medieval landscape are predicted.

10.13 Summary

10.13.1 This chapter identifies the archaeological and cultural heritage value of the site and assesses the potential for direct and settings effects on archaeological heritage assets resulting from the construction and operation of the Proposed Development. This chapter also identifies measures that should be taken to mitigate predicted adverse effects.

10.13.2 This assessment has identified 88 non-designated heritage assets and one designated asset within the site. The Proposed Development has been designed to avoid directly impacting upon that designated asset; Quoy Chambered Cairn (Site 1).

10.13.3 The Proposed Development has also been designed so as to avoid impacts upon known heritage assets where possible. Given the density and extent of known remains it has not been possible to avoid all impacts and there would be direct impacts on seven non-designated heritage assets. All of these assets are post-medieval remains and comprise the sites of former buildings (Sites 5 and 12) and a well (Site 109) recorded from historic mapping, areas of former rig cultivation (Sites 73 and 74), a road (Site 114) and a slipway (Site 119) of 20th century date. Assets recorded and known only from historic mapping are judged to be of negligible importance. The remaining assets are judged to be of low importance. The Proposed Development would remove any deposits associated with the assets known from historic mapping evidence and the slipway. The Proposed Development would impact upon only part of the remaining assets leading to some loss of information content. A **minor** and not significant direct effect has been predicted in each case.

10.13.4 Planning policies and guidance require that account is taken of potential effects upon heritage assets by proposed developments and that where possible such effects are avoided. Where avoidance is not possible, effects on any significant remains should be minimised or offset. Given the potential for presently unknown archaeological remains, in particular of prehistoric and post-medieval date, to survive within the site, a programme of archaeological works designed to avoid inadvertent damage to known remains and to investigate and mitigate against the possibility of uncovering hitherto unknown remains will be undertaken.

10.13.5 The implementation of the above outlined mitigation measures will prevent inadvertent damage to known heritage features; investigate the potential for previously unknown features and disseminate the results of archaeological works to the public. Following the implementation of mitigation measures there may be a slight loss of overall information content and as such a marginal magnitude of residual impact is anticipated. The residual direct effect would be **negligible** and not significant.

10.13.6 There would be a **moderate** and significant temporary effect on the setting of Quoy Chambered Cairn during the construction phase. Effects associated with construction noise and traffic would cease on completion of the construction phase.

10.13.7 Potential operational effects on the settings of designated heritage assets within the 5 km and 10 km study areas and selected assets within the 15 km study area have been considered in detail as part of this assessment. **Moderate** and significant effects have been predicted upon the setting of the Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Vinquoy Hill Chambered Cairn (Site 40) and the Faray post-medieval landscape.

10.13.8 A programme of Historic Building Recording will be undertaken within the site as compensatory mitigation to create a baseline record of the condition of the upstanding buildings on the site and partially offset potential impacts of the Proposed Development on the setting of the post-medieval landscape of Faray.

10.13.9 There would be **moderate** and significant residual effects on the setting of the Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Vinquoy Hill Chambered Cairn (Site 40) and the Faray post-medieval landscape, although the core components and integrity of the setting of these assets would not be adversely affected.

10.13.10 The possibility of cumulative effects has been considered and assessed. A **minor** and not significant cumulative effect has been predicted on the setting of the Burn of Musetter standing stone (Site 22) and the chambered cairns at The Manse (Site 23), Eday Church Hall (Site 24), Calf of Eday (Site 28), Bay of London (Site 33), Vinquoy Hill (Site 40), Fitty Hill (Site 124) and Howa Tower (Site 125). No additional cumulative effects have been predicted

Table 10.7 – Summary of Effect

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Direct impacts on non-designated assets of negligible importance recorded from historic maps (Sites 5, 12 and 109)	Minor and not significant	Adverse	A mitigation strategy in four stages is proposed; geophysical survey and trial trenching will be undertaken in the first instance. Should the results of the trial trenching indicate that further works are required further excavation and post-excavation analysis will be undertaken.	Negligible and not significant	Adverse
Direct impacts on known non-designated remains of low importance that are present on the site (Sites 73, 74, 114 and 119).	Minor and not significant	Adverse	A mitigation strategy in four stages is proposed; geophysical survey and trial trenching will be undertaken in the first instance. Should the results of the trial trenching indicate that further works are required further excavation and post-excavation analysis will be undertaken.	Negligible and not significant	Adverse
Direct impacts on previously unrecorded non-designated archaeological remains of potential medium or high importance that could be present on the site.	Major and significant	Adverse	A four-stage mitigation strategy is proposed; survey and trial trenching will be undertaken initially and will be followed by excavation and post-excavation analysis as necessary. Any significant remains will be preserved in situ wherever possible.	Negligible and not significant	Adverse
Temporary significant effects on the setting of Quoy Chambered Cairn (Site 1) during construction operation	Moderate and significant	Adverse	Effects on setting from heavy traffic movement and associated noise would cease on completion of construction.	Neutral	-

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Operation					
Moderate significant effects on the settings of Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Vinquoy Hill Chambered Cairn (Site 40) and the Faray post-medieval landscape.	Moderate and significant	Adverse	Historic Building Recording to be undertaken to ensure better understanding and appreciation of the surviving extent and condition of upstanding built heritage remains on Eday and ensure a lasting legacy of their preservation by record for future generations prior to any further deterioration. Measured survey and recording of assets eroding from the coastal edge will help to preserve a record of their extent and nature before they are lost to coastal erosion.	Moderate and significant	Adverse
Decommissioning					
The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.					

Table 10.8 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Burn of Musetter standing stone (Site 22). Chambered cairns at The Manse (Site 23),	Settings Effect	Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill	Minor and not significant	Adverse

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Eday Church Hall (Site 24), Calf of Eday (Site 28) Bay of London (Site 33), Vinquoy Hill (Site 40), Fitty Hill (Site 124) and Howa Tower (Site 125		Rennibister and Crowness Business Park turbines on Mainland		
Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Dale Burnt Mound (Site 35) Helzie Windmill (Site 48) Rusk Holm (Site 49) Sangar croft house (Site 50) and the Faray post-medieval landscape.	Settings Effects	Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill Rennibister and Crowness Business Park turbines on Mainland	No additional cumulative effect	N/A
Direct impacts on known non-designated assets on Faray	Direct Effects	Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill Rennibister and Crowness Business Park turbines on Mainland	Negligible and not significant	N/A
Unknown archaeological remains	Direct Effects	Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill Rennibister and Crowness Business Park turbines on Mainland	Negligible and not significant	N/A

10.14 References

Anderson, J. Rev. 1795. Stronsay and Eday, County of Orkney Old Statistical Accounts of Scotland Volume XV. Available at: https://stataccscot.edina.ac.uk/static/statacc/dist/viewer/osa-vol15-Parish_record_for_Stronsay_and_Eday_in_the_county_of_Orkney_in_volume_15_of_account_1/ Accessed 19/03/2020

Ben, J., 1529. 'A Description of the Orkney Islands by Jo. Ben, living there in the year 1529'. in W., Macfarlane, 1726. Geographical Collections relating to Scotland made by Walter Macfarlane. edited from Macfarlane's transcript held in the Advocates Library by Sir Arthur Mitchell. 1906. Scottish History Society LI, Vol. III, 313-23.

CIfA, (2014). *Standard and guidance for commissioning work or providing consultancy advice on archaeology and the historic environment*. The Chartered Institute for Archaeologists. Published December 2014. Available at: https://www.archaeologists.net/sites/default/files/CIfAS&GCommissioning_1.pdf. Accessed: October 2019

CIfA, (2017). *Standard and guidance for historic environment desk-based assessment. The Chartered Institute for Archaeologists*. Published December 2014. Updated January 2017. Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf. Accessed: October 2019

Cowan, I. B., 1967, The Parishes of Medieval Scotland, Scottish Record Society vol. 93

Davidson, J L and Henshall, A S 1989, The chambered cairns of Orkney: an inventory of the structures and their contents, Edinburgh, 158-9.

Davidson, A., Harkness, D & Simpson A 1986 The Formation of Farm Mounds on the Island of Sanday, Orkney *Geoarchaeology: An International Journal* 1, 45-60

Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended). Available at: http://www.legislation.gov.uk/ssi/2017/101/contents/made. Accessed: October 2019

Fenton, A. (1978) The Northern Isles: Orkney and Shetland. John Donald Publishers, Edinburgh.

Fenton. A (1987) Country Life in Scotland. John Donald Publishers, Edinburgh.

Gibson, J (2008) Rising Tides. The Loss of Coastal Heritage on Orkney. Orkney: Northings

Henshall, A S 1963, The chambered tombs of Scotland, vol. 1, Edinburgh, 232-3, ORK. 47.

Historic Environment Scotland, (2004). Statement Of Significance St Magnus Church, Egilsay Accessed September 2020

Historic Environment Scotland, (2020). *Managing Change in the Historic Environment: Setting.* Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=80b7c0a0-584b-4625-b1fd-a60b009c2549 Accessed September 2020

Historic Environment Scotland et al. (2016). *The Heart of Neolithic Orkney World Heritage Site: Management Plan, 2014-19*. Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=c96546cf-ff4d-409e-9f96-a5c900a4f5f2. Accessed September 2020

Historic Environment Scotland (2019a) '*Historic Environment Policy for Scotland* 'HEPS'. Available at: https://www.historicenvironment.scot/archives-and-

research/publications/publication/?publicationId=1bcfa7b1-28fb-4d4b-b1e6-aa2500f942e7. Accessed September 2020

Historic Environment Scotland (2019b) *Designation Policy and Selection Guidance*. Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=8d8bbaeb-ce5a-46c1-a558-aa2500ff7d3b. Accessed September 2020

Historic Environment Scotland (2019c). *Scotland's Listed Buildings*. Available at: https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=34c90cb9-5ff3-45c3-8bc3-a58400fcbc44. Accessed September 2020

Historic Environment Scotland (2019d). Quoy, broch 270m NW of Designation Report of Handling

ICOMOS (2005). *Xi'an Declaration*. Available at: https://www.icomos.org/images/DOCUMENTS/Charters/xian-declaration.pdf. Accessed September 2020ICOMOS. (2013). Burra Charter. Available at: https://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf. Accessed September 2020

IEMA, (2016). *Guidelines for Environmental Impact Assessment*. Available at: https://www.iema.net/assets/newbuild/documents/Delivering%20Quality%20Development.pdf Accessed September 2020

Lee, D H J 2015 Northern World Views in Post medieval Orkney: Towards a more Holistic Approach to Later Landscapes. Historical Archaeology 49 (3) 126-148.

Leslie, R 1998a The Island on North Faray. In Sib Folk News Orkney Family History Society Issue No 7.

Leslie, R 1998b The Faray Story Part 2. In Sib Folk News Orkney Family History Society Issue No 8.

Leslie, R 1999 Faray Part 4 In Sib Folk News Orkney Family History Society Issue No 10.

Newman, P. and Newman, A. (1991) Simmens and Strae: Thatched Roofs in Orkney in Scottish Vernacular Buildings Working Group Journal, Volume 15. p.27-40 at https://www.svbwg.org.uk/journals/SVBWG_VB_15_1991.pdf Accessed September 2020.

McNeil, R 2015 Royal Air Force Commands http://www.rafcommands.com/ Accessed September 2020.

Noble, G. (2006) Harnessing the waves: Monuments and ceremonial complexes in Orkney and beyond. *Journal of Maritime Archaeology*, Vol1, Issue 1, pp 100–117.

Ordnance Survey Books of Reference 1855-1882 Parish of Eday Available at https://digital.nls.uk/ordnance-survey-books-of-reference-1855-1882/archive/99264807#?c=0&m=0&s=0&cv=15&xywh=-4%2C-1%2C5056%2C4145 Accessed September 2020

Orkney Island Council (2017a). *Orkney Local Development Plan*. Available at: http://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Local-Plan/OLDP_2017/Orkney_Local_Development_Plan_2017_2022.pdf. Accessed September 2020.

Orkney Islands Council (2017b). *Supplementary Guidance: Historic Environment and Cultural Heritage*. Available at: http://www.orkney.gov.uk/Files/Planning/Development-and-Marine-Planning/Adopted_PPA_and_SG/Guidance_for_the_Plan/Historic_Environment_and_Cultural_Heritage_Supplementary_Guidance.pdf. Accessed September 2020..

Orkney Islands Council (2017c). *Planning Policy Advice: Historic Environment (Topics and Themes)*, available at: https://www.orkney.gov.uk/Files/Committees-and-Agendas/Council-Meetings/GM2017/09-03-2017/I14_App4_PPA_Historic_Env_Topics_Themes.pdf. Accessed September 2020.

Ritchie, A. 1995. Prehistoric Orkney. London: Historic Scotland/BT Batsford.

Scotland's Places. 2020. Ordnance Survey Name Books- Orkney Volume 4. Available at: https://scotlandsplaces.gov.uk/search/results?st=faray. Accessed September 2020.

Scottish Government (2011), PAN 2/2011 *Archaeology and Planning*, available at: http://www.gov.scot/Resource/Doc/355385/0120020.pdf. Accessed September 2020.

Scottish Government (2014), *Scottish Planning Policy*, available at: http://www.gov.scot/Publications/2014/06/5823SNH. Accessed September 2020.

Scottish Government (2014b) *The National Planning Framework for Scotland (NPF3)* available at: https://www.gov.scot/publications/national-planning-framework-3/ Accessed December 2020

Scottish Government (2014c) *Our Place in Time,* available at: *https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=fa088e13-8781-4fd6-9ad2-a7af00f14e30* Accessed December 2020

Scottish Natural Heritage (2012). *Assessing the Cumulative Impact Of Onshore Wind Energy Developments* Available at: https://www.nature.scot/sites/default/files/2017-09/Guidance%20note%20%20-%20Assessing%20the%20cumulative%20impact%20of%20onshore%20wind%20energy%20developments.pdf. Accessed September 2020.

Scottish Natural Heritage & Historic Environment Scotland (2018). *Environmental Impact Assessment Handbook v5*. Available at: https://www.nature.scot/sites/default/files/2018-05/Publication%202018%20-%20Environmental%20Impact%20Assessment%20Handbook%20V5.pdf. Accessed September 2020.

Simpson, J. Rev. 1845. Stronsay and Eday, County of Orkney New Statistical Accounts of Scotland Volume XV. Available at: https://stataccscot.edina.ac.uk/static/statacc/dist/viewer/nsa-vol15-Parish_record_for_Stronsay_and_Eday_in_the_county_of_Orkney_in_volume_15_of_account_2/ . Accessed 20/03/2020

Tait, I 2012 Shetland Vernacular Buildings Shetland Times Limited, Lerwick.

The Orcadian. 2018. OIC set to purchase Faray, Holm of Faray and Red Faray. Available at: https://www.orcadian.co.uk/oic-set-to-purchase-faray-holm-of-faray-and-red-holm/ Accessed 19/03/2020

UK Government (1979). *Ancient Monuments and Archaeological Areas Act 1979 (as amended)*. Available at: http://www.legislation.gov.uk/ukpga/1979/46. Accessed September 2020.

UK Government (1997) *Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 (as amended)*. Available at: http://www.legislation.gov.uk/ukpga/1997/9/contents. Accessed September 2020.

Scottish Government (2006). *Planning etc. (Scotland) Act 2006*. Available at: http://www.legislation.gov.uk/asp/2006/17/contents. Accessed September 2020.

Scottish Government (2011). *Historic Environment (Amendment) (Scotland) Act 2011*. Available at: http://www.legislation.gov.uk/asp/2011/3/contents/enacted. Accessed September 2020.

Scottish Government (2014). *Historic Environment (Scotland) Act 2014*. Available at: http://www.legislation.gov.uk/asp/2014/19/contents/enacted. Accessed September 2020.

Woodman, P. E. 2000. Beyond significant patterning, towards past intentions: the location of Orcadian chambered tombs, in C. Buck, V. Cummings, C. Henley, S. Mills & S. Trick (eds) Proceedings of the UK Chapter of Computer Applications and Quantitative Methods in Archaeology:91–105.BAR International Series, 844: Oxford: BAR

Historic Maps

1654 Blaeu, *Orkney and Shetland*

1665 Sanson, *Les Isles Orkney*

1745 Moll, *Orkney Shire*

1750 MacKenzie, M., *Pomona or main-land*

1795 Eunson, G *A chart of the islands of Orkney... with the coast of Scotland*

1832 Thomson, J *Orkney Islands John Thomson's Atlas of Scotland, 1832*

1881 Ordnance Survey *Orkney LXXXVI.5 and 6 (Eday & Westray)* Survey date: 1879 Publication date: 1881

1881 Ordnance Survey *Orkney LXXXVI.2 (with extension LXXXVI.1) (Eday & Westray)* Survey date: 1879 Publication date: 1881

1881 Ordnance Survey *Orkney LXXX.14 (Eday)* Survey date: 1879 Publication date: 1881

1882 Ordnance Survey *Orkney, Sheet LXXX* (includes: Eday; Westray) Survey date: 1879 Publication date: 1882

1902 Ordnance Survey *Orkney LXXXVI.2* Publication date: 1902 Revised: 1900

1903 Ordnance Survey *Orkney Sheet LXXX (*includes: Eday; Westray) Publication date: 1903 Date revised: 1900

Aerial Photographs

Library Reference	**Sortie**	**Date**	**Frame Run/ Photo Number**	**Barcode Reference**
SCOT B_0157	CPE/Scot/UK/0188	10/10/1946	4123 to 4126 and 4175 to 4178	SB_001100
SCOT B_0253	LEU/UK/0002	16/04/1948	7082 to 7086	SB_001527
SCOT B_0563	543/1663	23/02/1962	0270 to 0280	SB_002391
SCOT C_0050	CPE/Scot/UK/0188	10/10/1946	5034 to 5036,	SB_002865
SCOT C_0094	543/1663	23/02/1962	0072 to 0074	SB_002919
SCOT C_0212	ASS/60687	26/06/1987	302 to 303	SB_003079
SCOT 05_06_01	OS/64/220	25/09/1964	035 to 038	SB_003710
SCOT OS_06_02	OS/64/146	22/08/1964	034 to 035	SB_003706
SCOT OS_06_02	OS/63/045	26/04/1964	043 to 047	SB_003661
SCOT OS_06_05	OS/70/195	01/06/1970	015 to 016	SB_004537

11 Geology, Hydrology and Hydrogeology

Contents

11.1	*Executive Summary*	*11-1*
11.2	*Introduction*	*11-1*
11.3	*Legislation, Policy and Guidelines*	*11-2*
11.4	*Consultation*	*11-4*
11.5	*Assessment Methodology and Significance Criteria*	*11-7*
11.6	*Baseline Conditions*	*11-11*
11.7	*Receptors Brought Forwards for Assessment*	*11-15*
11.8	*Standard Mitigation*	*11-16*
11.9	*Likely Effects*	*11-18*
11.10	*Mitigation and Enhancement*	*11-19*
11.11	*Residual Effects*	*11-19*
11.12	*Cumulative Effects*	*11-20*
11.13	*Summary*	*11-20*
11.14	*References*	*11-22*

This page is intentionally blank.

11 Geology, Hydrology and Hydrogeology

11.1 Executive Summary

11.1.1 The site comprises the island of Faray, an uninhabited island to the north and west of Eday and south-southeast of Westray in the Orkney Islands. The site boundary encompasses the island of Faray as well as extending approximately 500 m east into the sea. The smaller island Holm of Faray is immediately to the north. Faray is approximately 17 km northeast of Orkney Mainland, and approximately 25 km from Kirkwall. The island comprises open fields of improved pasture, a number of abandoned buildings and a jetty. The current land use is sheep farming.

11.1.2 The topography of the island comprises two fairly low hills rising to just over 30 m Above Ordnance Datum. The ground level gently falls away from the two hills with the steepest slope being near the coast to the west of the southern hill. The Proposed Development site contains a network of drainage ditches that mainly follow old field boundaries.

11.1.3 Ordnance Survey (OS) mapping shows two springs located in the centre of the site at Grid References HY 52937, 36808 and HY 52937, 36762 from which a small stream flows towards the west into the sea. OS mapping also shows a number of caves and geos located along the coastline. There are no major surface watercourses within the study area.

11.1.4 There are six abandoned wells located within the site area, according to OS mapping. These are located in the central and northern parts of the island. The wells have been confirmed to be abandoned by Orkney Islands Council. There are no active Private Water Supplies (PWS) within the study area (DWQR, 2019) and there is no potential for hydrogeological continuity with any potential off-site areas where groundwater could be abstracted.

11.1.5 Site geology comprises sedimentary bedrock, overlain in the west southwest by superficial glacial till, along with localised blown sand and marine beach deposits (sand gravel and boulders). The remainder of the site is shown as having little or no superficial cover over bedrock. No peat has been identified at the site, from desk study and targeted peat survey work.

11.1.6 Likely construction and operational effects include siltation or pollution of the water environment from surface runoff, and effects on groundwater quality and flow regime. Standard / embedded mitigation measures include appropriate design to minimise potential impact on minor surface watercourses, pre-construction site investigation works, and implementation of a Construction Environmental Management Plan (CEMP) and Drainage Strategy. These mitigation measures are considered to be robust and implementable and will result in no significant effects on the hydrological, hydrogeological and geological receptors.

11.1.7 The likely effects on hydrological, geological and hydrogeological receptors, taking account of the standard mitigation measures, have been assessed as **negligible** to **minor** (not significant).

11.1.8 No additional mitigation is proposed or considered necessary, beyond the standard / embedded mitigation noted above. The significance of residual effects on hydrological, geological and hydrogeological receptors is therefore considered to be **negligible** to **minor** (not significant).

11.1.9 No cumulative effects on hydrology, hydrogeology and geology are predicted.

11.1.10 It should be noted that this chapter presents the assessment of effects on terrestrial geology, surface water and groundwater. Likely effects on the marine environment, relating to the proposed new extended slipway and landing jetty, have also been assessed and are discussed in Chapter 17.

11.2 Introduction

11.2.1 This chapter outlines the potential geological, hydrological and hydrogeological effects of the construction and operation of the Proposed Development. An assessment is provided based on the value of the receptor and the magnitude of the impact giving the significance of the effect. Where

appropriate, mitigation measures to enhance, prevent, minimise or control identified effects are presented.

Statement of Competence

11.2.2 The assessment has been carried out by Jenny Hazzard (BSc (Hons), MSc, PIEMA) who has over 20 years consultancy experience in geology, peat, hydrogeology and hydrology.

11.3 Legislation, Policy and Guidelines

11.3.1 With regard to hydrology, management of water-borne pollution and protection of natural heritage areas, the Scottish Environment Protection Agency (SEPA) has statutory obligations in terms of the management and control of pollution into water resources in Scotland. Where careful design has avoided sensitive receptors, it would be reasonable to assume that the adoption of the SEPA's Good practice Guidelines will, in general, prevent pollution to acceptable standards and make the majority of any 'significant' effects unlikely. Specific mitigation measures may be required in certain areas or at certain times of the site development.

Legislation

11.3.2 There is a range of environmental legislation that the Proposed Development must adhere to throughout its life cycle. Relevant legislation and guidance documents have been reviewed and taken into account as part of this geological, hydrogeological and hydrological assessment. Key legislative drivers relating to the water environment which have been considered within this assessment are listed below:

- Control of Pollution Act 1974;
- Environmental Protection Act 1990;
- Environment Act 1995;
- Water Framework Directive 2000/60/EC;
- Groundwater Daughter Directive 2006/118/EC;
- Water Environment and Water Services (Scotland) Act (WEWSA) 2003;
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended in 2018) (CAR);
- The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 (amends and revokes the Private Water Supplies (Scotland) Regulations 2006);
- The Flood Risk Management (Scotland) Act 2009; and
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017.

11.3.3 The Water Framework Directive has been implemented in Scotland through WESWA and CAR. The primary objective of the Directive is for all surface and coastal water bodies to achieve good chemical and ecological status, and ground water bodies to achieve good quantitative and chemical status, by 2015 or 2021. This required assessment of a much wider set of water quality parameters than had previously been used. SEPA has published River Basin Management Plans (RBMPs) which detail the current and target status of water bodies, and the means of achieving these targets.

Planning Policy

11.3.4 Scottish Planning Policy (SPP) (Scottish Government, 2014) identifies the range of considerations likely to be relevant to the determination of energy projects, including onshore wind developments (Paragraph 169). These include:

- effects on hydrology, the water environment and flood risk; and

- impacts on carbon rich soils.

11.3.5 It also states that the planning system should '*promote protection and improvement of the water environment, including rivers, lochs, estuaries, wetlands, coastal waters and groundwater, in a sustainable and co-ordinated way*' (paragraph 194); and '*Development management decisions should take account of potential effects on landscapes and the natural and water environment, including cumulative effects*' (paragraph 202).

11.3.6 With respect to flooding, SPP paragraph 255 promotes a precautionary approach to flood risk from all sources and states that the planning system should prevent development which would have a significant probability of being affected by flooding or would increase the probability of flooding elsewhere. Policy 264 sets out aspects to be taken into account for development management, in respect of flood risk. This includes consideration of the design and use of the proposed development. Policy 266 notes that Flood Risk Assessments should be required for development in the medium to high category of flood risk (annual probability of coastal or watercourse flooding is greater than 0.5% or 1:200 years).

11.3.7 The following Planning Advice Notes, issued by the then Scottish Executive, are also relevant to the assessments made in this chapter:

- Planning Advice Note 50: Controlling the Environmental Effects of Surface Mineral Workings, 1996 (in respect of borrow pit workings);
- Planning Advice Note 61: Planning and Sustainable Urban Drainage Systems, 2001; and
- Planning Advice Note 79: Water and Drainage, 2006.

11.3.8 The Orkney Local Development Plan (Orkney Islands Council, 2017), identifies considerations relevant to onshore wind developments, as well as Nationally Designated Sites related to geology and peat (Policies 7 and 9) These include:

- Section D, Policy 7: Onshore Wind Development; and
- Section D, Policy 9: The Water Environment.

11.3.9 Full details of relevant planning policy can be found in Chapter 5.

Guidance

11.3.10 A review plan for Pollution Prevention Guidance documents (PPGs) is currently underway by Natural Resources Wales (NRW), the Northern Ireland Environment Agency (NIEA) and the Scottish Environment Protection Agency (SEPA), replacing them with a replacement guidance series: Guidance for Pollution Prevention (GPPs). GPPs provide environmental good practice guidance for the whole UK, and environmental regulatory guidance directly to Northern Ireland, Scotland and Wales only.

11.3.11 The PPGs and GPPs include the documents referred to below, which are the principal documents used for guidance on preventing contamination of surface water from construction activities. Those relevant to this Proposed Development include:

- PPG1: General guide to the prevention of pollution (EA, SEPA & EHSNI, 2013);
- GPP2: Above ground oil storage tanks (EA, SEPA & EHSNI, January 2018);
- GPP5: Works and maintenance in or near water (EA, SEPA & EHSNI, January 2017);
- PPG6: Working at construction and demolition sites (EA, SEPA & EHSNI, 2012); and
- GPP21: Pollution incidence response planning (EA, SEPA & EHSNI, 2017).

11.3.12 The following SEPA Guidelines are also relevant:

- SEPA Supporting Guidance (SAT-SG-75) – Sector specific guidance: construction sites (SEPA, 2018);

- Temporary Construction Methods, WAT-SG-29 (SEPA, 2009);
- Flood Risk and Planning Briefing Note (SEPA, 2014);
- Position Statement: The role of SEPA in natural flood management (SEPA, Feb, 2012);
- Technical flood risk guidance for stakeholders, version 12 (SEPA, May 2019);
- Land Use Planning System Guidance Note 4 (LUPS GU4) - Planning guidance on on-shore windfarm developments (SEPA, September 2017);
- Land Use Planning System Guidance Note 31 (LUPS-GU31)- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, October 2014);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended in 2018 - A practical guide (SEPA, 2011 as amended in 2019);
- River Crossings, Engineering in the water environment: good practice guide (SEPA,2010);
- Development of a groundwater vulnerability screening methodology for the Water Framework Directive, Project WFD28 Final Report (SEPA 2004); and
- The River Basin Planning Strategy for the Scotland River Basin District (SEPA, 2009/2015).

11.3.13 Other relevant guidance includes:

- Control of water pollution from constructions sites. Guidance for consultants and contractors C532 (CIRIA, 2001);
- Environmental good practice on site C650 (CIRIA, 2010);
- Good practice during windfarm construction (Scottish Renewables, SNH, SEPA & Forestry Commission Scotland, 4th Edition 2019);
- Code of Practice for the sustainable use of soils on construction sites (DEFRA, 2011);
- Private Water Supplies: Technical Manual, Scottish Executive, 2006;
- Special Requirements for Civil Engineering Contracts for the Prevention of Pollution, Version 2, (SEPA, 2006); and
- UK Technical Advisory Group on the WFD, UK Environmental Standards and Conditions Final Report, November 2013.

11.4 Consultation

11.4.1 The following consultation responses were received during the Scoping process for the Proposed Development.

Table 11.1 – Consultations in Relation to Geology, Hydrology and Hydrogeology

Consultee	Consultation Response	Key Actions
SEPA	SEPA advise that the following key issues need to be addressed in the EIA process.	
	a) Map and assessment of all engineering activities in or impacting on the water environment including	A site layout plan, including buffer zones around watercourses, has been generated (refer to Figure 11.1). Flood risk within the site area is considered as stated in section 11.6.

Consultee	Consultation Response	Key Actions
	proposed buffers, details of any related CAR applications.	
	b) Map and assessment of impacts upon Groundwater Dependent Terrestrial Ecosystems and buffers.	A map showing identified areas of potential GWDTE, with buffers, is provided as Figure 11.4. Paragraphs 11.6.34 to 11.6.38 provide discussion on GWDTE, including assessment of whether areas are likely to actually be groundwater fed rather than surface- or rainwater-fed. Likely effects on groundwater are assessed as set out in Sections 11.9 and 11.11.
	c) Map and assessment of impacts upon groundwater abstractions and buffers.	There are no active groundwater abstractions (Private Water Supplies) within 250 m of the Proposed Development.
	d) Assessment of any peat and if applicable table detailing re-use proposals.	Targeted peat surveys at proposed turbine locations have been conducted and have identified no peat, which is consistent with desk study findings. This is discussed in sections 11.5 and 11.6.
	e) Map and site layout of borrow pits	Proposed borrow pit search areas are shown in Figures 11.1 and 11.4.
	f) Schedule of mitigation including pollution prevention measures	Chapter 18 of the EIA Report provides a schedule of all committed mitigation measures. A Construction Environmental Management Plan (CEMP) will be developed, outlining pollution prevention measures (an outline CEMP can be found in Appendix 3.1).
	g) Borrow Pit Site Management Plan of pollution prevention measures/	Two borrow pit search areas are shown on Figures 11.1 and 11.4. The search area and proposed borrow workings are described in Chapter 3. An outline CEMP, including borrow pit management measures, is included as Appendix 3.1. If the proposed Development is granted consent, a Borrow Pit Management Plan will be produced, including additional details to be agreed prior to commencement of construction.

Consultee	Consultation Response	Key Actions
	h) Map of proposed waste water drainage layout	There will be no foul/waste water drainage on site.
	i) Map of proposed surface water drainage layout	Outline drainage arrangements are discussed in Chapter 3 and Section 11.8 and would be developed further as part of a detailed Drainage Strategy to be agreed with SEPA and OIC prior to commencement of construction.
	j) Map of proposed water abstractions including details of the proposed operating regime	There is no intention to abstract groundwater or surface water from the proposed development site. Should water abstraction be determined as a requirement, this would be regulated under the CAR licensing regime and any necessary licence would be sought from SEPA prior to the commencement of any operations on site.
	k) Decommissioning statement	The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.
SEPA	Site Specific Comments	
	It should be confirmed that the wells on the island are no longer used to provide drinking water.	Onsite wells have been confirmed by Orkney Islands Council as being abandoned, as discussed in section 11.6.
	Provided watercourse crossings are designed to accommodate the 1 in 200 year event and other infrastructure is located well away from watercourses, SEPA does not foresee a need for detailed information on flood risk.	There are no substantial surface watercourses on the site and no major water crossings are therefore proposed. This is discussed in section 11.8.

Consultee	Consultation Response	Key Actions
	Any infrastructure required on the coast may need to take into account the estimated 1 in 200 year coastal flood level for the area of 3.5 m Above Ordnance Datum.	The online SEPA Indicative River & Coastal Flood Map illustrating the areas where there is a 0.5 % or greater probability of being flooded in any given year, i.e. the 1:200-year flooding event, in the vicinity of the site has been reviewed. Mapping indicates that areas of coastal flood risk are limited to the immediate vicinity of the coast, with no coastal flood risk identified at any proposed infrastructure locations. This is discussed in section 11.6.
Orkney Islands Council (OIC)	OIC notes that Soil Survey of Scotland mapping indicates that Faray is underlain by peaty gleys, and the application should therefore be accompanied by a peatland management plan.	The SNH Carbon and Peatland Map 2016 identifies 'Class 0' soils on site (not peat), and 1:50,000 scale BGS geological mapping identifies no peat on site. Site reconnaissance, review of aerial photography, and habitat survey work has identified no peat at the site. Targeted peat surveys at proposed turbine locations have been conducted and have identified no peat, which is consistent with desk study findings. It is therefore considered that a peatland management plan is not required. Further information is provided in sections 11.5 and 11.6.
	If on-site borrow pits are proposed, then an assessment of associated impacts should be included.	Two borrow pit search areas are shown on Figures 11.1 and 11.4. The search area and proposed borrow workings are described in Chapter 3. An outline CEMP, including borrow pit management measures, is included as Appendix 3.1. If the Proposed Development is granted consent, a Borrow Pit Management Plan will be produced, including additional details to be agreed prior to commencement of construction.

11.5 Assessment Methodology and Significance Criteria

11.5.1 The following section sets out the approach that was followed to collect relevant baseline information and the methodology for assessing impacts and the significance of effects.

Study Area

11.5.2 The study area incorporates the site boundary, which itself comprises the island of Faray, adjacent coastline, and a limited area of sea (Sound of Faray) to the east of the island. Given that the site is an island, the study area does not extend to a buffer area beyond the site boundary, as would typically be the case (for example to consider potential effects on watercourses downstream of the site, off-site Private Water Supplies, etc.)

Desk Study

11.5.3 Baseline conditions have been established primarily via desk-based research and has included the following:

- consultation with SEPA as described in Table 11.1 above;
- identification of the locations and characteristics of catchments and principal watercourses and waterbodies as shown on 1:50,000 scale OS mapping which may be affected by construction activities;
- identification of SEPA/WFD watercourse and waterbody classifications;
- review and collation of pertinent information on surface hydrology, flooding, climate etc.;
- review of geological mapping of the area, British Geological Survey, Geology of Britain Viewer, 1:50,000 scale;
- review of hydrogeological characteristics and groundwater resource;
- review of Private Water Supply records held by the Drinking Water Quality Regulator for Scotland (DWQR) and Orkney Islands Council; and
- review of coastal erosion maps supplied by Dynamic Coast Scotland.

Site Visit

11.5.4 The findings of the desk study have been supported by a site reconnaissance survey of surface watercourses and ground conditions which was undertaken on the 18th August 2020. This included a visual inspection of watercourses where works are likely to occur within or in the close vicinity of the Proposed Development, and an inspection of the ground conditions. An engineering site visit was conducted on the 9th March 2020. The engineering site visit was to obtain an appreciation of the potential marine access to the island and to ground truth the initial site layouts. A walk over of all turbine positions was completed to check the terrain and constraints matched the desktop study. A review of possible borrow pit search areas was also completed.

Targeted Peat Depth Survey

11.5.5 As outlined in Section 11.6 below, the desk study identified a low likelihood of any substantial peat or carbon-rich soils being present at the site. However, as part of the site reconnaissance, targeted peat depth probing was undertaken at proposed turbine locations. This identified no discernible peat at any of the turbine locations, confirming expected site conditions based on the desk study. No further peat survey work was considered to be warranted.

Significance Criteria

11.5.6 The characterisation of geological, hydrological and hydrogeological sensitivities has been guided by the matrix presented in Table 11.2 which lists the characterisation criteria.

Table 11.2 – Geological, Hydrological and Hydrogeological Sensitivity

Sensitivity	Description
High	Areas containing geological, geomorphological or hydrological features considered to be of international or national interest, for example Aquatic Natura 2000 sites, SACs, SSSIs. Highly permeable superficial deposits allowing free transport of contaminants to groundwater and surrounding surface waters. Wetland/watercourse of High or Good Ecological Potential. Raised or blanket bog. High risk of flooding.
Medium	Areas containing features of designated regional importance, for example Regionally Important Geological and Geomorphological Sites (RIGS), considered worthy of protection for their educational, research, historic or aesthetic importance. Moderately permeable superficial deposits allowing some limited transport of contaminants to groundwater and surrounding surface waters. Wetland/watercourse of Moderate Ecological Potential. Significant peat deposits. Moderate risk of flooding.
Low	Geological features not currently protected and not considered worthy of protection. Low permeability superficial deposits likely to inhibit the transport of contaminants. Wetland/watercourse of Poor or Bad Ecological Potential or no WFD classification. Thin superficial peat deposits. Low risk of flooding.

11.5.19 The criteria for sensitivity have been developed based on a hierarchy of factors relating to quality of the aquatic and geological environment including international and national designations, water and soil quality information, watercourse status from the WFD review work undertaken to date by SEPA, consultations, site reconnaissance and the professional judgement of the assessment team.

11.5.20 The prediction and assessment of effects on hydrology, hydrogeology and geology has been undertaken using a series of tables to document the various potential impacts from aspects of the construction works and operations. Effects have been predicted for the Proposed Development based on the guideline criteria for impact magnitudes set out in Table 11.3.

Table 11.3 – Impact Magnitude

Impact Magnitude	Guideline Criteria
High	Total loss of, or alteration to, key features of the baseline resource such that post development characteristics or quality would be

Impact Magnitude	Guideline Criteria
	fundamentally and irreversibly changed e.g. extensive excavation of peatland or watercourse realignment.
Medium	Loss of, or alteration to, key features of the baseline resource such that post development characteristics or quality would be partially changed e.g. instream permanent bridge supports or partial excavation of peatland.
Low	Small changes to the baseline resource, which are detectable, but the underlying characteristics or quality of the baseline situation would be similar to pre-development conditions e.g. culverting of very small watercourses/drains.
Negligible	A very slight change from baseline conditions, which is barely distinguishable, and approximates to the 'no-change' situation e.g. short-term compaction from machinery movements.

11.5.21 The significance of the predicted effects has been assessed in relation to the sensitivities of the baseline resource and magnitude of predicted impacts. A matrix of significance was developed to provide a consistent framework for evaluation and is presented in Table 11.4. Guideline criteria for the various categories of effect are included in Table 11.5.

Table 11.4 - Effect Significance Matrix

	Sensitivity			
Magnitude	**High**	**Moderate**	**Low**	**Not Sensitive**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Minor	Negligible	Negligible

Table 11.5 - Effect Significance Categories

Significance	Definition	Guideline Criteria
Major	A fundamental change to the environment	Changes in water quality or quantity affecting widespread catchments or groundwater reserves of strategic significance, or changes resulting in substantial loss of conservation value to geological or aquatic habitats and designations.
Moderate	A larger, but non-fundamental change to the environment	Changes in water quality or quantity affecting part of a catchment or groundwaters of moderate vulnerability, or changes resulting in loss of conservation value to geological or aquatic habitats or designated areas.

Significance	Definition	Guideline Criteria
Minor	A small but detectable change to the environment	Localised changes resulting in minor and reversible effects on soils, surface and groundwater quality or habitats.
Negligible	No detectable change to the environment	No effects on geological resources, drainage patterns, surface and groundwater quality or aquatic habitat.

11.5.22 In the above classification, fundamental changes are those which are permanent, either adverse or beneficial, and would result in widespread change to the baseline environment. For the purposes of this assessment, those effects identified as being major or moderate have been evaluated as significant environmental effects.

11.5.23 These matrices have been used to guide the assessment, although they have been applied with a degree of flexibility, since the evaluation of effects will always be subject to location-specific characteristics which must be taken into account. For this reason, the evaluation of the significance of effects in particular will not always correlate exactly with the cells in the relevant matrix, especially where professional judgement and knowledge of local conditions may result in a slightly different interpretation of the impact concerned.

11.5.24 Cumulative effects have been accounted for through the prediction and evaluation of effects cumulatively with those which could arise as a result of the construction and operation of other developments (operational, consented or in planning) within the study area.

Requirements for Mitigation

11.5.25 Proposed mitigation measures are presented within this chapter (Section 11.8 and 11.10) where the potential to affect sensitive geological, hydrological or hydrogeological receptors has been predicted. These may include temporary effects from construction or permanent/longer-term effects associated with the operational phase of the Proposed Development and its associated infrastructure.

Assessment of Residual Effect Significance

11.5.26 An assessment of any predicted significant residual effects on sensitive geological, hydrological or hydrogeological receptors, taking account of committed mitigation measures, is presented within this chapter (Section 11.11).

Limitations to Assessment

11.5.27 No water quality monitoring has been undertaken, although this is not considered warranted at this stage and would not materially affect the impact assessment.

11.6 Baseline Conditions

Geography, Topography and Geomorphology

11.6.1 The Proposed Development site occupies a remote island and coastal setting approximately 1.4 km west of the coast of the Island of Eday. The island comprises open fields of improved pasture, a number of abandoned buildings and a jetty. The current land use is sheep farming.

11.6.2 The island's topography is characterised by two fairly low hills. The southern of the two rises to 32 m Above Ordnance Datum (AOD), whilst the northern hill rises to 31 m AOD. The ground level gently falls away from the two hills with the steepest slope being near the coast to the west of the southern hill. Slope gradients are generally gentle throughout the site area.

11.6.3 Surface water is mainly rainwater derived and flows through a number of drainage channels. There are two springs located in the centre of the site at Grid References HY 52937, 36808 and HY 52937, 36762 from which a small stream flows towards the west into the sea. A small pond is located at Grid Reference HY 53126, 36789.

Land Use, Historical Developments and Man-Made Features

11.6.4 Grazing sheep is the primary land use currently. The remains of past farms and houses are evident on the island, but there are no inhabitants.

11.6.5 Historical mapping from the late 1800s shows approximately eight to ten farmhouses on the island, as well as a school in the north (Grid Reference HY 53065 37075), and a burial ground towards the west (Grid Reference HY 52775 36784).

11.6.6 The island was abandoned shortly after World War II and is now used only for grazing sheep. As noted above, the former farms and structures are still evident but are disused and in a derelict state.

11.6.7 There are six abandoned wells located within the site area, according to OS mapping. These are located in the central and northern parts of the island as shown on Figure 11.1. The wells were previously used for agricultural purposes and presumably for drinking water, when the island was inhabited, but have since been abandoned.

Designated Sites

11.6.8 There are no geological Sites of Special Scientific Interest (SSSI) located within or adjacent to the site boundary.

11.6.9 The Faray and Holm of Faray SSSI is within the site boundary, generally along the coastline of Faray and extending inland from the western shore in the central part of the island. The Faray and Holm of Faray Special Area of Conservation (SAC) is largely coincident with the SSSI, but extends further out into the sea. Both designations are for grey seal and are not considered to be directly relevant to the assessment of geological, hydrological and hydrogeological effects. These designations are discussed further in Chapter 8 Ecology.

11.6.10 There are no Geological Conservation Review sites (GCR) within the Study Area, the nearest being on the shores of Eday to the east and south of the Proposed Development site.

11.6.11 There are no Local Nature Conservation Sites (LNCS) within the Study Area.

Surface Water

11.6.12 There are no major surface watercourses, classified by SEPA under the WFD, within the study area.

11.6.13 The Proposed Development site contains a network of drainage ditches that mainly follow old field boundaries as seen in Figure 11.1.

11.6.14 Surface water within the site is predominantly derived from rainwater and field drainage, draining to the sea at the northern site boundary. However, there are also two springs located at Grid References HY 52937, 36808 and HY 52937, 36762 from which small streams flow towards the west into the sea as seen on Figure 11.1.

11.6.15 The site visit on the 9th March 2020 also confirmed a lack of any major watercourses on site, with only the above-noted minor field drains and spring-derived streams observed.

11.6.16 The Sound of Faray is immediately east of the island of Faray (with the site boundary extending into the Sound), whilst the Sound of Rapness forms the western site boundary. The coastal water body at this location is classified by SEPA as having an overall condition of High (2014).

11.6.17 Based on the presence of minor surface watercourses and drainage ditches in the study area, and taking account of the small scale of the site in the context of the coastal water body, the sensitivity of hydrological resources is considered to be **low**.

Flood risk

11.6.18 The online SEPA Indicative River & Coastal Flood Map illustrating the areas where there is a 0.5 % or greater probability of being flooded in any given year, i.e. the 1:200-year flooding event, in the vicinity of the site has been reviewed.

11.6.19 This map indicates that there are no areas of fluvial flood risk (i.e. flooding from rivers) nor surface water flood risk within the study area.

11.6.20 The mapping indicates that areas of coastal flooding could occur at the margins of the site area, only in the immediate vicinity of the coast with no evident flood risk extending inland.

11.6.21 Based on the absence of identified fluvial and surface water flood risk, and the coastal flood risk being restricted to the immediate coastline outside any proposed infrastructure locations, there is a low risk of flooding affecting the Proposed Development. Given that all site drainage is to the sea adjacent to the site, and that operational drainage will be appropriately designed in accordance with relevant guidance and in consultation with SEPA, there is considered to be no risk of the Proposed Development resulting in any downstream flooding risk. Flood risk is therefore scoped out of further consideration in the assessment.

Geology

11.6.22 Based on BGS digital mapping, the bedrock geology underlying the western part of the site comprises the Upper Stromness Flagstone Formation, with the Sacquoy Sandstone Member occurring on the northeast coast of the island at the Point of Tobar. Most of the eastern part of the site is underlain by the Lower Eday Sandstone Formation, with the Middle Eday Sandstone occurring on the eastern edge of the island. The Lower and Middle Eday Sandstone Formations are separated by the Eday Flagstone. The rocks comprise sandstones, siltstones and shales (Mykura, 1976). Bedrock geology is shown on Figure 11.2.

11.6.23 Based on BGS digital mapping, the bedrock in the west and southwest margins of the site is overlain by superficial glacial till deposited during the Late Devensian Stage, along with localised blown sand and marine beach deposits (sand gravel and boulders). The remainder of the site is shown as having little or no superficial cover over bedrock. Superficial geology is shown on Figure 11.3.

11.6.24 The Scottish Natural Heritage (SNH) Carbon and Peatlands Map (SNH, 2016) identifies the entire island as an area of Class 0, defined as mineral soil, with peatland habitats not typically found on such soils.

11.6.25 The 1:20,000 scale Soil Survey of Scotland map (Macaulay Institute for Soil Research, 1981) identifies the soil resource at the site as being non-calcareous gleys with peaty gleys.

11.6.26 During a site visit on 18th August 2020, targeted peat depth survey work was undertaken at the proposed turbine locations. This did not comprise a full peat depth survey in line with relevant Scottish Government, SEPA and SNH guidance, given that desk study work, ecology surveys, and review of aerial photography had identified a low potential for any substantial peat to be present at the site.

11.6.27 Peat probes advanced at approximately each proposed turbine location identified no discernible peat. A thin covering of organic topsoil was locally present, however no soils which could be described as peat were observed.

11.6.28 Photographs 1 to 3 below illustrate the grassland nature of the proposed turbine locations, with no vegetation/land cover suggestive of peat deposits.

Photograph 1 – Approximate Turbine 1 Location

Photograph 2 – Approximate Turbine 3 Location

Photograph 3 – Approximate Turbine 6 Location

11.6.29 Overall, the sensitivity of geological resources at the site is assessed as **low**, and further consideration of effects on geological resources is scoped out of the assessment.

Hydrogeology

Hydrogeology Mapping

11.6.30 The groundwater body at this location is the Orkney Groundwater, classified by SEPA as having an overall status of Good. The Hydrogeology Map of Scotland identifies the bedrock underlying the site as being a moderately productive aquifer classified as "Middle Old Red Sandstone – Aquifers in which flow is dominantly in fissures and other discontinuities".

11.6.31 There is potential for localised groundwater within the thin superficial deposits and/or the upper weathered bedrock, and the presence of six abandoned wells indicates that there is groundwater near enough the surface to be exploited. Two springs also represent groundwater seepage reaching the surface in the west of the island.

11.6.32 A desk study supported by site reconnaissance and information from the landowner as well as confirmation from OIC has confirmed that the wells are no longer in use and have been abandoned.

Private Water Supplies

11.6.33 There are no active Private Water Supplies (PWS) within the study area (DWQR, 2019). As noted above, the observed former wells on the site are confirmed as being no longer in use.

Groundwater Dependent Terrestrial Ecosystems (GWTDEs)

11.6.34 A Phase 1 Habitat survey and classification of habitats based on National Vegetation Classification (NVC) was conducted in May 2020. For further detail on this survey work and findings, refer to Chapter 8 Ecology.

11.6.35 Most of the site is characterised by open fields of improved pasture used for sheep farming, with little natural or semi-natural vegetation present. Dominant habitats were identified as semi-improved acid grassland and improved grassland, which are not indicative of potential groundwater dependence based on SEPA's Land Use Planning System Guidance Note 31 – Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems (SEPA, 2017).

11.6.36 A localised area of marshy grassland, identified in the above-noted guidance as potentially moderately groundwater dependent, was recorded in the western site area. The bedrock is a moderately productive aquifer, dominated by fracture flow. The identified springs within and immediately adjacent to this area of marshy grassland are likely the result of fracture flow reaching the surface, providing water that sustains the habitat in the immediate vicinity. This habitat is therefore interpreted as being GWDTE.

11.6.37 A second localised area of marshy grassland was observed in the south of the site. This is immediately adjacent to a field drain, and follows the route of the drain, suggesting it is more likely to be sustained at least in part by surface water, rather than being true GWDTE.

11.6.38 The identified areas of marshy grassland (potentially moderately dependent GWDTE) are illustrated on Figure 11.4.

Summary of Hydrogeological Sensitivity

11.6.39 The aquifer underlying the site is moderately productive and overlying superficial deposits are thin and discontinuous. The presence of springs and abandoned wells indicates the presence of groundwater near the surface at least locally on the island, with groundwater flow likely to be dominated by fracture flow. There are no active PWS on the island, and there is no potential for hydrogeological continuity with any potential off-site areas where groundwater could be abstracted. The sensitivity of groundwater as a receptor is assessed as **medium**.

Coastal Erosion

11.6.40 Through review of coastal erosion maps supplied by Dynamic Coast Scotland, it is observed that little coastal erosion has occurred surrounding and adjacent to the site from 1890 to present day (Dynamic Coast Scotland, 2019). Mapping shows localised areas where erosion has occurred up to a maximum of 20 m over that period, and it is noted that the historical mapping review and site walkover undertaken as part of the cultural heritage assessment identified some evidence of localised erosion where heritage assets were exposed or being eroded (refer to Chapter 10). However, recorded areas of erosion over 10 m in the 1890 to present day period are short stretches of coastline, with most areas exhibiting lesser or no erosion, and in some areas, accretion.

11.6.41 Projected coastal erosion maps, displaying future erosion until 2050, show that there is not predicted to be any substantial coastal erosion surrounding and adjacent to the site (Dynamic Coast Scotland, 2019). Therefore, there is considered to be a low risk of coastal erosion affecting the Proposed Development.

11.7 Receptors Brought Forwards for Assessment

11.7.1 The following receptors have been taken forward for assessment:

- hydrogeology (groundwater), encompassing GWDTEs; and

- surface water.

11.7.2 The following receptors have been scoped out of further assessment:

- designated sites;
- potential contaminated land from historic land use;
- flood risk;
- superficial geology (soils);
- bedrock geology;
- private water supplies; and
- coastal erosion.

11.8 Standard Mitigation

Project Design

11.8.1 A summary of the hydrological influences on the project layout are given below with full details of the project design provided in Chapter 2. The design of the infrastructure seeks to help maintain or even improve the local hydrology.

11.8.2 A 6m buffer was implemented for all drainage ditches located on site and shown in Figure 11.1 and infrastructure designed out with the ditches where possible, taking account of other constraints and suitable turbine spacing.

11.8.3 There are no substantial surface watercourses on the site and no major water crossings are therefore proposed. Drainage ditch crossings will be pre-cast concrete pipe culverts with cast in-situ headwalls (if required) and will be designed in accordance with SEPA Good Practice Guidance (2010). In some instances, it may be more appropriate to divert drainage ditches around new infrastructure, rather than incorporating ditch crossings. In all cases, the design will seek to maintain greenfield flow conditions.

Construction

Construction Environmental Management Plan

11.8.4 With specific reference to the SEPA 'Guidelines for Water Pollution Prevention from Civil Engineering Contracts' and 'Special Requirements', the contractor will produce a CEMP which contains a construction method statement that includes:

- a detailed breakdown of the phasing of construction activities;
- a pollution risk assessment of the site and the proposed activities;
- identification of all Controlled Waters that may be affected by the works and temporary discharge points to these drainage ditches and the marine environment;
- planning and design of appropriate pollution control measures during earthworks and construction;
- management of the pollution control system, including dewatering of excavations away from drainage ditches and the marine environment;
- contingency planning and emergency procedures; and
- on-going monitoring of construction procedures to ensure management of risk is maintained.

11.8.5 While it is acknowledged that best practice to minimise run-off would be to undertake construction and dismantling during the driest period of the year, and this aligns with the intention to not undertake construction works during winter (refer to Chapter 8 Ecology). However, given the

location of the Proposed Development on Orkney, there are likely to be significant periods of rainfall throughout the year. Therefore, site management will check the local weather forecast daily and prime all site staff to ensure that everyone is aware of their responsibilities to maintain the pollution control system during wet weather.

Pre-Construction Site Investigations

11.8.6 Detailed pre-construction site investigations would be conducted, focusing on areas where construction is proposed to be undertaken to inform suitable micro-siting of the turbines and associated infrastructure.

11.8.7 Targeted monitoring and assessment of the groundwater levels and flows beneath the site would also be carried out to inform micro-siting and to assist in the detailed design of infrastructure, the selection of appropriate materials for use during the construction process, and the requirement for any additional measures required to ensure protection of groundwater during construction. This will help to clarify whether identified areas of potential GWDTE are in fact groundwater fed and if any micro-siting or additional protective measures are required to minimise impacts to groundwater quality and flow in these areas.

Pollution Impact from Chemical Contaminated Runoff

11.8.8 All fuel and other chemicals will be stored in accordance with best practice procedures, including in a designated fuelling site located at a safe distance from existing drainage ditches and in appropriate impermeable bunded containers/areas which will be defined within the CEMP. These will be designed to capture any leakage, whether from a tank or from associated equipment such as filling and off-take points, sighting gauges etc., all of which will be located within the bund.

11.8.9 Oil booms and soakage pads will be maintained in all work areas and spill kits kept in all vehicles to enable a rapid and effective response to any accidental spillage or discharge. All construction staff will be trained in the effective use of this equipment.

11.8.10 Construction vehicles and plant will be regularly maintained and all maintenance, fuelling and vehicle washing will be undertaken on appropriate impermeable surfaces away from drainage ditches in order to minimise risks of leaks to soil and surface waters.

11.8.11 The contractor will develop a method statement to address the transport, transfer, handling and pouring of liquid concrete at foundations.

11.8.12 Cement, grout and unset concrete will not be allowed to enter the water environment. No operations involving concrete transfer between vehicles or into vehicles will take place within 30 m of water bodies. As noted in Chapter 3, it is likely that concrete batching will be undertaken on site. The mobile concrete batching plant will be sited away from watercourses and ditches, within an enclosed or shielded area. The plant will incorporate a suitable wastewater collection and treatment system to minimise potential pollution impacts on local ditches/watercourses. Environmental controls specific to the concrete batching plant will be incorporated into the CEMP.

11.8.13 All vehicles used for delivery of concrete will only be washed out at locations to be agreed with SEPA. Excess concrete or wash-out liquid will not be discharged untreated to drains or drainage ditches on site or at compounds. Drainage from washout facilities will be collected and treated or removed to an appropriate treatment point/licensed disposal site.

11.8.14 The requirement for dewatering will be minimised in all locations by timely and efficient excavation of the foundation void and subsequent concrete pouring and backfilling.

Operation

Surface Water Drainage

11.8.15 Prior to construction, a detailed Drainage Strategy (DS) will be developed and agreed with SEPA and OIC. The DS would detail the site drainage design, including the type of surface to be used for the access track, the soft engineering and habitat enhancement measures proposed to slow surface water flows and any necessary ponds, swales, cross drains and bunds, to ensure that runoff from

hard surfaces will be controlled. Should the detailed DS incorporate the existing site drainage into the Proposed Development drainage, then this will be agreed with SEPA.

11.9 Likely Effects

Construction

11.9.1 The construction phase includes all activities prior to the operation of the Proposed Development, i.e. up to the point at which the turbines begin generating electricity. The following outlines the likely effects identified, with respect to geology, hydrology and hydrogeology.

Pollution Impact from Silt-laden Runoff

11.9.2 Surface runoff containing silt, particularly during and after rainfall events, has the potential to enter the field drains and ephemeral ponds located on site. Silt laden surface water runoff is predicted to arise from excavations, exposed ground and any temporary stockpiles. This has the potential to temporarily impact on the water quality and hydrological and ecological function of the receiving watercourses.

11.9.3 The drainage ditches on site have been buffered by 6 m where possible. However, due to other constraints and the requirement to maintain suitable turbine spacing, several crossings or ditch diversions will be required. Ditch crossings will comprise pipe culverts, designed in accordance with SEPA Good Practice Guidance (2010). Existing drainage ditches will only be incorporated into the detailed DS with agreement of SEPA (refer to paragraph 11.8.15).

11.9.4 A suitable buffer has been applied around the coastline, with all proposed infrastructure (with the exception of the new extended slipway and landing jetty) above the 3 m AOD contour.

11.9.5 The sensitivity of the surface water receptors is low and the magnitude of impact is low with the implementation of the mitigation described in Section 11.8, resulting in an adverse, direct, temporary, short-term effect of **negligible to minor** significance (not significant).

Pollution Impact from Chemical Contaminated Runoff

11.9.6 Pollutants such as oils, fuel and cement may be mobilised through mechanical leaks or spillage and carried in surface drainage. Unless managed appropriately, the pollutants could be washed into watercourses, impacting on freshwater quality and ecological value.

11.9.7 The sensitivity of the surface water receptors is low and the magnitude of impact is low with the implementation of the mitigation described in Section 11.8, resulting in an adverse, direct, temporary, short-term effect of **negligible to minor** significance (not significant).

Impact on Groundwater Quality and Flow Regime

11.9.8 The introduction of turbine foundations has the potential to divert groundwater flows within superficial geology, and to impact groundwater quality as a result of alkaline leachate from concrete foundations. The potential requirement for dewatering of excavations during construction could locally reduce groundwater quantity.

11.9.9 There is anticipated to be limited, perched groundwater within localised superficial deposits at the site, with near-surface deposits having potential to allow transmission of groundwater. Therefore, dewatering of excavations would likely result in localised drawdown of the water table. The potential for groundwater within the bedrock to be near the surface in localised areas also cannot be ruled out, given the presence of habitats indicative of at least some potential groundwater dependence, and the moderately productive aquifer status (though noting that flow is likely to be restricted to fissures and other discontinuities).

11.9.10 SEPA guidance (SEPA, 2017) indicates there should not be deep excavations within 250m, or shallow excavations within 100m, of GWDTE without further detailed risk assessment. However, the driver for this guidance is the Groundwater Directive i.e. it is the groundwater that the guidance seeks to protect, not the habitat. The identified marshy grassland habitat is a useful as an indicator of groundwater being at/near the surface and therefore susceptible to impact from construction-related drawdown, pollution etc., but the habitat is not in itself a sensitive receptor.

11.9.11 The groundwater resource at the Proposed Development site is assessed as having moderate sensitivity, due to the moderately productive aquifer status, but absence of active PWS. Deep excavations within or close to the identified GWDTE area could result in localised water table drawdown, potentially affecting the groundwater flow that sustains the marshy grassland. However, given the interpretation of likely fracture flow, this potential is limited. Even with excavation of the shallow bedrock, fractures providing flow pathways would be expected to continue to significant depth and would therefore continue to provide that flow pathway to the surface. Therefore, there is low potential for the groundwater flow regime to be substantially affected, and suitable construction good practice can be employed to minimise potential for impact to groundwater quality via leaks/spills etc.

11.9.12 The sensitivity of groundwater resource at the site is moderate, and the magnitude of impact is low with the implementation of the mitigation described in Section 11.8, resulting in a direct adverse, short-term effect of **minor** significance (not significant).

Operation

Surface Water Drainage

11.9.13 The permanent access tracks and crane hardstandings for the wind turbines could result in additional surface water flows, potentially resulting in soil erosion and silt-laden runoff, which could pollute watercourses, ditches and ponds.

11.9.14 Taking account of the standard mitigation described in Section 11.8 (in particular the detailed DS to be developed and agreed with SEPA and OIC to ensure appropriate control of runoff from hard surfaces), there is the likelihood of a negligible magnitude impact, on low sensitivity surface water receptors. Therefore, there is potential for an adverse indirect, long-term effect of **negligible** significance (not significant).

Long-Term Changes to Groundwater Flow Regime

11.9.15 The presence of turbine foundations, access tracks and other infrastructure has the potential to interrupt groundwater flow; for example, impermeable concrete foundations can act as barriers to flow. However, given the nature of the superficial geology at the site, groundwater is anticipated to be limited to perched water in localised till and sand deposits. Groundwater flow within bedrock is indicated to likely be restricted to fissures and other discontinuities, and this flow is very unlikely to be impacted by foundations, which would be within superficial deposits.

11.9.16 Taking account of standard mitigation measures set out in Section 11.8, the magnitude of impact is assessed as low, on a moderate sensitivity receptor. There is therefore likely to be an adverse, indirect, long-term effect of **minor** significance (not significant).

Decommissioning

11.9.17 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

11.10 Mitigation and Enhancement

11.10.1 No significant environmental effects have been identified following the implementation of the mitigation outlined in Section 11.8 and no further mitigation is required.

11.11 Residual Effects

11.11.1 Residual effects are as per the assessment of likely effects in section 11.9.

11.12 Cumulative Effects

11.12.1 There are no proposed or operational wind farms within the study area, or which are directly hydrologically connected to the Proposed Development site. Therefore, no cumulative effects on hydrology, hydrogeology and geology are predicted.

11.13 Summary

11.13.1 The site comprises the island of Faray, an uninhabited island to the north and west of Eday and south-southeast of Westray in the Orkney Islands. The site boundary encompasses the island of Faray as well as extending approximately 500 m east into the sea. The site comprises open fields of improved pasture used for sheep farming, with generally gentle topography. The site contains several relic structures, namely former farms and cottages, and an old road/track. A network of drainage ditches generally follows field boundaries. There are no permanent surface watercourses on site, although there are several disused wells across the island, and localised springs in the west-central area.

11.13.2 Site geology predominantly comprises till over Upper Stromness Flagstone Formation. There is no discernible peat on site.

11.13.3 The aquifer underlying the site is moderately productive and overlying superficial deposits are thin and discontinuous. The presence of springs and abandoned wells indicates the presence of groundwater near the surface at least locally on the island, with groundwater flow likely to be dominated by fracture flow. There are no active private water supplies on the island or within 1 km of the site, and there is no potential for hydrogeological continuity with any potential off-site areas where groundwater could be abstracted.

11.13.4 The drainage ditches on site have been buffered by 6 m with no infrastructure proposed within those buffers apart from ditch crossings which were unavoidable due to other constraints and required turbine spacing.

11.13.5 Likely construction and operational effects include siltation or pollution of the water environment from surface runoff, and effects on groundwater quality and flow regime.

11.13.6 Standard/embedded mitigation measures include design and layout decisions taken through the design iteration process, including appropriate buffering of drainage ditches. Standard good construction and design practice has also been considered as standard mitigation, including detailed pre-construction site investigations, agreement and implementation of a CEMP, appropriate design of the proposed drainage ditch crossings, and development of a detailed Drainage Strategy for the site. These mitigation measures are considered to be robust and implementable and as a result there will be no significant effects on the hydrological, hydrogeological and geological receptors.

11.13.7 The likely effects on hydrological, geological and hydrogeological receptors, taking account of the standard mitigation measures, have been assessed as **negligible** to **minor** (not significant).

11.13.8 No additional mitigation is proposed or considered necessary, beyond the standard / embedded mitigation noted above. The significance of residual effects on hydrological, geological and hydrogeological receptors is therefore considered to be **negligible** to **minor** (not significant).

11.13.9 No cumulative effects on hydrology, hydrogeology and geology are predicted.

Table 11.6 - Summary Table – Hydrology, Hydrogeology and Geology

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Pollution from silt-laden runoff	Negligible to Minor (non-significant)	Adverse	No additional mitigation than the standard mitigation identified.	Negligible to Minor (non-significant)	Adverse
Pollution from chemical contaminated runoff	Negligible to Minor (non-significant)	Adverse		Negligible to Minor (non-significant)	Adverse
Effect on groundwater quality and flow	Minor (non-significant)	Adverse		Minor (non-significant)	Adverse
Operation					
Change in surface water drainage	Negligible (non-significant)	Adverse	No additional mitigation than the standard mitigation identified.	Negligible (non-significant)	Adverse
Long-term changes to groundwater flow regime	Minor (non-significant)	Adverse		Minor (non-significant)	Adverse

11.14 References

BGS. (2019). The BGS Lexicon of Named Rock Units — Result Details. Available at: *https://www.bgs.ac.uk/lexicon/lexicon.cfm?pub=TILLD*

CIRIA (2001). Control of water pollution from constructions sites. Guidance for consultants and contractors C532. Available at: *https://www.ciria.org/*

CIRIA (2006). Control of water pollution from linear construction projects: technical guidance C648. Available at: *https://www.ciria.org/*

CIRIA (2015). SUDS Manual C753. Available at: *https://www.ciria.org/*

CIRIA (2010). Environmental good practice on site C650. Available at: *https://www.ciria.org/*

CIRIA (2016). Groundwater Control – design and practice C515. Available at: *https://www.ciria.org/*

DEFRA (2011). Code of Practice for the sustainable use of soils on construction sites. Available at: *https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites*

DEFRA (2009). UK (UKCP09) climate projections. Available at: *https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/69257/pb13274-uk-climate-projections-090617.pdf*

DWQR. (2019). Private Water Supply map. Available at: *https://dwqr.scot/private-supply/pws-location-map/*

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

EA, SEPA & EHSNI (2011): PPG26: Storage and handling of drums and intermediate bulk containers. Available at: *https://www.gov.uk/government/publications/storing-and-handling-drums-and-intermediate-bulk-containers-ppg26*

EA, SEPA & EHSNI (2012). PPG6: Working at construction and demolition sites. Available at: *https://www.gov.uk/government/publications/construction-and-demolition-sites-ppg6-prevent-pollution*

EA, SEPA & EHSNI (2013). PPG1: General guide to the prevention of pollution. Available at: *https://www.gov.uk/government/publications/basic-good-environmental-practices-ppg1-prevent-pollution*

EA, SEPA & EHSNI (2017). GPP21: Pollution incidence response planning. Available at: *http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/*

EA, SEPA & EHSNI (January 2017). GPP5: Works and maintenance in or near water. Available at: *http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/*

EA, SEPA & EHSNI (January 2018). GPP2: Above ground oil storage tanks. Available at: *http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/*

EA, SEPA & EHSNI (July 2017). GPP8: Safe storage and disposal of used oils. Available at: http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

EA, SEPA & EHSNI (November 2017). GPP4: Treatment and disposal of sewage where no foul sewer is available. Available at: http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/

EC (1979). Groundwater Directive 80/68/EEC. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31980L0068

EC (2000). Water Framework Directive 2000/60/EC (WFD) 2000. Available at: http://ec.europa.eu/environment/water/water-framework/index_en.html

EC (2006). Groundwater Daughter Directive 2006/118/EC. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006L0118

Forestry Commission (2011). Guidance on Road Construction and Maintenance Forests and Water Guidelines Fifth Edition.

MAFF (2000). Good practice guide for handling soil. Available at: https://webarchive.nationalarchives.gov.uk/20090317221756/http://www.defra.gov.uk/farm/environment/land-use/soilguid/index.htm

Mykura W, (1976) British Regional Geology: Orkney and Shetland (HMSO, Edinburgh)

Ordnance survey (2019) OS Open Data Supply: Available at: https://www.ordnancesurvey.co.uk/opendatadownload/products.html Accessed: 30th of October 2019.

Ordnance Survey (1959). Orkney Islands (Kirkwall) One inch to One Mile Map, 7th Series. Sheet 6. Director General of the Ordnance Survey, Chessington, Surrey. Available at: https://maps.nls.uk/view/91549033

Ordnance Survey (1882). Orkney, Six inch to One Mile Map, 1st Edition. Sheet CII. Ordnance Survey, Southampton. Available at: https://maps.nls.uk/view/74427911

Ordnance Survey (1965) Orkney Islands (Kirkwall) 1:2,500 Map. Available at: https://www.old-maps.co.uk/#/Map/345500/1010500/12/100954

Scottish Executive (2000). Design Guidance on River Crossings and Migratory Fish. Available at: https://www2.gov.scot/Topics/marine/Publications/publicationslatest/recreational

Scottish Executive (2006). Private Water Supplies: Technical Manual. Available at: http://www.privatewatersupplies.gov.uk/private_water/files/Full%20Doc.pdf

Scottish Executive (2007). Flood Prevention and Land Drainage (Scotland) Act 1997. Available at: http://www.legislation.gov.uk/ukpga/1997/36/section/3/enacted

Scottish Government (2001). Planning Advice Note 61: Planning and SUDS, 2001. Available at: https://www.gov.scot/publications/pan-61-sustainable-urban-drainage-systems/

Scottish Government (2003). Water Environment and Water Services (Scotland) Act (WEWS Act) 2003. Available at: http://www.legislation.gov.uk/asp/2003/3/contents

Scottish Government (2006). Planning Advice Note 79: Water and Drainage, 2006. Available at: https://www.gov.scot/publications/planning-advice-note-pan-79-water-drainage/

Scottish Government (2009). The Flood Risk Management (Scotland) Act 2009. Available at: http://www.legislation.gov.uk/asp/2009/6/contents

Scottish Government (2011). The Waste Management Licensing (Scotland) Regulations 2011. Available at: http://www.legislation.gov.uk/ssi/2011/228/contents

Scottish Government (2011). Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended in 2018 (CAR). Available at: http://www.legislation.gov.uk/ssi/2011/209/contents/made

Scottish Government (2014). Scottish Planning Policy (SPP) June 2014. Available at: https://www.gov.scot/publications/scottish-planning-policy/

Scottish Government (2015). The Environmental Liability (Scotland) Regulations 2015. Available at: http://www.legislation.gov.uk/ssi/2015/214/contents/made

Scottish Government (2017). The Public Water Supplies (Miscellaneous Amendments) (Scotland) Regulations 2017. Available at: http://www.legislation.gov.uk/ssi/2017/321/contents/made

Scottish Government (2017). The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: http://www.legislation.gov.uk/ssi/2017/102/contents/made

Scottish Government (2017). The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017. Available at: http://www.legislation.gov.uk/ssi/2017/282/contents/made

Scottish Government (Second Edition, 2017). Peat Landslide Hazard and Risk Assessments: Good practice Guide for Proposed Electricity Generation Developments. Available at: https://www.gov.scot/publications/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/

Scottish Renewables, SNH, SEPA & Forestry Commission Scotland (4th Edition 2019). Good practice during windfarm construction 3rd Edition. Available at: https://www.nature.scot/guidance-good-practice-during-wind-farm-construction

SEPA (2002). Managing River Habitats for Fisheries. (Available at: https://www.sepa.org.uk/media/151323/managing_river_habitats_fisheries.pdf

SEPA (2002). Managing River Habitats for Fisheries. Available at: https://www2.gov.scot/Publications/2002/04/14606/3644

SEPA (2004). Methodology for the Water Framework Directive, Scotland and Northern Ireland Forum for Environmental Research, Project WFD 28 Final Report.

SEPA (2006). Special Requirements for Civil Engineering Contracts for the Prevention of Pollution, Version 2. Available at: https://www.sepa.org.uk/media/152220/wat_sg_31.pdf

SEPA (2008). Regulatory Position Statement: Waste Water Drainage.

SEPA (2009/2015). The River Basin Planning Strategy for the Scotland River Basin District. Available at: https://www.sepa.org.uk/media/37453/rbmp_planning-strategy_scotland.pdf

SEPA (2010). River Crossings, Engineering in the water environment: good practice guide. Available at: https://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/

SEPA (2010): Regulatory Position Statement – Developments on peat. Available at: https://www.sepa.org.uk/media/143822/peat_position_statement.pdf

SEPA (2011 as amended in 2018). The Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended in 2018 - A practical guide. Available at: https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf

SEPA (2014). Flood Risk and Planning Briefing Note. Available at: https://www.sepa.org.uk/media/143403/sepa-briefing-note-to-planning-authorities-on-the-flood-risk-management-scotland-act-2009.pdf

SEPA (2014). Land Use Planning System Guidance Note 31 (LUPS-GU31)- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Available at: https://www.sepa.org.uk/media/144266/lups-gu31-guidance-on-assessing-the-impacts-of-development-proposals-on-groundwater-abstractions-and-groundwater-dependent-terrestrial-ecosystems.pdf

SEPA (Feb 2012). Position Statement: The role of SEPA in natural flood management. Available at: https://www.sepa.org.uk/media/42133/sepa-04-12-position_statement_the_role_of_sepa_in_natural_flood_management.pdf

SEPA (January 2014, updated April 2018). Indicative River & Coastal Flood Map (Scotland). Available at: http://map.sepa.org.uk/floodmap/map.htm

SEPA (July 2012). Environmental Standards for River Morphology, WAT-SG-21. Available at: https://www.sepa.org.uk/regulations/water/engineering/engineering-guidance/

SEPA (July 2019). Technical flood risk guidance for stakeholders, version 12. Available at: https://www.sepa.org.uk/media/162602/ss-nfr-p-002-technical-flood-risk-guidance-for-stakeholders.pdf

SEPA (September 2017). Land Use Planning System Guidance Note 4 (LUPS GU4) - Planning guidance on on-shore windfarm developments. Available at: https://www.sepa.org.uk/media/136117/planning-guidance-on-on-shore-windfarms-developments.pdf

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

SNH (2016). Carbon and Peatland Map (2016). Available at: http://map.environment.gov.scot/Soil_maps/?layer=10

SNH (2018). A Handbook of Environmental Impact Assessment, 5th Edition. Available at: https://www.nature.scot/handbook-environmental-impact-assessment-guidance-competent-authorities-consultees-and-others

(SEPA, 2009) Temporary Construction Methods, WAT-SG-29

UK Government (1974). Control of Pollution Act 1974. Available at: https://www.legislation.gov.uk/ukpga/1974/40

UK Government (1990). Environmental Protection Act 1990. Available at: https://www.legislation.gov.uk/ukpga/1990/43/contents

UK Government (1994). Waste Management Licensing Regulations 1994. Available at: http://www.legislation.gov.uk/uksi/1994/1056/contents/made

UK Government (1995). Environment Act 1995. Available at: https://www.legislation.gov.uk/ukpga/1995/25/contents

UK Government (1998). Groundwater Regulations 1998. Available at: *http://www.legislation.gov.uk/uksi/1998/2746/contents/made*

UK Technical Advisory Group on the WFD (2013). UK Environmental Standards and Conditions Final Report, November 2013.

12 Traffic and Transport

Contents

12.1	Executive Summary	12-1
12.2	Introduction	12-1
12.3	Legislation, Policy and Guidelines	12-1
12.4	Consultation	12-3
12.5	Assessment Methodology and Significance Criteria	12-5
12.6	Baseline Conditions	12-10
12.7	Receptors Brought Forward for Assessment	12-14
12.8	Standard Mitigation	12-15
12.9	Likely Effects	12-16
12.10	Additional Mitigation and Enhancement	12-16
12.11	Residual Effects	12-17
12.12	Cumulative Assessment	12-17
12.13	Summary	12-17
12.14	References	12-19

This page is intentionally blank.

12 Traffic and Transport

12.1 Executive Summary

12.1.1 The Proposed Development will be accessed from new marine access points that will need to be constructed on the south-east of the island.

12.1.2 Materials for the majority of the works associated with the construction of the access track and crane hardstands will be won from on-site borrow pits. Material for the initial works will however need to be imported from quarries on the Mainland of Orkney.

12.1.3 Concrete will be batched on-site, with supplies coming from sources on Orkney. The majority of any traffic impact will therefore be focussed on the Mainland of Orkney.

12.1.4 The construction activities will lead to increased traffic volumes on the A965 during the construction phase only. Following commissioning of the Proposed Development, traffic flows will fall to two vehicle movements a week.

12.1.5 An assessment of likely effects using IEMA guidelines has been undertaken. This determined that no significant effects would occur as a result of traffic flows associated with the Proposed Development.

12.2 Introduction

12.2.1 This chapter considers the likely significant effects on receptors along the transport routes resulting from vehicle movements associated with the construction and operation of the Proposed Development. The specific objectives of the chapter are to:

- review the relevant policy and legislative framework;
- describe the baseline transport conditions;
- describe the assessment methodology and significance criteria used in undertaking the assessment;
- describe the likely effects, including direct, indirect and cumulative effects;
- describe the mitigation measures proposed to address likely significant effects; and
- assess the residual effects remaining following the implementation of mitigation.

12.2.2 A high-level overview of the effects of the traffic movements has been considered in accordance with Institute of Environmental Assessment (now Institute of Environmental Management and Assessment (IEMA)) Guidelines for the Environmental Assessment of Road Traffic. The document is referred to as the IEMA Guidelines in this chapter.

12.2.3 The chapter should be read in conjunction with Appendix 12.1 Transport Assessment.

12.3 Legislation, Policy and Guidelines

12.3.1 A review of relevant transport planning policies has been undertaken and is summarised below for national and local government policies.

Legislation

12.3.2 There is no legislation applicable to this chapter.

Policy & Guidance

12.3.3 Chapter 5 of the EIA Report provides an overview of all the relevant planning policy. Of particular relevance to this chapter are:

Planning Advice Note (PAN) 75

12.3.4 Planning Advice Note (PAN) 75: Planning for Transport provides advice on the requirements for Transport Assessments. The document notes that:

"… transport assessment to be produced for significant travel generating developments. Transport Assessment is a tool that enables delivery of policy aiming to integrate transport and land use planning."

"All planning applications that involve the generation of person trips should provide information which covers the transport implications of the development. The level of detail will be proportionate to the complexity and scale of the impact of the proposal...For smaller developments the information on transport implications will enable local authorities to monitor potential cumulative impact and for larger developments it will form part of a scoping exercise for a full transport assessment. Development applications will therefore be assessed by relevant parties at levels of detail corresponding to their potential impact."

Transport Assessment Guidance (2012)

12.3.5 Transport Scotland's (TS) Transport Assessment Guidance was published in 2012. It aims to assist in the preparation of Transport Assessments (TA) for development proposals in Scotland such that the likely transport effects can be identified and dealt with as early as possible in the planning process. The document sets out requirements according to the scale of development being proposed.

12.3.6 The document notes that a TA will be required where a development is likely to have significant transport effects but that the specific scope and contents of a TA will vary for developments, depending on location, scale and type of development.

Onshore Wind Turbines; Online Renewables Planning Advice (May 2014)

12.3.7 The most recent Scottish Government advice note regarding onshore wind turbines was published in 2014. The advice note identifies the typical planning considerations in determining applications for onshore wind turbines including landscape impact, impacts on wildlife and ecology, shadow flicker, noise, ice throw, aviation, road traffic impacts, cumulative impacts and decommissioning.

12.3.8 In terms of road traffic impacts, the guidance notes that in siting wind turbines close to major roads, pre-application discussions are advisable as this is important for the movement of abnormal indivisible loads during the construction period, ongoing planned maintenance and for decommissioning (if applicable).

Orkney Local Development Plan

12.3.9 The Orkney Local Development Plan (LDP) was adopted by the Council in April 2017 and is the established planning policy for Orkney. It sets out a settlement strategy and spatial framework for how the Council foresees development occurring in the forthcoming twenty-year period.

12.3.10 Within the plan, relevant transport elements include:

"Developments that have the potential to generate significant levels of freight will be directed to industrial allocations beside key ports and harbour facilities (Hatston, Copland's Dock and Lyness)."

"Development will only be permitted where due regard has been paid to Designing Streets and the proposal demonstrates that:

i. It is well connected to the existing network of roads, paths and cycleways and will not create a barrier to future development;

ii. It can be safely and conveniently accessed by service, delivery and other goods vehicles, as appropriate to the development;

iii. Any new access, or upgrades to an existing access, linking to the adopted road network has been designed to an adoptable standard as defined by the National Roads Development Guide (new accesses should be resource efficient, safe for all road users, and convenient for sustainable travel modes);

iv. It is designed to cause minimal impact on the character of the site and the surrounding area; and

v. There are satisfactory arrangements to ensure that there is provision for the long-term maintenance."

12.3.11 A Supplementary Energy Guidance noted is included within the LDP. With regards to transport and access, the supplementary note advises that:

"The developer must liaise with the Council as Roads Authority in relation to access and egress from the proposed development site. This must include for all works associated with alterations to the existing roads infrastructure required to transport materials to and from the development site and to all works associated with construction, maintenance and decommissioning.
Depending on the scale of the turbine(s) and the sensitivity of the site, all scales of wind energy developments could be required to submit a method statement for the construction of their proposal in support of the application. This statement would cover the phasing of construction, associated timescales and methods for transporting equipment to and from the site. This is to ensure minimal impacts on the surrounding environment and users."

12.4 Consultation

12.4.1 Table 12.1 summarises the consultation responses with regards to traffic and transport and the Proposed Development.

Table 12.1 – Consultation Summary

Organisation	Summary / Concerns Raised	Action Required
Orkney Islands Council – Scoping Opinion	There are no adopted public roads anywhere near the proposed site.	Noted.
	Full details of all loads that would be transported from Orkney Mainland to the site must be considered with their potential impact.	The TA and the assessment in this chapter cover the construction and operation of the Proposed Development. The application is for the development to exist in perpetuity, however, should decommissioning occur the effects are not anticipated to be greater than the construction phase. It should however be noted that elements of the Proposed Development would be retained should the site ever be decommissioned (i.e. the marine access and other elements such as sections of track that may assist with agricultural access, etc.) and as such, the assessment of the construction phase is the worst-case scenario. Should the site be decommissioned a Traffic Management Plan could be produced at that time to review access and transport issues.
	Need to outline the scale of the infrastructure	Details of proposed access strategy is provided in the Transport Assessment (Appendix 12.1). Details of the proposed

Organisation	Summary / Concerns Raised	Action Required
	required to access the site.	new extended slipway and landing jetty are provided in Chapter 3.
	A Section 96 Agreement to cover abnormal wear and tear on the road network may be required.	A Section 96 Agreement is noted and included as potential mitigation for the Proposed Development.
Orkney Islands Council – Marine Services	Access for abnormal loads would be best achieved via the Hatston Pier and there are no physical constraints to its use.	The Route Survey Report assumes access from Hatston Pier and notes that there are no physical infrastructure constraints at the pier.
	A swept path assessment of the route from the pier to the nearby storage areas will be required.	The Route Survey Report contains the required drawings and assessment.
	A Port Management Plan will be required to manage abnormal load deliveries and other marine traffic at Hatston Pier.	A commitment to a Port Management Plan is contained in the mitigation proposals.
Orkney Islands Council – Roads Services	No response received for Faray, but the following was relevant for the Orkney's Community Wind Farm Project - Quanterness scheme: The study area will need to include the A965 and Grainshore Road. The use of Low National Road Traffic Forecasts (NRTF) is acceptable in accounting for traffic growth and committed development traffic.	The study area contains traffic flow data for the A965 and Grainshore Road. Low NRTF has been applied.

12.5 Assessment Methodology and Significance Criteria

12.5.1 The methodology adopted in this assessment involved the following key stages:

- determine the baseline;
- review the Proposed Development for impacts;
- evaluate significance of effects on receptors;
- identify mitigation; and
- assess residual effects.

Consultation

12.5.2 Consultation was undertaken with the following:

- Orkney Islands Council – Roads Services; and
- Orkney Islands Council – Marine Services.

12.5.3 The results of these consultations have been included in the evolution of the design and access strategy for the Proposed Development and are detailed in Section 12.4 above.

Desk Study & Site Visit

The desk study included reviews and identification of the following:

- relevant transport planning policy;
- accident data;
- any other traffic sensitive receptors in the area (core paths, routes, communities, etc);
- Ordnance Survey (OS) plans;
- potential origin locations of construction staff and supply locations for construction materials to inform extent of local area roads network to be included in the assessment; and
- constraints to the movement of Abnormal Indivisible Loads (AILs) through a Route Survey including swept path assessments.

12.5.4 The desk review was later confirmed by a site visit and walk over of the Proposed Development site. This included a detailed review of Hatston Pier and the routes leading to potential material supply sources.

Study Area

12.5.5 Faray is currently uninhabited and does not have any metaled public adopted roads or road going vehicles on the island.

12.5.6 Access to the island for wheeled vehicles is currently taken from a small slipway located to the south of the island. This slipway is in poor condition and is only suitable for small landing craft style vessels. Access for HGV traffic to the island is currently not possible with the current infrastructure.

12.5.7 To access the island, the following strategy has been developed:

- a new extended slipway will be required to replace the existing facility. This item would need to be replaced regardless of the Proposed Development as the current slipway is badly damaged and access to the island is still required for agricultural purposes. The new extended slipway

would be built in the same location as the existing slipway and would be built to a standard design for Orkney Islands to allow access for locally based vessels;

- a new landing jetty will be constructed to allow access for larger vessels to Faray. This is to be located in close proximity to the slipway and will allow access for abnormal and heavy loads to the island; and
- a network of access roads will connect the new extended slipway and landing jetty to the other Proposed Development elements. The access tracks would be designed to accommodate all predicted loads and traffic for both the construction and operational phases of the Proposed Development.

12.5.8 Given that there is no traffic or road network on Faray, the traffic impact assessment elements of the study will focus on the Mainland of Orkney, where the majority of materials for the construction phase will originate from or will be transferred from vessels originating from the UK Mainland or wider afield.

12.5.9 No assessment of traffic impact will therefore be undertaken on Faray.

12.5.10 The study area for this assessment on the Mainland of Orkney is as follows and was discussed and agreed with Orkney Islands Council as part of Orkney's Community Wind Farm Project – Quanterness application. The study area includes:

- The A965 from Finstown through to Kirkwall; and
- Grainshore Road between the Hatston Pier and the junction with the A965.

12.5.11 The A965 covers the principal route for HGV access from Cursiter Quarry (the nearest quarry to the port) and Hatston Pier (the embarkation point for deliveries to Faray). The A965 in Finstown is an A Class distributor road and features regular HGV traffic due to its regional distributor function. To the east of Heddle Road, the street is fronted by residential properties on both sides of the road, with limited retail uses.

12.5.12 Finstown is the fourth largest settlement within Orkney and there are a small number of community and public facilities accessed from the A965 in Finstown (including a garage, public conveniences and a post office). Other community facilities are not directly accessed from the A965, including the primary school, which is accessed directly from the A966, to the north of the town.

12.5.13 The A965 is a district distributor road connecting Kirkwall to Stromness. The road is of a modern design standard within the study area and is approximately between 6 m and 7.2 m in width and is subject to a 60 mph speed limit. This reduces as the road passes through Finstown.

12.5.14 The A965 passes into Kirkwall and changes to a 30mph urban distributor road.

12.5.15 Grainshore Road is a loop to the A965, providing access to industrial units and the Hatston Pier to the north of the A road. The road is subject to a 40 mph speed limit between the A965 junction and the start of the industrial developments to the west of Kirkwall.

12.5.16 Prior to works commencing, the Balance of Plant (BoP) Contractor will select a base for construction staff to be based upon as staff will not be permanently based on Faray during construction. Westray could be used as a base, however this has been excluded from the assessment at this point in time. A staff travel plan will be provided to OIC prior to works commencing and will detail sustainable measures for staff to access the construction site.

Assessment of Likely Effect Significance

12.5.17 The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Impact Assessment' (2005) notes that the separate 'Guidelines for the Environmental Assessment of Road Traffic' (1993) document should be used to characterise the environmental traffic and transport effects (off-site effects) and the assessment of significance of the effects of major new developments. The guidelines intend to complement professional judgement and the experience of trained assessors.

Receptor Sensitivity

12.5.18 In terms of traffic and transport impacts, the receptors are the users of the roads within the study area and the locations through which those roads pass.

12.5.19 The IEMA Guidelines includes guidance on how the sensitivity of receptors should be assessed. Using that as a base, professional judgement was used to develop a classification of sensitivity for users based on the characteristics of roads and locations. This is summarised in Table 12.2.

Table 12.2 – Classification of Receptor Sensitivity

Receptor	Sensitivity			
	High	Medium	Low	Negligible
Users of Roads	Where the road is a minor rural road, not constructed to accommodate frequent use by HGVs. Includes roads with traffic control signals, waiting and loading restrictions, traffic calming measures.	Where the road is a local A or B class road, capable of regular use by HGV traffic. Includes roads where there is some traffic calming or traffic management measures.	Where the road is Trunk or A-class, constructed to accommodate significant HGV composition. Includes roads with little or no traffic calming or traffic management measures.	Where roads have no adjacent settlements. Includes new strategic trunk roads that would be little affected by additional traffic and suitable for Abnormal Loads and new strategic trunk road junctions capable of accommodating Abnormal Loads.
Users / Residents of Locations	Where a location is a large rural settlement containing a high number of community and public services and facilities.	Where a location is an intermediate sized rural settlement, containing some community or public facilities and services.	Where a location is a small rural settlement, few community or public facilities or services.	Where a location includes individual dwellings or scattered settlements with no facilities.

12.5.20 The classifications are based upon the activities that can be expected in different areas and different types of streetscape. Professional judgement is used to reflect these generalised descriptions to study areas, especially those in remote areas where settlement size, function and facilities are more important than the category descriptors suggest.

12.5.21 Where a road passes through a location, users are considered subject to the highest level of sensitivity defined by either the road or location characteristics.

Magnitude of Impact

12.5.22 The following rules, also taken from the IEMA Guidelines are used to determine which links within the study area should be considered for detailed assessment:

- Rule 1 – include highway 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 – include any other specifically sensitive areas where traffic flows are predicted to increase by 10 % or more.

12.5.23 The IEMA Guidelines identify the key impacts that are most important when assessing the magnitude of traffic impacts from an individual development: the impacts and levels of magnitude are discussed below:

- Severance – the IEMA Guidance states that, *"severance is the perceived division that can occur within a community when it becomes separated by a major traffic artery."* Further, *"Changes in traffic of 30 %, 60 %, and 90 % are regarded as producing 'slight', 'moderate', and 'substantial'* [or minor, moderate, and major] *changes in severance respectively"*. However, the Guidelines acknowledge that *"the measurement and prediction of severance is extremely difficult".* (Para 4.28).
- Driver delay – the IEMA Guidelines note that these delays are only likely to be *"significant [or major] when the traffic on the network surrounding the development is already at, or close to, the capacity of the system"* (Para 4.32).
- Pedestrian delay – the delay to pedestrians, as with driver delay, is likely only to be major when the traffic on the network surrounding the development is already at, or close to, the capacity of the system. An increase in total traffic of approximately 30 % can double the delay experienced by pedestrians attempting to cross the road and would be considered major.
- Pedestrian amenity – the IEMA Guidelines suggests that a tentative threshold for judging the significance of changes in pedestrian amenity would be where the traffic flow (or its lorry component) is halved or doubled (Para 4.39). It is therefore considered that a change in the traffic flow of -50 % or +100 % would produce a major change in pedestrian amenity.
- Fear and intimidation – there are no commonly agreed thresholds for estimating levels of fear and intimidation, from known traffic and physical conditions. However, as the impact is considered to be sensitive to traffic flow, changes in traffic flow of 30 %, 60 % and 90 % are regarded as producing minor, moderate and major changes respectively.
- Accidents and safety – professional judgement would be used to assess the implications of local circumstances, or factors which may elevate or lessen risks of accidents.

12.5.24 While not specifically identified, as more vulnerable road user, cyclists are considered in similar terms to pedestrians.

Significance of Effects

12.5.25 To determine the overall significance of effects, the results from the receptor sensitivity and magnitude of change assessments are correlated and classified using a scale set out in Table 2.4 of Volume 11, Section 2, Part 5 of the Design Manual for Roads and Bridges (DMRB) and summarised in Table 12.3.

Table 12.3 – Significance of Effects

Receptor Sensitivity	Magnitude of Impacts			
	Major	**Moderate**	**Minor**	**Negligible**
High	Major	Major / Moderate	Moderate / Minor	Minor
Medium	Major / Moderate	Moderate	Minor	Minor / Negligible
Low	Moderate / Minor	Minor	Minor	Minor / Negligible
Negligible	Minor	Minor	Minor / Negligible	Negligible

12.5.26 In terms of the EIA Regulations, effects would be considered of significance where they are assessed to be major or moderate. Where an effect is Moderate/Minor, professional judgement will be used to determine whether the effect is significant on a case by case basis.

Requirements for Mitigation

12.5.27 If significant likely effects are identified appropriate mitigation will be implemented to remove and reduce the significance of the effects where possible.

Residual Effects

12.5.28 Residual effects will be assessed following a similar methodology as the likely effects but taking into consideration the identified mitigation.

Cumulative Effects

12.5.29 Cumulative effects will take into consideration other developments with planning consent (i.e. committed developments), under construction or in operation which, with the addition of the Proposed Development could cumulatively impact upon receptors.

12.5.30 Developments in the planning process that have not been consented, will be excluded from the assessment.

Limitations to Assessment

12.5.31 The assessment is based upon an assumed construction programme for the Proposed Development. Alterations in this programme, may increase or decrease traffic flows per month.

12.5.32 This assessment is based upon average traffic flows. There may be localised peaks with construction days where flows can be higher for a specific hour, such as a shift change on-site when staff return from Faray to where they are temporarily resident.

12.5.33 Assumptions on the origination points for materials have been made to provide a worst-case assessment scenario. Should these origin points change, the effects on surrounding areas may alter to those presented in the assessment.

12.6 Baseline Conditions

Pedestrian and Cyclist Networks

12.6.1 There are no Core Paths recorded by Orkney Islands Council on Faray.

12.6.2 The closest Core Paths within the study area on the Mainland of Orkney that interact with the study area are located towards Finstown and are:

- WM7: Path to Keelylang Hill (from A956 to the top of Keelylang Hill – does not cross the A965);
- WM8: Cuween Paths (local paths near Old Finstown Road - does not cross the A965); and
- St Magnus Way: Within Finstown (running along and crossing the A965).

12.6.3 A review of the Sustrans cycle network plan of the United Kingdom indicates that there are no recommended National Cycle Routes (NCR) within the study area.

12.6.4 There is a segregated cycle / pedestrian path on Grainshore Road in the industrial unit section of the road. This provides links from this point, through to Kirkwall town centre via the A965.

Existing Traffic Conditions

12.6.5 In order to assess the impact of development traffic on the study area, data from a series of Automatic Traffic Count (ATC) sites were obtained. The locations and sources for the data are indicated below:

- A965 Finstown (obtained from the Department for Transport traffic counts);
- Grainshore Road (obtained from published data associated with Costa Head Wind Farm);
- A965 Kirkwall (obtained from the Department for Transport traffic counts); and
- A965 West of Finstown (obtained from the Department for Transport traffic counts).

12.6.6 The locations of the ATC sites are illustrated in Figure 12.1. These sites were identified as being areas where sensitive receptors on the access route could be located.

12.6.7 The traffic data collected at the count sites detailed in Figure 12.1 allowed the traffic flows to be split into vehicle classes and the data have been summarised into cars / light goods vehicles (Lights) and heavy goods vehicles (HGVs) (all goods vehicles >3.5 tonnes gross maximum weight).

12.6.8 Construction of the project could commence during 2025 if consent is granted and is anticipated to be complete by the 15th of September 2026, with a break for ecological and wider construction constraints occurring between the 15th September 2025 and March 2026.

12.6.9 To assess the likely effects during the construction and typical operational phase, base year traffic flows were determined by applying a National Road Traffic Forecast (NRTF) low growth factor to the surveyed traffic flows.

12.6.10 The traffic flows were brought to a common year of 2026 (where the peak of construction activities is expected to occur) using National Road Traffic Forecasts (Low Growth estimates). The 2026 baseline flows are presented in Table 12.4 and these flows will be used in the Construction Traffic Impact Assessment.

Table 12.4 – 2026 24 Hour Average Traffic Flows

Location	Cars & Lights	HGV	Total
A965 Finstown	4405	256	4661
Grainshore Road	3452	283	3735
A965 Kirkwall	7783	313	8096
A965 West of Finstown	3998	243	4241

Accident Review

12.6.11 Road traffic accident data for the five year period commencing 1st January 2015 through to the 31st December 2019 was obtained from the online resource crashmap.co.uk which uses data collected by the police about road traffic crashes occurring on British roads.

12.6.12 The statistics are categorised into three categories, namely "Slight" for damage only incidents, "Serious" for injury accidents and "Fatal" for accidents that result in a death. Tables 12.5, 12.6 and 12.7 summarise the accidents noted in the study area.

Table 12.5 – Accident History Summary

Accident Severity	Number of Recorded Incidents
Slight	8
Serious	1
Fatal	2

12.6.13 There are 11 recorded incidents, all occurring on the A965, of which two involved fatalities, one located to the west of Finstown and one at Rennibister.

Table 12.6 – Accident Casualty Summary

Accident Severity	Cyclist	Child	Motorcyclist	Pedestrian
Slight	1	0	1	1
Serious	0	0	0	0
Fatal	0	0	0	0

Table 12.7 – Vehicles Involved in Accidents Summary

Accident Severity	Cyclist	Motorcycle	Car	HGV	Bus	Young Driver
Slight	1	1	7	2	0	2
Serious	0	0	1	0	0	0
Fatal	0	0	2	1	0	1

12.6.14 The statistics indicate that the majority of accidents are "Slight" in nature and that there are a limited number of HGV incidents occurring in the five year review period.

12.6.15 One "Fatal" accident involved a young driver and a car (near Rennibister), whilst the other "Fatal" accident involved an HGV and a car (to the west of Finstown).

12.6.16 Within a three year window, five accidents were recorded with three being "Slight", one "Serious" and one "Fatal".

Construction Phase

12.6.17 During the construction period, a variety of different vessels will be used to transport staff, materials and components to Faray. These movements and vessels are described in the Transport Assessment (See Appendix 12.1)

12.6.18 Average monthly traffic flow data were used to establish the construction trips associated with the site based on the assumptions detailed in Appendix 12.1.

12.6.19 There are a number of ecological and weather constraints that will affect construction on Faray. These have been factored into provide an initial construction period commencing in 2025 between March and the 15th of September. Activities in this period will focus on initial works such as setting up the new slipway (to replace the existing facility which is life expired), works for the landing jetty, developing site compounds, borrow pits and access tracks.

12.6.20 By the 15th of September 2025, the site will be shut down to ensure that no construction activities are present during seal breeding season. The site will then recommence in March 2026 to allow sufficient time for the ecological constraints to pass along with likely adverse weather periods.

12.6.21 The 2026 construction would focus on the wind farm elements of the Proposed Development with the turbines being erected and commissioned before the 15th of September.

12.6.22 The likely traffic movements on the Mainland of Orkney associated with material deliveries have been used alongside the indicative programme to determine timescales for the various deliveries and trips and is detailed in Table 12.8.

12.6.23 The trip generation programme indicates that March 2026 is the peak period for construction activities. It is estimated that a total of 6 Car / LGV movements and 14 HGV movements per day, resulting in a total of 20 movements per day.

12.6.24 Using the distribution of traffic described Appendix 12.1, the proposed traffic flows on the study area network at the peak of construction are illustrated in Table 12.9.

Table 12.8 – Construction Traffic Generation Profile

Activity	March	April	May	June	July	August		March	April	May	June	July	August
Site Establishment	*10*	*10*	*10*			*26*		*30*				*15*	*15*
Emergency Access Works		*6*	*6*										
Slipway Fill Materials		*28*	*28*										
Slipway Concrete Material Imports		*19*	*19*										
Blunt End Sheet Piles			*20*	*20*									
Landing Jetty Fill Materials				*86*	*86*	*86*		*86*					
Landing Jetty Concrete Materials								*40*	*40*				
General Site Deliveries		*40*	*40*	*40*	*40*	*40*		*40*	*40*	*40*	*40*	*40*	*40*
Access Track & Compound Material Imports			*157*	*157*	*157*								
Reinforcement					*14*			*41*					
Concrete Aggregate & Cement Deliveries								*143*	*143*	*143*			
Cable Deliveries									*6*	*2*			
Cabling Sand									*116*	*116*			
Geotextile / Duct Deliveries				*10*				*6*	*2*				
Substation Deliveries								*34*	*34*				
Cranage											*20*		*20*
AIL Deliveries											*81*	*81*	
Commissioning												*40*	*40*
Reinstatement Works												*50*	*50*
Staff	*61*	*180*	*180*	*180*	*180*	*180*		*180*	*180*	*180*	*180*	*180*	*121*
Working Days	*31*	*30*	*31*	*30*	*31*	*31*		*31*	*30*	*31*	*30*	*31*	*31*
Total Daily LGV	*2*	*6*	*6*	*6*	*6*	*6*		*6*	*6*	*6*	*6*	*6*	*4*
Total Daily HGV	*1*	*4*	*10*	*11*	*10*	*5*		*14*	*13*	*10*	*5*	*8*	*6*
Total Vehicles per Day	*3*	*10*	*15*	*17*	*16*	*11*		*20*	*19*	*16*	*11*	*14*	*10*

Table 12.9 – Peak Construction Month Daily Traffic Data

Location	Cars & Lights	HGV	Total
A965 Finstown	0	8	8
Grainshore Road	0	12	12
A965 Kirkwall	0	2	2
A965 West of Finstown	0	0	0

12.6.25 The peak month traffic data was combined with the future year (2024) traffic data to allow a comparison between the baseline results to be made. The increase in traffic volumes is presented in percentage increases for each class of vehicle and is illustrated in Table 12.10.

Table 12.10 – 2024 Peak Month Daily Traffic Data

Location	Cars & Lights	HGV	Total	Cars & Lights % Increase	HGV % Increase	Total Traffic % Increase
A965 Finstown	4405	264	4669	0.00 %	3.12 %	0.17 %
Grainshore Road	3452	295	3747	0.00 %	4.24 %	0.32 %
A965 Kirkwall	7783	315	8098	0.00 %	0.64 %	0.02 %
A965 West of Finstown	3998	243	4241	0.00 %	0.00 %	0.00 %

12.6.26 A review of existing road capacity has been undertaken using the Design Manual for Roads and Bridges, Volume 15, Part 5 "The NESA Manual". The theoretical road capacity has been estimated for each of the road links that makes up the study area and the assessment is presented in Appendix 12.1. The assessment clearly indicates that there are no road capacity issues associated with the Proposed Development.

Operational Phase

12.6.27 It is predicted that during the operation of the site there would be up to two vehicle movements per week to Kirkwall Harbour (the likely start and end point for boat trips to and from Faray) for maintenance purposes.

12.6.28 Given the low level of traffic generation associated with the operational phase, no further assessment has been undertaken.

12.7 Receptors Brought Forward for Assessment

12.7.1 The impact assessment indicates that traffic levels will not exceed the 30 % threshold for total traffic or HGV flows at any point within the study area. As such, Rule 1 of the IEMA guidance is not exceeded.

12.7.2 Rule 2 notes that an assessment should be undertaken if traffic flows exceed 10 % in particularly sensitive areas. This rule is also not exceeded and as such, no further assessment is required.

12.8 Standard Mitigation

A number of the mitigation measures set out in the following section are considered good practice for wind farm construction sites and can be considered to be part of normal construction mitigation for a site of this nature.

Construction Phase

12.8.1 Subject to consent, the Applicant will prepare a Construction Traffic Management Plan (CTMP) for agreement with Orkney Islands Council prior to construction works commencing. The following measures would be implemented through the CTMP during the construction phase:

- All materials delivery lorries (dry materials) will be sheeted to reduce dust and stop spillage on public roads.
- Traffic originating from Cursiter Quarry could be fully or part routed via Zion's Loan to avoid integration with other road users in Finstown. This option will be further considered by the Balance of Plant (BoP) contractor in liaison with OIC prior to commencement of construction activities on site.
- Specific training and disciplinary measures will be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway.
- Provision of construction updates on the project website and distribution of a newsletter to study area road residents on material delivery routes.
- Requirement for all delivery drivers supplying bulk materials for export to Faray from Hatston to attend an induction to include a safety briefing, the need for appropriate care and speed control, particularly in sensitive areas, identification of specific sensitive areas, identification of the specified route, and the requirement not to deviate from the specified route.
- The production and implementation of a Staff Travel Plan for use on the Orkney Mainland or where staff are to be billeted during construction, which will include pick up times and car sharing information for those travelling to and from site.

12.8.2 The Applicant will cover the cost of abnormal wear and tear on roads not designed for that purpose and proposes that this is imposed by a planning condition.

12.8.3 Video footage of the pre-construction phase condition of the abnormal loads access route and the construction vehicles route will be recorded to provide a baseline of the state of the road prior to any construction work commencing. This baseline will inform any change in the road condition during the construction stage of the Proposed Development. Any necessary repairs will be coordinated with Orkney Islands Council. Any damage caused by traffic associated with the Proposed Development, during the construction period that would be hazardous to road users, will be repaired immediately.

12.8.4 Any damage to road infrastructure caused directly by construction traffic will be made good and street furniture that is removed on a temporary basis would be fully reinstated.

Specific Abnormal Load Mitigation

12.8.5 The ability for abnormal loads to interact with other traffic is restricted to movements around Hatston Pier only.

12.8.6 All abnormal load deliveries would be undertaken at appropriate times (to be discussed and agreed with the OIC Marine Services) with the aim to minimise the effect on other port users. It is likely that the abnormal load movements will avoid ferry and passenger vessel embarking / disembarking periods.

12.8.7 Advance warning signs would be installed on the approaches to the pier. Information signage could be installed to help assist drivers and to improve general safety.

12.8.8 An Abnormal Load Transport Management Plan would be developed. This will include:

- procedures for liaising with OIC Marine Services and ferry operators to ensure that vehicles are not impeded by the loads;
- a diary of proposed delivery movements to liaise with port operators and users to avoid key dates and times; and
- proposals to establish a construction liaison committee to ensure the smooth management of the project / public interface with the applicant, the construction contractor and port stakeholders. This committee would form a means of communicating and updating on forthcoming activities and dealing with any potential issues arising.

Operational Phase Mitigation

12.8.9 Regular maintenance will be undertaken to keep the site access track drainage systems fully operational and the road surface in good condition and to ensure there are no adverse issues affecting potential future use.

12.9 Likely Effects

Construction

The traffic levels will not exceed the assessment thresholds on the Mainland of Orkney and as such no significant effects are anticipated.

Operation

12.9.1 No operational effects are anticipated.

Decommissioning

12.9.2 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

12.10 Additional Mitigation and Enhancement

Port Management Plan

12.10.1 Following discussions with Orkney Islands Council's Marine Services, it is apparent that Hatston Pier is currently highly utilised with freight, oil support and cruise liner traffic. Many vessels, especially the cruise liners, book quay space many months in advance and it will not be possible to relocate them to allow access for turbine deliveries.

12.10.2 Following consent, the Applicant will need to undertake a procurement exercise with the turbine suppliers to agree timescales for the import of components through Hatston Pier. As part of this process, the turbine suppliers will be required to formulate a Port Management Plan with OIC Marine Services. The management plan will:

- agree timescales for deliveries to be made;
- agree quay space and temporary storage areas;
- agree crane and stevedore access arrangements;

- book quay space;
- detail the vessels that will undertake the deliveries; and
- agree access rights along the access road from the pier and the convoy management with Orkney Islands Council, OIC Marine Services and Police.

12.10.3 To ensure that there are no detrimental issues at Hatston Pier, the Applicant would produce a Port Management Plan secured by planning condition that will be agreed prior to the delivery of the first turbine component.

12.11 Residual Effects

Construction

12.11.1 The assessment confirms that the effects will be **negligible** and non-significant. The traffic effects associated with the construction phase are temporary in nature and are confined to the construction period only. No long lasting detrimental transport or access issues are associated with the Proposed Development.

Operation

12.11.2 There are no residual effects associated with the operational phase of the Proposed Development.

12.12 Cumulative Assessment

12.12.1 The use of Low NRTF growth assumptions has provided a basis for general local development growth within the study area. The use of NRTF covers other committed development traffic flows within the study area.

12.12.2 The only consented wind farm application that is located near to the proposed road study area and that would share portions of the assessed study area is Costa Head Wind Farm.

12.12.3 Costa Head Wind Farm is being developed by Hoolan Energy on the Mainland of Orkney and shares elements of the study road network for access. A statement by the Development Director of Hoolan Energy, states that the wind farm will have a grid connection date of 2023. This implies that the Costa Head site will be constructed in 2022 – 2023 ready for the connection and that as such, its construction activities will not coincide with those for the Proposed Development. As such, no further cumulative assessment is required.

12.12.4 Should the Costa Head Wind Farm construction be delayed, then construction activities could potentially coincide with works at the Proposed Development. In this scenario, traffic levels will be greater than those described in this chapter. Should this occur, then this will be mitigated by using an overarching Traffic Management and Monitoring Plan for both sites and by introducing a phased abnormal loads delivery plan which will be agreed with OIC. The implementation of the mitigation will reduce any effects to non-significant.

12.13 Summary

12.13.1 The Proposed Development will lead to increased traffic volumes on the A965 during the construction phase. This increase will be temporary.

12.13.2 An assessment of likely effect using IEMA guidelines has been undertaken. This determined that **negligible**, non-significant effects could be expected within the study network on the Mainland of Orkney, relating to the increase in HGV traffic operating on the route. All other receptors with the study area have been scoped out of the assessment.

Table 12.11 – Summary of Effects

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Traffic impacts within the study area road network	Negligible and not significant	Adverse	No additional mitigation than the standard mitigation and provision of a Port Management Plan.	Negligible and non-significant	Adverse
Operation					
No operational effects anticipated.					

Table 12.12 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Traffic impacts within the study area	Minor	Costa Head Wind Farm (assuming construction date of 2023)	No cumulative effects	
Traffic impacts within Finstown	Minor	Costa Head Wind Farm (assuming construction date of 2024)	Minor	

12.14 References

Department for Transport (2013). *Design Manual for Roads and Bridges, Volume 15, Part 5 "The NESA Manual*". Available at: http://www.sias.com/2013/TS/201303NesaManual.pdf

Orkney Islands Council (2017). Orkney Local Development Plan (LDP). Available at: https://www.orkney.gov.uk/Service-Directory/O/Orkney-Local-Development-Plan.htm

Scottish Government (2014). National Planning Framework 3. Available at: https://www.gov.scot/publications/national-planning-framework-3/

Scottish Government (2005). Planning Advice Note (PAN) 75. Available at: https://www.gov.scot/publications/planning-advice-note-pan-75-planning-transport/

Scottish Government (2014). Onshore Wind Turbines; Renewables Planning Advice. Available at: https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/

The Institute of Environmental Management and Assessment (2005). Guidelines for Environmental Impact Assessment.

The Institute of Environmental Management and Assessment (1993). Guidelines for the Environmental Assessment of Road Traffic.

Transport Scotland (2012). Transport Assessment Guidance. Available at: https://www.transport.gov.scot/media/4589/planning_reform_-_dpmtag_-_development_management__dpmtag_ref__17__-_transport_assessment_guidance_final_-_june_2012.pdf

Hoolan (2019). Costa Head Wind Farm. Available at: https://www.hoolanenergy.com/projects/costa-head

This page is intentionally blank

13 Socio-economic, Recreation and Tourism

Contents

13.1	Executive Summary	13-1
13.2	Introduction	13-3
13.3	Legislation, Policy and Guidelines	13-3
13.4	Consultation	13-3
13.5	Assessment Methodology and Significance Criteria	13-4
13.6	Baseline Conditions	13-8
13.7	Likely Effects	13-25
13.8	Additional Mitigation and Enhancement	13-38
13.9	Residual Effects	13-38
13.10	Cumulative Assessment	13-39
13.11	Summary	13-39
13.12	References	13-44

This page is intentionally blank.

13 Socio-economic, Recreation and Tourism

13.1 Executive Summary

13.1.1 This chapter considers the socio-economic, recreation and tourism impacts associated with the Proposed Development.

13.1.2 The assessment of the socio-economic impact during the construction and development phase and the operations and maintenance phase was conducted based on the Proposed Development featuring six 4.8 MW turbines and having an indicative total generating capacity of 28.8 MW[1].

13.1.3 It was estimated that during the construction and development phase the Proposed Development could support £2.6 million Gross Value Added (GVA) and 39 job years in Orkney, and £10.4 million GVA and 161 job years across Scotland (including in Orkney). The additional expenditure required to guarantee access to the island is expected to generate £0.2 million GVA and support five job years in Orkney and £0.8 million GVA and 11 job years across Scotland (including Orkney). Operation and maintenance spend from the Proposed Development could have an annual impact of £0.3 million GVA and four jobs in Orkney and £0.5 million GVA and nine jobs in Scotland (including Orkney). In addition, it would contribute around £0.5 million to public finances through the payment of non-domestic rates.

13.1.4 The Proposed Development is also an essential part of the needs case required by Ofgem for the construction of an interconnector linking Orkney to the Scottish mainland. The transmission link would have substantial economic benefits, with potential GVA for the Orkney economy of between £371 million and £807 million, since it would enable the further development of the renewable energy sector in Orkney.

13.1.5 Communities living closest to the Proposed Development are expected to benefit from a location specific community benefit fund, of approximately £144,000 per annum. The impact from the payment of local community benefits was assessed as **minor** (beneficial) and not significant.

13.1.6 The ownership structure contributes to the distinctiveness of the Proposed Development, since profits would stay in Orkney and be used for the benefit of the people of Orkney, increasing the level of local benefits significantly and also socialising the benefits amongst as many people as possible. A key aim of the Proposed Development is to generate profit to be used for the benefit of the people of Orkney. Benefits will be delivered via a community fund with funding distributed in the interests of Orkney and its inhabitants. The effect associated with the ownership structure was assessed as **minor** (beneficial) and not significant in Orkney.

13.1.7 The assessment of the economic impacts found a temporary **minor** (beneficial) and not significant impact from the construction and development phase in Orkney and a temporary **negligible** (beneficial) and not significant impact in Scotland. The effect of the additional infrastructure required for access to the island was assessed as negligible (beneficial) with respects to both the Orkney and Scottish economies. Operation and maintenance spend from the Proposed Development was assessed as having a **negligible** (beneficial) and not significant impact on the local and national economy.

13.1.8 In addition, the indirect benefits associated with the contribution to the delivery of the interconnector and the additional indirect benefits associated with the ownership structure mean that the total direct and indirect economic benefits of the Proposed Development are expected to be much greater than would generally be expected for a development of this scale. Whilst it is noted that these benefits are indirect, the implications of the interconnector for the future development of renewable energy in Orkney would represent a material change for the Orkney economy, and so were assessed as **moderate** (beneficial) and significant.

[1] The assessment has been based on an indicative installed capacity of 28.8 MW. Actual installed capacity may be greater or less dependent on turbine model selection.

13.1.9 The proposed Orkney's Community Wind Farm Project - Quanterness and Orkney's Community Wind Farm Project - Hoy may provide an opportunity for the local supply chain to strengthen and may result in larger local impacts, as businesses in Orkney would be able to carry out more works than might be the case for a single project.

13.1.10 Adding together the economic impacts from the development and construction of the Proposed Development and the construction of enabling infrastructure, the proposed Orkney's Community Wind Farm Project - Quanterness and the proposed Orkney's Community Wind Farm Project - Hoy, it was estimated that they could support a total £7.9 million GVA and 121 job years in Orkney, and £32.1 million GVA and 493 job years across Scotland (including in Orkney).

13.1.11 It was also estimated that the cumulative economic impact of the Proposed Development, the proposed Orkney's Community Wind Farm Project - Quanterness and the proposed Orkney's Community Wind Farm Project - Hoy during the operations and maintenance phase could be £0.9 million GVA and 12 jobs in Orkney and £1.6 million GVA and 26 jobs in Scotland (including in Orkney) each year. This cumulative effect was assessed as **minor** (beneficial).

13.1.12 The tourism assessment relied on a literature review of the relationship between wind farms and tourism activity in Scotland, as well as on a desk-based study of tourism and recreation assets and accommodation providers located in the proximity of the Proposed Development. The literature review found little evidence of a negative effect on the tourism economy.

13.1.13 Visitor attractions were identified within 15 km of the Proposed Development. The assessment has found that, for all identified attractions, as a result of separation distance and/or the fact that the Proposed Development would not impact upon visitor experience, it would not have an impact on motivation to visit them. As a result, the assessment has concluded that there would be a **negligible** and non-significant effect on visitor attractions.

13.1.14 The assessment of effects on popular routes has considered 19 recreational trails and 41 core paths within 15 km of the Proposed Development. Assessment of these routes found that the effect on their amenity as tourism or recreational assets would be **negligible** and not significant as the Proposed Development would not impact upon their use.

13.1.15 Analysis of representative accommodation providers within a 15 km study area considered whether visitor behaviour would change due to the Proposed Development and found that none would be made unattractive to guests, as a result of the Proposed Development. The assessment therefore found that effects would be **negligible**, and non-significant, both during construction and operation of the Proposed Development.

13.1.16 Overall, there were no significant adverse effects associated with the Proposed Development, while there would be some beneficial effects linked to construction and operational expenditure, though they would also not be significant. Whilst it is noted that the benefits are indirect and cannot be solely attributed to the Proposed Development, the contribution made to the threshold for the interconnector and the implications for the future development of the renewable energy in Orkney represent a material economic opportunity for Orkney, and is considered a **moderate** and significant beneficial effect.

13.1.17 The COVID-19 pandemic and the strategy being adopted for economic recovery and transformation, based on green growth, means that the Proposed Development can be considered to be of substantial socio-economic importance, since it has the potential to make a meaningful contribution to economic recovery, providing employment during the construction phase and boosting productivity growth in the economy during the operational phase.

13.2 Introduction

13.2.1 This chapter considers the socio-economic, recreation and tourism assessment of the Proposed Development. This assessment was conducted on the basis of the Proposed Development including six turbines with a generating capacity of 4.8 MW each. As a result, the assessment was conducted on an installation with an indicative total generating capacity of 28.8 MW.

13.2.2 The rest of this chapter is structured as follows:

- Section 13.3 considers the relevant legislation, policy and guidelines setting out how to conduct the assessment;
- Section 13.4 summarises the responses to the scoping opinion and sets out where they were addressed;
- Section 13.5 outlines the assessment criteria followed when considering the socio-economic, tourism and recreation impact of the Proposed Development;
- Section 13.6 provides a baseline of socio-economic and tourism characteristics;
- Section 13.7 assesses the potential socio-economic and tourism effects;
- Section 13.8 sets out mitigation and enhancement measures;
- Section 13.9 considers any residual effects;
- Section 13.10 carries out a cumulative assessment; and
- Section 13.11 summarises the main findings of the chapter.

13.3 Legislation, Policy and Guidelines

13.3.1 There is no specific legislation, policy or guidance available on the methods that should be used to assess the socio-economic impacts of a proposed onshore wind farm development. The method is based on established best practice, including that used in UK Government and industry reports on the sector.

13.3.2 In particular this assessment draws on two studies by BiGGAR Economics on the UK onshore wind energy sector, a report published by RenewableUK and the then Department for Energy and Climate Change (DECC) in 2012 on the direct and wider economic benefits of the onshore wind sector to the UK economy [1] and a subsequent update to this report published by RenewableUK in 2015 [2].

13.3.3 Similarly, there is no formal guidance on the methods that should be used to assess the effects that wind farm developments may have on tourism and leisure interests. The assessment is based on best practice and draws on BiGGAR Economics' experience in assessing the socio-economic, tourism and recreation impacts of onshore wind developments across Scotland. This is consistent with the Scottish Government's Draft Advice on Net Economic Benefit and Planning (Scottish Government, 2016).

13.3.4 The approach taken to the assessment is consistent with paragraph 29 of Scottish Planning Policy in that it gives *"due weight to net economic benefit"* and the baseline analysis sets the context of the appropriate *"economic issues, challenges and opportunities, as outlined in local economic strategies"* (Scottish Government, 2020).

13.4 Consultation

13.4.1 This section sets out the responses to the scoping opinion (Appendix 4.2) concerned with socio-economic, recreation and tourism aspects.

13.4.2 The responses relevant to this chapter are listed and described in Table 13.1. This provides details on the organisation providing the response, the response content and where it was addressed in this chapter.

Table 13.1 Consultation Responses

	Scoping Opinion	Where it Was Addressed
Orkney Islands Council (April 2019)	Orkney Islands Council Development and Infrastructure scoping opinion set out what socio-economic impacts should be considered with reference to the Supplementary Guidance Energy, part of the Local Development Plan 2017.	
	This refers to the consideration of local net-economic impacts, as well as of local business and supply chain opportunities.	The assessment in this chapter considers the potential for both beneficial and adverse economic effects. The economic impacts quantified are net economic impacts.
	Other factors that the analysis of net economic benefits can consider include local and community ownership.	Section 13.7 considers the net economic benefits from local and community ownership.
	The assessment should consider whether there is the potential for any adverse effects on tourism and recreation to residents and visitors.	The assessment of the effect of the Proposed Development on tourism and recreation assets within 15 km is provided in Section 13.7

13.5 Assessment Methodology and Significance Criteria

Study Area

13.5.1 The economic assessment was based on two study areas: Orkney and Scotland.

13.5.2 The tourism assessment focused on relevant assets within 15 km from the Proposed Development, consistent with other studies that have considered local tourism effects associated with wind farm developments. This includes Faray, Eday, Westray, Papa Westray, Rousay, Egilsay, Shapinsay, Stronsay, Wyre and Sanday.

Desk Study

13.5.3 The assessment was conducted through desk study research. No site visit was necessary, as the authors are familiar with the local economic conditions.

Assessment of Socio-Economic Effects

13.5.4 The assessment of economic effects was undertaken using a model that has been developed by BiGGAR Economics specifically to estimate the socio-economic effects of wind farm developments. This model was also the basis of an assessment of the UK onshore wind sector for the then Department of Energy and Climate Change (DECC) and RenewableUK in 2012 [1], which was subsequently updated in 2015 [2]. These assessments were based on case studies of the local, regional and national socio-economic effects of wind farms that have been developed in the UK in recent years.

13.5.5 This approach is considered industry best practice in the assessment of the socio-economic effects of the onshore wind sector. This model has been used by BiGGAR Economics to assess the socio-economic effects of numerous wind farms across the UK, with the results being accepted as robust at several public inquiries.

13.5.6 The assumptions made have been based on two main sources:

- the analysis undertaken in the 2015 report on behalf of RenewableUK, which uses evidence from existing wind farms around the UK. This report examined the size and location of contracts for their development, construction, and operation & maintenance phases; and
- assessment of the economies of the relevant study areas undertaken, based on analysis of local, regional and national statistics.

13.5.7 Alongside consideration of the direct GVA and employment supported by the Proposed Development, the assessment considered indirect and induced impacts. Indirect impacts capture the effect of direct spending on the supply chain of the businesses where this spending occurs. Induced impacts refer to the economic activity that is supported by the spending of employees where direct and indirect jobs have been supported.

Stages in Socio-Economic Analysis

13.5.8 To begin estimating the economic activity supported by the Proposed Development, it is first necessary to calculate the expenditure during the construction and development phase, and the operation and maintenance phase. The total expenditure figure is then divided into its main components using calculated assumptions regarding the share that could be expected by main and sub-contractors. This provides an estimate for each main component contract that can be secured by companies in Orkney and Scotland.

13.5.9 There are three sources of economic activity:

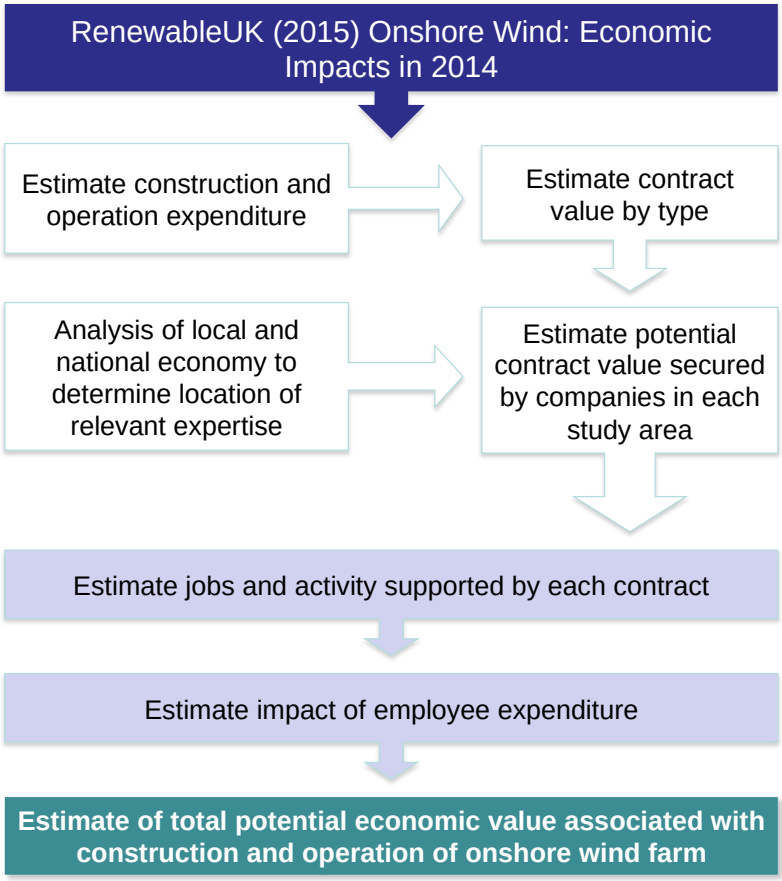
- component contracts and the jobs they support;
- wider spending in the supply chain (indirect effect); and
- spending of people employed in these contracts (induced effect).

13.5.10 There are four key stages of this model, which are illustrated in Figure 13.1 :

- estimation of total capital expenditure;
- estimation of the value of component contracts that make up total expenditure;
- assessment of the capacity of businesses in the study areas to perform and complete component contracts; and
- estimation of economic impact from resultant figures.

13.5.11 This methodology is considered best practice in the assessment of the socio-economic benefits linked to an onshore wind development.

Figure 13.1 Approach to Direct and Indirect Economic Impact Assessment



13.5.12 The assessment also considers the socio-economic benefits arising from the contribution of the Proposed Development to the case for an interconnector linking Orkney and mainland Scotland. The ownership structure of the Proposed Development and the potential impacts on the people of Orkney are also considered.

Tourism and Recreation Assessment

13.5.13 The potential effects of wind farm developments on the tourism and recreation sector is well-researched, and as such, key studies have been included for reference, including:

- The Economic Impacts of Wind Farms on Scottish Tourism [3];
- A Report on the Achievability of the Scottish Government's Renewable Energy Targets [4]; and
- Wind Farms and Tourism Trends [5].

13.5.14 Tourism and recreation assets and visitor accommodation are identified within 15 km of the Proposed Development.

13.5.15 Once an asset is identified as lying within 15 km of the Proposed Development, an analysis of its main features is carried out. These may differ across types of tourism assets and depend on how attractions and accommodation providers market themselves. For instance, the availability of recreational activities in the area, connectivity and views are all features that accommodation providers tend to stress when marketing their properties.

13.5.16 Having established the main features characterising each tourism asset, assessments are carried out based on whether the Proposed Development would lead to any changes in these features compared to baseline. At which point, it is assessed whether changes may impact on visitors' behaviours, affect their decisions to visit and to spend money in the local economy.

Effect Evaluation Methodology

13.5.17 The significance of the effect of the Proposed Development on each tourism and recreation asset and the economy for each study area is considered by determining the type and magnitude of change on each.

13.5.18 The significance of the effect depends on the magnitude of the impact and on the sensitivity of the receptor. This is assessed in relation to the key features of each tourism and recreational receptor. For instance, the sensitivity of an indoor art gallery to any visual impacts would be considered to be relatively smaller than that of a tourism accommodation that markets itself based on views.

13.5.19 The impact magnitude is assessed using the economic model and professional judgement, considering socio-economic effects from the Proposed Development in Orkney and Scotland. The significance of effects from the Proposed Development on tourism and recreation assets are assessed with reference to evidence from research and comparable wind farm developments.

13.5.20 Effects on socio-economic, tourism and recreation assets are also assessed in terms of the sensitivity of tourists to change to the extent that it might lead to changes in tourism behaviour. This assessment specifically considers potential effects on tourism and recreation. A cultural heritage or landscape and visual effect does not necessarily imply a tourism and recreation effect; that would only be the case if such effects were likely to lead to changes in behaviour.

13.5.21 The significance of effect on each economic, tourism and recreational asset is determined on the basis of the criteria provided below, in Table 13.2. Major and moderate effects are considered significant.

Table 13.2 – Effect Significance Criteria

Significance	Description
major	Major loss/improvement to key elements/features of the baseline conditions such that post development character/composition of baseline condition will be fundamentally changed. For example, a major long-term alteration of socio-economic conditions, a major reduction/improvement of recreational assets, or a substantial change to tourism spend.
moderate	Loss/improvement to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed. For example, a moderate long-term alteration of socio-economic conditions, a moderate reduction/improvement in the recreational asset, or a moderate change to tourism spend.
minor	Changes arising from the alteration will be detectable but not material; the underlying composition of the baseline condition will be similar to the pre-development situation. For example, a small alteration of the socio-economic conditions, a small reduction/improvement in the recreational asset, or a small change in tourism spend.
negligible	Barely any change from baseline conditions. Change is almost indistinguishable, approximating to a “no change” situation.

Limitations to Assessment

13.5.22 The assessment of tourism assets was undertaken based on the existing assets prior to the COVID 19 pandemic, when no restrictions were in place. Since then, changes will have occurred, with no tourism activity taking place during the peak summer season of 2020 and potential for restrictions on travel and the activities of tourism business to continue for some time.

13.5.23 By the time of construction and operation and maintenance, it is expected that the measures that were in place in 2020-21 will be lifted. However, uncertainty remains as to the future state and composition of the tourism industry, including in Orkney.

13.5.24 The same limitations apply to other baseline socio-economic indicators, in particular those where the latest statistics available do not yet take account of the economic impact of the COVID-19 pandemic. This is because the sources of data on which the baseline assessment was based all have lag times in publication which means that they do not take account of the economic impact of the COVID-19 pandemic.

13.5.25 It is acknowledged that the socio-economic baseline position will have declined as a result of COVID-19, including business closures, reductions in levels of employment and increased unemployment. This is likely to be particularly the case for the tourism economy, given the restrictions that have been associated with COVID-19.

13.5.26 The data reflect the best available statistics on Orkney's socio-economic conditions. However, statistics at the local authority level have a degree of statistical error, as a result of the smaller samples on which they rely, as already noted in the Orkney Islands Economic Review (Fraser of Allander Institute, 2020). For this reason, this baseline should be seen as mainly providing an indication of trends and differences between the socio-economic structures of Orkney and Scotland.

13.6 Baseline Conditions

Strategic Economic Context

Scotland's Economic Action Plan 2019-20

13.6.1 The Scottish Government's Economic Action Plan [6] set out how it planned to make Scotland a leader in technological and social innovations. It aimed to deliver higher productivity and greater competitiveness, while transitioning to a carbon neutral economy through measures that support business, and encouraging investment, innovation and upskilling.

13.6.2 At the heart of this strategy is inclusive growth, combining increased prosperity with greater equity, which requires getting the fundamentals right. These include:

- investment: boosting private and public investment and delivering world-class infrastructure;
- enterprise: ensuring a competitive business environment;
- international: growing exports and attracting international investment;
- innovation: supporting world-leading innovation;
- skills: providing a highly skilled workforce;
- place: supporting thriving places;
- people: ensuring a sustainable working population where everyone can participate in and benefit from increased prosperity; and
- sustainability: seizing the economic opportunities in the low carbon transition.

Economic Recovery Plan

13.6.3 At the time of writing, it is difficult to predict the longer-term consequences of the COVID-19 pandemic. To date the impact has been highest on sectors associated with tourism, such as accommodation and food services, which is particularly important in the Highlands and Islands.

13.6.4 The renewable energy sector is well placed to make an important contribution to local, regional and national economic recovery and transformation. This is because it is employment intensive in the short term during the construction phase and so can provide jobs to replace those lost in the COVID-

19 crisis, and also because it delivers sustainable growth in the longer term, by decarbonising the energy supply for the economy as a whole.

13.6.5 The role that renewable energy can play in the economic recovery was recognised in the June 2020 report of the Advisory Group on Economic Recovery (AGER) to the Scottish Government [7]. The recommendations included *"prioritisation and delivery of green investments"*, including that the green economic recovery is central to recovery overall and that Scotland should lever its natural advantages, such as *"the almost limitless quantities of renewable energy from wind, wave and tidal power"*.

13.6.6 The report also endorsed the principles for a resilient recovery set out by the Committee on Climate Change [8], which included *"use climate investments to support the economic recovery and jobs"* and *"ensure the recovery does not 'lock-in' greenhouse gas emissions or increased climate risk"*.

13.6.7 The Scottish Government's response, the Economic Recovery Implementation Plan [9], sets out how it intends to take forward the AGER report's recommendations. It prioritises a sustainable recovery that supports jobs and supports all parts of Scotland, while meeting its climate change targets and wider environmental objectives.

13.6.8 This was further developed in the Scottish Government's Programme for Government [10], which focuses on economic recovery, making clear that the aim is not a return to business as usual, but a transition to a *"fairer, greener and wealthier country"*. The programme is centred around three commitments:

- the creation of new jobs, good jobs and green jobs;
- promoting lifelong health and wellbeing; and
- promoting equality and supporting young people to reach their potential.

13.6.9 Investment in renewable energy is part of the Scottish Government's first commitment. In particular, the plan sets out a range of measures to *"protect biodiversity, create green jobs and accelerate a just transition to net-zero"*. Specific commitments include significant investments in a Green New Deal, including £100 million committed for a Green Job Fund and £60 million to help industrial and manufacturing sectors decarbonise, grow and diversify.

Scottish Energy Strategy

13.6.10 In December 2017, the Scottish Government published the Scottish Energy Strategy [11], which sets out the Government's vision for Scotland's energy future.

13.6.11 In 2016, 54.4 % of all electricity in Scotland was generated renewably, with a target of producing 100 % from renewable sources by 2020. This increased to 73.9 % in 2018. The overall share of energy consumption, which includes heat and transport, produced by renewables was 19.8 % [12]. By 2030, the Scottish Government wants the proportion of all energy, including heat and transport, supplied from renewable sources to increase to 50 %.

13.6.12 The Scottish Government has also highlighted that renewables present an economic opportunity as an expanding market which will continue to support Scottish economic growth. The Scottish Government will continue to support businesses in this sector.

13.6.13 Additionally, the Scottish Government has emphasised the importance of communities benefitting from renewable energy generation, including through community benefit funds and shared ownership.

Climate Change (Emissions Reduction Targets) (Scotland) Act

13.6.14 In September 2019, the Scottish Parliament unanimously passed the Climate Change (Emissions Reduction Targets) (Scotland) Bill [13], which sets a legally binding target of achieving "net-zero" carbon emissions by 2045. This is five years earlier than the previous target. Within this legislation, interim targets were set for the reduction of emissions by 75 % of the baseline by 2030.

National Islands Plan

13.6.15 The National Islands Plan [14] provides a framework to improve outcomes for island communities. The framework followed the Islands (Scotland) Act 2018. The plan, which is set to last five years, covers 13 strategic objectives, including climate change and energy.

13.6.16 Reference is made to the need to encourage the development of renewable energy projects. These could lead to additional benefits through community funds and ownership models that see the participation of local communities, as in the case of the Proposed Development. The plan recognises the need for island economies to upgrade existing connections with the Scottish mainland.

Scottish Government Networks Vision Statement (2019)

13.6.17 'A Vision for Scotland's Electricity and Gas Networks' [15] proposes an approach to energy systems that provides a transition to a decarbonised energy system, considers a whole system approach and focuses on smarter local energy models.

13.6.18 In the context of energy transmission, the document focuses on the need for infrastructures that could support Scotland's ambitions in the development of the renewable energy sector, including new links to Scotland's Islands.

Orkney Islands Economic Review

13.6.19 The Orkney Islands Economic Review [16] assesses the economic performance of Orkney compared to Scotland as a whole, sets out four challenges that are going to affect its economy and lists eight areas that feature opportunities for sustainable growth in Orkney.

13.6.20 The report finds that the economic performance of Orkney tends to compare positively with that of Scotland on a range of dimensions, including labour market performance and measures of economic output. Still, it faces several challenges that are linked to its geographical position including access, infrastructure (physical and digital) and fuel poverty.

13.6.21 The review further considers four future challenges to which policymakers are exposed both at an Orkney and Scottish level. These include:

- transition to net zero;
- demographic change;
- technological change; and
- growth and wellbeing.

13.6.22 The transition to net zero in Orkney provides a good example of the challenges Orkney faces and of the relative advantages it has with respect to them. Whereas Orkney has a larger carbon footprint per capita than the Scottish average mostly due to its rurality and high levels of fuel poverty, it is also one of the areas across Scotland with the most potential for renewable energy.

13.6.23 The study also identified the energy sector as one of the key areas offering economic opportunities for Orkney. This is mostly a result of its renewable energy potential as well as of existing activity, in particular, wind and tidal energy.

Orkney Sustainable Energy Strategy

13.6.24 As highlighted in the Orkney Sustainable Energy Strategy [17] renewable energy currently plays an important part in the Orkney economy, with 60 MW of installed capacity and 300 jobs related to sustainable energy in 2017. Orkney also generated 120 % of its electricity demand from renewable sources, while also reducing its energy consumption through initiatives in areas such as transport and grid management.

13.6.25 For instance, there is a higher level of penetration of electric vehicles (EVs) in Orkney than elsewhere in Scotland with over 200 EVs registered in 2019 [18]. There is also a commitment to increase the number of EVs to 1,000 by 2022 and to install additional public chargers, as highlighted in the 2018 - 2022 Electric Vehicle Strategy [19].

13.6.26 Orkney has ambitious plans to increase their total installed capacity for renewable energy generation to 600 MW, and the number of jobs supported to 600 by 2030. It also aims to increase the renewable generation of electricity to 300 % of domestic demand, a substantial increase in energy exports.

Orkney Council Plan 2018-2023

13.6.27 The Orkney Council Plan 2018-2023 [20] sets out the priorities for Orkney Islands Council. The plan considers the context within which Orkney Islands Council operates and will operate, which includes challenges, such as budgetary pressures and the uncertainties related to Brexit, as well as opportunities such as the Islands Deal.

13.6.28 The result of consultations with local residents, the plan is built around five priority themes:

- connected communities – to give access to affordable well-integrated public services as well as to digital connectivity;
- caring communities – to provide care and support to those who need it and encourage a healthy population;
- thriving communities – to have access to a modern infrastructure that can support leisure, work and learning;
- enterprising communities – to have a carbon neutral economy supporting local businesses and promoting investment in Orkney; and
- quality of life – to have a good quality of life, with people choosing to stay in Orkney and returning there.

13.6.29 Since the Proposed Development will be publicly owned, the benefits from its operations will be reinvested in the provision of local public services and local ambitions as set out in the Orkney Council Plan 2018-2023. This will be in line with the objective that renewable energy projects benefit local communities.

13.6.30 The Proposed Development will also contribute to fill the need for generating capacity to ensure the construction of the interconnector between Orkney and the Scottish mainland. This will have the potential to increase the level of investment in renewable energy in Orkney and lead to future benefits for Orkney and its inhabitants.

13.6.31 The Proposed Development would contribute towards the achievement of a local carbon neutral economy, as set out in the plan.

Orkney Islands Council Revenue Budget 2019-20

13.6.32 Over the last decade Orkney Islands Council has confronted a series of budgetary pressures. This led the Council to save a total of £13.15 million since 2011/2012, including £1.69 million planned for 2018/19 [21]

13.6.33 In addition to savings, in its budget Orkney Islands Council has drawn on reserves in order to balance the books, amounting to £44.8 million over the last ten years. Reliance on reserves to fill gaps in the budget would be unsustainable in the long term. As a result, Orkney Islands Council has been investigating how it can take an innovative approach to reducing costs and generating new revenue.

13.6.34 The Proposed Development is a key element of that approach, given its potential to generate substantial income to help relieve pressure on local service provision.

Ofgem - Conditional Decision on Orkney Final Needs Case

13.6.35 In September 2019 Ofgem [22] published its final decision on the Needs Case for a new grid connection for Orkney in which it agreed with SSENs proposals to build a 220 MW connection, provided that 135 MW of new generation can demonstrate that it has been awarded a Contract for Difference (CfD) or is 'likely to be developed' by December 2021, now extended to December 2022.

13.6.36 'Likely to be developed' is defined by Ofgem as being projects which have been granted planning permission, have signed a relevant grid connection agreement and are financially viable.

13.6.37 At present 36 MW of new wind generation is consented in Orkney and could contribute to this and whilst there are other private projects under development in Orkney it is apparent that without the Proposed Development and the other two wind farms within 'Orkney's Community Wind Farm Project', it is unlikely that the 135 MW threshold will be reached by the deadline. This has been confirmed by a recent report [23], see Appendix 13.1.

Baseline Economic Context

13.6.38 As shown in Table 13.3, in 2019 the population living in Orkney was 22,270 [24]. Overall, the population in Orkney was relatively older than that in Scotland. This was reflected in Orkney having a larger share of its population (23.8 %) aged 65 and over and a relatively smaller (60.1 %) working age population – population between 16 and 64 years old - compared to Scottish averages of 19.1 % and 64.0 % respectively.

Table 13.3 Population and Demography, 2019

	Orkney	Scotland
Total	22,270	5,463,300
0-15	16.1 %	16.9 %
16-64	60.1 %	64.0 %
65 and over	23.8 %	19.1 %

Source: National Records of Scotland (2020), Mid-2019 Population Estimates Scotland.

13.6.39 Existing differences in the population structure of Orkney and Scotland are expected to last. By 2043, the population of Orkney is expected to fall slightly to 21,828, whereas the population of Scotland will increase to almost 5.6 million [25]. While both Orkney and Scotland will have relatively older populations, the trend towards an ageing population is expected to be more marked in Orkney, with 33.2 % of the population being over 65 and 13.0 % being under 16 by 2043, as shown in Table 13.4.

Table 13.4 Population Change (2018-2043)

	Orkney		Scotland	
	2018	2043	2018	2043
Total	22,190	21,828	5,438,100	5,574,819
0-15	16.0 %	13.0 %	16.9 %	14.8 %
16-64	60.4 %	53.9 %	64.2 %	60.3 %
65 and over	23.6 %	33.2 %	18.9 %	24.9 %

Source: National Records of Scotland (2020), Population Projections for Scottish Areas (2018-based).

13.6.40 As shown in Table 13.5, in 2019 the rate of economic activity in Orkney was 89.1 %, almost 12 percentage points higher than in Scotland (Office for National Statistics, 2020). Data on the unemployment rate to December 2019 present a similar pattern, with Orkney having a lower unemployment rate (2.1 %) than Scotland (3.5 %) (Office for National Statistics, 2019). Median annual gross pay for full-time workers was also slightly higher in Orkney (£30,650) than in Scotland (£30,000). However, people living in Orkney are likely to face higher living costs than communities

elsewhere in Scotland. A report by Highlands and Islands Enterprise [26] found that residents of remote Scottish islands such as Orkney can often have living costs 20–40 % higher than residents in urban Britain.

Table 13.5 Economic Indicators, 2019

	Orkney	Scotland
Economic Activity Rate (16-64) *	89.1 %	77.5 %
Unemployment Rate (all economically active) **	2.1 %	3.5 %
Median Annual Gross Pay (£)	30,644	30,000

*Source: ONS (2020) Annual Survey of Hours and Earnings - resident analysis; *ONS (2020), Annual Population Survey; ** model-based estimates.*

13.6.41 Around 19.2 % of those in employment in Orkney work within the agriculture, forestry and fishing sector, as opposed to 3.3 % in Scotland as a whole, with fishing accounting for around 3.5 % of total employment in Orkney [27]. Orkney has a relatively lower share of people employed in manufacturing, professional, scientific and technical activities and in administrative and support services activities. In Orkney 7.7 % of those in work are employed in accommodation and food services, sectors related to tourism activity, compared to 8.2% across Scotland as a whole.

Table 13.6 - Industrial Structure 2019

	Orkney	Scotland
Agriculture, forestry and fishing	19.2 %	3.3 %
Mining and quarrying	0.6 %	1.1 %
Manufacturing	2.7 %	6.5 %
Electricity, gas, steam, air conditioning	0.4 %	0.7 %
Water supply, sewerage, etc.	0.4 %	0.7 %
Construction	6.9 %	5.5 %
Wholesale and retail trade	11.5 %	13.3 %
Transportation and storage	6.9 %	4.1 %
Accommodation and food services	7.7 %	8.2 %
Information and communication	1.7 %	3.3 %
Financial and insurance activities	0.6 %	3.2 %
Real estate activities	0.8 %	1.5 %
Professional, scientific and technical activities	4.6 %	7.1 %
Administrative and support service activities	3.1 %	7.8 %
Public administration and defence	7.7 %	6.0 %
Education	6.9 %	7.9 %
Human health and social work activities	15.4 %	15.4 %
Arts, entertainment and recreation	3.8 %	2.7 %
Other service activities	1.2 %	1.7 %
Total Number of People Employed	13,000	2,602,000

Source: ONS (2020), Business Register and Employment Survey 2019

Fuel Poverty

13.6.42 Fuel poverty is defined as spending over 10 % of household income on fuel, and extreme fuel poverty is defined as spending over 20 % of income.

13.6.43 The main causes of fuel poverty are low incomes, high fuel costs, and poor energy efficiency. Whereas median annual gross pay in Orkney is marginally higher than in Scotland as a whole, remote communities face different expenditure profiles than urban communities as demonstrated by data from the ONS' 'Family spending in the UK' by Output Area Classification (Office for National Statistics, 2019). Communities living in rural and island settings spend more on electricity, due, for instance, to higher user system charges and the absence of a gas grid, and also spend more in other

areas such as transportation. These problems can compound, as money spent on fuel reduces the amount that low income households can invest in energy saving measures, with the housing stock being relatively older. Fuel poverty can also be linked to serious health complications, and it is estimated that every £1 invested in property improvements can reduce health spending by £0.42 (THAW Orkney, 2017).

13.6.44 Despite substantial income from the energy sector, Orkney has the highest fuel poverty rate in Scotland, with data from the Scottish House Condition Survey (SHCS)[2] [28] from 2015-17 finding that:

- 57 % of the 10,000 households in Orkney are in fuel poverty (about 5,700), rising to 79 % among pension-aged households;
- 23 % of all households are in extreme fuel poverty, rising to 38 % among all pension-aged households;
- 55 % of Orkney dwellings failed to meet the Scottish Housing Quality Standard (SHQS); and
- 62 % of dwellings are in a state of disrepair, with 32 % in urgent disrepair and 13 % in extensive disrepair.

13.6.45 While there have been improvements from the 2014-2016 findings on most of these dimensions, Orkney's performance lags behind Scotland's on most of these metrics (the exception is the share of dwellings in disrepair).

13.6.46 In 2017, THAW Orkney, a charity established in 2014 to assist fuel poor households in Orkney, prepared a report outlining how fuel poverty might be addressed by deploying community benefit funds from renewable energy projects.

13.6.47 THAW's work confirms that fuel poverty is a serious issue, which often requires substantial investment. Of its 404 clients, 83 % are in fuel poverty, with 45 % in extreme fuel poverty, and 22 % spending over 40 % of their income on fuel, as of 2017 (THAW Orkney, 2017).

13.6.48 By 2017, THAW had undertaken 179 installations, with an estimated cost of £603,000, with about 42 % of funding coming from grants. Given that there are an estimated 5,700 fuel poor households in Orkney, and that the Orkney Islands Council aims to reduce the proportion of households in fuel poverty to below 20 % by 2030, [29] the potential costs could be quite high.

Summary Socio-Economic Baseline

13.6.49 The population in Orkney is relatively older than in the rest of Scotland and is set to decline in the future, as well as ageing relatively more than in the rest of Scotland. While labour market outcomes in Orkney compare positively with Scotland as a whole, living costs are higher than elsewhere in Scotland, due to higher energy and fuel costs and transport costs. This contributes to Orkney having relatively high fuel poverty rates compared to Scotland.

[2] Since the publication of these statistics, the Scottish Government, as part of the Fuel Poverty (Targets, Definition and Strategy) (Scotland) Act 2019, revised the definition of fuel poverty, including the addition of an income threshold. Under these changes the households in Orkney that would be considered as fuel poor would be 31 %, and those considered in extreme fuel poverty would be 22 % *(Scottish Government, 2019)*. Both measures are above average for Scotland (26 % and 12 % respectively). These changes point to the fact that under a more restrictive definition of fuel poverty, about 71 % of the households that are fuel poor are in extreme fuel poverty.

Strategic Tourism Context

Scotland's Outlook 2030

13.6.50 Following on from the Tourism Scotland 2020 (TS2020) strategy [30], a collaborative network of industry experts created Scotland's Outlook 2030, which is focused on creating a world-leading tourism sector in Scotland that is sustainable in the long-term.

13.6.51 The strategy is focused on four key priorities:

- people;
- places;
- businesses; and
- experiences.

13.6.52 The strategy recognises the effects of climate change, technological advancements, Brexit and changing consumer behaviour on tourism and highlights the need for collaboration between government, communities and the public and private sectors [31].

13.6.53 There are six conditions that the strategy has highlighted as being crucial for success:

- using technological advancements and information to understand changes and trends in tourist behaviours;
- ensuring policies are in place that support the vision;
- enabling investment opportunities into Scotland's tourism market;
- improving transport and digital infrastructure;
- greater collaboration between businesses in the industry; and
- positioning Scotland as a great place to live and visit locally and globally.

13.6.54 A main commitment of the strategy is to address the effects of energy demand associated with tourism and make the sector commit fully to Scotland's ambition of becoming a net-zero society by 2045.

Destination Orkney – Orkney Tourism Strategy Summary

13.6.55 The Orkney Tourism Strategy [32] sets out the ambitions for the tourism sector up until 2025. The vision of the partnership of tourism industry business and public sector organisations that prepared the strategy is: "By 2025, Orkney will be a world-class sustainable destination enriching the lives of its people and visitors".

13.6.56 The objectives of the strategy are to:

- increase economic prosperity of the islands;
- extend the visitor season and increase visitor spend;
- sustainably manage visitor numbers to protect the quality of experience, the key sites and routes to the sites, for visitors and local residents;
- disperse the benefits of tourism throughout the whole of Orkney; and
- conserve and enhance the islands' natural and cultural heritage.

Sustainable Tourism Sector

13.6.57 Sustainable Tourism is one of the six sectors, which are considered as growth sectors by the Scottish Government. In 2018, 1,250 people were employed in this sector across Orkney (9.6 % of total

employment). The GVA generated by sustainable tourism in Orkney was estimated at around £21.5 million (Scottish Government, 2019).

Table 13.7 Sustainable Tourism Statistics

	Orkney	Scotland
Employment (people)	1,250	218,000
GVA (£m)	21.5	4,127.1

Source: Scottish Government (2019), Growth Sector Statistics.

Visitors

13.6.58 In May 2020, Orkney Islands Council and VisitScotland released the Orkney Islands Visitor Survey 2019, which found that in 2019 there were around 192,000 visitors to the Orkney Islands, with a total spend of £67 million. The number of visitors increased by 10 % in comparison to 2017, when there were 174,000 visitors. This represented an increase of 35 % on 2009 visitor numbers.

Table 13.8 Visitors to Orkney (not Including Cruise Passengers), 2013-2019

	2009	2013	2017	2019
Visitors to Orkney	142,000	143,000	174,000	192,000

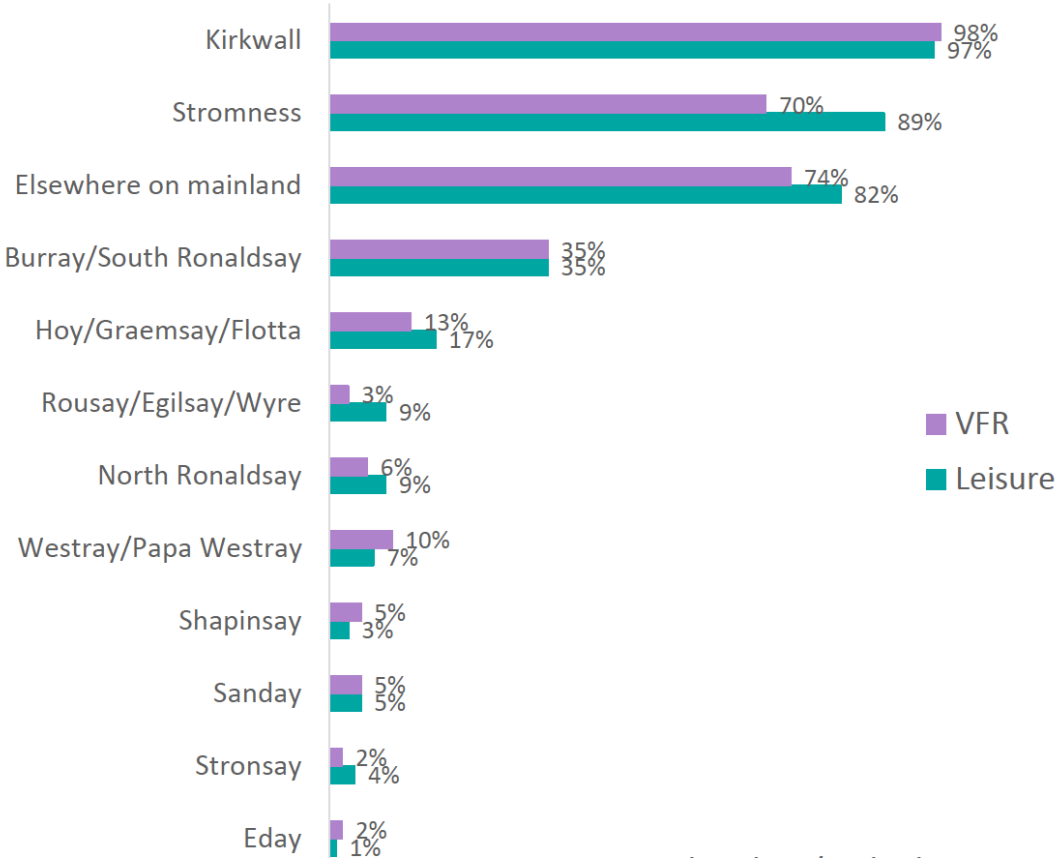
Source: Orkney Islands Council/ Visit Scotland (2020), Orkney Islands Visitor Survey 2019.

13.6.59 The majority of visitors were from Scotland (42 %) or elsewhere in the UK (29 %), with the remainder coming from Europe (16 %), North America (8 %) or other overseas (6 %) [33].

13.6.60 These figures do not include cruise passengers, of which there were 160,000 in 2019, with Kirkwall named Top Cruise Destination for Western Europe and the United Kingdom by Cruise Critic [34]. Due to the COVID-19 pandemic and travel restrictions, there was no cruise tourism in 2020.

13.6.61 The areas of Orkney where those visiting for leisure or to visit friends or relatives (VFR) tend to go to are shown in Figure 13.2 . Most leisure visitors spend time in Kirkwall, Stromness and the Mainland of Orkney. As an uninhabited island, Faray was not included in the survey. Rousay and Westray/Papa Westray are the most visited of the islands closest to Faray, with the other nearby islands of Eday and Sanday receiving a lower share of leisure visitors.

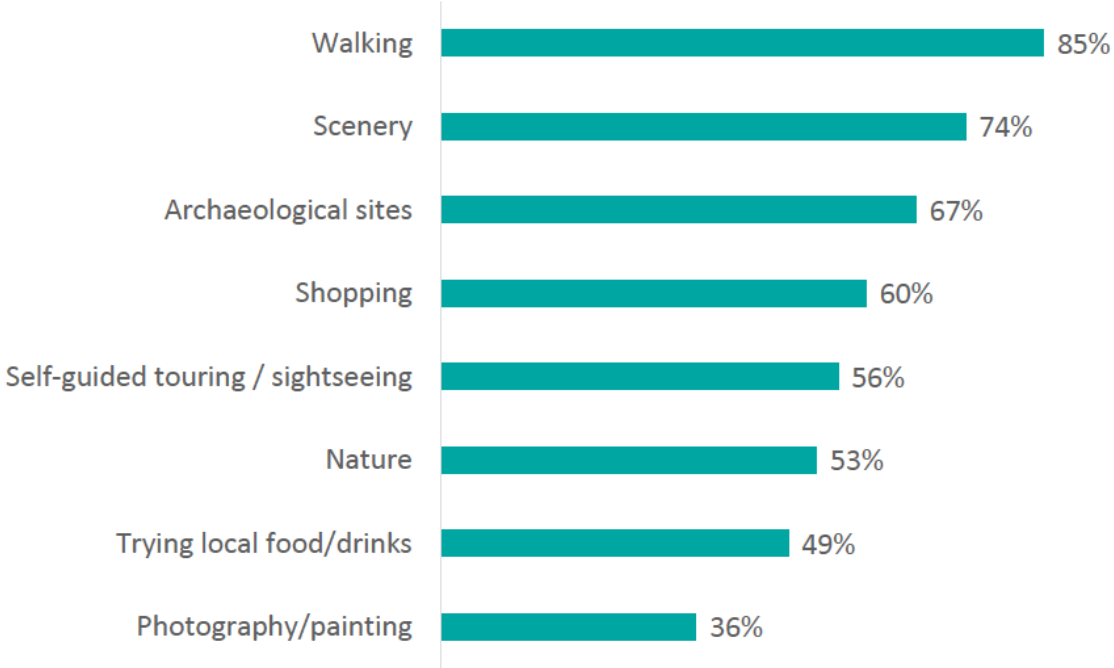
Figure 13.2 Areas of Orkney Visited by Recreational Visitors



Source: Orkney Islands Council and VisitScotland (2020), Orkney Islands Visitor Survey 2019.

13.6.62 The survey also reported on the activities that visitors engage in once in Orkney. Walking (85 %) enjoying the scenery (74 %) and visiting archaeological sites (67 %) were the favourite activities of leisure visitors (Figure 13.3).

Figure 13.3 Top Activities in Orkney for Leisure Visitors



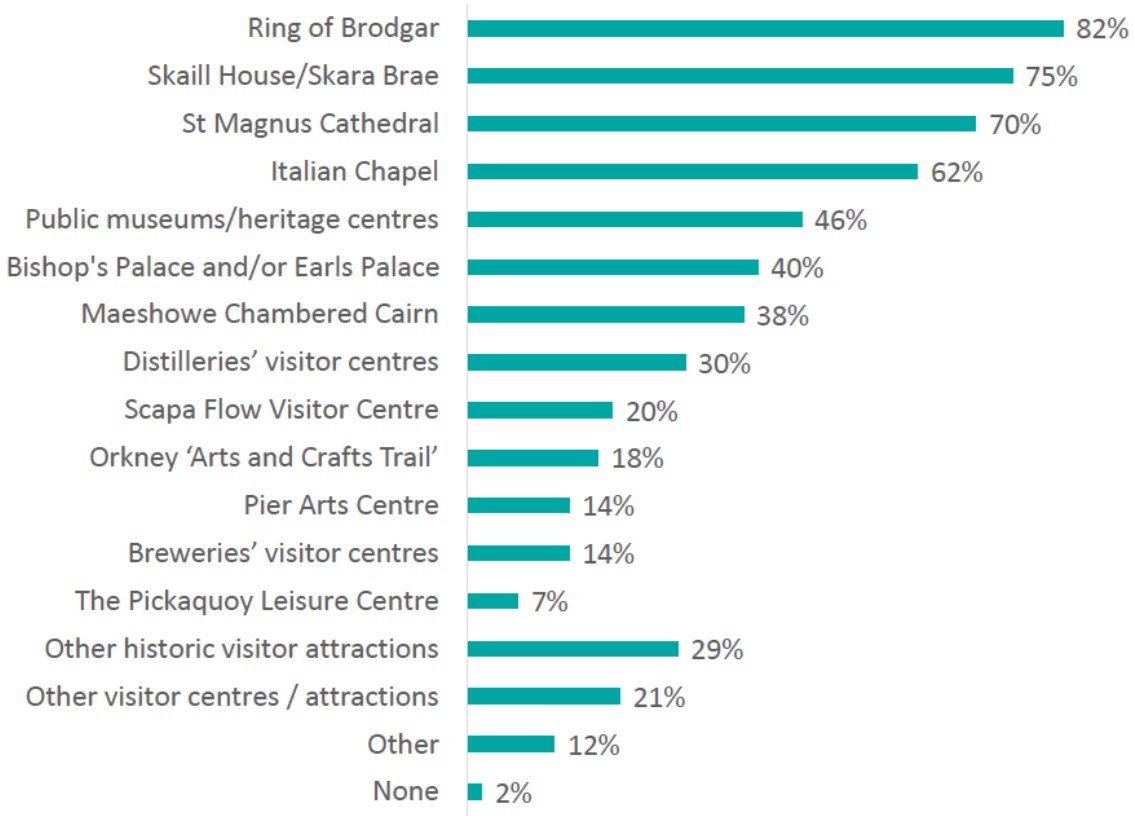
Source: Orkney Islands Council and VisitScotland (2020), Orkney Islands Visitor Survey 2019

Visitor Attractions

13.6.63 The Orkney Islands Visitor Survey also provided evidence on the most popular visitor attractions in Orkney.

13.6.64 The attractions most frequently visited by leisure visitors were the Ring of Brodgar (82 %), Skaill House/Skara Brae (75 %) and St Magnus Cathedral (70 %). The Italian Chapel (62 %), public museums/heritage centres (46 %) and Bishop's Palace/Earl's Palace (40 %) were also popular attractions (Figure 13.4).

Figure 13.4 Visitor Attractions in Orkney Visited by Leisure Visitors



Source: Orkney Islands Council and VisitScotland (2020), Orkney Islands Visitor Survey 2019.

13.6.65 None of the most visited named attractions are located within 15 km of the Proposed Development.

13.6.66 Visitor attractions located within 15 km of the Proposed Development were identified through a search on the Visit Scotland web portal and listed in Table 13.9. These attractions include natural and historical heritage sites, museums and art galleries.

Table 13.9 Visitor Attractions within 15 km of the Proposed Development

Visitor Attraction	Distance to site (km)	Description
The Stone of Setter	3 km	One of the tallest standing stones in Orkney set along the Eday Heritage Trail.
Carrick House	4 km	This 300-year old house hosts a collection of portraits, animal heads and stone and iron age artifacts. It was where Britain's last pirate, John Gow was captured and held captive.
Eday Heritage Centre	4 km	A centre featuring history and artefacts of the island of Eday, located in a renovated Baptist Chapel.
St Magnus Church	8 km	Located in Egilsay, this church, which dates back to 1136, commemorates the martyrdom of Earl Magnus.
RSPB Onziebust	8 km	A nature reserve in Egilsay comprising of wildflower meadows, grassy fields and wetlands.
RSPB Trumland	13 km	A nature reserve in Rousay that is home to various species of breeding birds during the summer months.
Trumland House Gardens	13 km	Located in Rousay, these scenic gardens feature a picnic area for visitors.
Westray Art Gallery	13 km	The gallery includes an exhibition and the studio of artist Peter Brown.
Noltland Castle	13 km	A 16th century castle with historical links to Mary Queen of Scots. The castle is open to the public.
Westray Heritage Trust	13 km	This museum provides insight into the history of the isle of Westray.
Knap of Howar	14 km	A Neolithic farmstead located in Papa Westray. It could be the oldest preserved stone house in Northern Europe.
Wheeling Steen Gallery	15 km	A family-run gallery at the north-end of Westray displaying products designed and made on-site. It also features a deck cabin recovered from a 19th century shipwreck.

Source: BiGGAR Economics Analysis

Recreational Trails and Core Paths

13.6.67 A web-search of WalkHighlands identified 19 recreational trails falling within a 15 km distance from the Proposed Development. These are listed in Table 13.10, where a description of each is provided.

Table 13.10 Recreational Trails

Name of Walk	Description	Distance to site (km)
Eday Heritage Walk	Created as a figure of eight loop, this 10 km trail exhibits the highlights of Eday.	3 km
Bay of Newark from Heritage Centre	A 4 km walk on the west coast of Eday, which passes by the Bays of Doomy and Newark.	3 km
Castle O'Burrian and Bay of Tafts	A seaside trail renowned for its up-close views of puffins, dramatic clifftops and sandy beaches.	4 km
War Ness and Ward Hill	At the Point of War Ness, seals and seabirds can often be seen before the trail continues to Ward Hill, which has scenic views.	5 km
Tuquoy and Mae Sand	A circular trail exploring the Ness of Turquoy, the 12th century Norse kirk and the sandy beach of Mae Sand.	8 km
Egilsay explorer	This 12 km trail explores the island of Egilsay.	8 km
Faraclett Head	A clifftop walk to the highest point on Faraclett Head where terns and skuas can be spotted.	9 km
Papa Westray – the island circuit	This 20 km long coastal walk circles the whole island of Papa Westray, taking in all its scenic features. The trail is recommended as a day visit from nearby islands.	10 km
Westray west coast	A 10 km coastal walk featuring picturesque cliff scenery and seabird cities.	11 km
Backaskaill Bay	A trail exploring the beach of Backaskail Bay and the ruins of a 16th century chapel.	11 km
Cubbie Roo's Castle and The Taing	Located on the islands of Wyre, this walk exhibits one of Scotland's oldest castles and seals can be seen at times of low tide.	12 km
Knitchen Hill, Blotchnie Fiold and Trumland Reserve	On this 8 km trail the highest point of Rousay can be reached. The walk also passes through a RSPB reserve and chambered cairn.	12 km
The Tombs of Rousay	Three chambered cairns can be seen on this walk on the island of Rousay. The trail also passes the gardens of Trumland House.	12 km
Sacquoy Head	A 7 km coastal walk where seals and arctic skuas can often be spotted.	13 km
Pierowall – Kirk, Castle and Beach	This 5 km walk explores the settlement of Pierowall, the largest on Westray. It has harbour views and features the Noltland Castle.	14 km

Name of Walk	Description	Distance to site (km)
Sands of Rothiesholm	A circular trail running the length of Stronsay's sandy beach.	14 km
Quoyness Cairn	This 8 km walk features the Quoyness Cairn, a 5,000-year-old large chambered burial cairn, situated next to the sea.	15 km
Noup Head	Circling the clifftops along the coast, this 7 km trail passes an RSPB nature reserve, arches, caves and a lighthouse.	15 km
St Catherine's Bay	Approximately 6 km long, this walk links the village and harbour at the ferry port to the beach at St Catherine's Bay.	15 km

Source: https://www.walkhighlands.co.uk/

13.6.68 A series of core paths were also identified, based on the 2018 Orkney Core Paths Plan [35]. By law, each Council has to define a series of key routes to outdoor access. These constitute the core set of paths and trails that provide residents and visitors with an opportunity to walk in the countryside.

13.6.69 While there are no core paths in Faray, within 15 km of the site 41 core paths have been identified. These are located across Eday (9), Papa Westray (7), Westray (8), Sanday (11), and Rousay (6).

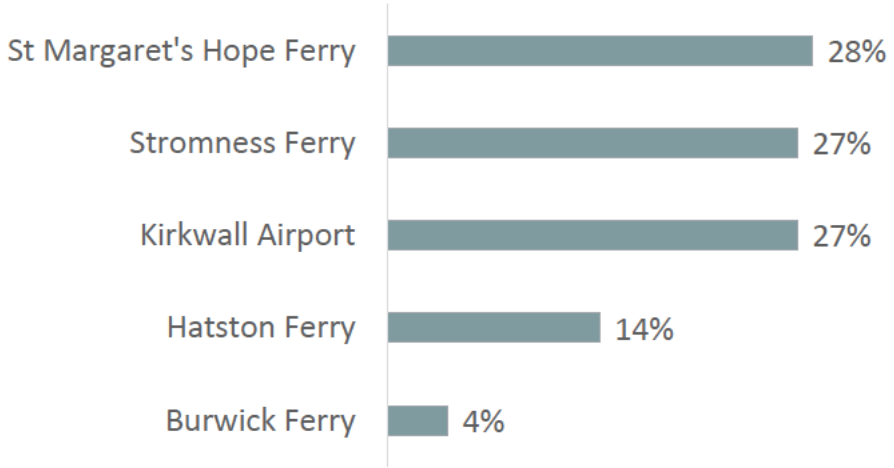
13.6.70 Several of these paths have already been captured among the trails identified in Table 13.10. The remaining paths were considered in the assessment and included:

- core paths ED2, ED3 and ED4 and ED6 in Eday;
- core paths W3, W4, W5, and W7 in Westray;
- core paths PW2, PW3, PW4, PW5, PW6 and PW7 in Papa Westray; and
- core paths SA8, SA9 and SA11 in Sanday.

Tourism Routes

13.6.71 The majority of visitors to Orkney arrive via either the St Margaret's Hope Ferry (28 %), the Stromness Ferry (27 %) or Kirkwall Airport (27 %). Around 14 % arrive via the Hatston Ferry in Kirkwall, and a further 4 % in Burwick Ferry, although it should be noted that these exclude cruise ship visitors.

Figure 13.5 Visitor Arrivals by Point of Entry



Source: Orkney Islands Council and VisitScotland (2020), Orkney Islands Visitor Survey 2019

13.6.72 In addition, approximately 160,000 cruise ship passengers arrived in 2019, with the majority arriving at Hatston Ferry in Kirkwall. As a result of the COVID-19 pandemic, in 2020 there was no tourism activity associated with cruise ships.

Accommodation Providers

13.6.73 As for the other tourism assets, those accommodation providers falling within a 15 km distance from the Proposed Development were considered. The assessment identified 27 accommodation providers. Information over their location and characteristics, where available, were obtained through a search on the Visit Scotland [36] and Orkney.com [37] portals. There may be other tourism accommodation providers that do not use these marketing channels and so this could be an underestimate of the supply of visitor accommodation available. The assessment considers representative properties in:

- Eday;
- Sanday;
- Westray;
- Papa Westray; and
- Rousay.

13.6.74 On each of the nearby islands, the majority of providers are self-catered accommodation. The largest cluster of accommodation providers situated within 15 km of the Proposed Development is located in Westray, where 12 providers were identified including the only nearby hotel. Closest to the Proposed Development is the Eday Hostel at approximately 2 km from the site.

13.6.75 A summary of identified representative accommodation providers by type and location is provided in Table 13.11.

Table 13.11 - Identified Local Accommodation Providers

Location	Hotels	Caravan Sites/ Youth Hostels	Bed & Breakfasts/ Guest Houses / Lodge	Self-Catering	Distance to Site (km)
Eday	-	1	-	2	2 - 6
Sanday	-	3	2	3	8 - 15
Westray/ Papa Westray	1	3	3	5	10 - 14
Rousay	-	1	1	2	13
Total	**1**	**8**	**6**	**12**	**n/a**

Source: Visit Scotland (2020), Orkney.com (2020)

Summary of Tourism and Recreational Baseline

13.6.76 Tourism is a relatively important sector in Orkney, with increasing visitor numbers since 2005. The main reasons for visiting Orkney, as identified by tourists, were walking, the scenery and archaeological heritage. Tourism activity is particularly concentrated in the Mainland of Orkney. The closest accommodation providers, tourist attractions and recreational trails to the Proposed Development are located in the islands of Eday, Westray, Papa Westray, Rousay and Sanday.

13.7 Likely Effects

13.7.1 This section considers the likely effects of the Proposed Development on socio-economics, tourism and recreation. Effects are assessed with reference to the assets' sensitivity, as identified in the baseline.

Economic Effects

Construction

13.7.2 This application is for six turbines with a capacity of approximately 4.8 MW each, giving a combined indicative generating capacity of 28.8 MW. Using research undertaken by BiGGAR Economics on behalf of RenewableUK in 2015 [2], the average expenditure on the construction and development of wind farms can be estimated based on the average spend per MW, the average spending per turbine, or a combination of the two, as appropriate. On the basis of this methodology the total construction and development cost of the Proposed Development was estimated to be £35.6 million.

13.7.3 The Proposed Development is expected to be associated with higher construction expenditure, due to its location and the need for additional infrastructure to allow access to the island. The impact from this spending is considered separately at the end of this section.

13.7.4 This expenditure was split into four main categories of contract:

- development and planning;
- balance of plant;
- turbines; and
- grid connection.

13.7.5 The proportion of development and construction spending spent on each of the main categories was also informed by BiGGAR Economics' research into wind farms that are currently in operation

in the UK. This found that the largest proportion of capital expenditure (Capex) was on turbine related contracts (68.7 %), followed by balance of plant (20.9 %), grid connection (5.3 %) and development and planning (5.1 %).

13.7.6 Whenever figures in this section refer to Scotland, they are intended as being inclusive of the impact taking place in Orkney.

Table 13.12 – Development and Construction Expenditure by Contract Type

	% Capex	Value of the Proposed Development (£m)
Development and Planning	5.1 %	1.8
Turbines	68.7 %	24.5
Balance of Plant	20.9 %	7.4
Grid Connection	5.3 %	1.9
Total	100 %	35.6

Source: BiGGAR Economic Analysis of RenewableUK (2015), Onshore Wind: Economic Impacts 2014.

13.7.7 The economic impact of the construction and development phase was estimated for Orkney and Scotland as a whole. In order to do this, it was necessary to estimate the proportion of each type of contract that might be secured in each of the study areas. The assumptions were based on the average from the RenewableUK research, analysis of the industries and professions in each study area, and BiGGAR Economics' previous experience undertaking such analysis for other wind energy projects in Orkney.

13.7.8 Orkney is expected to benefit from contracts relatively more, than would be the case in other local authority areas, given that its geographical position makes it less likely that spending will spill over to neighbouring local authority areas. To estimate the expenditure for each contract in each of the study areas these percentages were applied to the estimated size of each component contract.

13.7.9 On this basis, it was estimated that Orkney could secure contracts worth £3.9 million, equivalent to 11 % of the total capital expenditure. The largest opportunity for Orkney would be with the balance of plant contracts as companies in the area could secure 25 % of contracts, worth c.£1.8 million.

13.7.10 Scotland (including Orkney) was estimated to be able to receive contracts worth £12.7 million, equivalent to 36 % of the total capital expenditure. The largest opportunities would be the contracts related to balance of plant, worth around £5.0 million and elements of the turbine contracts (including the supply of towers) worth c.£4.7 million.

Table 13.13 – Development and Construction Expenditure by Study Area and Contract Type

	Orkney		Scotland (including Orkney)	
	%	£m	%	£m
Development and Planning	13 %	0.2	63 %	1.1
Turbines	5 %	1.1	19 %	4.7
Balance of Plant	25 %	1.8	68 %	5.0
Grid Connection	38 %	0.7	100 %	1.9
Total*	11 %	3.9	36 %	12.7

**Totals may not sum due to rounding*

13.7.11 The contract values potentially awarded in each area would represent an increase in turnover of businesses in these areas. Using industry-specific data from the Annual Business Survey [38], which gives the turnover to GVA ratio for each of the industries involved, the GVA impact from any increase in turnover can be estimated.

13.7.12 On this basis, it was estimated that the development and construction contracts would generate £1.9 million GVA in Orkney and £6.1 million GVA in Scotland.

Table 13.14 – Development and Construction GVA by Study Area and Contract Type

	Orkney (£ m)	Scotland (£ m) (including Orkney)
Development and Planning	0.2	0.8
Turbines	0.5	2.1
Balance of Plant	0.9	2.5
Grid Connection	0.3	0.8
Total	1.9	6.1

13.7.13 Similarly, the contract values potentially awarded in each area would support employment. Turnover per employee for each of the industries involved is also given by the Annual Business Survey, which allows the employment from any increase in turnover to be estimated.

13.7.14 The employment impacts during the construction and development phase are reported in job years as the contracts would be short-term. Job years measures the number of years of full-time employment generated by a project. For example, an individual working on this project for 18 months would be reported as 1.5 job years.

13.7.15 In this way, the development and construction impacts were estimated to support 29 job years in Orkney, with 14 job years being related to the balance of plant contracts. In Scotland, 96 job years are estimated to be supported, of which 38 job years are related to turbine contracts.

Table 13.15 – Development and Construction Employment in Job Years

	Orkney	Scotland (including Orkney)
Development and Planning	2	11
Turbines	9	38
Balance of Plant	14	36
Grid Connection	4	11
Total	**29**	**96**

13.7.16 There would also be knock on effects in the supply chain and from spending by employees in the local economy. These effects are estimated by applying Type I (indirect) and Type II (indirect and induced) GVA and employment multipliers, which are sourced from the Scottish Government [39], to the direct GVA and employment impacts.

13.7.17 In order to adjust these multipliers, which consider the national economy, for the economy of Orkney it was assumed that indirect multiplier effects would be 33 % of the national impact, and induced multiplier effects, which consider the effect of local spending, would be 70 % of the national impact. The indirect impact multiplier is consistent with the impact from the supply chain of EMEC in 2014 [40], whereas the share of induced impacts taking place locally, was based on an analysis of data from the Office for National Statistics' 'Family Expenditure Survey in the UK – April 2017 to March 2018' [41].

13.7.18 In this way it was estimated that the indirect impact would be £0.3 million GVA and four job years in Orkney, and £2.4 million GVA and 39 job years in Scotland.

Table 13.16 – Development and Construction Indirect Impact

	Orkney	Scotland (including Orkney)
Indirect Impact (£m)	0.3	2.4
Indirect Impact (job years)	4	39

13.7.19 It was estimated that the induced impact during the development and construction phase would be £0.4 million GVA and five job years in Orkney, and £1.9 million GVA and 25 job years in Scotland.

Table 13.17 – Development and Construction Induced Impact

	Orkney	Scotland (including Orkney)
Induced Impact (£m)	0.4	1.9
Induced Impact (job years)	5	25

13.7.20 The total impact during the construction and development phase is the sum of the direct impacts, the indirect impacts and the induced impacts. The total combined impact was estimated to be £2.6 million GVA and support 39 job years in Orkney and £10.4 million GVA and support 161 job years across Scotland.

Table 13.18 Economic Impact During Development and Construction

	Orkney	Scotland (including Orkney)
Total Impact (£m)	2.6	10.4
Total Impact (job years)	39	161

13.7.21 It is expected that during the development and construction phase, the effect of the Proposed Development would be **minor** (beneficial) in Orkney and **negligible** (beneficial) in Scotland. Neither would be significant.

Enabling Infrastructure

13.7.22 Due to its location, the Proposed Development will require additional spending in infrastructure to allow for access to the island, compared with a standard development with a similar generating capacity. This will include the construction of a new extended slipway and a landing jetty. It was estimated that these two infrastructural elements may cost approximately £1.3 million.

13.7.23 As it was the case with development and construction expenditure, these will generate economic benefits. In order to estimate the impact from this spending, it was assumed that around 38 % of spend would take place in Orkney and 100 % in Scotland. Spending was then allocated to the civil engineering sector and relevant ratios and economic multipliers were applied in line with the methodology adopted to estimate the economic impacts from construction and development.

13.7.24 In this way, it was estimated that the expenditure on infrastructure enabling access to the island could generate £0.2 million GVA and support five job years in Orkney and £0.8 million GVA and 11 job years across Scotland.

Table 13.19 Enabling Infrastructure Economic Impact

	Orkney	Scotland (including Orkney)
Total Impact (£m)	0.2	0.8
Total Impact (job years)	5	11

13.7.25 The effect of the construction of this infrastructure related to the Proposed Development was assessed as **negligible** (beneficial) in Orkney and **negligible** (beneficial) in Scotland. Neither would be significant.

Operation

13.7.26 The operation and maintenance impact of the Proposed Development was estimated as the impact that would persist throughout the lifespan of the Proposed Development.

13.7.27 Annual expenditure on operations and maintenance was estimated based on analysis undertaken in the 2015 RenewableUK report. It was estimated that the annual operations and maintenance expenditure associated with the Proposed Development could be up to £0.8 million (which excludes community benefit payments and non-domestic rates).

13.7.28 In order to estimate the economic impact of the operation and maintenance expenditure in Orkney and Scotland, it was first necessary to estimate the proportion of contracts that could be secured in each of these areas. These assumptions were based on the contract proportions reported in the RenewableUK report, the analysis of the industries present in each of the study areas, as well as previous experience BiGGAR Economics had on onshore renewable wind farms in Orkney.

13.7.29 On this basis it was estimated that Orkney could secure 50 % of operation and maintenance contracts, worth £0.4 million, and that Scotland could secure 86 % of contracts, worth £0.7 million.

Table 13.20 – Annual Operation and Maintenance Expenditure by Study Area

	Orkney		Scotland (including Orkney)	
	%	£m	%	£m
Operation and Maintenance	50 %	0.4	86 %	0.7

13.7.30 As with the construction phase, the contract values awarded in each of the study areas represent an increase in turnover in those areas. The economic impact of the increase in turnover on GVA and employment was estimated in the same way as the construction expenditure, using the Annual Business Survey [38].

13.7.31 In this way, it was estimated that turnover generated by the operation and maintenance of the Proposed Development could support £0.2 million GVA and three jobs in Orkney, and £0.3 million GVA and five jobs in Scotland.

Table 13.21 – Annual Operation and Maintenance Direct Impact

	Orkney	Scotland (including Orkney)
GVA (£m)	0.2	0.3
Employment (jobs)	3	5

13.7.32 There would also be indirect and induced impacts during the operation and maintenance of the Proposed Development, which were estimated using the same method as for the development and construction phase.

13.7.33 Adding together the direct, indirect and induced impacts, it was estimated that the total annual economic impact would be £0.3 million GVA and four jobs in Orkney, and £0.5 million GVA and nine jobs in Scotland.

Table 13.22 – Annual Economic Impact During Operation and Maintenance

	Orkney	Scotland (including Orkney)
GVA (£m)	0.3	0.5
Employment (jobs)	4	9

13.7.34 It is expected that the effect on the economy of Orkney of the direct, indirect and induced spend related to operation and maintenance expenditure would be **negligible** due to the scale of the regional economy as a whole. In Scotland, it is expected that the effect would also be **negligible**.

Cumulative Benefits from an Interconnector

13.7.35 In addition to the benefits linked to its construction, development and operations, the Proposed Development will contribute towards reaching the threshold set by Ofgem for investment in an interconnector between Orkney and the Scottish mainland to take place.

13.7.36 At present, Orkney is not served by a transmission grid connection and the distribution network is at capacity such that there has been a moratorium on new grid connections since 2012 and many operational wind energy projects are experiencing substantial constraint through an Active Network Management system. Whilst the moratorium was lifted in September 2020 there is no material change to the overall level of constraint in Orkney and it is not considered that any substantial project will be able to secure a grid connection with acceptable curtailment levels. The lack of grid capacity has driven some innovation locally, but the overall impact has been to heavily impede development of the energy industry.

13.7.37 The investment in an interconnector can take place only if 135 MW of new generation have been awarded a Contract for Difference (CfD) or are likely to be developed by December 2022, having secured planning permission and been subject to an Ofcom financial audit. A recent report [23], see Appendix 13.1, reviewed proposed Orkney renewable projects and concluded that the Proposed Development is an essential part of the needs case required by Ofgem.

13.7.38 The presence of the interconnector could lead to considerable economic benefits. A recent study [23] found that the transmission link would have substantial economic benefits, with potential GVA for the Orkney economy of between £371 million and £807 million, since it would enable the further development of the renewable energy sector in Orkney.

13.7.39 These benefits cannot be directly attributed to the construction of the Proposed Development. However, the existence of sufficient capacity in Orkney is a pre-condition for the interconnector to be built and for these wider benefits to be realised and is therefore an indirect effect of the Proposed Development.

13.7.40 There are wider economic benefits from securing the cable including from development, construction and operation of all relevant wind farms and enabling infrastructure, as well as the potential for knock on benefits to other parts of the local energy industry, potentially including marine renewable energy technologies.

13.7.41 Whilst it is noted that these benefits are indirect and cannot be solely attributed to the Proposed Development as they will be delivered in combination with other developments, the implications for the future development of the renewable energy in Orkney represent a material change for the Orkney economy and so were assessed as **moderate** (beneficial) for Orkney (and so significant) and **negligible** for Scotland.

Wider Economic Effects

13.7.42 The Proposed Development is expected to have wider economic benefits through:

- a location specific community benefit fund;
- profits from ownership; and
- non-domestic rates.

13.7.43 Each source of broader economic impact is considered and quantified in turn.

Location Specific Community Benefit Fund

13.7.44 The Proposed Development is expected to support communities in Orkney through a location specific community benefit fund, as set out in 'Orkney's Community Wind Farm Project, Community Benefit Guiding Principles' [42].

13.7.45 The following principles have been identified as guiding decisions over the scale and beneficiaries of the location specific community benefit fund:

- the beneficiaries of the fund will be identified as comprising those communities located closest to the Proposed Development, since they will be impacted most by its construction and operation;
- in determining the level and geographic extent of any location-specific community benefit payment, the principles outlined by the Scottish Government in Community benefits from onshore renewable energy developments: Guidance on good practice principles for communities, businesses, local authorities and others (2019) will be used; and
- receipt of a location-specific community benefit payment by any area will not impact on the likelihood of an area receiving further community benefits from ownership of the Proposed Development.

13.7.46 The Scottish Government's guidance on community benefits [43] sets out four types of ownership structure for allocation of location specific community benefit funds:

- funding being delivered to existing local organisations such as community councils or development trusts;
- funding being distributed to a specifically-created organisation tasked with managing and allocating funds;
- the wind farm owner paying for the services of a third-party organisation in charge with the governance of the funding; and
- the wind farm owner being directly in charge of the community benefits.

13.7.47 The choice of the community benefit structure will follow a further round of consultations with local communities and build on the general consensus reached.

13.7.48 The Scottish Government [43] recommends that for similar projects the revenue going to the location specific community benefit fund shall be £5,000 / MW each year.

13.7.49 On the basis of a capacity of 28.8 MW, it was estimated that local communities could benefit approximately £144,000 each year in location specific community benefits. These would support local projects and the aspirations of the local communities affected the most during the construction and operation of the Proposed Development.

13.7.50 The impact from the payment of location specific community benefits was assessed as **minor** (beneficial).

Ownership

13.7.51 The Applicant agreed and committed to implement general principles of community benefit from the Proposed Development [42], should it be developed to operation. These include:

- the key purpose of the Proposed Development is to generate profit to be used for the benefit of the people of Orkney;
- community benefit from the project will be delivered via a Community Fund with funding distributed in the interests of Orkney and its inhabitants;
- financing of the project will be structured to achieve a profit which can be used for community benefit as soon as reasonably practicable in the project lifecycle, noting that any wind farm constructed must pay-off its own construction costs and provide a return on capital invested;
- profit may be retained for the purpose of extending the life of the Community Fund, such as through developing new projects, or repowering existing projects; and
- the Proposed Development is for the benefit of the whole community with benefit delivered through the distribution of funds.

13.7.52 These general principles contribute to the distinctiveness of the Proposed Development, since profits would stay in Orkney and be used for the benefit of the people of Orkney, increasing the level of local benefits substantially and also socialising the benefits amongst as many people as possible.

13.7.53 Based on its financial modelling, and recognising that numerous uncertainties exist in the electricity market, the Applicant expects that throughout its operation the Proposed Development could generate around £0.1 million in annual profits per MW of capacity installed. On this basis, the Proposed Development could generate £2.88 million in profits annually.

13.7.54 As an illustration of the potential impact that the profits could generate, it was assumed that spending made possible by the profits generated would support employment and generate additional benefits to suppliers. The extent of expenditure on staff and supply was based on their relative shares in the gross annual expenditure of Orkney Islands Council [44].

13.7.55 This would generate a direct impact equivalent to £2.2 million GVA in staff costs and support 57 jobs.

13.7.56 The impact from households spending was then estimated assuming that 70 % of expenditure, as done for the induced impacts of above, would occur in Orkney. Similarly, it was assumed that 30 % of supply spending would benefit local businesses.

13.7.57 Adding all these sources of impact, it was estimated that profits could generate £2.6 million GVA and support 66 jobs in Orkney. These economic benefits would be additional to the GVA and jobs directly associated with the development, construction, operation and maintenance of the Proposed Development itself.

13.7.58 The effects associated with ownership structure were assessed as **minor** (beneficial) in Orkney and as **negligible** across the Scottish economy.

Non-Domestic Rates

13.7.59 The Proposed Development would be liable for non-domestic rates, the payment of which would contribute directly to public sector finances. Whilst non-domestic rates are set at the national level, they are redistributed to local authorities and so considered to be local taxation. Analysis of the rateable values of nearby wind farms suggests that the average rateable value per MW is £30,834, and that the total rateable value would be £0.9 million.

13.7.60 Given a poundage rate of £0.516 per £1 of rateable value it is estimated that the Proposed Development could contribute up to £0.5 million annually to public finances. However, the actual contribution would depend on variables such as the actual load factor and the potential for any relief from non-domestic rates.

13.7.61 These non-domestic rates, by providing an additional revenue stream, would support the delivery of local government services.

13.7.62 The effect on the economy of Orkney from the annual contribution from the Proposed Development to non-domestic rates was assessed as **minor** (beneficial) and not significant.

Tourism and Recreation Effects

Wind Farms and Tourism Evidence

13.7.63 The most comprehensive study of the potential effects of wind farms on tourism was undertaken by the Moffat Centre at Glasgow Caledonian University in 2008 [3]. The study found that, although there may be minor effects on tourism providers and a small number of visitors may not visit Scotland in the future, the overall effect on tourism expenditure and employment would be very limited. A Scottish Government report confirmed these findings [45]. These studies are now several years old and in the intervening time wind farms have become a more common feature in Scotland. As such, it would be expected that any negative effects on the tourism economy would now be apparent.

13.7.64 However, the Moffat Centre study was based on what could happen, rather than what has happened. In 2017 BiGGAR Economics undertook a study into the effects of already constructed wind farms on tourism at the national, regional and local level [5]. This study updated work on the same subject carried out in 2016 and included an appendix that addressed the critique of the earlier report by the John Muir Trust.

13.7.65 Tourism employment was considered over the period 2009 to 2015, a six-year period over which Scotland and almost all local authority areas increased the number of wind farms, while employment in sustainable tourism also grew substantially. The analysis found no correlation between tourism employment and the number of turbines at the national or local authority level.

13.7.66 The study also considered the impact on employment at a much smaller, more granular level, in data zones up to 15 kilometres from developments. The sites considered were constructed between 2009 and 2015. As these sites did not exist in 2009, comparing employment in 2009 and 2015 was

considered an effective measure of the effect of wind farms on local employment, while excluding construction impacts, such as wind farm related employees staying in local accommodation.

13.7.67 At the local authority level in these smaller areas, no link was found between the development of a wind farm and tourism related employment. In 21 out of the 28 areas considered employment in this sector grew. In 22 of the areas, employment either grew faster or decreased less than the rate for the relevant local authority area as a whole.

13.7.68 Overall, the conclusion of this study was that published national statistics on employment in sustainable tourism demonstrate that there is no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at the local authority level, nor in the areas immediately surrounding wind farm developments.

13.7.69 The findings of this research are in accordance with those of the Scottish Parliament's Economy, Energy and Tourism Committee in 2012 [4], when they concluded that there is no robust, empirical evidence of a negative link between wind farm development and tourism.

13.7.70 Overall, there is no research evidence that shows that fears of negative effects on the tourism economy in Scotland as a result of wind farms have been realised.

13.7.71 Within that overall context, the following assessment nevertheless considers whether there might be any specific effects on individual tourism assets. This assessment considers whether the Proposed Development could result in changes in the behaviour of tourists that might lead to effects on the tourism economy.

Basis of Assessment

13.7.72 This section assesses whether there would be an effect on the tourism economy, as a result of the Proposed Development leading to a change in behaviour, for example, a change in visitor numbers or tourism income. Therefore, the assessment is made on whether the Proposed Development could lead to a change in behaviour that would lead to effects on the tourism economy.

13.7.73 The assessment of accommodation providers was conducted based on the offering prior to the start of the COVID-19 pandemic, business closures and travel restrictions. It is acknowledged that changes to the baseline considered may occur.

Tourism and Recreation Assets

13.7.74 This section considered whether the Proposed Development would have any effect on tourism and recreation assets, including local visitor attractions, trails, tourism routes and accommodation providers, as identified in Section 13.6. The assessment includes consideration of whether the Proposed Development is likely to result in changes to tourism behaviour and motives for visiting particular attractions or accommodation.

Visitor Attractions

13.7.75 The baseline identified twelve visitor attractions that are located within 15 km of the Proposed Development.

13.7.76 Three visitor attractions were identified on the island of Eday, between 3 km and 4 km from the Proposed Development. The Stone of Setter, located in northern Eday, is one of the tallest megaliths in Orkney, standing at over 15 feet tall and surrounded by ancient cairns. The Eday Heritage Centre opened in 2008 and is a renovated old Baptist Chapel, offering an exhibition space with information and artefacts about the history of the island, as well as a café. Carrick House is a 300-years old house, hosting a collection of artefacts and family portraits. Given that these sites are likely to attract tourists due to their historical and cultural significance to the island, visitor motivations are unlikely to change with the existence of the Proposed Development. In addition, the cultural heritage assessment in Chapter 10 finds that the Stone of Setter is outwith the Zone of Theoretical Visibility (ZTV) and that there is no intervisibility between the Proposed Development and Carrick House. For these reasons, the effect of the Proposed Development on these visitor attractions has been assessed as **negligible.**

13.7.77 Located in Egilsay, around 8 km from the Proposed Development, St Magnus Church, which dates back to 1136, commemorates the martyrdom of Earl Magnus. In line with the assessment carried out in the cultural heritage assessment (Chapter 10), where no significant effect was found, and considering that visitors would likely spend time at St Magnus Church out of an interest in the island's historical heritage, the effect of the Proposed Development was assessed as **negligible**.

13.7.78 On the island of Rousay, approximately 8 km – 12 km from the site there are two nature reserves: RSPB Onziebust and RSPB Trumland. Trumland House Gardens are also located on the island, around 13 km from the Proposed Development. RSPB Onziebust provides a peaceful setting with wildflower meadows, lochs and fields and is home to a population of birds. RSPB Trumland attracts visitors particularly in the summer months when it features a number of breeding birds and owls. Both sites are an attraction for nature lovers, as are the Trumland House Gardens which features woodlands and water gardens, complete with a picnic area. The main attractions to these nature sites are their tranquil settings and the opportunity to see local wildlife. This motivation is unlikely to be affected by the Proposed Development and therefore its effect on attractions in Rousay has been assessed as **negligible.**

13.7.79 Knap of Howar, located on Papa Westray at around 14 km from the Proposed Development, is a Neolithic farmstead, which is likely to attract visitors through its value as a historical heritage site. Potential visitors' motives for seeing this monument are unlikely to be affected by the Proposed Development. For this reason, its effect was assessed as **negligible**.

13.7.80 Four visitor attractions were identified in Westray, approximately 13 km – 15 km from the Proposed Development. Noltland Castle is under the care of Historic Environment Scotland and is a 16th century castle, the home of Gilbert Balfour, master of Mary Queen of Scots' household. The castle was built to seek out incoming attacks and features 7 ft thick walls and gun loops. Wheeling Steen Gallery is a family-run gallery to the north of Westray, exhibiting art and photographs designed and produced on-site. Westray Art Gallery, also to the north of the island, features the work and studio of local artist Peter Brown, as well as attracting guest artists to exhibit their work. The Westray Heritage Trust Centre stages exhibitions on the island's history, with the 2020 exhibit focusing on the island's fishing and farming past. Since the cultural and historic motivations for visiting each of these attractions are unlikely to be affected by the Proposed Development, its effect on them has been assessed as **negligible.**

Recreational Trails and Core Paths

13.7.81 Included in this section is consideration of whether the Proposed Development is likely to affect the use of recreational trails. The primary concern of local residents in relation to these trails is whether the routes will continue to be available in light of the Proposed Development.

13.7.82 The baseline identified 19 recreational trails and 41 core paths that are up to 15 km from the Proposed Development. The analysis considered separately those core paths that are not part of recreational trails.

13.7.83 In Eday, approximately 3 km - 5 km from the site, there are two recreational trails. The Bay of Newark walk from the Eday Heritage Centre is a short walk on the west coast of the island, passing the bays of Doomy and Newark, and is the closest to the Proposed Development. The Eday Heritage Walk takes the form of a figure of eight loop to the north of the island and encompasses various scenic and historic sites. The landscape and visual assessment (Chapter 6) finds that there would be significant visual effects along these trails. However, visual elements are unlikely to be the only considerations that would lead visitors to use these tracks, as they provide a convenient way to explore the main visitor attractions in the island and visitors would likely use them to walk in nature. For this reason, the effect of the Proposed Development has been assessed as **minor.**

13.7.84 Also, on the island of Eday is the War Ness and Ward Hill trail. Seals and seabirds can often be seen along this route as well as livestock through the farmland section. The landscape and visual assessment (Chapter 6) found no significant visual effects on the southern section of the B9063. As a result, this trail, which is located in the south of the island, is unlikely to be affected by the Proposed Development. For this reason, the effect was assessed as **negligible**.

13.7.85 There are five recreational trails on the island of Westray that are within 15 km of the Proposed Development. Closest to the site at a distance of around 4 km is the Castle O'Burrian and Bay of Tafts trail, renowned as the best place in Orkney to see puffins up-close. The Westray west coast walk is a 10 km trail taking in cliff-top scenery and overlaps with the Noup Head trail which passes through a RSPB reserve. The Tuquoy and Mae Sand walk on the island also visits a 12th century Norse kirk. To the north of the island is a further trail taking in the sights of the village of Pierowall. Based on the landscape and visual impact assessment (Chapter 6), there will be significant effects on the southern coast of Westray and non-significant effects on the northern and eastern coast. On this basis, the effect on Castle O'Burrian and Bay of Tafts was assessed as **minor** since views would be just one of the factors affecting users' choices, whereas the effect on the other four recreational trails in Westray was considered as **negligible.**

13.7.86 Papa Westray has one recreational trail which, at its closest point, is approximately 10 km from the Proposed Development. The island circuit takes in many of the island's features including northern Europe's oldest standing house. Given the use of the trail as a way to reach the island's different visitor attractions and the fact that the impact of views may vary across the trail as the distance from the Proposed Development increases, the effect on it has been assessed as **negligible.**

13.7.87 On the island of Egilsay, the 12 km Egilsay explorer trail covers most of the island, encapsulating its main features including the remains of St Magnus church, a sandy beach and the Onziebust RSPB Reserve. At its closest point, the trail is approximately 8 km from the site of the Proposed Development. Considering the distance and local use of the trail, the Proposed Development's effect on it has been assessed as **negligible.** The landscape and visual assessment (Chapter 6) found that the effect on the Egilsay regional coastal character area (RCCA) will not be significant.

13.7.88 There is one recreational trail on the small island of Wyre. The trail passes by one of Scotland's oldest castles, Cubbie Roo's, and the coastal path can be completed in 2-3 hours. Given the 12 km distance from the Proposed Development, the fact that this island benefits from the intervening presence of Egilsay, as noted in the landscape and visual assessment (chapter 6), and that the cultural and scenic motivations for completing the trail will be unaffected, the Proposed Development's effect on it has been assessed as **negligible.**

13.7.89 Sacquoy Head is a recreational trail that is located at around 13 km from the Proposed Development in the North of Rousay. In line with the landscape and visual impact assessment in Chapter 6 and considering its distance, the effect of the Proposed Development has been assessed as **negligible.**

13.7.90 Around 14 km from the Proposed Development, the Sands of Rothiesholm circuit is located on Stronsay's sandy beach and can be completed within two hours. St Catherine's Bay walk, also on Stronsay, goes through the village and harbour of Whitehall before leading to the sandy beach at St Catherine's Bay. Given these trails' distance from the Proposed Development, they are unlikely to be affected by it. The effect of the Proposed Development on visitor motivations for using these trails have been assessed as **negligible.**

13.7.91 Four recreational trails within 15 km of the site were identified on the island of Rousay. The trails feature the highest point on Faraclett Head and Rousay, ancient tombs and Trumland RSPB Reserve and gardens, and are places to see breeding birds. These will continue to be attractions as the landscape and visual assessment (Chapter 6) found that there are no significant effects in Rousay North associated with the Proposed Development and therefore the effect of the Proposed Development has been assessed as **negligible**. The effect on the trail to Faraclett Head was assessed as **minor**, since the landscape and visual assessment found a significant impact on views from Faraclett Head.

13.7.92 Within 15 km of the Proposed Development, on the island of Sanday are a further two recreational trails. The Backaskail Bay trail crosses a sandy beach and quiet country road as well as a 16th century chapel. The Quoyness Cairn route features the Quoyness Cairn which is a 5000-year-old burial cairn. The route is also suitable for bird watching. Given the distance from the Proposed Development and historic attractions as motivations for completing the trails and the fact that the landscape and visual assessment (Chapter 6) found no significant effects, the effect of the Proposed Development has been assessed as **negligible.**

13.7.93 Core paths ED2, ED3, ED4 and ED6 are between 3 km and 7 km from the Proposed Development in Eday. They provide links to the Eday Heritage Walk (considered above), a link between Newark Bay and the Bay of Doomy and access to the beaches of Mussetter and Doomy. Given their nature, they are likely used to walk across the island by residents, who have been considered as less sensitive to changes in underlying assets' characteristics than visitors. Therefore, it was concluded that the effect on them would be **negligible.**

13.7.94 Core paths W3, W4, W5 and W7 in Westray are around 8 km – 12 km from the Proposed Development. Given their likely use by residents and distance from the Proposed Development, it is unlikely that there will be any changes in their use and, as such, the effect on these core paths has been assessed as **negligible**. The landscape and visual assessment (Chapter 6) found significant effects only in the south of Westray.

13.7.95 On Papa Westray there are a further six core paths (PW2, PW3, PW4, PW5, PW6 and PW7) that have not already been included in the assessment of the recreational trails. These trails are all joined to the island circuit. Given their distance from the site, the effect of the Proposed Development has been assessed as **negligible**.

13.7.96 Core Paths SA8, SA9 and SA11, on the island of Sanday, are approximately 13 km from the Proposed Development. Given their distance and intended likely use by local residents and the intervening presence of Eday, the effect of the Proposed Development has been assessed as **negligible**.

Accommodation Providers

13.7.97 The research on wind farms and tourism finds no evidence of negative impacts on the tourism sector. Nevertheless, this section considers whether there are locations where tourism behaviour in relation to the choice of accommodation provider may change. The proposition that accommodation providers in the area utilise, particularly in relation to their marketing, is therefore relevant to assessing whether any tourist behaviour changes might be expected.

13.7.98 The closest accommodation providers to the Proposed Development are located on the island of Eday and include two self-catered cottages and the Eday Hostel. They are situated approximately 2 km – 6 km from the Proposed Development and market themselves as a base for visitors exploring the island, particularly for walking, bird-watching or visiting historic sites. Little or no change is expected compared to the baseline during the Proposed Development's operations and maintenance. Therefore, the effect has been assessed as **negligible**.

13.7.99 To the north-east of the Proposed Development, on the island of Sanday, are a further eight accommodation providers. Located between 8 km – 15 km from the Proposed Development, these providers include three campsites/hostels, two B&B's and three self-catered accommodations. The providers tend to market themselves based on their locations which include both countryside and seaside views, as well as sandy beaches. As found in the landscape and visual assessment (Chapter 6), the intervening presence of Eday limits the visual impact of the Proposed Development. In addition, it is unlikely that visitor motivations will change as a result of the Proposed Development and therefore its effect on accommodation providers on Sanday has been assessed as **negligible**.

13.7.100 Twelve accommodation providers were identified in the islands of Westray and Papa Westray, approximately 10 km – 14 km from the Proposed Development. These providers are largely clustered around the village of Pierowall and include the Pierowall Hotel, three caravan sites/hostels, three B&B's and five self-catered providers. Providers market themselves to visitors as a base for exploring the islands wildlife and scenery and their closeness to local attractions in the area. The landscape and visual assessment (Chapter 6) found that the impact to the north of Westray is expected to be not significant. Several providers also operate their own tours of the island for visitors. Given the distance from the Proposed Development and motivations for visiting the island, the effect of the Proposed Development on accommodation providers on Westray has been assessed as **negligible.**

13.7.101 A further four accommodation providers were located approximately 13 km from the Proposed Development on the island of Rousay. These include a campsite/hostel, the Taversoe Inn and two self-catered providers. The Taversoe Inn markets itself on its proximity to neighbouring islands and its views over the Eynhallow Sound. The hostel and Trumland farm market themselves as a base for

visitors coming to explore the island and a converted chapel markets themselves as an idyllic self-catered provider featuring its own recording studio. All these providers are located in the south of the island, where based on the landscape and visual assessment (Chapter 6), no visibility is expected. Given the distance from the Proposed Development and the intended purpose of these providers, the effect of the Proposed Development has been assessed as **negligible**.

Tourism Routes

13.7.102 The majority of cruise ships arrive in Kirkwall, which is located over 25 km from the Proposed Development. Based on this location and the award-winning reputation Orkney has as a cruise stop destination; it is unlikely that the existence of the Proposed Development will affect motivations for cruise ship trips to the area. Other tourist routes on the islands are located further than 15 km from the Proposed Development and, as such, were not included in the assessment. Therefore, the effect on tourism routes has been assessed as **negligible**.

13.8 Additional Mitigation and Enhancement

Socio-Economic Mitigation (Enhancement)

13.8.1 The scale of the investment required to develop, build and operate a wind farm means that it represents a substantial investment in the local area. Developers can maximise the associated impacts through a range of measures, which can have the benefit of increasing local support for a wind farm. It could also improve the delivery of the Proposed Development through having a more conveniently located supply chain and having scope to cut costs.

13.8.2 Since the analysis in section 13.7 did not find any significant adverse effects, no need for mitigation measures was envisaged.

Best Practice in Supply Chain Development

13.8.3 Best practice is set out in a 2014 report by RenewableUK [46], which considered how developers can increase economic impacts in the local area. There are six main recommendations, which the Applicant has indicated a commitment to, subject to procurement processes and procedures:

- maximise your local presence and begin early – identify potential suppliers and increase your visibility in the local area;
- partnerships work – work with local authorities and business groups to gain information on local expertise and spread the message to local businesses;
- leverage primary contractors – ensure that primary contractors also consider the impact that they can make in the local area;
- provide the right information – give information in plenty of time and in the right format so that local businesses are able to prepare;
- communicate technical requirements early – provide opportunities for local companies to upskill and form local consortia; and
- demonstrate local content in planning – insert local-content commitments in the planning application where applicable and undertake post-construction auditing.

13.9 Residual Effects

Construction

13.1.1 Construction is expected to result in a temporary, **minor** (beneficial) socio-economic effect in Orkney and **negligible** socio-economic effect in Scotland.

Operation

13.9.1 Direct and indirect spend related to operational and maintenance expenditure is expected to result in a permanent **negligible** effect on the Orkney and Scottish economies.

13.9.2 Whilst the benefits associated with the interconnector are indirect and cannot be solely attributed to the Proposed Development, they represent a material change for the Orkney economy and so were assessed as **moderate** (beneficial) and significant for Orkney and **negligible** for Scotland.

13.9.3 The impact from the payment of location specific community benefits was assessed as **minor** (beneficial), the effect on the economy of Orkney from the annual contribution from the Proposed Development to non-domestic rates was assessed as **minor** (beneficial), and the effects associated with ownership were assessed as **minor** (beneficial) in Orkney.

13.9.4 The assessment of tourism and recreation assets and accommodation providers found that there were no significative adverse effects expected as a result of the Proposed Development.

13.10 Cumulative Assessment

13.10.1 The cumulative assessment considered the existing and proposed developments in the area. The focus was on effects on supply chain activity, recreation and tourism.

13.10.2 Adding together the economic impacts from enabling infrastructure and the development and construction of the Proposed Development, the proposed Orkney's Community Wind Farm Project - Hoy and the proposed Orkney's Community Wind Farm Project - Quanterness, it was estimated that they could generate a total £7.9 million GVA and support 121 job years in Orkney and £32.1 million GVA and support 493 job years across Scotland.

13.10.3 It was also estimated that the cumulative economic impact of the Proposed Development, the proposed Orkney's Community Wind Farm Project - Hoy and the proposed Orkney's Community Wind Farm Project - Quanterness during the operations and maintenance period could be £0.9 million GVA and 12 jobs in Orkney and £1.6 million GVA and 26 jobs in Scotland each year.

13.10.4 The impact arising during the operations and maintenance phase of these three projects would be complemented by that arising from two other developments consented in Orkney, Hesta Head and Costa Head.

13.10.5 The combined presence of these projects may provide existing companies in sectors that are part of renewable energy's supply chain with a stream of work, as well as it could stimulate the emergence of new businesses in Orkney providing goods and services to the renewable energy sector. The effect of these projects on the supply chain was assessed as **minor** (beneficial).

13.10.6 Considering the location of the Proposed Development, the evidence from the existing literature on the relationship between wind farms and tourism and the evidence considered in the analysis of tourism and recreation receptors, it was assessed that there would be a **negligible** effect on tourism activity from the combined presence of these developments.

13.11 Summary

13.11.1 This chapter provided the socio-economic, tourism and recreation assessment of the Proposed Development. The analysis was based on the Proposed Development featuring six 4.8 MW turbines and an indicative total generating capacity of 28.8 MW.

13.11.2 The socio-economic and tourism baseline suggests that Orkney has a declining and ageing population in comparison to other areas of Scotland. While the labour market performs well, the area features higher costs of living in comparison to the rest of Scotland, which are partly associated to the higher share of income that needs be spent on fuel. Tourism plays an important part in the

local economy and accounts for 9.6 % of employment. However, the North Isles of Orkney tend to attract a lower share of visitors.

13.11.3 Based on an indicative installed capacity of 28.8 MW, it was estimated that the Proposed Development during the construction and development phase could generate up to:

- £2.6 million GVA and support 39 job years in Orkney; and
- £10.4 million GVA and support 161 job years in Scotland.

13.11.4 The Proposed Development, compared to a similar development, will require additional expenditure in infrastructure to allow for access to the island. This expenditure could generate up to £0.2 million GVA and support five job years in Orkney and £0.8 million GVA and 11 job years in Scotland.

13.11.5 It was estimated that annual direct and indirect spend related to operational and maintenance expenditure for the Proposed Development would generate:

- £0.3 million GVA and support four jobs in Orkney; and
- £0.5 million GVA and support nine jobs in Scotland.

13.11.6 The Proposed Development would have an important strategic role for Orkney towards the achievement of the threshold set by Ofgem, in order for the construction of a new interconnector to be approved. This would in turn lead to substantial additional socio-economic benefits and will support investment and innovation in the renewable sector in Orkney.

13.11.7 While the exact details and structure of the locational community benefit fund are yet to be decided, local communities in Orkney and, in particular, those living in proximity to the Proposed Development will be able to benefit from community benefit funding. The Proposed Development is also expected to provide benefits through its community ownership structure. In this way, profits will remain in Orkney and will be spent in the interests of the people of Orkney.

13.11.8 Throughout its operation, the Proposed Development would also contribute to local public finances via payment of non-domestic rates and in this way support the provision of public services locally. It was estimated that the Proposed Development could contribute £0.5 million each year in non-domestic rates.

13.11.9 The Proposed Development would have a wider impact than that associated with local community benefits, given that the Applicant is Orkney Islands Council, which is committed to spread the benefits from its investment. Based on an annual profit of £0.1 million/MW, it was estimated that the Proposed Development could generate £2.88 million annually. This could support 66 jobs and £2.6 million GVA in Orkney, in addition to the GVA and jobs directly associated with the development, construction, operation and maintenance of the Proposed Development itself.

13.11.10 There would be cumulative effects on the supply chain for the renewable energy sector in Orkney from the construction and development of the Proposed Development, the proposed Orkney's Community Wind Farm Project - Quanterness and the proposed Orkney's Community Wind Farm Project - Hoy.

13.11.11 Adding together the economic impacts from enabling infrastructure and the development and construction of the Proposed Development, of the proposed Orkney's Community Wind Farm Project - Quanterness and of the proposed Orkney's Community Wind Farm Project - Hoy, it was estimated that they could generate a total £7.9 million GVA and support 121 job years in Orkney and £32.1 million GVA and support 493 job years across Scotland (including in Orkney).

13.11.12 It was also estimated that the cumulative economic impact of the Proposed Development, of the proposed Orkney's Community Wind Farm Project - Quanterness and of the proposed Orkney's Community Wind Farm Project - Hoy during the operations and maintenance period could be £0.9 million GVA and twelve jobs in Orkney and £1.6 million GVA and 26 jobs in Scotland each year. This cumulative effect was assessed as **minor** (beneficial).

13.11.13 A review of existing evidence on the relationship between wind farm developments and tourism has found little evidence of a negative effect on the tourism economy. An assessment of tourism attractions, popular routes and accommodation providers was also undertaken.

13.11.14 Visitor attractions were identified within 15 km of the Proposed Development. The assessment has found that, for all identified attractions, as a result of separation distance and/or the fact that the Proposed Development would not impact upon visitor experience, it would not have an impact on motivation to visit them. As a result, the assessment has concluded that there would be a **negligible** and non-significant effect on visitor attractions.

13.11.15 The assessment of effects on popular routes has considered 19 recreational trails and 41 core paths within 15 km of the Proposed Development. This found that the effect on their amenity as tourism or recreational assets would be **negligible** and not significant as the Proposed Development would not impact upon their use.

13.11.16 Analysis of representative accommodation providers within a 15 km study area considered whether visitor behaviour would change due to the Proposed Development and found that none would be made unattractive to guests, as a result of the Proposed Development. The assessment therefore found that effects would be **negligible**, and non-significant, both during construction and operation of the Proposed Development.

13.11.17 There were no expected adverse cumulative effects on tourism and recreation activity.

13.11.18 Overall, there were no significant adverse effects associated with the Proposed Development, while there would be some beneficial effects linked to construction and operational expenditure, though they would also not be significant. Whilst it is noted that the benefits are indirect and cannot be solely attributed to the Proposed Development, the contribution made to the threshold for the interconnector and the implications for the future development of the renewable energy sector in Orkney represent a material economic opportunity for Orkney, and is considered a **moderate** and significant beneficial effect.

13.11.19 The COVID-19 pandemic and the strategy being adopted for economic recovery and transformation, based on green growth, means that the Proposed Development can be considered to be of substantial socio-economic importance, since it has the potential to make a meaningful contribution to economic recovery, providing employment during the construction phase and boosting productivity growth in the economy during the operational phase.

Table 13.23 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Economic impact of £2.6 million GVA and 39 job years in Orkney	Minor and not significant.	Beneficial	n/a	Minor and not significant.	Beneficial
Economic impact of £10.4 million GVA and 161 job years in Scotland	Negligible and not significant.	Beneficial	n/a	Negligible and not significant.	Beneficial
Construction of Enabling Infrastructure					
Economic impact of £0.2 million GVA and 5 job years in Orkney	Negligible and not significant.	Beneficial	n/a	Negligible and not significant.	Beneficial
Economic impact of £0.8 million GVA and 11 job years in Scotland	Negligible and not significant.	Beneficial	n/a	Negligible and not significant.	Beneficial
Operation					
Annual O&M economic impact of £0.3 million GVA and 4 jobs in Orkney	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a
Annual O&M economic impact of £0.5 million GVA and 9 jobs in Scotland	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a
Contribution to the case for the interconnector	Moderate and significant.	Beneficial	n/a	Moderate and significant.	Beneficial

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Annual payment of an estimated £0.5 million in non-domestic rates	Minor and not significant.	Beneficial	n/a	Minor and not significant.	Beneficial
Annual payment of £144,000 in a location specific community benefit fund	Minor and not significant.	Beneficial	n/a	Minor and not significant.	Beneficial
Annual profit of £2.88 million from ownership	Minor and not significant.	Beneficial	n/a	Minor and not significant.	Beneficial
Effect on tourism assets	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a
Effect on core paths and recreational access	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a
Effect on accommodation providers	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a

Table 13.24 – Summary of Cumulative Effects

Receptor	Significance of Potential Effect		Mitigation Measure	Significance of Cumulative Effect	
	Significance	Beneficial/Adverse		Significance	Beneficial/ Adverse
Local Supply Chain Cumulative Effects	Minor and not significant	Beneficial	n/a	Minor and not significant	Beneficial
Cumulative Tourism Effects	Negligible and not significant	n/a	n/a	Negligible and not significant	n/a

13.12 References

Literature

Advisory Group on Economic Recovery. (2020). *Towards a Robust, Resilient Wellbeing Economy for Scotland*.

BiGGAR Economics. (2017). *Wind Farms and Tourism Trends in Scotland*.

ClimateXchange. (2012). *The Impact of Wind Farms on Scottish Tourism*.

Committee on Climate Change. (2020). *Building a Resilient recovery from the COVID-19 crisis*.

Department of Energy and Climate Change, RenewableUK. (2012). *Onshore Wind: Direct and Wider Economic Impacts*.

Destination Orkney Partnership. (2020). *Orkney Tourism Strategy 2020-2025*.

EMEC. (2019). *EMEC Socio-Economic Report*.

Fraser of Allander Institute. (2020). *Orkney Islands Economic Review*.

GHD. (2021). *A Transmission Link for Orkney: An Impact Analysis on the Orkney Economy.*

Glasgow Caledonian University/Moffat Centre. (2008). *The Economic Impacts of Wind Farms on Scottish Tourism.*

Highland and Islands Enterprise. (2013). *A Minimum Income Standard for Remote Rural Scotland*.

National Records of Scotland. (2020). *Mid-2019 Population Estimates Scotland*.

National Records of Scotland. (2020). Population Projections for Scottish Areas (2018-based).

Office for National Statistics. (2018). A*nnual Business Survey Provisional Results 2016*.

Office for National Statistics. (2019). *Business Register and Employment Survey 2018*.

Ofgem. (2019). *Conditional Decision on Orkney Final Needs Case.*

ONS. (2020). *Annual Population Survey.*

ONS. (2020). *Annual Survey of Hours and Earnings - Resident Analysis.*

ONS. (2019). *Family Expenditure Survey in the UK - April 2017 to March 2018*.

OREF. (2017). *Orkney Sustainable Energy Strategy 2017-2025.*

Orkney Islands Council. (2018). *Orkney Core Paths Plan*.

Orkney Islands Council. (2018). *The Council Plan 2018-2023*.

Orkney Islands Council. (2019). *Key Facts and Figures*.

Orkney Islands Council. (2019). *Orkney's Community Wind Farm Project: Community Benefit - Guiding Principles.*

Orkney Islands Council b). (2019). *Revenue Budget 2019/20.*

Orkney Islands Council/VisitScotland. (2020). *Orkney Islands Visitor Survey 2019.*

Orkney Renewable Energy Forum. (2017). *Orkney Sustainable Energy Strategy 2017/2025*.

Orkney Renewable Energy Forum. (2018). *Orkney Electric Vehicle Strategy 2018-2023*.

RenewableUK. (2014). *Local Supply Chain Opportunities in Onshore Wind: Good Practice Guide*.

RenewableUK. (2015). *Onshore Wind: Economic Impacts in 2014*.

Scottish Government. (2016). *Draft Advice on Net Economic Benefit and Planning.*

Scottish Government. (2017). *Scottish Energy Strategy: The Future of Energy in Scotland*.

Scottish Government. (2018). *Input-Output Tables 2015*.

Scottish Government. (2019). *A vision for Scotland's electricity and gas network*.

Scottish Government. (2019). *Energy Statistics Database Q1 2019*.

Scottish Government. (2019). *Latest estimates of Fuel Poverty and Extreme Fuel Poverty under the proposed new definition - following Stage 2 of the Fuel Poverty (Targets, Definition and Strategy) (Scotland) Bill.*

Scottish Government. (2019). *Scottish Government Good Practice Principles for Community Benefits from Onshore Renewable Energy Developments.*

Scottish Government. (2019). *Scottish House Condition Survey (SHCS) Local Authority Analysis 2015-2017.*

Scottish Government. (2019). *The Proposed National Islands Plan.*

Scottish Government. (2020). *Economic Recovery Implementation Plan.*

Scottish Government. (2020). *Economic Recovery Implementation Plan - The Scottish Government's response to the Advisory Group on Economic Recovery.*

Scottish Government. (2020). *Programme for Government.*

Scottish Government. (2020). *Scottish Planning Policy.*

Scottish Parliament Economy, Energy and Tourism Committee. (2012). *Report on the Achievability of Scottish Government's renewable energy targets.*

Scottish Tourism Alliance. (2012). *Tourism Scotland 2020*.

The Scottish Tourism Alliance. (2020). Scotland's Outlook 2030.

Websites

BBC. (2019, August 13). Is Orkney 'in the fast lane' on electric vehicles? Retrieved from BBC News: https://www.bbc.co.uk/news/uk-scotland-49319120 Accessed on: 15th September 2020

Orkney Islands Council. (2017, September 29). Orkney's Cruise Season comes to an end. Retrieved from Orkney.gov: https://www.orkney.gov.uk/OIC-News/Orkneys-Cruise-Season-comes-to-and-end.htm. Accessed on: 20th September 2020

Orkney Islands Council. (2019, July 17). Kirkwall named top cruise destination. Retrieved from Orkney.gov: https://www.orkney.gov.uk/OIC-News/Kirkwall-named-top-cruise-destination.htm. Accessed on: 20th of September 2020

Orkney.com (2020). Retrieved from: https://www.orkney.com/plan/accommodation/search Accessed on: 20th of September 2020

Scottish Government. (2019). Economic Action Plan 2019-20. Retrieved from https://economicactionplan.mygov.scot. Accessed on:15th of September 2020.

VisitScotland (2020). Retrieved from: https://www.visitscotland.com/accommodation/ Accessed on: 20th of September 2020

Legislation

Scottish Parliament. (2019). Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. Available at: https://www.legislation.gov.uk/asp/2019/15/contents/enacted

14 Aviation and Radar

Contents

14.1	Executive Summary	14-1
14.2	Introduction	14-1
14.3	Legislation, Policy and Guidelines	14-2
14.4	Consultation	14-3
14.5	Assessment Methodology	14-3
14.6	Baseline Conditions	14-4
14.7	Mitigation	14-5
14.8	Likely Effects	14-5
14.9	Additional Mitigation and Enhancement	14-5
14.10	Residual Effects	14-5
14.11	Cumulative Assessment	14-5
14.12	Summary	14-5
14.13	References	14-6

This page is intentionally blank.

14 Aviation and Radar

14.1 Executive Summary

14.1.1 The assessment of aviation and radar involves considering all military and civil aerodromes in the wider area out to circa 30 km, all radar installations out to the limit of their range, all navigational aids, air-ground-air communications stations and low flying activities.

14.1.2 Consultations were conducted with NATS, Highlands and Islands Airports Ltd (HIAL), Orkney Islands Council Airfields, Kirkwall Airport and the Ministry of Defence (MoD).

14.1.3 No objections were received from NATS, HIAL and Orkney Islands Council Airfields.

14.1.4 The Kirkwall Senior Pilot for Loganair did not object but requested daytime only red aviation lighting, as mitigation for low flying under conditions of reduced visibility.

14.1.5 Aviation obstruction lighting will be fitted, the final specification to be agreed with the CAA and Loganair. The Environmental Impact Assessment (EIA) has been assessed on the basis of steady red medium intensity light with the intensity being able to be reduced to 10 % in conditions of good visibility. Recommended lighting also reduces in intensity below the horizontal to minimise the downward spillage of light.

14.1.6 The MOD did not object but noted that the Proposed Development may have an impact on low flying operations. MOD scoping responses are based on generic mapping with no project specific assessment having been conducted. The assessment conducted in the impact assessment has determined that at full application there will be no low flying objection.

14.1.7 In addition, the MOD considered it probable that it would request MOD accredited visible or infrared aviation safety lighting to operate from dusk till dawn. This requirement will be met with infrared lights fitted to every turbine nacelle. This lighting will not be visible to the human eye.

14.1.8 Following implementation of the required mitigation outlined above, it is concluded that there will be no significant residual effects on aviation or radar as a result of the Proposed Development.

14.2 Introduction

14.2.1 This chapter considers the potential effects of the Proposed Development on existing and planned military and civil aviation activities, including those resulting from impacts to radar. Other potential effects result from the physical presence of the turbines as obstacles and effects on navigational and air-ground-air communications stations are also considered.

14.2.2 Following a summary of relevant policy and legislation, this chapter describes the consultations conducted, the assessment methodology that has been adopted, the overall baseline conditions and associated mitigation requirements. The chapter concludes with a description of residual effects and a summary.

14.2.3 Radio waves are used in a variety of surveillance and communication systems within aviation and any large structure has the potential to interfere with their broadcast and reception. The potential of a structure to affect the propagation of radio waves is principally dependent upon the size, shape and materials of construction. Wind turbines are very slender and the rotor is substantially constructed from non-conducting materials (glass reinforced plastic), both of which reduce the potential for turbines to cause interference. However, the tower is usually steel and the rotor blades contain some conductive materials, for lightning conduction and in some cases structural carbon fibre. Because the blades rotate, this can cause turbines to show up on radar, which are specifically designed to detect movement.

14.2.4 The potential effects are highly dependent on the location of the wind farm and on the positions of the individual turbines. In some cases, there are no significant consequences and no mitigation is required, whilst in other cases the turbine specification or layout must be designed to accommodate local infrastructure. Mitigation is often available and appropriate to manage impacts. In the

extreme, sites can be considered inappropriate for wind energy development where no mitigation is considered fully effective.

Statement of Competence

14.2.5 The assessment has been carried out by Ian Fletcher (BEng, IMechE) of Wind Business Support, an aviation specialist who has been advising on aviation and radar impacts for 21 years.

14.3 Legislation, Policy and Guidelines

14.3.1 The relevant sections of key legislation, policy and guidance documents are described below, which together place a responsibility on the planning authorities and the Applicant to assess potential impacts on aviation.

Legislation

14.3.2 There is a statutory requirement for the lighting of onshore wind turbines over 150 m tall, specified in the Civil Aviation Authority (CAA) CAP 393, The Air Navigation Order and Regulations. The Proposed Development is under 150 m tall and hence this statutory requirement does not apply.

Policy

14.3.3 Policies include those relevant aspects of Scottish Planning Policy (SPP), Planning Advice Notes and other relevant guidance. Of relevance to the aviation and radar assessment presented within this chapter, regard has been given to the following policies.

Scottish Planning Policy (SPP), 2014

14.3.4 The SPP states under paragraph 169 on Development Management, that consideration should be given to the, "*impacts on aviation and defence interests and seismological recording*".

Planning Circular 2/03 (revised March 2016): Safeguarding of Aerodromes, Technical Sites and Military Explosives Storage Areas

14.3.5 This Circular summarises the Scottish Ministers' understanding of the general effect of the relevant primary or secondary legislation.

14.3.6 It contains 4 Annexes. Annexes 1 and 2 describe the formal process by which planning authorities should take into account safeguarding, including in relation to wind energy developments. Annex 3 lists officially safeguarded civil aerodromes and Annex 4 lists planning authority areas containing civil en-route technical sites for which separate official safeguarding maps have been issued (as at 27 January 2003).

14.3.7 The circular refers planning authorities, statutory consultees, developers and others to CAA CAP 764 (CAA Policy and Guidance on Wind Turbines), which is discussed further under Guidance below, and Met Office guidelines.

14.3.8 The circular also refers them to the interim guidelines, Wind Energy and Aviation Interests – Interim Guidelines, published by the Department of Trade and Industry in 2002. Whilst still of some relevance, the advice here has largely been superseded.

Guidance

14.3.9 CAA guidance, within CAP 764 (CAA Policy and Guidance on Wind Turbines), sets out recommended consultation and assessment criteria for the impacts of wind turbines on all aspects of civil aviation.

14.3.10 The CAA involvement in the Wind Farm Pre-Planning Consultation Process ceased on 25 December 2010. CAP 764 now states that "*developers are required to undertake their own pre-planning assessment of potential civil aviation related issues*."

14.3.11 Within CAP 764 the CAA provides a chapter describing the "wind turbine development planning process", within which the main civil aviation stakeholders and their interests are listed and

described in brief. Table 1 within the guidance document provides an overview of considerations and the following paragraphs detail what developers will need to consider, conducting associated consultations as appropriate.

14.3.12 The CAA notes in section 5.25 of CAP 764 that "*it is incumbent upon the developer to liaise with the appropriate aviation stakeholder to discuss – and hopefully resolve or mitigate – aviation related concerns without requiring further CAA input. However, if these discussions break down or an impasse is reached, the CAA can be asked to provide objective comment*".

14.3.13 Section 5.26 of CAP 764 states that "*the CAA will not provide comment on MoD objections or arguments unless such comments have been requested by the MoD*."

14.4 Consultation

14.4.1 The aviation stakeholders consulted as a part of the EIA process were NATS, HIAL, Orkney Islands Council Airfields, Kirkwall Airport and the MoD. Table 14.1 provides a summary of all consultation responses received.

Table 14.1 – Consultation Responses

Consultee	Response	Actions
NATS (En Route) Plc	No Objection.	No action required.
Orkney Islands Council Airfields	No Objection.	No action required.
Kirkwall Airport (Loganair chief pilot)	No objection. Request for red aviation safety lighting.	Daytime only red aviation lighting to be fitted, dimmable under conditions of good (5 km+) visibility.
MoD	No Objection. May have concerns in relation to low flying. Request for Infra-Red (IR) or low intensity visible lighting.	Turbines to be fitted with infra-red lighting to provide night time visibility for military aircraft. No issue with low flying expected.
Highlands and Islands Airports Ltd	No objection. The initial concerns over potential impact to future surveillance systems were removed in August 2020.	No action required.

14.5 Assessment Methodology

14.5.1 The requirement for the Proposed Development to have no significant effects on aviation is addressed through consultation with all relevant stakeholders within the consenting process. The task of the Applicant is to independently assess the potential effects and where significant effects may occur, to enter a dialogue with the affected stakeholders prior to submission as far as is possible.

14.5.2 Wind turbines can have an impact on flying simply by virtue of their physical presence. In this respect they are no different to any other tall obstacles such as pylons or television masts, with recognised criteria for safeguarding the airspace around airfields. Away from airfields, such obstacles are a

normal part of the aviation scenery and measures are in place to enable aircraft to safely navigate around them.

14.5.3 The assessment process involves considering all military and civil aerodromes in the wider area out to circa 30 km, all radar installations out to the limit of their range, all navigational aids, air-ground-air communications stations and low flying activities.

14.5.4 The study considered the visibility of the Proposed Development to primary surveillance radars, secondary surveillance radars, weather radars, precision approach radars, en-route radars and air defence radars. These are used by aerodromes, NATS and by the MoD. A network of 12 radars within the UK are used by the Met Office to monitor the weather.

14.5.5 The baseline assessment identified NATS, HIAL/Kirkwall Airport, OIC Airfields and the MoD as relevant stakeholders and consultation has been undertaken with them as per Table 14.1.

14.6 Baseline Conditions

14.6.1 The London airport main runway reference point on the Isle of Eday lies at a range of 3.3 km from the nearest turbine. This is a licensed aerodrome with two short runways oriented away from the Proposed Development. The Airfield Superintendent of the Orkney Islands Council Airfields, responsible for the safeguarding of all the Council operated airfields including London, has raised no objection to the proposal.

14.6.2 The nearest turbine at the site lies 23.5 km from the main runway reference point (the centre) of Kirkwall Airport, with that airport requiring detailed consideration. No other active aerodromes or private air strips were found to be sufficiently close to require consideration. The site lies beyond the safeguarding limits for air-ground-air communication stations and navigational aids. It is located within a low priority military low fly zone.

14.6.3 The Proposed Development is not visible to any aviation or met office radar.

Kirkwall Airport

14.6.4 HIAL removed all objections in August 2020 (refer to Appendix 4.4). This position reflects the independent impact assessment of the effects on existing infrastructure and operations, also finding no impacts. The interests of Kirkwall Airport are fully represented by HIAL, as the operator of the airport.

14.6.5 Typically, the airport operator would be expected to consult with its users in generating its own response. In this case the chief pilot of Loganair, the main commercial user of the airport, was additionally consulted directly, raising no objection but requesting day time aviation lighting.

14.6.6 There was a direct dialogue with the Loganair chief pilot to determine an appropriate specification for the requested aviation lighting. It was agreed that this should match the lighting used on the Sanday turbines. These are medium intensity steady red lights of minimum intensity 2000 cd. It was further agreed that, in accordance with CAA policy, the lights could be dimmed to 10 % of their minimum intensity (200 cd) in conditions of high visibility. This can be achieved automatically with turbine mounted sensors, measuring both visibility and light levels for daylight hours use only.

14.6.7 In addition to the reduction of intensity under conditions of good visibility, the intensity also reduces sharply when observed from beneath the light, with reference to the horizontal. At -1 degree the intensity recommended by the CAA (via ICOA Annex 14 Volume 1 to the Chicago Convention) should not exceed 56 % of the maximum intensity, falling to 4 % at -10 degrees.

MOD

14.6.8 The MOD has no objection to the Proposed Development. It noted that it may have concerns related to low flying. The low flying position is based on generic mapping with no project specific assessment having been conducted by the relevant MOD expert at the scoping stage. The site is within a large area mapped as low priority for military low flying. Areas defined as low priority generate the standard response given at the scoping and pre-application inquiry stage. In practice such areas have not generated objections at the full application stage and there are no apparent military low

flying activities in this area that would generate an objection. It is therefore anticipated that there will be no low flying objection in response to the full application.

14.6.9 Aviation lighting was requested; to comprise of either infra-red (IR) or low intensity visible spectrum red lighting day and night. To meet this requirement, in addition to the daytime lighting required by Kirkwall Airport, infra-red lighting will be fitted to every turbine nacelle. This lighting will not be visible to the human eye.

14.6.10 No other issues were raised.

14.7 Mitigation

14.7.1 Medium intensity fixed red LED obstruction lights (2000 cd) on every turbine; daylight hours only. The intensity can be reduced in conditions of high visibility. If the horizontal meteorological visibility in all directions from every wind turbine generator is more than 5 km, the intensity for the light may be reduced to not less than 10 % of the minimum peak intensity; i.e. 200 cd. The intensity of the light reduces sharply below the horizontal

14.7.2 The lighting specified to suppliers will meet CAA and ICOA lighting requirements for medium intensity obstruction lighting.

14.7.3 The MOD request for aviation lighting will be met with the installation of IR lighting on every turbine. The MOD specifies the lighting requirement. This specification will be stipulated to suppliers to ensure appropriate lighting is fitted.

14.7.4 There are no other mitigation requirements from the MOD, HIAL, the CAA or NATS.

14.8 Likely Effects

14.8.1 No aviation or radar effects are anticipated during construction or operation.

14.8.2 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be similar but of a lesser level than those during construction (i.e. no effects on aviation or radar). Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

14.9 Additional Mitigation and Enhancement

14.9.1 No additional mitigation or enhancement is required.

14.10 Residual Effects

14.10.1 There will be no residual effects from the Proposed Development with respect to aviation or radar.

14.11 Cumulative Assessment

14.11.1 It is considered that, as the Proposed Development will have no significant residual effects on aviation or radar interests, there will be no cumulative effects. Note that stakeholders take into account cumulative impacts in their responses.

14.12 Summary

14.12.1 No objections were received from the MOD, NATS, HIAL and Orkney Islands Council Airfields.

14.12.2 The MOD noted that low flying may be a concern, ahead of a detailed assessment by their subject matter expert. Having considered the site specifics no objection is expected, but the requirement for lighting is very likely to be retained and hence IR lighting is specified.

14.12.3 The Kirkwall Senior Pilot for Loganair requested red day time only aviation lighting, as mitigation for flying low under conditions of reduced visibility.

14.12.4 The MOD requested lighting, which will be realised as infra-red lighting fitted to every turbine nacelle. This lighting will not be visible to the human eye.

14.12.5 Following implementation of the required mitigation outlined above, it is concluded that there will be no significant residual effects on aviation or radar as a result of the Proposed Development

14.13 References

Department of Trade and Industry, ETSU W/14/00626/REP (2002). *Wind Energy And Aviation Interests – Interim Guidelines*

Scottish Government (2014). Scottish Planning Policy. Available at https://www.gov.scot/publications/scottish-planning-policy/

Scottish Government (2013). Onshore Wind Turbines. Available at http://www.scotland.gov.uk/Resource/0044/00440315.pdf [Accessed 05/08/2019]

Civil Aviation Authority (Feb 2016). *CAP 764: CAA Policy and Guidelines on Wind Turbines*.

Civil Aviation Authority (Mar 2019). *CAP 393: The Air Navigation Order 2016 (ANO) and Regulations*

Planning Circular 2/03 (revised March 2016). *Safeguarding of Aerodromes, Technical Sites and Military Explosives Storage Areas.* Scottish Government.

International Civil Aviation Organization (2016). Annex 14, volume 1, 7th edition

15 Shadow Flicker

Contents

15.1	Introduction	15-1
15.2	Legislation, Policy and Guidelines	15-1
15.3	Consultation	15-2
15.4	Assessment Methodology and Significance Criteria	15-3
15.5	Baseline Conditions	15-6
15.6	Likely Effects	15-6
15.7	Mitigation	15-7
15.8	Residual Effects	15-7
15.9	Cumulative Assessment	15-8
15.10	Summary	15-8
15.11	References	15-10

This page is intentionally blank.

15 Shadow Flicker

15.1 Introduction

15.1.1 This chapter describes and assesses likely shadow flicker effects resulting from the Proposed Development on neighbouring residential and commercial receptors. This chapter (and its associated figures and appendices) is not intended to be read as a standalone assessment and reference should be made to the description of the Proposed Development in Chapter 3.

15.1.2 Shadow flicker occurs when, "[In] *certain combinations of geographical position, time of day and time of year, the sun may pass behind the rotor and cast a shadow over neighbouring properties. When the blades rotate, the shadow flicks on and off; the effect is known as "shadow flicker". It occurs only within buildings where the flicker appears through a narrow window opening"* (Scottish Government, 2014a, Onshore Wind Turbines).

15.1.3 The magnitude of shadow flicker effects varies both spatially and temporally, and depends on a number of environmental conditions coinciding at a particular point in time, which include:

- time of day and year;
- wind direction;
- height of wind turbine and blade length;
- position of the sun in the sky;
- weather conditions;
- proportion of daylight hours in which the turbines operate; and
- distance and direction of the wind turbine from the receptor.

15.1.4 The flickering effect caused by shadow flicker also has the potential to induce epileptic seizures in patients with photosensitive epilepsy. The National Society for Epilepsy (NSE) advises that around 1 in 131 people have epilepsy and up to 5 % of these have photosensitive epilepsy (NSE, 2011). The common rate or frequency at which photosensitive epilepsy might be triggered is between 3 and 30 hertz (Hz, flashes per second). Large commercial turbines rotate at low speeds resulting in less than 3 flashes per second and are therefore unlikely to cause epileptic seizures (Harding *et al*., 2008: Smedley *et al.,* 2010). Therefore, there are not considered to be any health effects associated with the Proposed Development and this assessment will address the effects of shadow flicker related to local amenity.

15.1.5 This assessment has been undertaken by Rebecca Todd (BSc (Hons), PIEMA) who has 7 years' experience undertaken shadow flicker assessments for wind farms.

15.2 Legislation, Policy and Guidelines

Legislation

15.2.1 There is no legislation that directly deals with the matter of shadow flicker.

Policy

15.2.2 Chapter 5 of the EIA Report sets out the planning policy framework that is relevant to the EIA. The policies set out within this chapter include those from the Orkney Islands Council (OIC) Local Development Plan (LDP) and relevant supplementary guidance, those relevant aspects of Scottish Planning Policy (SPP), PANs and other relevant guidance. Of relevance to the shadow flicker assessment presented within this chapter, regard has been had to the following policies and guidance:

- The Orkney Local Development Plan (OIC, 2017a);
- The Orkney Local Development Plan. Supplementary Guidance: Energy (OIC, 2017b);
- Development Criterion 1 – Communities and Amenity, Part 4: Wind Energy: The Orkney Local Development Plan. Supplementary Guidance: Energy (OIC, 2017b); and
- Paragraph 169 of SPP (Scottish Government, 2014b).

Guidance

15.2.3 The Update of UK Shadow Flicker Evidence Base (DECC, 2011) reviews international legislation relating to the assessment of shadow flicker for wind turbine development and concludes that the area within 130 degrees either side of north from the turbine, and out to 10 rotor diameters, is considered acceptable for shadow flicker assessment. This supports the policy detailed above (refer to paragraph 15.2.2).

15.2.4 This report draws on the conclusions of the Nordrhein-Westfalen (2002) on the identification and evaluation of shadow flicker, which are further referenced below.

15.2.5 This assessment also takes into consideration the Scottish Government Online Renewables Planning Advice: Onshore Wind Turbines (Scottish Government, 2014a).

15.3 Consultation

15.3.1 Consultation on the methodology of the shadow flicker assessment was undertaken with OIC. A summary of this consultation is shown in Table 15.1 below.

Table 15.1 - Consultation

Consultee	Comment	Applicant Response
OIC (Scoping Opinion)	With reference to shadow flicker it is noted that the 10 times rotor blade diameter separation distance is cited. Notwithstanding development criterion within Supplementary Guidance quoting this separation distance, as a general point the onus should be on avoiding harm and nuisance, which should be established by exposure thresholds, and not necessarily on limiting the area of assessment. The mitigation hierarchy of prevent, reduce and offset should be followed and detailed within the EIA Report given inhabited properties within 2km of the site.	A shadow flicker assessment has been conducted with an initial study area consisting of 10 times rotor blade diameter separation with an additional 50 m buffered (to account for micro-siting), resulting in a study area of 1,410 m from each turbine location. Properties out with the 1,410 m study area and up to 2km from the nearest turbine were included for avoidance of doubt to ensure that none could breach the significance threshold (i.e. greater than 30 hours of flicker a year or more than 30 minutes per day on the worst affected day (see Paragraph 15.4.6).

15.4 Assessment Methodology and Significance Criteria

Consultation

15.4.1 Consultation has been undertaken with OIC through EIA Scoping to confirm the proposed methodology and requirement to undertake a shadow flicker assessment in respect to the Proposed Development (refer to Section 15.3).

Study Area

15.4.2 The shadow flicker assessment has been carried out for the proposed six turbines at the locations identified in Chapter 3. Dimensions of the chosen model, based on the largest rotor diameter, used for the purposes of the shadow flicker assessment can be found in Table 15.2.

Table 15.2 – Details of the Turbine Model Used for the Shadow Flicker Assessment

Hub height	81.9m
Rotor diameter	136m
Swept area	14,526.72m^2

15.4.3 The study area within which receptors could potentially be affected by shadow flicker has been set at a distance of 10 rotor diameters with an extra 50 m added in order to account for micro-siting purposes and each turbine and 130 degrees either side of north (relative to each turbine), as noted within Update of UK Shadow Flicker Evidence Base report (DECC, 2011). In this assessment the study area extends to 1.14 km from each turbine. Figure 15.1 shows the extent of this area and those receptors that could potentially be affected by shadow flicker.

Desk Study

15.4.4 The desk-based assessment identified no residential receptors within the study area. However, four receptors were identified within 2 km of the nearest turbine and as such, the shadow flicker assessment was undertaken for these properties as requested by OIC. For the avoidance of doubt, a fifth receptor on the island of Westray was also included, even though it is located further than 2 km from the nearest turbine to determine whether impacts are anticipated on properties on Westray.

15.4.5 Table 15.3 summarises the locations of the receptors and the distance from each property/location to the nearest turbine.

Table 15.3 – Receptor Locations

Property	Ownership	Shadow Flicker ID	Easting	Northing	Approx. Distance to Nearest Turbine (m)	Turbine which may cause shadow
Crowbar (Eday)	Residential	A	355221	1037391	2,002	T4
Lesshamar (Eday)	Residential	B	355164	1037058	1,843	T4
North Guith (Eday)	Residential	C	355015	1036577	1,637	T4

Property	Ownership	Shadow Flicker ID	Easting	Northing	Approx. Distance to Nearest Turbine (m)	Turbine which may cause shadow
Mid Guith (Eday)	Residential	D	355271	1036559	1,892	T4
Ness (Westray)	Residential	E	349958	1039055	3,348	T1

Assessment of Likely Effect Significance

15.4.6 There are no UK statutory provisions setting out acceptable levels of shadow flicker. The DECC 2011 report identifies best practice guidelines across Europe and this assessment will adopt German quantitative guidance (Nordhein-Westfalen, 2002) which adopts two maximum limits to determine significant effects:

- an astronomic worst-case scenario limit of 30 hours per year or 30 minutes on the worst affect day; and
- a realistic scenario taking account of meteorological parameters limited to 8 hours per year.

15.4.7 Within this assessment effects are determined to be significant if they exceed the two limits identified above, or non-significant if they are below the limits.

Assessment Modelling

15.4.8 In assessing the effect of shadow flicker, the commercial software model WindPro 3.2. was used to calculate the expected number of hours shadow flicker that could occur at each receptor. The model takes into account the movement of the sun relative to the time of day and time of year and predicts the time and duration of expected shadow flicker at a window of an affected receptor. The input parameters used in the model are as follows:

- the turbine locations;
- the turbine dimensions;
- the location of the receptors to be assessed; and
- the size of windows on each receptor and the direction that the windows face.

15.4.9 The WindPro model is based upon a Zone of Theoretical Visibility (ZTV) analysis, which in this case was based upon a Digital Terrain Model (DTM) of 50 m resolution.

15.4.10 Calculations were undertaken for predicted shadow hours at each of the receptors for two scenarios: a theoretical (worst-case) and a realistic scenario. For the worst-case scenario the following assumptions were made:

- all receptors have a 1 m x 1 m window facing directly towards the turbine;
- the turbine blades were assumed to be rotating for 365 days per year;
- there is a clear sky 365 days per year;
- the turbine blades were assumed to always be positioned towards each receptor;
- more than 20 % of the sun was covered by the blade; (in practice, at a distance, the blades do not cover the sun but only partly mask it, substantially weakening the shadow);
- the receptor is occupied at all times; and

- no screening was present.

15.4.11 The effect of shadow flicker was not calculated where the sun lies less than 3 degrees above the horizon due to atmospheric diffusion, low radiation (intensity of the sun's rays is reduced) and high probability of natural screening. It is generally accepted that below 3 degrees shadow flicker is unlikely to occur to any significant extent (Nordrhein-Westfalen, 2002).

15.4.12 These assumptions result in a highly conservative assessment for the following reasons:

- in reality, some of the houses within the study area may not directly face the turbines;
- the turbine blades will not turn for 365 days of the year, and will turn to face into the direction of the wind, in order to maximise the energy generating potential from the wind, and therefore will not always face one or more receptors;
- it is unlikely that there will be clear skies 365 days a year;
- receptors may not be occupied at the time that the shadow flicker impact is experienced; and
- screening, such as vegetation or curtains between the window and the turbine is not accounted for within the DTM and model and will prevent any shadows from being cast onto the window and therefore prevent any flickering effect.

15.4.13 The assessment carried out is limited to the effects of shadows within buildings. Moving shadows will also be apparent out of doors; however, these do not result in flicker in the same manner or to the same extent, as the light entering windows. Therefore, shadow flicker effects outdoors have been scoped out of further assessment.

Theoretical Scenario

15.4.14 The modelling results for the theoretical scenario are typically considered to be a theoretical worst-case estimation of the actual impacts experienced, which would not arise in practice given the assumptions listed in paragraph 15.4.10.

Realistic Scenario

15.4.15 In actuality, for much of the year weather conditions will be such that shadows will not be cast, or will be weak and would therefore not give rise to shadow flicker effects. WindPro calculations most likely overestimate the duration of effects as outlined in the theoretical scenario. To create a more realistic scenario for the potential impact of shadow flicker on receptors, it was necessary to identify the expected meteorological conditions at the site and take into account any significant shielding of receptors by buildings and vegetation between the receptors and the turbines.

15.4.16 A 16 degree sector wind rose was calculated for 7,475 hours of wind (assumes the Proposed Development is operational for 85 % of the year) based on representative UK wind data (refer to Appendix 15.1, Table 2). The WindPro model also employs a slightly simplistic assumption that sunshine probability and turbine operational probability are independent parameters. The model is therefore expected to yield conservative results; as bright and sunny weather conditions and low wind speeds generally tend to show some degree of correlation.

Limitations to Assessment

15.4.17 All assumptions made by the WindPro 3.2 are outlined above. There are no limitations to the assessment although the following must be noted:

- Given the absence of UK guidance towards the assessment of significant effects of shadow flicker, the assessment has adopted the generally accepted industry practise maximum figure of 30 hours per year or 30 minutes per day for permanent dwellings and commercial properties.

15.5 Baseline Conditions

15.5.1 The desk-based assessment identified no residential receptors within the study area. However, four receptors were identified within 2 km of the nearest turbine and as requested by OIC a shadow flicker assessment was undertaken of these. For the avoidance of doubt, a fifth receptor on the island of Westray was also included, even though it is located further than 2 km from the nearest turbine.

15.5.2 For the purposes of the assessment it is assumed that all properties face directly on to the Proposed Development. No local screening (vegetation and blinds/curtains) is considered.

15.5.3 Within this assessment the sensitivity of the receptors is assumed to be high in all cases.

15.6 Likely Effects

Construction

15.6.1 No shadow flicker will occur during construction of the Proposed Development.

15.6.2 Given that any occurrence of shadow flicker during the short commissioning period would replicate itself during operation of the Proposed Development, albeit more infrequently, it is considered appropriate to consider the commissioning activities as part of the operational stage of the Proposed Development.

Operation

Theoretical Modelling of Shadow Flicker Occurrence

15.6.3 The modelling results presented below represent the theoretical worst-case scenario discussed in Section 15.4. The results of the modelling are shown in Table 15.4. The theoretical duration of shadow flicker calculated shows no shadow flicker at all at receptors A, B, D and E. Shadow flicker at receptor C is shown to be below the limit of 30 hours per year or 30 minutes on the worst affected day, and therefore no significant effects are anticipated. It should be noted that this is the theoretical modelling and in reality the duration of shadow flicker at each location is likely to be considerably less than that indicated below for the reasons outlined in Section 15.4.

Table 15.4 – Worst-Case Scenario Shadow Flicker Occurrence at each Receptor

Property Name	Shadow Flicker ID	Easting	Northing	Shadow Flicker Hours per Year	Max Shadow Flicker Minutes per Day
Crowbar (Eday)	A	355221	1037391	0	0
Lesshamar (Eday)	B	355164	1037058	0	0
North Guith (Eday)	C	355015	1036577	8:59	11:40
Mid Guith (Eday)	D	355271	1036559	0	0
Ness (Westray)	E	349958	1039055	0	0

Realistic Modelling of Shadow Flicker Occurrence

The modelling results presented in Table 15.5, Appendix 15.2 and Figure 15.1 represent the realistic scenario discussed in paragraphs 15.4.15-16. The inclusion of indicative wind data and average

sunshine hours into the shadow flicker calculations has greatly reduced the potential of shadow flicker occurrence at all of the receptors.

Table 15.5 - Realistic Scenario Shadow Flicker Occurrence for each Receptor (hrs/yr)

Property Name	Shadow Flicker ID	Easting	Northing	Shadow Flicker Hours per Year	Max Shadow Flicker Minutes per Day
Crowbar (Eday)	A	355221	1037391	0	0
Lesshamar (Eday)	B	355164	1037058	0	0
North Guith (Eday)	C	355015	1036577	1:22	3:42
Mid Guith (Eday)	D	355271	1036559	0	0
Ness (Westray)	E	349958	1039055	0	0

15.6.4 No shadow flicker is predicted at receptors A, B, D and E. With a modelled shadow flicker occurrence of 1:22 hours per year, the anticipated shadow flicker at receptor C is below the 8 hours per year significance threshold, and therefore no significant effects are anticipated.

Decommissioning

15.6.5 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, it is anticipated that the levels of effect would be similar but of a lesser level than those predicted during construction (i.e. no effects). Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

15.7 Mitigation

Construction

15.7.1 No mitigation measures are required during the construction phase of the Proposed Development.

Operation

15.7.2 Although the realistic scenario takes into consideration expected operational time for the turbines and average sunshine hours for the region, the results are likely to still be conservative due to local vegetation, dwelling orientation and internal screening from blinds, curtains or furniture that are not included in the model. Additionally, while shadow flicker may potentially occur at North Guith, it is possible that flicker will not be 'experienced' at all locations due to the time of day during which it may potentially occur.

15.7.3 Due to the above and as no significant effects are anticipated no mitigation is required during operation.

15.8 Residual Effects

15.8.1 No shadow flicker effects are anticipated during construction or decommissioning phases of the Proposed Development and no significant residual effects are anticipated during operation.

15.9 Cumulative Assessment

15.9.1 In order to assess the potential for cumulative impact from other wind developments in the surrounding area, any turbines within 3 km of the proposed turbine locations were noted. Shadow flicker impacts are considered to extend to 10 rotor diameters (Scottish Government, 2014a) from turbine locations, therefore a 10 rotor diameter study area has been placed around all turbines in the vicinity of the Proposed Development. Two turbines were identified within the 3 km study area of the Proposed Development. These include Newark Wind Turbine and Bredakirk Wind Turbine, both operational Evance R9000 turbines with rotor diameters of 5.5 m. This would give a shadow flicker study area of 55 m (refer to Figure 15.2). No receptors were identified within any overlap between the shadow flicker study areas for the Newark and Bredakirk turbines and the Proposed Development (refer to Figure 15.2), and as such there is no potential for cumulative shadow flicker effects.

15.10 Summary

15.10.1 This assessment considers whether the effect known as 'shadow flicker' is likely to be caused by the Proposed Development and assesses the potential for impact on sensitive receptors. Shadow flicker is the effect of the sun passing behind the moving rotors of the turbines casting a flickering shadow through the windows and doors of neighbouring properties. This occurs in certain combinations of geographical position, time of day, time of year and specific weather conditions.

15.10.2 The study area within which properties could potentially be affected by shadow flicker covers a distance of 10 rotor diameters plus an additional 50 m from each turbine and lies 130 degrees either side of north (relative to each turbine). In the case of the Proposed Development, this area extends to 1,410 m from each turbine. At OIC's request the study area has been extended beyond this to include properties within 2 km of the turbines.

15.10.3 No shadow flicker impact can occur during the construction of the turbines.

15.10.4 Shadow flicker modelling was undertaken for five receptors. Both the worst-case and realistic modelling identified no effects at four of the receptors. No significant effects were identified at the fifth receptor as the shadow flicker anticipated in a realistic scenario would equal 1:22 hours per year, which is significantly below the eight hours per year threshold considered to be a significant effect.

15.10.5 It is important to note that these results do not take into account any existing features which would limit the incidences of shadow flicker such as screening features (structures and vegetation), dwelling orientation, blinds or curtains which will reduce potential effects further. Receptors may also be in rooms that are not generally used at the affected times, therefore, the amount of time when shadow flicker is actually 'experienced' will likely be substantially less than what has been predicted.

15.10.6 No significant residual effects are anticipated from shadow flicker.

Table 15.6 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Shadow flicker nuisance on residential receptor	None	N/A	None required.	None	N/A
Operation					
Shadow flicker nuisance on residential receptor	Not significant	Adverse	None required.	None	N/A
Decommissioning					
The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning it is anticipated that the levels of effect would be similar but of a lesser level than those during construction (i.e. no effects). Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.					

Table 15.7 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
No receptors found	No effect	**None**	None	N/A

15.11 References

DECC- Department of Energy and Climate Change (16 Mar 2011). *Update of UK Shadow Flicker Evidence Base*. Prepared by Parsons Brinckerhoff.

Harding G, Harding P & Wilkins A (2008). *Wind turbines, Flicker and photosensitive epilepsy: Characterising the flashing that may precipitate seizures and optimising guidelines to prevent them*. Epilepsia. Vol. 19 (6): 1095-1098.

NSE- The National Society for Epilepsy (2011, reviewed – April 2019). Available at: http://www.epilepsysociety.org.uk/AboutEpilepsy/Whatisepilepsy/Triggers/Photosensitiveepilepsy/windturbines. Accessed on 25 October 2019.

Nordrhein-Westfalen (2002). *Notes on the identification and Evaluation of the Optical Emissions of Wind Turbines*. States Committee for Pollution Control. Germany

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

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

Scottish Government (updated May 2014a). *Scottish Government Online Renewables Planning Advice: Onshore Wind Turbines*. Available at: http://www.gov.scot/Resource/0045/00451413.pdf. Accessed on 25 October 2019.

Scottish Government (2014b). *Scottish Planning Policy* (Page 6, Paragraph 169). Available at: https://www.gov.scot/publications/scottish-planning-policy/pages/6/

Smedley ARD, Webb AR & Wilkins AJ (2010). *Potential of wind turbines to cause epileptic seizures under various meteorological conditions*. Epilepsia. Vol. 51(7): 1146-1151.

16 Underwater Noise

Contents

16.1	Executive Summary	16-3
16.2	Introduction	16-6
16.3	Legislation, Policy and Guidelines	16-7
16.4	Consultation	16-11
16.5	Assessment Methodology and Significance Criteria	16-12
16.6	Baseline Conditions	16-26
16.7	Receptors Brought Forward for Assessment	16-31
16.8	Standard Mitigation	16-31
16.9	Likely Effects	16-32
16.10	Additional Mitigation and Enhancement	16-40
16.11	Residual Effects	16-41
16.12	Cumulative Assessment	16-44
16.13	Summary	16-44
16.14	References	16-49

This page is intentionally blank

16 Underwater Noise

16.1 Executive Summary

16.1.1 As part of the Proposed Development there is a requirement for a new extended slipway and a new landing jetty to be constructed on the south-east of Faray, this would include works below the Mean High Water Spring (MHWS). This chapter provides an assessment of underwater noise impacts below MHWS only.

16.1.2 The Proposed Development comprises:

- A new extended slipway to replace the existing facility. The extant slipway is c.20 m long by 3.5 m wide, though this was originally longer. This would be upgraded (i.e. extended and widened) to a maximum 36 m long and 8 m wide. The design of the slipway would be sufficient to enable access by larger vessels with the bow or stern gate and would be built to a standard design for the Orkney Islands to allow access for local vessels.
- A new landing jetty to accommodate abnormal loads. The jetty would comprise a causeway up to 55 m long and 10 m wide, terminating in square structure for docking measuring up to 20 m by 20 m. The square docking structure would likely be constructed on site from sheet piles. The causeway would be in-filled and capped-off with concrete batched onsite.

16.1.3 The new extended slipway and landing jetty are shown in Figure 3.3.

16.1.4 The works would likely involve sheet piling for the new landing jetty. Piling causes high-amplitude, impulsive sounds that can result in a range of impacts to marine mammals, from behavioural changes to masking auditory cues used for navigation, communication and foraging and injury, such as physical damage to hearing systems. As such, the potential impacts of underwater noise from piling to marine mammals required assessment.

16.1.5 Based on data sources such as SCANS-III (Hammond et al, 2017) and the Special Committee on Seals (SCOS) (2019), along with site specific data from the Orkney Wildlife Information and Records Centre (OWIRC), the following marine mammals are likely to be present within the Proposed Development area and were scoped into the underwater noise assessment:

- Pinnipeds (grey seal and harbour seal);
- Low-frequency cetaceans (baleen whales);
- Mid-frequency cetaceans (common dolphin, bottlenose dolphin, Atlantic white-sided dolphin, orca, long-finned pilot whale, minke whale, Risso's dolphin, white-beaked dolphin); and,
- High-frequency cetaceans (harbour porpoise).

16.1.6 This chapter describes the assessment carried out to assess the impact of underwater sound generated by sheet pile driving activity on marine mammals in the proximity to Faray.

16.1.7 Underwater noised modelling was undertaken by HR Wallingford. Three impact thresholds were assessed, with the modelling identifying the area where these thresholds would be exceeded:

- Potential for permanent impacts, known as Permanent Threshold Shift (PTS). PTS is where permanent impacts to hearing sensitivity could occur (note this is any permanent change to hearing sensitivity, not just total loss of hearing).
- Potential for temporary impacts, known as Temporary Threshold Shift (TTS). TTS is where temporary injury would occur, i.e. temporary impacts to hearing sensitivity which will return to normal overtime.

- Potential for behavioural changes. At sound levels lower than those that can cause injury, impacts may also occur due to behavioural disturbance to marine mammals. Possible behavioural changes may include startle response, extended cessation or modification of vocal behaviour, brief cessation of reproductive behaviour or brief separation of females and dependent offspring.

16.1.8 From this, the number of individuals that could potentially be impacted was identified and impacts to local, regional and population levels of each species determined.

16.1.9 The modelling assumed that a soft-start procedure is in place, as per the JNCC piling protocol (2010), to allow for marine mammals to vacate the area. However, the modelling results are conservative estimates as, in line with the piling protocol, a pre-piling search of an established 500 m mitigation zone around the operations would be undertaken to ensure the area is clear of marine mammals prior to the soft-start commencing. If there is a pause in the piling operations for a period of greater than 10 minutes, then the pre-piling search and soft-start procedure should be repeated before piling recommences. Therefore, the number of animals potentially within the areas of TTS and PTS exceedance would be less than those calculated within the assessment.

16.1.10 The modelling shows that, with the use of standard mitigation (i.e. soft-start), mid-frequency cetaceans are predicted to receive dosages that are below the threshold for both the TTS and PTS. Thus, effects to mid-frequency cetaceans were assessed as **negligible and not significant**.

16.1.11 During installation of a single pile using standard mitigation measures, which includes a 20 minute soft start period at the start of pile driving, seals are predicted to receive a cumulative sound exposure level (SELcum) dosage that exceeds TTS within a distance of 1,980 m (1.35 km^2 area). No exceedance above the level for PTS is predicted for seals. Harbour seals are not likely to be within the area in any great numbers, therefore the effect is **negligible and not significant**. However, the area that exceeds TTS has the potential to impact a significant percentage of the local grey seal population, although regionally and nationally the percentage of grey seal population potentially experiencing TTS is predicted to be below 1%. As such, the significance of effect to grey seals was initially assessed as moderate and significant.

16.1.12 Low-frequency cetaceans (baleen whales) are predicted to have the largest extent of impact, exceeding PTS and TTS thresholds within a distance of 3,030 m (7.65 km^2) and 12,950 m (15.90 km^2) respectively. This assumes the low-frequency cetaceans swim directly away from the noise source and results in the potential for PTS <0.01% of the regional population. Using a modified fleeing method for low-frequency cetaceans, whereby they are assumed to flee to the nearest exit, results in marginally smaller distance for PTS of 2,770 m (TTS remains the same), and the area the impact for PTS reduces to 2.3 km^2 instead of 7.65 km^2. Again, this results in PTS to less than 0.01% of the regional population. However, the shallow water depth in the region means that there is a low likelihood of low-frequency whales being present in much of the area affected by the noise. At MHWS, approximately 3 km^2 and 10 km^2 of the area is less than 10 m and 20 m deep respectively. The area at which PTS is exceeded is limited to these shallower waters and, thus, effects from PTS are considered to be negligible and not significant.

16.1.13 TTS impact would affect 0.01% of the population. In reality, the result is likely to lie somewhere between the two fleeing methods. Overall, taking into account the fact that the area is relatively shallow, the effect to low-frequency cetaceans, assuming standard mitigation and fleeing via the nearest exit, was deemed to be **minor and not significant**.

16.1.14 High-frequency cetaceans (harbour porpoise) are predicted to have the second largest extent of impact, exceeding PTS and TTS thresholds within a distance of 340 m (0.01 km^2) and 3,080 m (8.60 km^2) respectively. This assumes the high-frequency cetaceans are swimming directly away from the noise source and results in the potential for TTS to more than 1% of the local population. Using a modified fleeing method for high-frequency cetaceans, whereby they are assumed to flee to the nearest exit, results in marginally smaller distances for PTS and TTS (30 m and 3,070 m), and in terms of total area the impact is 7.9 km^2 instead of 8.6 km^2 for TTS.

16.1.15 Overall, for harbour porpoise using either the swim directly away or the quickest escape method for fleeing, the PTS thresholds are only expected to be exceeded within the standard 500 m mitigation zone. As a pre-piling search will be undertaken to ensure the mitigation zone is clear of marine mammals prior to piling commencing, PTS to an individual is not expected to occur. Furthermore, due to the pre-piling search of the mitigation zone, the number of individuals impacted is a conservative estimate. None the less, as TTS could occur to >1% of the local population, the overall significance of effect (due to TTS) was deemed to be **moderate and significant**.

16.1.16 As there is the potential for moderate impacts to both local grey seal and harbour porpoise populations, the use additional mitigation has been investigated. Namely, the use of a bubble curtain.

16.1.17 The use of a bubble curtain results in no exceedance of the PTS threshold for any marine mammal species. In addition to standard mitigation, the predicted distances for TTS for seals is also zero. As such the residual effect to grey seals is **negligible and not significant**.

16.1.18 For low-frequency cetaceans, the addition of a bubble curtain results in a maximum distance of 3,030 m for TTS, reducing slightly to 2,760 m if the animals are assumed to swim to the nearest exit. This results in the potential for TTS to <0.001% of the regional population. Thus, residual effect to low-frequency cetaceans is **minor and not significant**.

16.1.19 Using a bubble curtain, the impact distance for TTS to harbour porpoise result in a maximum distance of 50 m and 300 m for the 'nearest exit' and 'swim directly away' fleeing methods, respectively, which is within the standard 500 m mitigation zone. The residual effect to harbour porpoises using bubble curtain mitigation is, therefore, deemed to be **minor and not significant**.

16.1.20 Behavioural disturbance of the marine mammals is predicted to occur over a larger area compared to the areas of potential injury described above. Under standard mitigation (soft-start only) the maximum distance within which low-level disturbance (140 dB re 1µPa) may occur for marine mammals is predicted to be approximately 19 km, covering an area of 26.6 km^2. High-level disturbance is predicted to occur at a distance of up to 3.4 km (8.0 km^2). Using the bubble curtain mitigation option reduces this to 4 km (9.1 km^2) and 0.42 km (0.1 km^2) for low-level and high-level disturbance, respectively. Although the areas are quite large, behavioural impacts are temporary and reversible and the percentage of marine mammals impacted at regional and population levels is low; <1% of all species when the bubble curtain is applied. As such the residual effects from behavioural disturbance are deemed to be **negligible and not significant** for all marine mammal species assessed.

16.2 Introduction

16.2.1 This chapter describes and evaluates impacts from underwater noise to marine mammals associated with sheet piling of the new landing jetty. It documents the baseline conditions, includes an assessment of the likely effects of underwater noise below Mean High Water Springs (MHWS) on ecological features above a certain value, and defines mitigation measures where significant effects are predicted.

16.2.2 As part of the Proposed Development there is a requirement for a new extended slipway and a new landing jetty to be constructed on the south-east of Faray, this would include works below the MHWS. Under the Marine (Scotland) Act 2010, an application for a marine licence will be submitted to Marine Scotland (MS-LOT) for the construction works below MHWS. The structures are illustrated in Figure 3.3.

16.2.3 Initial information suggests that the new landing jetty would be constructed using 0.6 m wide PU-28 sheet piles which are likely to be installed using a 30 kJ pile driving hammer. Because these are to be installed beyond mean low water, there is the possibility for underwater sound to be introduced into the surrounding water. Marine mammals use sound for a variety of reasons (foraging, orientation and navigation, communication, detection and predator avoidance) and are, therefore, potentially susceptible to elevated levels of anthropogenic underwater noise. Piling causes high-amplitude, impulsive sounds that can result in a range of impacts to marine mammals, from behavioural changes to masking auditory cues used for navigation, communication and foraging and injury, such as physical damage to hearing systems. It is therefore necessary to assess the potential noise impacts on marine mammals.

16.2.4 The specific objectives of this chapter are to:

- Describe the ecological baseline conditions below MHWS.
- Define the scope of the underwater noise assessment.
- Assess the magnitude of the impacts and significance of effect on marine mammals in the area due to underwater noise emitted during the pile driving activity. The assessment draws upon detailed numerical modelling of underwater sound propagation carried out by HR Wallingford and includes the presence of standard mitigation measures.
- Provide additional mitigation measures to address potential significant effects and assess any residual impacts.
- Provide an impact assessment to accompany the marine licence application.
- Provide MS-LOT and NatureScot (previously Scottish Natural Heritage, SNH) with the relevant information to determine whether a European Protected Species (EPS) and/or seal licence is required for the piling activities.

16.2.5 This chapter has been authored by HR Wallingford and ITPE and is supported by the following appendices:

- Appendix 16.1 – Underwater noise modelling figures
- Appendix 16.2 – Behavioural disturbance assessment

Statement of Competence

16.2.6 The underwater noise modelling has been carried out by HR Wallingford in accordance with National Oceanic and Atmospheric Administration (NOAA) and Marine Scotland Guidelines. This chapter has been prepared by Thomas Benson of HR Wallingford and Gemma Tait of ITPE.

16.2.7 Thomas Benson (MRes, PhD) has 15 years of experience working at HR Wallingford as a physical oceanographer, specialising in underwater acoustics, hydrodynamics and agent-based modelling of marine species. HR Wallingford is a world-renowned independent research, engineering and

consultancy organisation founded in 1947 by the Department of Scientific and Industrial Research as a publicly funded facility for carrying out hydraulic research and development for the UK government. In 1982 the company was privatised but still retained a special status as a not-for-profit distributing company where any profits are reinvested back into the company in order to fund further research.

16.2.8 Gemma Tait (MA, MSc) is a Principal Environmental Consultant at ITPE, an EIA specialist with over 10 years' experience.

Proposed development

16.2.9 As discussed in Chapters 3 and 12, the following construction works would include works below MHWS.

New Extended Slipway

16.2.10 A new extended slipway would be required to replace the existing facility. This item would need to be replaced regardless of the Proposed Development as the current slipway is badly damaged and access to the island is still required for agricultural purposes. The new extended slipway would be built in the same location as the existing slipway. It would be refurbished and extended to allow for preliminary site works to be undertaken. The design of the slipway would be sufficient to enable access by larger vessels with the bow or stern gate and would be built to a standard design for the Orkney Islands to allow access for local vessels. The extant slipway is c.20 m long by 3.5 m wide, though this was originally longer. This would be upgraded to a maximum 36 m long and 8 m wide.

16.2.11 Piling will not be required for the extended slipway, thus it has been scoped out of the underwater noise assessment.

New Landing Jetty

16.2.12 The new landing jetty is necessary because of the dimensions of the turbine components mean that a slipway is unsuitable for delivery. The jetty has, therefore, been designed to accommodate vessels which transport the turbine components. The jetty would comprise a causeway up to 55 m long and 10 m wide, terminating in square structure for docking measuring up to 20 m by 20 m. The square docking structure would likely be constructed on site from sheet piles, this would result in piling activities below MHWS. The causeway would be in-filled and capped-off with concrete batched onsite.

16.2.13 Localised dredging will be required for the construction of both the slipway and the jetty, in addition there is the potential for dredging to allow for vessel access to the jetty to be required. Dredging is subject to a separate marine licence application. Chapter 17 assesses the potential impacts of the proposed dredging activities.

16.3 Legislation, Policy and Guidelines

16.3.1 Relevant legislation, policy and guidance documents have been reviewed and taken into account as part of this assessment. Of particular relevance are:

- Council Directive 2014/89/EU establishing a framework for maritime spatial planning (Marine Spatial Planning Directive);
- Council Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive, MSFD);
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (the Habitats Directive);
- Marine (Scotland) Act 2010;
- The Marine Strategy Regulations 2010;
- Scotland's National Marine Plan (NMP) (Scottish Government, 2015);

- The Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016);
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations);
- The protection of Marine European Protected Species from injury and disturbance, guidance for Scottish Inshore Waters (Marine Scotland, 2020);
- The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014;
- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The statutory protocol for minimising the risk of injury to marine mammals from piling noise written by the Joint Nature Conservation Committee (JNCC piling protocol) (JNCC, 2010);
- Guidance by the National Oceanic and Atmospheric Administration on the criteria for underwater noise impacts on marine mammals (Southall et al, 2007; NOAA, 2016);
- The Good Practice Guide No. 133 for Underwater Noise Measurement by the National Physics Laboratory (NPL, 2014); and
- An evaluation of the effectiveness of Acoustic Deterrent Devices and other non-lethal measures on marine mammals has also been published (Marine Scotland, 2014).

Legislation

Marine Strategy Framework Directive

16.3.2 Under the Marine Strategy Regulations 2010, which ratify the MSFD into UK law, the Secretary of State and devolved authorities must take necessary measures to achieve or maintain "good environmental status". Good environmental status is defined within the regulations as: *"the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations, i.e….Anthropogenic inputs of substances and energy, including noise, into the marine environment do not cause pollution effects"*.

Marine Licence

16.3.3 Under the Marine (Scotland) Act 2010, an application for a marine licence will be submitted to MS-LOT for the Proposed Development construction works below the MHWS, namely the new extended slipway and new landing jetty (as shown in Figure 3.3).

16.3.4 In line with the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013, a pre-application consultation event will be held for the application. Comments received will be considered and detailed within a pre-application consultation report which will accompany the application.

Marine Mammal Protection

<u>Cetaceans</u>

16.3.5 Under Regulation 39(1) of the Habitats Regulations, it is an offence to:

- Deliberately or recklessly capture, injure, or kill a wild animal of a European Protected Species (EPS);
- Deliberately or recklessly –
  - Harass a wild animal or group of wild animals of an EPS;

- Disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
- Disturb such an animal while it is rearing or otherwise caring for its young;
- Obstruct access to a breeding site or resting place of such an animal, or otherwise to deny the animal use of the breeding site or resting place;
- Disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs;
- Disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young; or
- Disturb such an animal while it is migrating or hibernating

16.3.6 Under Regulation 39(2), it is an offence to deliberately or recklessly disturb any dolphin, porpoise or whale (cetacean). Underwater noise, such as piling, has the potential to cause such disturbance.

16.3.7 Marine EPS are species which are listed in Annex IV of the Habitats Directive whose natural range includes any area in Scottish inshore waters. They include all species of cetaceans. EPS likely to be within the Proposed Development area are detailed in Section 16.6. A number of cetaceans are also listed as Priority Marine Features (PMFs) under Scotland's NMP.

16.3.8 Where an activity has the potential to disturb an EPS, suitable mitigation must be in place to avoid or reduce the potential for injury and or/disturbance. If, despite the use of alternatives and/or mitigation measures, an activity remains likely to result in injury, death or disturbance of marine EPS, the activity may still be able to go ahead under an EPS licence.

Seals

Under the Marine (Scotland) Act, it is an offence to kill, injure or take a live seal except to alleviate suffering, or where Marine Scotland has issued a licence to do so. It is also an offence to intentionally or recklessly harass seals at significant haul-out sites under the Protection of Seals (Designation of Haul-out Sites) (Scotland) Order 2014. Underwater noise, such as piling, as the potential to cause such disturbance.

Both grey and harbour seals have the potential to be within the Proposed Development area, see Section 16.6. Both species are listed under Annex II and Annex V of the Habitats Directive and are listed as PMFs under Scotland's NMP.

Planning Policy

Scottish NMP

16.3.9 The Scottish NMP sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 nautical miles, taking into account various EU Directives on marine management, including those listed above, and the Marine (Scotland) Act 2010. The following General Policies of the NMP are applicable to this assessment (Scottish Government, 2015):

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

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

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

  (c) Protect and, where appropriate, enhance the health of the marine area".
- GEN 13 Noise: *"Development and use in the marine environment should avoid significant adverse effects of man-made noise and vibration, especially on species sensitive to such effects".*
- GEN 18 Engagement: *"Early and effective engagement should be undertaken with the general public and all interested stakeholders to facilitate planning and consenting processes".*

- GEN 21 Cumulative impacts: *"Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation".*

Pilot Pentland Firth and Orkney Waters Marine Spatial Plan

16.3.10 To satisfy the requirements of the Scottish NMP, the planning policy for Orkney is covered under the Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016) developed by a collaboration between Marine Scotland, Orkney Islands Council and Highland Council. This planning policy, referred to hereon as 'the Plan', sets out an integrated planning policy framework to guide marine development, activities and management decisions, whilst ensuring the quality of the marine environment is protected.

16.3.11 Under General Policy 8A (Noise) of the Plan, it is a requirement that applications for a marine development or an activity that is likely to have significant noise impacts (on sensitive species and/or people) include a noise impact assessment or supporting information to describe the duration, type and level of noise expected to be generated at all stages of the development (construction, operation, decommissioning). In particular, the assessment must consider whether the level of surface or underwater noise has the potential to affect an EPS. As noted above, where an activity has the potential to result in disturbance to an EPS, the activities may be permitted to go ahead under an EPS licence.

16.3.12 The Plan requires that mitigation measures are in place to minimise the adverse impacts associated with the duration and level of significant noise activity. It suggests that measures could include Marine Mammal Observers (MMO) and Passive Acoustic Monitoring (PAM), location of noise generating devices away from sensitive receptors, controlling noise generating activities during sensitive periods (i.e. breeding, rearing, migration), eliminating or controlling noise at source by enclosing or insulating the noise and routing ship movements away from sensitive receptors where feasible. These are in line with the requirements of the JNCC (2010) piling protocol.

16.3.13 Cumulative effects of noise in the marine environment and on local communities must also be assessed as detailed in the Plan.

16.3.14 In addition, the Plan states that, as part of the data collection to monitor noise for the MSFD, MS-LOT sends records on activities that may generate underwater noise (piling, explosives and Acoustic Deterrent Devices) to the Joint Nature Conservation Committee (JNCC) to contribute to a Noise Registry that will be the national recording programme for anthropogenic noise in the marine environment.

16.3.15 It is acknowledged in the Plan that, for some species, there is limited information on the effect that noise can have and there is ongoing research to fill some of these knowledge gaps.

Guidance

Standards for reporting underwater sound

16.3.16 A general background on underwater sound and the accepted terminology and metrics are provided in The Good Practice Guide No. 133 for Underwater Noise Measurement by the National Physics Laboratory (NPL, 2014). The reader is referred to this document for details of terminology related to underwater noise used in this chapter, not already described in this chapter.

General guidance on carrying out an assessment of marine EPS

16.3.17 The assessment described in this chapter follows Marine Scotland's guidance for Scottish Inshore Waters in relation to '*The Protection of Marine European Protected Species from Injury and Disturbance*' (Marine Scotland, 2020). The document describes how to plan a development or activity that has potential to kill, injure or disturb a marine EPS and the process for gaining a licence, if needed.

Criteria for underwater noise impacts on marine mammals

The latest NOAA (2016) guidance criteria have been used for assessing impacts of underwater noise on marine mammals in this assessment. These criteria underpin the impact assessment in terms of sensitivity of the mammals to underwater sound (and hence the significance of the effect) and, therefore, are described in detail in this section.

16.4 Consultation

Summary of consultation

16.4.1 A summary of consultation undertaken to date is provided in Table 16.1, full details are provided in Appendix 4.4.

Table 16.1 – Consultation Relevant to the marine assessment

Consultee	Summary of consultation	Key consultee comments	Applicant action
MS-LOT	Meeting held on 4 December 2020 to provide a summary of the project and agree scope of assessment	▪ Liaison with JNCC required to agree scope assessment and underwater noise assessment methodology.	▪ JNCC contacted on 22 December 2020, see below.
JNCC	Technical note and summary of underwater noise assessment methodology shared on 22 December 2020 in order to agree scope and methodology of assessment	▪ JNCC's remit is offshore waters so cannot advise on the application; NatureScot would be better placed in this instance.	▪ Information shared with NatureScot on 07 January 2020
NatureScot	Technical note and summary of underwater noise assessment methodology shared on 07 January 2021 in order to agree scope and methodology of assessment	▪ Impact assessment appears sufficient and is SELcum based. If impact piling is used SPL_{pk} and SELs may also need to be considered ▪ It is noted that the assessment looks at disturbance in a qualitative manner, considering individual disturbed is also recommended ▪ Recommend including baleen whales within the assessment. Depending on the noise levels, sound could propagate significant distances and there are regular sightings of baleen whales including	▪ Peak SPL has been considered, as required, within the assessment ▪ This has been included within the assessment ▪ Given that the works are within a relatively enclosed bay with maximum depths of 25m at MHWS (with large areas less than 10m deep), it is highly unlikely that baleen whales

Consultee	Summary of consultation	Key consultee comments	Applicant action
		humpback, minke and fin whale in the relatively shallow waters in and around Orkney	would be within a close enough range from the piling activity to be adversely impacted. However, these have been included in the assessment since there is potential for sound to propagate through the Faray Sound into deeper water. Sperm and fin whales have been included in the assessment. Minke whales is a mid-frequency cetacean, which have also been scoped into the assessment. Further details are provided in Section 16.6.

16.5 Assessment Methodology and Significance Criteria

Summary

16.5.1 The assessment of impacts from underwater sound from pile driving on marine mammals in the region has been undertaken in line with the methodology outlined in Chapter 4: Approach to EIA. The terms 'impact' and 'effect' are defined as:

- Impact – Actions resulting in changes to an ecological feature. For example, underwater noise associated with sheet piling activities.
- Effect – Outcome to an ecological feature from an impact. For example, behavioural changes or damage to a marine mammal's hearing as a result of the underwater noise.

16.5.2 Impacts in relation to underwater sound from pile driving, are assessed here using the cumulative sound exposure level metric (SEL_{cum}). The potential effect of the noise impact on the marine mammals in the region is to damage the animals' hearing (Permanent Threshold Shift, PTS or Temporary Threshold Shift, TTS) and may also lead to behavioural changes at lower sound levels.

The sensitivity of the different receptors (i.e. the marine mammal hearing groups) is very important for assessing the relative magnitude of the noise impact. Here the sensitivity is defined using the NOAA (2016) criteria for TTS and PTS using the M-weighted SEL_{cum} metric (as described in the following section on the *Background to Underwater Sound*). These criteria are the updated version of the criteria set originally by Southall et al (2007) and are generally now regarded as the best guidance.

Background to Underwater Sound

Sound in the Underwater Environment

16.5.3 Underwater sound propagates through water as a pressure wave and, due to the low impedance and absorption characteristics of water, it can travel further and faster than sound in air. The amount of sound generated by anthropogenic sources in the marine environment has been increasing due to the growth in a number of areas e.g. shipping activity and construction of more offshore and coastal facilities. There is a concern that the increased levels of underwater sound will

adversely impact on marine life and, as discussed in Section 16.3, there are numerous pieces of legislation in place to ensure marine mammals aren't disturbed by underwater noise.

16.5.4 The propagation of sound underwater is affected by the frequency of sound emitted and the physical properties of the water and seabed. Water depth is a key factor altering the propagation of underwater sound. In shallow water (less than about 200 m deep) propagated sound will dissipate more quickly than in deeper water due to numerous interactions with the surface and the bed, although this is also frequency dependant. The seabed type will alter the rate of transmission loss (TL) of propagated sound, with softer muddy sediments tending to absorb sound whereas hard rocky surfaces will cause reflection and hence less absorption. The vertical profiles of temperature and salinity through the water column are also important, particularly in deep water, because these affect the speed of sound and thus the degree to which the sound is refracted up or down as it propagates horizontally away from the source.

16.5.5 As sound propagates away from a source it loses energy and so eventually the sound level drops to the same intensity as the ambient level at which point it becomes indistinguishable from the background and can no longer effectively be heard. The ambient sound is a combination of all natural sounds such as wind, waves, rain, animals and other common sources of man-made sound in the area, such as shipping. The term *ambient sound* can be used to describe all sound not associated with the development or activity being assessed in the present study.

Acoustic Metrics and Units

16.5.6 The unit of sound pressure is the pascal (Pa) and is commonly described in terms of decibels (dB) relative to a reference pressure, which for underwater sound is 1 µPa (expressed as dB re 1µPa). The use of a logarithmic scale means that a 6 dB increase in the underwater sound level equates to a doubling of the intensity.

16.5.7 The frequency spectrum of underwater sound is also important in terms of potential impacts. The power spectral density for different anthropogenic sources of sound can vary greatly. For example, seismic airguns generally have most energy in the lower frequency range, from the low tens of Hertz (Hz) up to a few hundred Hz, whereas the range of high frequency sonar, for example, is generally much higher, in the thousands to millions of Hz. Knowing the frequency range of the acoustic source being assessed means that the potential adverse impacts on marine life can be assessed realistically, as hearing ranges of different species can be taken into account.

<u>Sound Pressure Level (SPL)</u>

16.5.8 Most commonly, underwater sound is expressed as the root mean square (RMS) of the sound pressure level (SPL) over a stated interval. This is a time-averaged value for the pressure, which is most useful for assessing continuous sound sources such as drilling or shipping sounds, rather than impulsive sounds such as pile driving or seismic surveying. This is calculated from the following:

$$SPL = 20 \log_{10} \frac{P}{P_{ref}} \quad (1)$$

16.5.9 Where P is the sound pressure and P_{ref} is the reference pressure (1 µPa).

16.5.10 The SPL is described as the received level (RL) which is the sound pressure level at a distance from a source with a source level (SL) minus the transmission loss (TL). For Environmental Impact Assessment (EIA) purposes the RL is the more useful metric as this will provide the sound level a receptor is being exposed to. Models are usually required to simulate both the source level and the transmission loss.

<u>Sound Exposure Level (SEL)</u>

16.5.11 The sound exposure level (SEL) is a measure of sound energy in a pulse that takes into account both the peak and the duration of the sound and is, therefore, useful for describing impulsive sounds, such as those emitted by seismic airguns or by pile driving. SEL is calculated by integrating the square of the pressure waveform over the duration of the pulse. The duration of the pulse is defined as the region of the waveform containing the central 90 % of the energy (E_{90}) of the pulse. The calculation is given by:

$$E_{90} = \int_{t5}^{t95} P^2(t)dt \quad (2)$$

16.5.12 This is usually expressed as dB re 1 μPa^{2}s and is calculated as follows:

$$SEL = 10\log_{10}\left[\frac{E_{90}}{E_0}\right] \quad (3)$$

16.5.13 where E_0 is the reference value of 1 Pa^{2}s.

16.5.14 Since the SEL is the time integral of the sound, it can also be related to the RMS SPL by the time duration T over which the RMS was calculated, as:

$$SEL = SPL + 10\log_{10}(\mathrm{T}) \quad (4)$$

Cumulative Sound Exposure Level (SEL_{cum})

16.5.15 SEL is also used to express the amount of sound over time to which a receptor is exposed, this can be called the SEL *dose* or the cumulative SEL (SEL_{cum}).

16.5.16 For a sequence of pulses, the cumulative SEL is calculated as:

$$SEL_{cum} = 10\log_{10}\left(\sum_{p=1}^{N_p} 10^{\frac{SEL_p}{10}}\right) \quad (5)$$

16.5.17 For a sequence of equal intensity SEL exposures, this simplifies to:

$$SEL_{cum} = SEL + 10\log_{10}(\mathrm{N_p}) \quad (6)$$

16.5.18 Where N_p is the number of pulses.

Power Spectral Density and Third-octaves

16.5.19 It is important to model the frequency spectrum emanating from a source because different marine species are more sensitive to certain portions of the sound spectrum. Modelling of the full range of frequencies is usually carried out by modelling discrete frequencies at third-octave intervals. The broadband sound is then calculated by integrating the sound energy across the bandwidth (Δbf) for each third-octave frequency and then summing across all the bands, written as:

$$SEL_{bb} = \sum_{f=1}^{N_f} SEL_f + 10\log_{10}(\Delta b_f) \quad (7)$$

16.5.20 Where SEL_{bb} is the broadband sound exposure level, and SEL_f is the sound exposure level at each discrete frequency, f.

Potential Impacts of Sound on Marine Fauna

16.5.21 Underwater sound from anthropogenic activities has the potential to have adverse impacts on fish, marine reptiles (sea turtles) and marine mammals. The potential impacts on these animals range from causing discomfort by changing the acoustic environment, causing the animals to retreat from an area (i.e. behavioural response), to causing physical injury. Generally physical injury is caused by either a large and sudden change in pressure causing barotrauma e.g. bursting of swim-bladder or blood vessels, or by the cumulative amount of sound that an animal is exposed to. The latter is usually associated with temporary threshold shift i.e. a temporary increase in the threshold at which an animal can hear. For all of the available impact criteria, assessment of the effects is related to the SPL in the far-field rather than to the associated particle motion in the near-field area of the sound source.

Lethal Effects

16.5.22 Mortality from underwater sound (primarily only a concern for fish species) is usually associated with being very close to the acoustic source due to the high peak pressure levels, particularly from pulsed sounds such as seismic sources or pile driving. Severe injury which leads to death of the individual is also possible within a certain distance from the acoustic source. These injuries are associated with the rapid and large changes in pressure that an animal is exposed to rather than whether they can hear the sound.

Hearing Threshold Shift

Exposure to high levels of underwater sound can also cause impairment in sound detection capabilities of marine species. The impairment can be a temporary threshold shift (TTS) where normal detection would return after a length of time dependant on the intensity of the sound and the duration for which an animal was exposed, or the impairment can be a permanent threshold shift (PTS) where no recovery is possible.

Marine Mammal Threshold Shift Criteria

16.5.23 The hearing frequency range of marine mammals is wide, and each species will differ slightly in the frequency of greatest sensitivity. In general, baleen whales such as the blue, humpback and southern right whale hear the lowest frequencies; dolphins and toothed whales hear mid-high frequencies; and porpoises and their relatives are most sensitive to high frequencies. Pinnipeds have different hearing abilities dependent on whether they are underwater or not, with a greater hearing range underwater than in air (Babushina et al, 1991; Kastak and Schusterman, 1999; Reichmuth, et al, 2013). Pinnipeds can also be split into otariids, such as sea lions and fur seals, and phocids which are the true seals (grey or harbour seal in UK waters), as research has shown that they have markedly different hearing ranges (Hemilä et al, 2006; Kastelein et al, 2009; Reichmuth et al, 2013).

16.5.24 The response of marine mammal species to underwater sound, and the potential physical impact of anthropogenic sound, has been the subject of scientific study for several decades, although the results are often uncertain due to the difficulties of identifying behavioural responses to sound in the open sea (Weilgart, 2007; Boyd et al, 2011). The US Marine Mammal Criteria Group within NOAA developed criteria for the impacts of underwater sound on marine mammals which allow an assessment of behavioural response to be made based on the best scientific knowledge at that time (Southall et al, 2007).

16.5.25 Southall et al (2007) divided marine mammals into four distinct groups based on their known, or assumed, auditory ranges – low-frequency cetaceans, mid-frequency cetaceans, high frequency cetaceans and pinnipeds (in air and in water). For each mammal group, the hearing range of the animals was accounted for using weighting factors (or M-weightings) to the received level sound at each centre frequency (f) of the third-octave sound spectrum.

16.5.26 For impulsive sound sources, such as seismic survey airguns or pile drivers, the zero-to-peak (referred to as peak) SPL close to the source may be high enough to cause injury or mortality for marine animals. The work of Southall et al (2007), therefore, also determined impact criteria based on peak sound pressure level of impulsive sound using unweighted broadband values.

16.5.27 The criteria of Southall et al (2007) were not originally meant to become guidance for carrying out acoustic impact assessments for estuarine or offshore developments but they became accepted as industry standard for doing so (NOAA, 2013). It was also acknowledged that the work of Southall et al (2007) was limited to the few marine mammal species which had been studied up to that point. As such, NOAA developed new impact criteria into a guidance document which is designed to be used for assessing impacts of anthropogenic sound on marine mammals (NOAA, 2016). These latest guidelines have been used to carry out the marine mammal's assessment detailed in this chapter.

16.5.28 The NOAA guidance for assessing the impact of underwater acoustics on marine mammals updated the auditory weighting functions defined by Southall et al (2007) and split the pinnipeds into phocids and otariids rather than accounting for different hearing in air and water (NOAA, 2016). The estimated functional hearing bandwidth for each of the hearing groups under the NOAA (2016) guidelines are shown in Table 16.2.

Table 16.2 – Marine Mammal Hearing Groups and Hearing Ranges

Hearing group	*Mammals represented*	*Hearing range (Hz)*	
		Lower limit	*Upper limit*
Low-frequency cetaceans	Baleen whales	7	35,000
Mid-frequency cetaceans	Dolphins, toothed whales, beaked whales, bottlenose whales	150	160,000
High-frequency cetaceans	True porpoises, Kogia, river dolphins, cephalorhynchid, Lagenorhynchus cruciger and L. australis	275	160,000
Phocid pinnipeds	True seals	50	86,000
Otariid pinnipeds	Sea lions and fur seals	60	39,000

16.5.29 The form of the updated auditory weighting functions for the hearing groups is written below:

$$M(f) = C + 10\log_{10}\left\{\frac{(f/f_1)^{2a}}{[1+(f/f_1)^2]^a[1+(f/f_2)^2]^b}\right\} \quad (8)$$

16.5.30 Where M(f) is the weighted frequency. The constants for the above auditory weighting function for each mammal hearing group are given in Table 16.3 and the resultant weighting curves are plotted in Appendix 16.11, Figure 16.1:

Table 16.3 – Summary of Weighting and Exposure Function Parameters (NOAA,2016)

Hearing group	a	b	f1 (Hz)	f2 (Hz)	C (dB)
Low-frequency cetaceans	1.0	2	200	19,000	0.13
Mid-frequency cetaceans	1.6	2	8,800	110,000	1.20
High-frequency cetaceans	1.8	2	12,000	140,000	1.36
Phocid pinnipeds	1.0	2	1,900	30,000	0.75
Otariid pinnipeds	2.0	2	940	25,000	0.64

16.5.31 The guidelines of NOAA (2016) also determine impact criteria based on peak sound pressure level for impulsive sound using unweighted broadband values for both TTS and PTS thresholds (with PTS calculated as 6 dB greater than TTS for each mammal hearing group). The SEL_{cum} and peak SPL criteria for TTS and PTS for each mammal functional hearing group are given in Table 16.4 for impulsive sounds.

16.5.32 In general, for impacts on marine mammals from small to medium sized piling operations (such as those proposed for carrying out the landing jetty installation for the current work), the SEL_{cum} metric is most likely to result in the greatest impact because of the importance of the duration of the sound dosage on any potential damage to the animals' hearing. The modelling carried out in the present assessment therefore focuses on the SEL_{cum} metric although the peak SPL is also considered later in this chapter.

Table 16.4 – Impact Criteria for Marine Mammals and Impulsive Sounds (NOAA,2016)

Hearing group	TTS threshold		PTS threshold	
	Peak SPL (dB re 1µPa)	SEL_{cum} (dB re 1µPa²s)	Peak SPL (dB re 1µPa)	SEL_{cum} (dB re 1µPa²s)
Low-frequency cetaceans	213	168	219	183
Mid-frequency cetaceans	224	170	230	185
High-frequency cetaceans	195	140	202	155
Phocid pinnipeds	212	170	218	185
Otariid pinnipeds	226	140	232	203

Behavioural Response Thresholds in Marine Mammals

16.5.33 At sound levels lower than those that can cause injury, impacts may also occur due to behavioural disturbance to marine mammals. The area within which behavioural response occurs can be large and, hence, has potential to disturb a large number of individuals. Possible behavioural changes may include startle response, extended cessation or modification of vocal behaviour, brief cessation of reproductive behaviour or brief separation of females and dependent offspring. It should be noted that for the present study, piling will not occur during seal breeding season, but assessing disturbance is still a requirement (JNCC, 2010). To assess the possibility of a disturbance resulting from the pile driving noise, it is necessary to consider the likelihood that the sound could cause significant disturbance and also the likelihood and number of marine mammals that could potentially be exposed to that sound (i.e. expected animal density in the area).

16.5.34 Differences between location, piling equipment, species and even individuals within a species mean it is not yet possible to accurately quantify the sound level at which mammals will respond. Southall et al. (2007) states that "*behavioural reactions to acoustic exposure are generally more variable, context-dependent, and less predictable than effects of noise exposure on hearing or physiology*". Furthermore, they suggest that the only feasible way to assess whether a particular sound might cause disturbance is to compare the circumstances of the situation with empirical studies using a ranking system to assess the severity of the behavioural response (from 0 to 9). The more severe the response (higher score), the lower the amount of time that the animals will tolerate the noise before they could be negatively impacted.

16.5.35 The JNCC guidance (JNCC, 2010) defines disturbance as when there is a risk of animals incurring sustained or chronic disruption of behaviour or when animals are displaced from an area, with subsequent redistribution being significantly different from that occurring due to natural variation. The JNCC guidance also indicates that a score of 5 or more on the Southall et al. (2007) behavioural response severity scale could be significant.

16.5.36 Southall et al. (2007) presents a summary of observed behavioural responses, with associated response score, due to multiple pulsed sound, although the data are primarily based on responses to seismic airgun noise and mainly for low-frequency cetaceans. Low frequency cetaceans, other than bow-head whales, were typically observed to respond significantly at a received level of 140 – 160 dB re 1 µPa (rms). It should be noted that the sound level spectrum generated by seismic air-guns is generally concentrated below a frequency of about 1 kHz, and therefore low-frequency cetaceans are relatively sensitive to this type of noise source. Pile driving noise tends to be spread across a much broader frequency range and so the energy at lower frequencies will be less for the same broadband SPL.

16.5.37 Southall et al (2007) also states that there are few reliable studies available for pinnipeds, mid-frequency or high-frequency cetaceans. However, they refer to a study of mid-frequency cetaceans

in which some significant response was observed at a sound pressure level of 120 - 130 dB re 1µPa (rms), but the majority of the observed cetaceans did not display significant behavioural disturbance until exposed to an SPL of 170 – 180 dB re 1µPa (rms). Even at these levels some mid-frequency cetaceans within the same study were observed to have no behavioural response.

16.5.38 For pinnipeds, a study using ringed, bearded and spotted seals (Harris et al, 2001) observed onset of a significant response at a received rms SPL of 160 – 170 dB re 1 µPa, although larger numbers of animals showed no response at noise levels of up to 180 dB re 1 µPa. Only at much higher sound pressure levels in the range of 190 – 200 dB re 1 µPa (rms) were significant numbers of seals found to exhibit a significant response. More recently, field studies investigating changes in seal densities during pile driving have suggested a single strike SEL threshold for behavioural avoidance of between 130 dB re 1 μPa^2s and 155 dB re 1 μPa^2s (Russell et al, 2016; Whyte, 2020). Assuming a pulse length of between 100 ms and 150 ms (typical for a wind farm monopile), this would equate to an rms range of approximately 138 dB re 1 µPa to 164 dB rms.

16.5.39 For high-frequency cetaceans there is a general lack of reliable behavioural response data (South et al, 2007). However, significant behavioural reactions have been observed for a single harbour porpoise to pulsed sound at received sound pressure levels above 174 dB re 1 µPa (peak-peak) or a SEL of 145 dB re 1 μPa^2s, equivalent to an estimated rms sound pressure level of 166 dB re 1 µPa (Lucke et al, 2008).

16.5.40 The need to define threshold criteria for EIA purposes has meant that previous underwater noise studies have tended to take a precautionary approach to defining the thresholds for behavioural response. Two such studies (Kongsberg, 2010; Marine Scotland, 2015a) based the thresholds on the findings of the High Energy Seismic Survey workshop on the effects of seismic (i.e. pulsed) sound on marine mammals (HESS, 1997), which concluded that mild behavioural disturbance would most likely occur at rms sound levels greater than 140 dB re 1 µPa (rms), although acknowledged there was significant uncertainty. A second, higher threshold of 160 dB re 1 µPa (rms) is often used to define a higher level disturbance, based on the US National Marine Fisheries Service guidance (NMFS, 2005) for Level B harassment threshold for marine mammals.

16.5.41 Based on the above discussion, for the purposes of this study, a precautionary threshold level for behavioural disturbance of 140 dB re 1 µPa (rms) is adopted to indicate the onset of low level marine mammal disturbance effects for all mammal groups for impulsive sound. In line with other assessments, a higher threshold of 160 dB re 1 µPa (rms) is used to define higher level disturbance.

Consultation

16.5.42 As detailed in Chapter 4, MS-LOT and NatureScot were consulted on the scope of the underwater noise assessment.

Scope of assessment

16.5.43 It is anticipated that sheet piling will be required for construction of the landing jetty and, since the installation will be beyond mean low water, underwater sound is likely to be introduced into the surrounding environment. Thus, it is necessary to assess the potential noise impacts on marine mammals. Sheet piling of the landing jetty is considered to be the only activity to present the potential for significant underwater noise impacts to marine mammals and, as such, is the focus of this assessment.

16.5.44 Faray is surrounded by the Faray and Holm of Faray Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI), with the qualifying interest being grey seals. The site supports the second largest grey seal breeding colony in the UK (JNCC, 2020). In addition to grey seals, other marine mammals such as whales, porpoises and dolphins have the potential to be impacted. The marine mammals included within the assessment are detailed in Sections 16.6 and 16.7. To summarise the following have been scoped into the assessment -

- Phocid pinnipeds: grey seals and harbour seals;
- Low-frequency cetaceans: baleen whales;

- Mid-frequency cetaceans: common dolphin, bottlenose dolphin, Atlantic white-sided dolphin, orca, long-finned pilot whale, minke whale, Risso's dolphin, white-beaked dolphin; and,
- High-frequency cetaceans: harbour porpoise.

16.5.45 It is highly unlikely that low frequency cetaceans (baleen whales) would be in the immediate vicinity of the pile driving activity due to the shallow water depth. The maximum water depth during MHWS at the new landing jetty is about 4.5 m. The water depth in the relatively enclosed bay area opposite the new landing jetty is also only up to 25 m at MHWS (with large areas less than 10 m deep). It is therefore considered very unlikely that baleen whales would be within a close enough range from the piling activity to be impacted. However, it is possible that noise may propagate through the Faray Sound into deeper water. Therefore low-frequency cetaceans have been included in the underwater noise assessment.

16.5.46 Otariid pinnipeds (sea lions and fur seals) are highly unlikely to be within the area (SCOS, 2019), as they are not native to UK waters (SCOS, 2019), so these have been excluded from the assessment.

16.5.47 Noise created by piling will predominantly travel through the water column. Sound reduces much more quickly in air than water, thus additional impacts to seals and [Red from piling when they are on land is highly unlikely. Therefore, airborne noise from construction of the landing jetty has been scoped out of the assessment.

16.5.48 Airborne noise from construction works associated with the onshore wind farm aspects of the Proposed Development is assessed in Chapter 8. This includes potential impacts to seals [Redacte

Study Area

16.5.49 The new landing jetty will be situated on the south-east end of the island of Faray. As discussed in Chapter 8, the Proposed Development site is within the Faray and Holm of Faray SAC and SSSI, shown in Figure 8.1. The area considered in the underwater noise modelling is also shown in Appendix 16.1, Figure 16.2.

Assessment of the Magnitude of Impact from Underwater Sound

16.5.50 The level of impact caused by underwater sound emitted from the pile driving activity proposed for installing the new landing jetty was assessed by using a numerical model of underwater sound propagation to predict the likely sound levels in the region.

16.5.51 The modelling undertaken for assessing the impacts due to underwater noise was carried out by HR Wallingford.

Underwater Sound Propagation Model Description

16.5.52 To account for the complexity of underwater sound propagation, the numerical modelling tool UnaCorda (HR Wallingford, 2012, 2013a, 2013b; Rossington et al, 2013) was used to predict sound propagation from the installation of the piles. This model is used to predict the propagation of underwater sound from one or more point sources throughout the water column and for 360° around each sound source. Underwater sound is assessed for third-octave frequencies of sound across the spectrum from 10 Hz to 25 kHz and the outputs from the model are presented as 'sound maps' for each frequency showing the transmission loss (TL) or received level (RL) from the source in decibels (dB).

16.5.53 UnaCorda uses a parabolic equation approach based on the Range dependent Acoustic Model (RAM) which has been modified to be computationally efficient and to produce 3D sound maps, rather than just results along a single line. Being a range dependent model, it takes into account changes in bathymetry, sediment type and speed of sound profile with distance from the source. The model is used to predict the TL for discrete frequencies, allowing differences in attenuation that come with different wavelengths to be included in the model. The seabed sediment type is taken into account using known absorption coefficients for different sediment types.

16.5.54 The model has been validated against laboratory and field measurements (HR Wallingford, 2013a, 2013b) and used successfully on a wide range of previous pile driving noise impact assessments, including offshore renewable energy installations (HR Wallingford, 2015a), bridge building (HR Wallingford, 2020) and harbour infrastructure construction works (HR Wallingford, 2015b).

Model Set Up

16.5.55 The underwater sound propagation model (UnaCorda) requires various input data, listed as:

- A sound source level spectrum for the pile driving activity undertaken;
- Source locations and bathymetry to take into account the spatially varying water depth; and,
- Geophysical bed parameters to simulate sound absorption by the seabed material.

Pile Driving Source Level and Duration

16.5.56 Impact piling would likely be required to install the sheet piles for constructing the new landing jetty. The new landing jetty would be constructed using 0.6 m wide PU-28 sheet piles (154 in total) which are to be installed using a 30 kJ pile driving hammer (SL30). The size of the outer piled section of the landing jetty would be a maximum of 20 m x 20 m, and the overall length of sheet piled wall is estimated to be 92 m (154 sheet piles) including returns. Based on information provided by the Applicant for a similar structure, the piles are likely to be 14 m in length and driven to 2 m minimum embedment to refusal in rock. The number of piles pitched and then driven over a two day cycle is estimated to be between 12 and 18 piles, installed during daylight hours.

16.5.57 Using this information, and assuming it would take approximately half an hour to prepare and pitch each pile, it is estimated that it would take approximately 40 minutes on average to drive each pile to refusal depth. The strike rate of the SL30 hammer is quoted as 84 blows per minute (BSP, 2015). This equates to a total of 3,360 blows for each pile installation.

16.5.58 In terms of duration for the full works to be completed, it is estimated from the above that the number of days when piles would be driven should be around 18 to 21 days in total. Including downtime, this equates to approximately 4 weeks total construction time. This is just the period when piles are being driven; the actual marine works would take longer as there would be other activities taking place in the marine environment including setting up of temporary works, piling gates, installation of walings and tie rods (works involving divers), formation of the causeway bund and placing of rock armour. Additionally, there would be the works associated with the construction of the new slipway.

16.5.59 Using the hammer energy specified above, the source level of the sound emitted during pile driving can be estimated. In the past, various authors have related the source level from impact piling to the pile diameter (e.g. Nedwell et al, 2007). More recent methods for calculating source level energy (SLE) have identified that the hammer energy (E) of the pile driver is a more reliable indicator of source level. An example of this is by De Jong and Ainslie (2008), who developed the following empirical relationship:

$$E = \frac{4\pi}{\rho_0 c_0} 10^{(SL_E - 120)/10} \quad (9)$$

16.5.60 Where: E = pile driver hammer energy (J); ρ_0 = water density (1027 kg/m^3 for seawater); c_0 = speed of sound (~1500 m/s in seawater); and SL_E = energy related RMS source level (dB re 1µPa^{2}m^{2}s).

16.5.61 Rearranging Equation 9 in terms of SL_E gives the following:

$$SL_E = 10.log_{10}\left(\frac{E\rho_0 c_0}{4\pi}\right) + 120 \quad (10)$$

16.5.62 Assuming a 30 kJ hammer would be used, if it is further assumed that all of the hammer energy is converted to sound, the SL_E calculated from Equation 10 would be 216 dB re 1µPa^{2}m^{2}s. However, field measurements from other studies (De Jong and Ainslie, 2008; Ainslie et al, 2012) have shown that only a small fraction of the total hammer energy is converted into sound with values in the range of 0.3 % to 10 %, with an average of around 1 %. More recently, there has been growing consensus amongst various authors that the conversion factor is more likely to be lower, at about

0.5 % (Dahl et al, 2015; Marine Scotland, 2019). In the present study, a hammer energy conversion factor of 0.5 % has been used for assessing behavioural effects, resulting in a SL_E of 193 dB re 1µPa^{2}m^{2}s. For assessing injury to mammals (TTS and PTS), a more precautionary value of 1 % was applied in the current study to the 30 kJ hammer energy, resulting in a source level (SL_E) for percussive piling of 196 dB re 1µPa^{2}m^{2}s.

In addition to the overall broadband sound level, it is necessary to know the power spectrum of sound levels at different frequencies. *S*uitable sound spectra for sheet piling are *not available* in *the* literature. Instead, a spectrum was derived using *the* methodology described in a prev*ious assessment of* sheet piling noise in Cromerty Firth (Subacoustech, 2018). In that study, a source level spectrum for a 2 m diameter pile was scaled according to *the* hammer energy *that was to be used for driving the piles*. *In the present study, t*he source level spectrum *from the Cromerty Firth study* was scaled to *provide the* broadband source levels of 19*3* dB 1µPa^{2}m^{2}s and *196 dB re 1µPa^{2}m^{2}s (see previous paragraph)*. The resultant *source level* spectra were used in the UnaCorda sound propagation modelling.

Model Geometry and Pile Location

16.5.63 The UnaCorda model uses an unstructured mesh (with triangular elements) onto which detailed bathymetry of the area around Faray was interpolated (Appendix 16.1, Figure 16.2). One pile location was modelled and located at the furthest offshore point of the new landing jetty, at the easternmost corner, the position of which is given in Table 16.5. The unstructured mesh allows a spatially non-uniform mesh resolution to be defined. A maximum resolution (smaller mesh spacing) of 2 m was defined at the sound source, with gradually decreasing resolution (larger mesh spacing) away from the source up to a maximum mesh spacing of 20 m in areas affected by sound. The water level was set to +3.6 m CD, representing MHWS (which will generally be the worst case in terms of sound propagation distance).

16.5.64 The 3D model set up includes a vertical resolution of 21 horizontal sigma planes spaced uniformly between the seabed and the sea surface. The individual planes do not represent a constant depth, but rather a proportion of the water column position across the whole model domain.

Table 16.5 – Modelled Pile Location (British National Grid Coordinate System)

Pile Location	***Easting (m)***	***Northing (m)***
East corner of new landing jetty	353430	1035872

Bed Sediment Characterisation

16.5.65 The geo-acoustic properties of the seabed sediment influence how sound is refracted and attenuated as it propagates away from the sound source. In the absence of local geotechnical data, the acoustic properties of the seabed within the near-field area have been estimated based on literature of the area.

16.5.66 The geology in the local region around the island of Faray consists largely of sandstone bedrock referred to as Old Red Sandstone (McKirdy, 2010). It is likely that there is a layer of sand of varied thickness over the sandstone bedrock. However, a detailed survey of the local bed deposits was not available for this study. Therefore, although the acoustic properties for sandstone (Table 16.6) are unlikely to be representative of the whole area, the properties of this type of bed material mean that it can be considered a worst case in terms of sound propagation distance and it was therefore applied across the whole domain.

Table 16.6 – Bed Parameters Used in the Underwater Noise Model

Physical property	Value
Density (kg/m^3)	2,450
Sound speed (m/s)	3,500
Attenuation coefficient (dB/λ)	0.2

Fleeing Mammal Model

16.5.67 An important factor to consider when calculating the cumulative sound exposure level (SEL_{cum}) metric is that mammals have the ability to swim away from an acoustic source if the sound levels are not tolerable. Hence it is now common practice (Lepper et al, 2007) to assume that as soon as piling is initiated, the mammals affected by the sound swim in a straight line away from the source. As the individuals move away into quieter water, the instantaneous SEL generally reduces with range. The SEL_{cum} for each individual is therefore considerably less than if they were assumed to remain stationary. A value of swim speed for all mammal species as a whole is usually taken to be 1.5 m/s (e.g. Lepper et al, 2007; RSK Environmental, 2012) as it represents an approximate speed at the lower end of the range and so includes harbour porpoise which are generally the slowest swimmers, and this value has been assumed in this study.

Agent-based Model Description

16.5.68 HydroBoids is an agent-based model (ABM) developed at HR Wallingford for predicting the movement of fish (or other mobile marine animals) and consequences of behaviours in response to stimuli such as sound or properties of the water (Rossington and Benson, 2019). In the model, individuals are represented as quasi-Lagrangian points in a three dimensional underwater space in which they are able to swim according to programmed, species specific behaviours. Depending on the type of assessment, the animals can also be carried by time-varying currents calculated offline using a 3D hydrodynamic model.

16.5.69 Each modelled individual is assigned a swim speed and can be assigned multiple behaviours (e.g. schooling, light avoidance or predator-prey interactions). Of particular importance for the present study, a feature of the ABM is that the simulated agents are able to actively avoid shallow water and land boundaries. In the event of an agent finding itself stranded at the end of a particular model time step, they iteratively reattempt the movement for that step, each time modifying their heading in small increments, until they successfully remain in the water column and within the model domain at the end of the step. This simulates avoidance behaviour and allows the modelled animals to swim away from the noise source without getting stuck on the shoreline. The model is described in more detail by Rossington and Benson (2019).

16.5.70 In the particular case of seals, it is assumed that the animals are able to leave the water at the shoreline, thus reducing the time that they are exposed to the underwater sound. Since it is assumed that the seals swim directly away from the pile, then some modelled seals will leave the water close to the new landing jetty. Although it is unlikely that seals will actually leave the water so close to the new landing jetty during the piling, it is also unlikely that seals will be in this region between the pile and the shoreline due to local disturbance during setting up of the pile and also during the pre-piling search within the marine mammal mitigation area.

Cumulative Sound Exposure Levels for Fleeing Mammals

16.5.71 For each mammal hearing group, the group specific M-weighting function was applied to the source spectrum (see Appendix 16.1, Figure 16.1) and the weighted spectrum model results from UnaCorda were used to calculate the instantaneous spatial SEL for that hearing group.

16.5.72 In the agent-based model simulations, agents (i.e. mammal individuals) were placed at the vertices of the computational model mesh (approximately 5 m resolution within the area of the bay). The cumulative sound exposure level (SEL_{cum}) was then calculated as the agents of each hearing group

swam away from the noise source. At each model time interval, the instantaneous M-weighted SEL at each animal's position was added cumulatively (as described previously in paragraph 16.5.17). This procedure was carried out for the duration of the Hydroboids simulation (or shorter for seals reached the shoreline) to give the total SEL_{cum} for each animal. Interpolation of the final SEL_{cum} values at the start position for all animals then allowed contour plots of potential impacts to be generated in terms of the exceedance criteria for PTS and TTS.

Estimation of peak SPL

16.5.73 For underwater pile driving noise or other activities where there are multiple sound impulses over an extended period of (e.g. seismic surveys), the SEL_{cum} metric is usually the greater of the two metrics in terms of distance to TTS or PTS for mammals. This is due to the cumulative effect of integrating the energy dosage over time using SEL_{cum} metric. The potential impacts on mammals are, therefore, primarily assessed in this chapter in terms of the SEL_{cum} metric. However, following the guidance of Southall el al (2007) consideration of peak SPL should also be given. This is provided below.

16.5.74 Sound propagation models generally are only able to predict the propagation of sound energy (i.e. SEL) and are not capable of resolving the time component of the sound impulse. They are, therefore, not capable of modelling the peak in the sound pressure. The peak SPL is dependent on the type of pile driving equipment and also the peak reduces relative to the sound energy due to spreading of the pulse as it travels away from the source of the sound. Previous research has shown that there is a relationship, albeit an empirical one, between the SEL and peak SPL (Lippert et al, 2015). Generally, the empirical relationship between SEL and peak SPL is site specific and therefore, to be accurate, it requires in situ sound measurements from the development site in question recorded whilst the piling equipment is in use. Clearly this is not possible for an EIA for a proposed development, where the construction works have not yet started, such as the present study. Despite this, an estimate of the peak SPL was calculated for the present study under the assumption that the empirical constants were similar to those calculated by Lippert et al, 2015 for a study of pile driving during construction of three offshore wind farms. The three cases showed similar linear relationships between SEL and peak SPL, with the worst case used for the present study, written as:

$$\text{peak SPL} = 1.43\ \text{SEL}_{ss} - 44.0 \qquad (11)$$

16.5.75 This approach is considered to be the only available option for assessing the impact due to peak SPL in this instance.

Behavioural response thresholds

16.5.76 Based on the earlier discussion on behavioural response (see paragraphs 16.5.4 to 16.5.8), thresholds of 140 dB re 1µPa (rms) and 160 dB re 1µPa (rms) were applied to be representative of low level and high level disturbance, respectively. Because the response criteria metric uses rms SPL, it was necessary to convert the modelled single strike SEL by assuming a typical sound impulse duration of 100 ms and applying Equation 4 (on paragraph 0).

Assessment of Effects

16.5.77 Significance of effects has been determined using the methods outlined in Chapter 4. To summarise, as shown in Table 4.1, the magnitude of the impact and sensitivity of receptor are considered in order to determine if the effects are of major, moderate, minor or negligible significance. Table 4.1 has been repeated in Table 16.7 below for reference.

Table 16.7 - Guide to the Inter-Relationship between Magnitude of Impact and Sensitivity of Receptor

		Sensitivity of Receptor / Receiving Environment to Change			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Impact/Change	**High**	major	moderate to major	minor to moderate	negligible
	Medium	moderate to major	moderate	minor	negligible
	Low	minor to moderate	minor	negligible to minor	negligible
	Negligible	negligible	negligible	negligible	negligible

Magnitude of impact

16.5.78 The magnitude of the direct impact of the sound on marine mammals is quantified here as the maximum distance from the pile driver that the SEL_{cum} threshold for PTS or TTS is exceeded for each marine mammal receptor hearing group.

16.5.79 Impact magnitude has been categorised with reference to the definitions in Table 16.8, this is based on the methods used in Chapter 8.

Table 16.8 – Impact Magnitude

Magnitude of impact	Definition
Negligible	Detectable impact but reversible. Not expected to affect the conservation status of the nature conservation designation, habitat or species under consideration In terms of noise modelling, this has been defined as below the TTS and PTS thresholds.
Low	Detectable impacts, and may be irreversible, but either of sufficiently small scale or of short-term duration to have no material impact on the conservation status of the nature conservation designation, habitat or species population. In terms of noise modelling, this has been defined as behavioural changes and/or TTS to less than 1% of the local marine mammal population, with no potential for PTS.
Medium	Detectable impact on the status of the nature conservation designation, habitat or species population in the medium term but is reversible/replaceable given time, and not a threat to the long-term integrity of the feature In terms of noise modelling, this has been defined as TTS to more than 1% and/or PTS to less than 1% of the local marine mammal population.

Magnitude of impact	Definition
High	Irreversible impact on the status of the nature conservation designation, habitat or species and likely to threaten the long-term integrity of the feature. Not reversible or replaceable. In terms of noise modelling, this has been defined as PTS to more than 1% of the local marine mammal population.

16.5.80 In terms of timing, frequency and duration of the impact, it is estimated that it will take approximately four weeks for the entire piling activity to be completed, with pile driving occurring during daylight hours only. Each pile will take approximately 40 minutes to drive to refusal depth, with about half an hour preparation time between piles. Because of the limited duration of the works the impact of the works and resultant effects are considered temporary (reversible).

16.5.81 Because of the limited duration of the piling activity, indirect impacts are likely to be **negligible**, although the feeding behaviour of the animals may change temporarily due to the requirement for them to search for food in other areas.

Sensitivity of receptor

16.5.82 In terms of sensitivity, all marine mammals are classified as having a high sensitivity to piling as they are afforded some level of protection (as outlined in Section 16.3 and 16.6) with the activities resulting in a range of impacts, from behavioural changes to injury or even death.

Requirements for Mitigation

16.5.83 Standard mitigation measures have been adopted based on the guidelines of the JNCC piling protocol (2010). This is a basic requirement of the Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016). See Section 16.8 for further details.

16.5.84 In addition to the standard mitigation, further mitigation, such as Acoustic Deterrent Devices (ADDs), bubble curtains and piling cushions, may be required. See Section 16.10 for further details.

Assessment of Residual Effect Significance

16.5.85 Where a moderate to major effect was identified, further investigation of effects using appropriate additional mitigation measures, such as piling cushions, was undertaken and the residual impact identified.

Limitations to Assessment

16.5.86 There are a number of limitations to the modelling methodology and data availability which mean that a relatively conservative approach has been adopted, these are:

- A detailed map of bed deposits in the area was not available for parameterising the sound absorption parameters for the underwater noise model. It was, therefore, conservatively assumed that the bed consisted of sandstone which is known to form the bedrock in this region (McKirdy, 2010). A sandy or muddy bed layer, if present, would result in greater attenuation of the sound and, hence, could result in lower impacts than predicted in this study.
- The precise behaviour of the animals in response to the sound is not known and simplified assumptions have, therefore, been made in the model as to swim speed and direction. However, the assumptions made are considered the best-estimate of how animals might behave.

- The underwater sound model does not account for the water level change over time due to tides. Instead, the model assumes a fixed water level representative of MHWS. This is considered to be conservative (worst case) since sound tends to travel a longer distance in deeper water due to fewer interactions with the bed and water surface. The new landing jetty is located in an area that almost dries out at low tide, with the water depth reducing to less than 2 m during MLWS. Therefore, if piling occurs close to low water, the propagated sound levels are expected to be lower than modelled, resulting in reduced impacts on marine mammals compared to those predicted in this assessment.

16.6 Baseline Conditions

Background noise

16.6.1 Based on previous studies of noise data relating to other sites in UK waters, background underwater noise levels in the area are likely to be low (Brooker et al, 2012; Marine Scotland, 2015b). Generally the unweighted average background levels in UK coastal waters away from shipping lanes has been measured to be in the range of 92 dB to 132 dB, with the main sources of noise being due to the sea-state and occasional vessel movements (i.e. engine and propellor noise). The background levels are unlikely to exceed threshold levels for PTS or TTS however, it may cause short term behavioural changes to mammals.

Cetaceans

16.6.2 In terms of marine mammals likely to occur within the wider area, data from the latest Small Cetaceans in European Atlantic waters and the North Sea (SCANS) report (SCANS-III), as reported by Hammond et al (2017) has been used. A primary aim of SCANS-III was to provide robust large-scale estimates of cetacean abundance to inform the MSFD assessment of GES in European Atlantic waters in 2018. The report provides design-based estimates of abundance of the following cetaceans species: harbour porpoise, bottlenose dolphin, Risso's dolphin, white-beaked dolphin, white-sided dolphin, common dolphin, striped dolphin, pilot whale, all beaked whale species combined, sperm whale, minke whale and fin whale (Hammond et al, 2017).

16.6.3 Faray is located within SCANS-III block S (measuring 40,383 km^2, shown in Appendix 16.1, Figure 16.3). Marine mammal abundance and density within SCANS-III area S, along with the wider JNCC (2015) Marine Mammal Management Unit (MMMU) populations, are provided in Table 16.9. Species recorded within 10km of Faray are provided in Table 16.10. This shows a number of species that Hammond et al (2017) do not list as being present within SCANS-III block S. Densities for these species have been estimated based on neighbouring blocks and the MMMU populations provided. Where MMMU data is not available, representative data from SCANS-III has been used.

16.6.4 For baleen whales, the SCANS-III ship survey data for fin whale and sperm whale was used, these blocks are shown in blue in Appendix 16.1, Figure 16.3. The closest area, block 8, was assumed for the purposes of this assessment. MMMU data is not available for baleen whales, therefore representative data assuming all ship survey blocks has been used.

16.6.5 Note, there is no overall estimate for the orca population available, however, local sightings have been included in Table 16.10.

16.6.6 There is no humpback whale data provided in ether Hammond et al (2017) or JNCC (2015). However, JNCC's atlas of cetacean distribution in north-west Europe waters (Reid et al, 2003) shows no sightings of humpback whales in the waters surrounding Orkney, the closet sighting are between Shetland and the Faroe Islands and in the central north sea off the coast of Peterhead.

Table 16.9 – Cetacean abundance and density within SCANS-III block S (Hammond et al, 2017; JNCC, 2015)

Species	Legal / Conservation status	SCANS-III Block S (Hammond et al, 2017)		Wider MMMU population (JNCC, 2015)
		Abundance	Density (animals/km^2)	
Harbour porpoise *Phocoena phocoena*	EPS Annex II species Schedule 5 of the WCA PMF	6,147	0.152	227,298
Bottlenose dolphin *Tursiops truncatus*	EPS Annex II species Schedule 5 of the WCA PMF	151	0.004	195[1]
White-beaked dolphin *Lagenorhynchus albirostris*	EPS Schedule 5 of the WCA PMF	868	0.021	15,895
Minke whale *Balaenoptera acutorostrata*	EPS Schedule 5 of the WCA PMF	383	0.010	23,528
Orca *Orcinus orca*	EPS Schedule 5 of the WCA PMF	N/A	N/A	N/A
Atlantic white-sided dolphin[2] *Lagenorhynchus acutus*	EPS Schedule 5 of the WCA PMF	1,366	0.034	69,293
Common dolphin[3] *Delphinus delphis*	EPS Schedule 5 of the WCA PMF	4,679	0.116	56,556
Pilot whale[4] *Globicephala melaena*	EPS Schedule 5 of the WCA PMF	1,733	0.043	1,812[5]
Risso's dolphin[4] *Grampus griseus*	EPS Schedule 5 of the WCA PMF	440	0.011	8,818[6]
Sperm whale[7]	EPS Schedule 5 of the WCA PMF	9,599	0.060	13,518[8]
Fin whale[7]	EPS Schedule 5 of the WCA PMF	820	0.005	18,142[8]

[1] Note the MMMU includes the Moray Firth SAC which is designated for bottlenose dolphins, actual sightings within the Faray area are low as highlighted in Table 16.10.
[2] Representative abundance data from adjacent SCANS-III block, T, has been assumed. Density has then been calculated based on this representative abundance data and area of block S.

Species	Legal / Conservation status	SCANS-III Block S (Hammond et al, 2017)		Wider MMMU population (JNCC, 2015)
		Abundance	Density (animals/km^2)	
[3] Representative abundance data from nearest SCANS-III block, J, has been assumed. Density has then been calculated based on this representative abundance data and area of block S. [4] Representative abundance from adjacent SCANS-III block, K, has been assumed. Density has then been calculated based on this representative abundance data and area of block S. [5] MMMU abundance data not available, combined abundance of pilot whale in UK and Irish waters (SCANS-III blocks J and K) used as representative population data. [6] MMMU abundance data not available, combined abundance of Risso's dolphin in UK and Irish waters (SCANS-III blocks E, H, J and K) used as representative population data. [7] Representative abundance and density data from nearest SCANS-III block, 8, has been assumed. [6] MMMU abundance data not available, total abundance from SCANS-III ship surveys used as representative population data.				

16.6.7 Data provided by the Orkney Wildlife Information and Records Centre (OWIRC) include records of nine cetacean species from locations within 10 km of the site boundary, dating from within the last 10 years, as summarised in Table 16.10. The listed species can be grouped into the mammal hearing groupings of Southall et al (2007) described previously in Section 16.3, as indicated in the last column of Table 16.10.

16.6.8 Species density has been calculated using the same method as the SCANS-III data (Hammond et al, 2017), where the sightings have been compared against the study area of 10 km (c.314km^2).

16.6.9 The sensitivity of these groups is deemed to be high as outlined in paragraph 16.5.82.

Table 16.10 – Key Protected Cetacean Species recorded within 10km of Faray

Species	Legal / Conservation status	Existing Records	Density (animals/km^2)	Hearing group
Harbour porpoise *Phocoena phocoena*	EPS Annex II of the Habitats Directive Schedule 5 of the WCA	72 records, 1 record south of Faray and 67 records in Warness sound, eday.	0.229	High-frequency cetacean
Orca *Orcinus orca*	EPS Schedule 5 of the WCA PMF	17 records, 2013, x3 Calf Sound , east side of Eday, c.4.0km east; x1 record, 9 records -Fall of Warness Eday, c.5.5km south, 4 off Sanday, 1 each off Egilsay, Rousay, Papa Westray and Green Holm; all >5km from faray.	0.054	Mid-frequency cetaceans

Species	Legal / Conservation status	Existing Records	Density (animals/km^2)	Hearing group
Atlantic white-sided dolphin *Lagenorhynchus acutus*	EPS Schedule 5 of the WCA PMF	Single records, Warness Sound 5km south of Faray, 2014.	0.003	
Bottlenose dolphin *Tursiops truncatus*	EPS Annex II of the Habitats Directive Schedule 5 of the WCA PMF	Single record, Westray 2009.	0.003	
Common dolphin *Delphinus delphis*	EPS Schedule 5 of the WCA PMF	Single record, 2014, Sound of Faray, c.0.5km east	0.003	
Long-finned pilot whale *Globicephala melaena*	EPS Schedule 5 of the WCA PMF	Single record, Twiness Westray 4.5km north-west 2012	0.003	
Minke whale *Balaenoptera acutorostrata*	EPS Schedule 5 of the WCA PMF	24 records, 20 off Warness sound, Eday. Other records Eday, Westray, Sanday, Egilsay all >5km from Faray.	0.076	
Risso's dolphin *Grampus griseus*	EPS Schedule 5 of the WCA PMF	14 records, 9 Warness Sound Eday. 3 records Sanday and a single records iat Rapness, Westray in 2017. All records > 5km from faray.	0.045	
White-beaked dolphin *Lagenorhynchus albirostris*	EPS Schedule 5 of the WCA PMF	4 records between 2009 and 2015, 3 off Warness Sound and one of Westray all > 5km from Faray.	0.013	

Pinnipeds

16.6.10 The Proposed Development partially overlaps the Faray and Holm of Faray SAC and SSSI, which is designated for grey seals. The site is of particular importance to breeding seals, supporting the second-largest breeding colony in the UK and is one of the most important breeding and haul out sites for grey seal in Orkney. As discussed in Chapter 8, the overall 2018 UK grey seal population was estimated at c.152,000 (SCOS, 2019). The Orkney population was estimated at c.23,849 animals, representing c.43.6 % of the Scottish population (54,741) and a significant 36.5 % of the UK total (SCOS, 2019). Specifically, for the Faray and Holm of Faray SAC, and indicating its importance to the Orcadian grey seal population, the SAC accounted for c.15% (c.3,578 animals) of Orkney grey seal pup production in 2010 (Russel *et al*., 2019).

16.6.11 In addition to the Faray and Holm of Faray SAC and SSSI, there are three sites designated for grey or harbour seals within a 15km radius of the Proposed Development (see Table 16.11). There are also a number of designated seal haul outs within 10km of the Proposed Development, as detailed in Appendix 8.3.

16.6.12 Harbour seals are noted to forage in a range of 40-50 km (SCOS, 2019), therefore have the potential to be within the area. The overall 2018 UK harbour seal population was estimated at 45,800 with the Scottish Population (26,900) representing c.59% of the UK total (SCOS, 2019).

16.6.13 Grey seals widely forage and frequently travel over 100 km between haul out sites (SCOS, 2019), therefore seals from the wider Scotland population, including those supported by the Muckle and Little Green Holm SSSI, have the potential to be within the Proposed Development area.

Table 16.11 – Designated Sites (seals) within 10 km of the Proposed Development

Site	Designation	Distance to Site	Species Designation
Faray and Holm of Faray	SAC	Partly overlaps with the site	Grey seal
	SSSI	Partly overlaps with the site	Grey seal
Sanday	SAC	10.7 km east	Harbour seal
East Sanday Coast	SSSI	11.4 km east	Harbour seal
Muckle and Little Green Holm	SSSI	7.8 km south	Grey seal

16.6.14 Data provided by OWIRC include four records of grey seals from locations within 10 km of the site boundary and dating from within the last 10 years. No records of harbour seals were recorded.

16.6.15 As documented in Chapter 8, Appendix 8.3 and shown on Figure 8.4, grey seals were recorded all around the Faray coastline, with animals apparently present on any suitable haul-out surface. 1,480 animals recorded with counts varying between 43 (April) and 406 (August); an average of 182.

16.6.16 Only one harbour seal was noted during the site seal survey (in June 2019), with all other animals being grey seals. While harbour seals are present in the area, the survey results indicate that Faray is unlikely to be of any particular importance to this species.

16.6.17 The abundance and density of grey and harbour seals is provided in Table 16.12. This has been calculated using the same method as the SCANS-III data (Hammond et al, 2017), using the seal survey data provided in Appendix 8.3. The seal survey area covered the island and a 500m radius around the island offshore, equating to c.5.26km^2. The abundance was assumed to be an average of the daily counts recorded (182) as the 1,461 animals recorded were in relation to sightings not individuals. The total UK population from SCOS (2019) is also provided.

Table 16.12 – Grey seals and harbour seal abundance and density

Species	Legal / Conservation status	Seal survey area		UK population (SCOS, 2019)	Hearing group
		Abundance	Density (animals/km^2)		
Grey seal *Halichoerus grypus*	Annex II & V of the Habitats Directive PMF	182	35	152,000	Phocid pinnipeds
Harbour seal *Phoca vitulina*	Annex II & V of the Habitats Directive PMF	1	0.190	45,800	

16.7 Receptors Brought Forward for Assessment

16.7.1 The assessment focuses on the three hearing groups with the specific species present based on both regional and site specific data, as discussed in Section 16.6:

- Phocid pinnipeds (grey seals and harbour seals);
- High-frequency cetaceans (harbour porpoise, also known as common porpoise); and
- Mid-frequency cetaceans (common dolphin, bottlenose dolphin, Atlantic white-sided dolphin, orca, long-finned pilot whale, minke whale, Risso's dolphin, white-beaked dolphin);
- Low-frequency cetaceans (baleen whales).

16.7.2 Otters are not included in the modelling assessment as their hearing abilities are not included in standard guidance. [Redacted]

16.7.3 There were no low frequency cetaceans (i.e. baleen whales) recorded in the region due to the shallow water depths, however there have been sightings of baleen whales in deeper water away from Faray (see Table 16.9) and some noise could propagate through Faray Sound to the northeast into deeper water. Therefore low-frequency cetaceans have been included in the assessment. There are no otariid pinniped species (i.e. sea lions and fur seals) native to the UK. This hearing group has, therefore, been excluded from the assessment.

16.8 Standard Mitigation

16.8.1 A range of standard mitigation measures, in accordance with the JNCC piling protocol (2010), have already been put in place as part of the iterative design process to minimise the potential risks to marine mammals, and in particular local grey seals, in the area. The standard measures, as detailed in JNCC (2010), built into design are listed below:

- **Mitigation zone:** implementation of a mitigation zone where the area is monitored either visually and/or acoustically (via Passive Acoustic Monitoring, PAM) for marine mammals prior to piling commencing. Monitoring should be undertaken by a suitably qualified MMO / PAM operative. The extent of the mitigation zone should be agreed with the consenting authority prior to the works taking place. The minimum is a 500 m radius, which has been assumed for this assessment.

- **Pre-piling search and delayed start:** the mitigation zone should be monitored visually by the MMO and/or acoustically via PAM for a period of at least 30 minutes. Piling should not commence if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual or acoustic detection.
- **Avoid piling at night or in poor visibility:** piling activities should not commence during periods of darkness, poor visibility (e.g. fog) or a rough sea state where it is not conductive to visual mitigation as there is a greater risk of failing to detect a marine mammal within the mitigation zone.
- **Soft-start:** the piling activities should employ a soft-start, where the piling power is gradually ramped up incrementally until full power is achieved. This is to allow for any marine mammals within the area to move away from the noise source and will reduce the likelihood of exposing marine fauna to sounds which can cause injury. The soft-start period should be a minimum of 20 minutes. If a marine mammal enters the area during the soft start then, wherever possible, the piling should cease, or at the least the power should not be increased until the marine mammal exits the mitigation zone and there is no further marine mammal detection for 20 minutes. When piling at full power, there is no requirement to cease piling or reduce the power if a marine mammal is detected in the mitigation zone as it is deemed to have entered "voluntarily". JNCC (2010) does recognise in the piling protocol that it may not be technically possible to stop piling at full power until the pile is in position.
- **Break in piling activity:** If there is a pause in the piling operations for a period of greater than 10 minutes, then the pre-piling search and soft-start procedure should be repeated before piling recommences. If a watch has been kept during the piling operation, the MMO or PAM operative should be able to confirm the presence or absence of marine mammals, and it may be possible to commence the soft-start immediately. However, if there has been no watch, the complete pre-piling search and soft-start procedure should be undertaken.

16.8.2 The soft start procedure is included in the standard mitigation modelling presented in this chapter. It is not possible to build the mitigation zone into the model as it needs to assume the presence of marine mammals within close proximity to the piling source in order to determine the potential zone of impact.

16.8.3 Due to the Proposed Development overlapping with Faray and Holm of Faray SAC and SSSI, there is a project commitment to avoid construction during the grey seal breeding season, which extends from mid-September-December (see Chapter 8). Seal densities across Faray are discussed in Chapter 8. Breeding use within Scammalin Bay (the location of the landing jetty) is not fully understood, this is due to careful avoidance of surveying during the breeding season to minimise disturbance to grey seals (as per consultation with NatureScot on survey scope). However, the majority of haul-out use of the island is to the north, away from the landing area, which is already subject to regular use by the farmer.

16.8.4 As per Table 3.2, the sheet piling operations are scheduled to commence on 1 May at the earliest. Piling would last a maximum of 21 days and will not take place any later than 15 August. This will ensure piling is out with the breeding season and for a month prior where seals are expected to be returning to the island for breeding purposes.

16.8.5 The piling schedule will be included within the CEMP and construction marine licence application to ensure piling operations do not occur past 15 August or during the breeding period itself.

16.9 Likely Effects

16.9.1 The results from the fleeing mammal model are used in this section to assess the magnitude of the impact and the resulting significance of effect on the receptors brought forward for assessment.

Construction Noise

16.9.2 The magnitude of impact due to underwater sound during construction of the new landing jetty is presented in this section for standard mitigation. The magnitude of the impacts is first assessed using the cumulative sound exposure level (SEL_{cum}) threshold criteria for injury (PTS and TTS) for marine mammals in the different hearing groups for phocid pinnipeds, low-frequency cetaceans, mid-frequency cetaceans and high-frequency cetaceans. The PTS and TTS injury impacts are then reassessed using the peak SPL metric to determine which metric gives the worst impact. Finally, behavioural disruption is assessed using the rms SPL.

Injury to mammals (SEL_{cum})

16.9.3 For phocid pinnipeds (grey seals and harbour seals) the modelled SEL_{cum} dosage received during the installation of a single sheet pile using standard mitigation is presented in Appendix 16.1, Figure 16.4. Similar plots are provided for low-frequency cetaceans (Appendix 16.1, Figure 16.5) mid-frequency cetaceans (Appendix 16.1, Figure 16.6) and high-frequency cetaceans (Appendix 16.1, Figure 16.7). On each of these plots a contour indicating the threshold for PTS and TTS is drawn (if exceeded). The maximum distances to the PTS and TTS threshold for each mammal hearing group are presented in Table 16.13 and the corresponding area of exceedance has been tabulated in Table 16.14. The latter is useful when considering the likely density of mammals in the area and hence numbers of individuals that may be affected, as detailed in the subsequent sections.

16.9.4 The model results plotted in Appendix 16.1, Figure 16.4 to Figure 16.7 show the SEL_{cum} dosage for mammals using the assumption that the animals swim directly away from the pile driver. For pinnipeds, it is further assumed that the animals leave the water when they reach the shoreline. For cetaceans, the animals clearly cannot leave the water and some animals, therefore, may become temporarily trapped against the shoreline, before swimming along the coast due to land avoidance behaviour in the model. This simplified behaviour is considered a worst case scenario for cetaceans since they are likely to be more aware of the available exit routes. As such, for low- and high-frequency cetaceans (baleen whales and harbour porpoise) additional model simulations were undertaken whereby the mammals were assumed to exit the area of noise via their nearest exit route (i.e. northwards through the Sound of Faray, or westwards past Fers Ness). The SEL_{cum} results for these 'quickest escape' model scenarios are plotted in Appendix 16.1, Figure 16.8 and Figure 16.9.

Table 16.13 – Maximum Distances to PTS and TTS Impact Thresholds using the SEL_{cum} metric (Standard Mitigation)

Hearing group	Maximum distance to threshold (m)	
	PTS	TTS
Phocid Pinnipeds	0	1,980
Low-frequency cetaceans	3,030	12,950
Low-frequency cetaceans (quickest escape)	2,770	12,950
Mid-frequency cetaceans	0	0
High-frequency cetaceans	340	3,080
High-frequency cetaceans (quickest escape)	30	3,070

Table 16.14 – Area of PTS and TTS Impact using the SEL_{cum} metric (Standard Mitigation)

Hearing group	Area of threshold exceedance (km^2)	
	PTS	TTS
Phocid Pinnipeds	0	1.35
Low-frequency cetaceans	7.65	15.90
Low-frequency cetaceans (quickest escape)	2.31	15.29
Mid-frequency cetaceans	0	0
High-frequency cetaceans	0.01	8.60
High-frequency cetaceans (quickest escape)	<0.01	7.85

Pinnipeds

16.9.5 Using the area of threshold exceedance in Table 16.14, and the baseline data provided in Section 16.6, the number of grey and harbour seals that could potentially be effected can be calculated. The results are shown in Table 16.16. From this, the significance of effect can be determined, as per the methodology outlined in Section 16.5.

16.9.6 Harbour seals are not likely to be within the area in any great numbers, therefore the effect is **negligible and not significant**. The potential impacts to grey seals are discussed below.

16.9.7 Using the standard mitigation (i.e. soft-start), for seals the modelled maximum start distance within which the TTS criteria is exceeded is 1,980 m, with the area of TTS threshold exceedance being 1.35km^2. This has the potential to temporarily impact a significant percentage of the local grey seal population, 26% (Table 16.16), resulting in a **moderate and significant** effect. On a larger, regional and national population level, the percentage of population with the potential for TTS is <0.1%.

16.9.8 For PTS, there is no exceedance predicted for seals.

16.9.9 The overall effect is, therefore, assessed as **moderate and significant** as there is the potential for TTS to greater than 1% of the local population, but there will be no potential for PTS. This is a conservative assessment as, although the modelling takes soft-start into consideration, a 500 m mitigation zone would also be implemented within which a pre-piling search would be undertaken to ensure the area is clear of marine mammals prior to piling commencing. Thus, the number of grey seals that could potentially experience TTS will be less than that calculated Table 16.16. It should also be noted that no construction work will take place between 15th of September and 31st of December inclusive to avoid grey seal breeding. Furthermore, the piling operations will be completed by 15th August at the latest.

Low-frequency cetaceans

16.9.10 Using the area of threshold exceedance in Table 16.14, and the baseline data provided in Section 16.6, the number of baleen whales (specifically, sperm whales and fin whales) that could potentially be effected can be calculated. The results are shown in Table 16.17. From this, the significance of effect can be determined, as per the methodology outlined in Section 16.5. Note, there is no population data available for humpback wales, therefore, they could not be included in the assessment. However, as noted in Section 16.6, this species has not been recorded within the area (Reid et al, 2003).

16.9.11 Of all the mammal hearing groups, low-frequency cetaceans are predicted to be impacted at the furthest distance from the pile. Under standard mitigation (i.e. soft-start), the distance to TTS is predicted to be almost 13 km, with the area of TTS threshold exceedance being 15.90km^2. Assuming the mammals swim away from the noise, the distance to PTS is predicted to be 3,030 m (7.65 km^2),

but reduces to 2,770 m (2.31 km^2) under the assumption that they swim immediately to the nearest exit.

16.9.12 There were no OWIRC records of baleen whales within 10 km of Faray, thus the assessment is based on the regional and national sperm and fin whale populations only (see Table 16.17). The maximum number of individuals within the area of TTS and PTS exceedance is <1 for both sperm whales and fin whales, representing TTS to 0.01% and PTS to <0.01% of the regional populations and TTS and PTS to <0.01% of the national populations.

16.9.13 The likelihood of baleen whales being within the bay area is very low due to the shallow water depths (see Figure 16.2); at MHWS, approximately 3 km^2 and 10 km^2 of the area is less than 10 m and 20 m deep respectively. As outlined above, a pre-piling search will be undertaken to ensure the area is clear of marine mammals prior to piling commencing. Thus, the number of individuals that could potentially experience TTS will be less than that calculated in Table 16.17. Assuming baleen whales escape via the quickest route, the area of PTS exceedance is limited to the shallower areas of the bay (see Appendix 16.1, Figure 16.8), therefore, with standard mitigation in place, PTS to an individual is not expected to occur. As such, the overall effect is assessed as **minor and not significant**.

Mid-frequency cetaceans

16.9.14 For mid-frequency cetaceans no exceedance of TTS or PTS is predicted (see Table 16.14 and Appendix 16.1, Figure 16.6). The effect using standard mitigation is, therefore, **negligible and not significant** for this hearing group.

High-frequency cetaceans

16.9.15 Using the area of threshold exceedance in Table 16.14, and the baseline data provided in Section 16.6, the number of harbour porpoise potentially effected can be calculated. The results are shown in Table 16.18. From this, the significance of effect can be determined, as per the methodology outlined in Section 16.5. Note, the highest density for harbour porpoise was assumed in order to represent the worst case, this was based on the OWIRC records within 10 km of Faray.

16.9.16 High-frequency cetaceans (harbour porpoise) are predicted to be subject to the second largest impact after low-frequency cetaceans. Under the assumption that they swim directly away from the noise, the modelled maximum start distance, assuming soft-start, for PTS is 340 m (0.01 km^2). This distance is within the standard 500 m mitigation zone and, considering the fact that the area will undergo a pre-piling search to ensure the area is clear of marine mammals prior to piling commencing, the effect is deemed to be **negligible and not significant** for harbour porpoise with regard to PTS.

16.9.17 The modelled maximum distance to TTS threshold is considerably larger for this mammal group, at 3,080 m (8.60km^2). This has the potential to impact >1% of the local population, therefore the significance of TTS effect was initially assessed as **moderate and significant.** On a larger regional (SCANS-III block S) and national (MMMU) scale, the percentage at risk of TTS is <1%.

16.9.18 This is a conservative assessment as the implementation of the 500 m mitigation zone will ensure the area is clear of marine mammals prior to piling commencing. Thus, the number of harbour porpoise that could potentially experience PTS or TTS will be less than that calculated in Table 16.18. None the less, as there is the potential for TTS to more than 1% of the local population, the overall significance of effect to harbour porpoises, assuming they swim directly away from the source, is deemed to be **moderate and significant**.

16.9.19 Under the assumption that the high-frequency cetaceans swim to their nearest exit, the impacts in terms of maximum distance are slightly shorter, with PTS and TTS distances of 30 m (<0.01km^2) and 3,070 m (7.85 km^2) respectively. The reason for the similarity of the TTS contours is due to the restricted distance to the shoreline within the bay opposite the new landing jetty which limits the extent of the impact.

16.9.20 For TTS exceedance, the area using the nearest exit method is only slightly reduced, at 7.85 km^2 compared to 8.60 km^2 for swimming directly away. Thus, there is still the potential for TTS to more than 1% of the local population.

Overall for harbour porpoise using either the swim directly away or the quickest escape method for fleeing, the PTS thresholds are only expected to be exceeded within the standard 500 m mitigation zone. As a pre-piling search will be undertaken to ensure the mitigation zone is clear of marine mammals prior to soft-start commencing, PTS to an individual is not expected to occur. Furthermore, due to the pre-piling search of the mitigation zone, the species numbers provided in Table 16.18 are conservative with less individuals than those calculated likely to experience TTS. None the less, as TTS could occur to >1% of the local population, the overall significance of effect (due to TTS) is conservatively deemed to be **moderate and significant**.

Injury to mammals (Peak SPL)

16.9.21 The impacts using standard mitigation were also assessed using the empirically derived peak SPL metric (see paragraph 16.5.74), applied to the modelled SEL_{ss}. For all mammals, the distances to the TTS and PTS threshold (Table 16.15) were found to be considerably smaller using the peak SPL metric, apart from PTS for seals which was predicted to be at 10 m using the peak SPL metric (as opposed to zero for SEL_{cum}). The maximum distance to impact using the peak SPL was predicted to be greatest for high frequency cetaceans, with ranges for PTS and TTS of up to 120 m and 370 m, respectively. These distances are within the standard 500 m mitigation zone and, considering the fact that the area will undergo a pre-piling search and the soft start procedure will be used, the effect using the peak SPL metric will be **negligible and not significant** to all marine mammals. Due to these results, the SEL_{cum} metric is considered most appropriate for assessing the overall impacts on mammals in the present assessment.

Table 16.15 – Maximum Distances to PTS and TTS Impact Thresholds using the peak SPL metric (Standard Mitigation)

Hearing group	Maximum distance to threshold (m)	
	PTS	TTS
Phocid Pinnipeds	10	30
Low-frequency cetaceans	10	25
Mid-frequency cetaceans	0	0
High-frequency cetaceans	120	370

Table 16.16 Estimated number of pinnipeds effected (PTS and TTS)

Species	Density	Maximum number of pinnipeds predicted to be within the area of threshold exceedance (density x area of exceedance)	Percentage of population impacted					
			Local Faray population		Wider population			
					Scottish population		UK population	
			Population	% potentially effected	Population	% potentially effected	Population	% potentially effected
PTS								
N/A								
TTS								
Grey Seal	35	46.74	182	26%	54,741	0.085%	152,000	0.031%
Harbour Seal	0.190	0.257	1	26%	26,900	0.001%	45,800	0.0006%

Table 16.17 Estimated number of baleen whales effected (PTS and TTS)

Species	Density	Maximum number of baleen whales predicted to be within the area of threshold exceedance (density x area of exceedance)	Percentage of population impacted					
			Local Faray population		Wider population			
					SCANS-III Block 8 population		SCANS-III total population	
			Population	% potentially effected	Population	% potentially effected	Population	% potentially effected
PTS								
Sperm whale (quickest escape)	0.060	0.954	-	-	9,599	0.010%	13,518	0.007%
Fin whale (quickest escape)	0.005	0.080	-	-	820	0.010%	18,142	<0.001%
TTS								
Sperm whale (quickest escape)	0.060	0.917	-	-	9,599	0.010%	13,518	0.007%
Fin whale (quickest escape)	0.005	0.076	-	-	820	0.009%	18,142	<0.001%

Table 16.18– Estimated number of harbour porpoise effected (PTS and TTS)

Species	Density	Maximum number of harbour porpoise predicted to be within the area of threshold exceedance (density x area of exceedance)	Percentage of population impacted					
			Local Faray population		Wider population			
					SCANS-III Block S population		MMMU population	
			Population	% potentially effected	Population	% potentially effected	Population	% potentially effected
PTS								
Harbour porpoise	0.229	0.002	72	0.003%	6,147	<0.001%	227,298	<0.001%
Harbour porpoise (quickest escape)	0.229	<0.002	72	<0.003%	6,147	<0.001%	227,298	<0.001%
TTS								
Harbour porpoise	0.229	1.967	72	2.74%	6,147	0.032%	227,298	0.001%
Harbour porpoise (quickest escape)	0.229	1.799	72	2.50%	6,147	0.029%	227,298	0.001%

Behavioural disturbance

16.9.23 Disturbance was assessed using thresholds of 140 dB re 1µPa (rms) and 160 dB re 1µPa (rms), plotted in Appendix 16.1, Figure 16.10. The thresholds are considered to be the same for all marine mammal species. Maximum distances to these thresholds from the pile are provided in Table 16.19.

Table 16.19 – Maximum Distances to Disturbance Threshold and Area of Disturbance for all Mammal Hearing Groups using the rms SPL Metric (Standard Mitigation)

Disturbance level	Maximum distance to threshold (m)	Area of disturbance (km^2)
Low	19,000	26.62
High	3,400	7.99

16.9.24 As per the TTS and PTS threshold assessments, the area of behavioural disturbance and the baseline data provided in Section 16.6 have been used to calculate the number of individuals that could be disturbed from the piling activities, as shown in Appendix 16.2.

16.9.25 Given the distances involved, along with the temporary and reversible nature of disturbance impacts, percentage of population impacted has been calculated at a regional and national scale only. Again, it should be noted that the number of individuals, and resultant percentage of population effected, are conservative as a pre-piling search of the mitigation zone would be completed to ensure the area was clear of marine mammals prior to the operations commencing.

16.9.26 The percentage of grey seal population disturbed on a regional scale is <1% for high disturbance and 1.68% for low disturbance. The percentage of populations disturbed for all other marine mammals is <1% at a regional and national scale. A higher percentage of local populations could be impacted, due to the area at which behavioural disturbance could occur, however, in consideration of the temporary and reversible nature of the impacts the effect is deemed to be **minor and not significant**.

Operational Noise

16.9.27 Operational noise will be limited to occasional vessel movements during maintenance visits. Some behavioural changes are likely during these visits, with mammals tending to avoid the vessels within a distance of approximately 200 m to 500 m (as already described in Chapter 8). However, the disturbance will be of a very short duration and the sound source levels relatively low, and so the magnitude of impact during operation is therefore regarded as **negligible and not significant**.

Decommissioning

The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the effects would be less than that of construction as piling would not be required for decommissioning. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

16.10 Additional Mitigation and Enhancement

16.10.1 The impacts and potential effects using standard mitigation measures described in the Section 16.8 and 16.9 indicated that there is the potential for moderate and significant effects to grey seals and harbour porpoise. As noted in Section 16.9, this is a conservative estimate as a pre-piling search of the mitigation zone would be undertaken prior to operations commencing.

16.10.2 Various forms of mitigation are available to reduce impacts on marine mammals. The most common take two forms, either to reduce the sound pressure levels being emitted from the pile driving (e.g. using pile driving cushions or bubble curtains), or attempting to displace the animals from the immediate area (e.g. through the use of deterrents or a longer soft start period).

16.10.3 Pile driving cushions or padding can be used between the head of the pile and the hammer. This reduces wear on the hammer and can also reduce the source sound level. Research into the sound reduction achieved is limited (e.g. Laughin, 2006; Deng et al, 2016). Cushions tend to reduce the high-frequency (above 1 kHz) sound in the source level spectrum whereas bubble curtains are effective at lower frequencies.

16.10.4 Bubble curtains can be an effective method for reducing underwater noise. Compressed air is injected through a perforated ring laid on the seabed around the pile, creating a ring of air bubbles which rise to the surface. The difference in impedance between water and air results in sound being absorbed and scattered as it passes from the water into the air bubbles (Koschinski and Lüdermann, 2013).

16.10.5 Koschinski and Lüdermann (2013) reviews several studies which used bubble curtains to mitigate piling noise. Reductions of the broadband SEL resulting from the bubble curtains were found to be between 11 dB re 1µPa^{2}s and 15 dB re 1µPa^{2}s, but varied with distance from the pile. In the present study, to account for the presence of a bubble curtain, the reductions for each frequency as reported in Elmer and Savery (2014) for experiments using the Big Bubble Curtain at the FINO3 research platform, were applied to the standard source level spectrum.

16.10.6 Cushions are more likely to reduce the potential impacts on high-frequency cetaceans, whereas bubble curtains may be more suited to reducing impacts on low-frequency cetaceans. However, both mitigations measures are likely to reduce the impacts for either of these mammal groups. Pinnipeds have a wider hearing range making them sensitive to both low and high frequencies (see Appendix 16.1, Figure 16.1) and therefore the impacts are likely to be reduced for seals by using either a bubble curtain or cushion.

16.10.7 The use of both a cushion and bubble curtain were modelled with bubble curtain providing the greatest reduction in impacts and effects. As such modelling outputs and assessment of the bubble curtain, only, should it be required, are presented in this Chapter.

Modified Source Levels for Mitigation Options

Source Level Spectrum with Bubble Curtain

16.10.8 Bubble curtains can be an effective method for reducing underwater noise. Compressed air is injected through a perforated ring laid on the seabed around the pile, creating a ring of air bubbles which rise to the surface. The difference in impedance between water and air results in sound being absorbed and scattered as it passes from the water into the air bubbles (Koschinski and Lüdermann, 2013).

16.10.9 Koschinski and Lüdermann (2013) reviews several studies which used bubble curtains to mitigate piling noise. Reductions of the broadband SEL resulting from the bubble curtains were found to be between 11 dB re 1µPa^{2}s and 15 dB re 1µPa^{2}s, but varied with distance from the pile. In the present study, to account for the presence of a bubble curtain, the reductions for each frequency as reported in Elmer and Savery (2014) for experiments using the Big Bubble Curtain at the FINO3 research platform, were applied to the standard source level spectrum (Appendix 16.1, Figure 16.11).

16.11 Residual Effects

Construction noise (with Bubble Curtain)

16.11.1 This section presents the potential impacts of piling with the use of a bubble curtain, in addition to standard mitigation, should it be deemed required for the project.

Injury to mammals (SEL_{cum})

16.11.2 For phocid pinnipeds the modelled SEL_{cum} dosage received during the installation of a single sheet pile using bubble curtain mitigation is presented in Appendix 16.1, Figure 16.12. Similar plots are provided for low-frequency cetaceans (Appendix 16.1, Figure 16.13), mid-frequency cetaceans (Appendix 16.1, Figure 16.14) and high-frequency cetaceans (Appendix 16.1, Figure 16.15). Similar

plots are provided for low- and high-frequency cetaceans under the assumption of escaping via the nearest exit route (Appendix 16.1, Figure 16.16 and Figure 16.17). The maximum distances to the PTS and TTS threshold for each mammal hearing group are presented in Table 16.20 and the corresponding area of exceedance has been tabulated in Table 16.21.

16.11.3 With the use of the bubble curtain, there is no PTS predicted for any hearing group.

Table 16.20 – Maximum Distances to PTS and TTS Impact Thresholds using the SEL_{cum} metric (with Bubble Curtain)

Hearing group	Maximum distance to threshold (km)	
	PTS	TTS
Phocid Pinnipeds	0	0
Low-frequency cetaceans	0	3,030
Low-frequency cetaceans (quickest escape)	0	2,760
Mid-frequency cetaceans	0	0
High-frequency cetaceans	0	300
High-frequency cetaceans (quickest escape)	0	50

Table 16.21 – Area of PTS and TTS Impact using the SEL_{cum} metric (with Bubble Curtain)

Hearing group	Area of threshold exceedance (km2)	
	PTS	TTS
Phocid Pinnipeds	0	0
Low-frequency cetaceans	0	7.63
Low-frequency cetaceans (quickest escape)	0	3.33
Mid-frequency cetaceans	0	0
High-frequency cetaceans	0	0.01
High-frequency cetaceans (quickest escape)	0	<0.01

Pinnipeds

16.11.4 Using the bubble curtain reduces the magnitude of the modelled impacts compared to standard mitigation (i.e. soft-start only) due to underwater sound levels. For seals the maximum start distance within which TTS is exceeded is reduced from 1,980 m to zero. Thus, the residual effect following the addition of bubble curtain mitigation is assessed as **negligible and not significant**.

Low-frequency cetaceans

16.11.5 Low-frequency cetaceans (baleen whales) are predicted to have the largest reduction in impact due to the addition of the bubble curtain. Under the assumption that they swim directly away from the noise, the maximum start distance for TTS reduces from 12,950 m to 3,030 m, equating to a reduction in area from 15.9km^2 to 7.63km^2. For PTS, the maximum distance to PTS threshold is reduced from 3,030 m to zero.

16.11.6 Under the revised assumption that the low-frequency cetaceans swim to their nearest exit (Appendix 16.1, Figure 16.16), the reduction in maximum distance TTS threshold distance is

marginally greater compared to the more simple fleeing method, reducing from 12,950 m to 2,760 m and the area of impact reducing from to 15.3 km^2 to 3.3 km^2 .

16.11.7 This would result in a reduction in the percentage of local population potentially affected, to <0.01% of the regional and national sperm whale and fin whale populations. As noted above, a search of the mitigation zone would be undertaken to ensure the area is clear of marine mammals prior to piling commencing thus individuals within the zone of TTS exceedance would be even less. Thus, in consideration of standard and additional mitigation measures, the residual effect is deemed to be **minor and not significant** overall.

Mid-Frequency Cetaceans

16.11.8 For mid-frequency cetaceans no exceedance of either the PTS or TTS threshold was predicted for standard mitigation and, therefore, no further reduction was possible, so, again effects are **negligible and not significant**.

High-Frequency Cetaceans

16.11.9 Under the assumption that harbour porposie swim directly away from the noise, the maximum start distance for PTS reduces from 340 m to zero. Furthermore, the maximum distance to TTS threshold is reduced, from 3,080 m to 300 m (and to 50 m under the revised assumption that the high-frequency cetaceans swim to their nearest exit (Appendix 16.1, Figure 16.17)

16.11.10 In terms of area of impact, for TTS the area is 0.01 km under the assumption that they swim directly away, reducing to almost zero (<0.01km) if the animals are assumed to swim to the nearest. Therefore, the TTS areas for both fleeing methods using the bubble curtain are considerably smaller than the TTS areas for the equivalent runs with standard mitigation, which had values of 8.6 km^2 and 7.9 km^2 respectively. This would result in a reduction in the percentage of local population potentially affected to <0.01%. As noted above, a search of the mitigation zone would be undertaken to ensure the area is clear of marine mammals prior to piling commencing. Thus, in consideration of standard and additional bubble curtain mitigation, the residual effect is deemed to be **minor and not significant** overall.

Injury to mammals (Peak SPL)

16.11.11 The residual impacts using bubble curtain mitigation were re-assessed using the empirically derived peak SPL metric (see paragraph 16.5.74). For all mammals, except high-frequency cetaceans, the distances to the PTS and TTS threshold were predicted to be zero. Thus, effects are considered to be **negligible and not significant.**

For high-frequency cetaceans (harbour porpoise) the PTS and TTS thresholds were exceeded with the bubble curtain in place for the peak SPL metric, at distances of up to approximately 10 m and 25 m respectively (as opposed to the equivalent SEL_{cum} distance of zero). This distance is within the standard 500m mitigation zone and also likely to be partly within the area inside the bubble curtain. The residual effect is therefore still deemed to be ***minor and not significant*** for harbour porpoise with regard to both PTS and TTS when using the bubble curtain mitigation.

Table 16.22 – Maximum Distances to PTS and TTS Impact Thresholds using the peak SPL metric (Standard Mitigation)

Hearing group	Maximum distance to threshold (m)	
	PTS	TTS
Phocid Pinnipeds	0	0
Low-frequency cetaceans	0	0
Mid-frequency cetaceans	0	0
High-frequency cetaceans	10	25

Behavioural disturbance

16.11.12 Disturbance was assessed using thresholds of 140 dB re 1µPa (rms) and 160 dB re 1µPa (rms), plotted in Appendix 16.1, Figure 16.18. The thresholds are considered to be the same for all mammals species. Maximum distances to these thresholds from the pile are provided in Table 16.23.

Table 16.23 – Maximum Distances to Disturbance Threshold and Area of Disturbance for all Mammal Hearing Groups using the rms SPL Metric (with Bubble Curtain)

Disturbance level	Maximum distance to threshold (m)	Area of disturbance (km^2)
Low	4,000	9.11
High	420	0.11

16.11.13 The number of individuals potentially disturbed significantly reduces for all marine mammal species (see Appendix 16.2). Thus, effects reduce from minor to **negligible and not significant**.

Operational Noise

16.11.14 The additional mitigation measures only apply to construction noise and therefore operational noise is not assessed in this section (refer to paragraph 16.9.27).

Decommissioning

The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the effects would be less than that of construction as piling would not be required for decommissioning. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.

16.12 Cumulative Assessment

There are no other planned developments in the area. Therefore, there are considered to be no cumulative effects.

16.13 Summary

16.13.1 An assessment was carried out of the potential impacts on marine mammals from underwater noise generated during pile driving operations to install the new landing jetty at the island of Faray.

16.13.2 The key species in the area under consideration were assessed according to three hearing groups:

- Phocid Pinnipeds (seals);
- Low-frequency cetaceans (baleen whales);

- Mid-frequency cetaceans (common dolphin, bottlenose dolphin, Atlantic white-sided dolphin, orca, long-finned pilot whale, minke whale, Risso's dolphin, white-beaked dolphin); and,
- High-frequency cetaceans (harbour porpoise).

16.13.3 Underwater noise modelling was undertaken which calculated the area at which PTS and TTS thresholds for each hearing group would be exceeded. The modelling assumes that a soft-start procedure is in place, as per the JNCC piling protocol (2010), to ensure marine mammals can vacate the area. However, the modelling results are conservative estimates as, in line with the piling protocol, a search of an established 500 m zone around the operations would be undertaken to ensure the area is clear of marine mammals prior to the soft-start commencing. Therefore, the number of animals potentially within the areas of TTS and PTS exceedance will be less than those calculated.

16.13.4 During installation of a single pile using standard mitigation measures, which includes a 20 minute soft start period at the start of pile driving, seals are predicted to receive a cumulative sound exposure level (SEL_{cum}) dosage that exceeds TTS within a distance of 1,980 m (1.35 km^2 area). No exceedance above the level for PTS is predicted for seals. Harbour seals are not likely to be within the area in any great numbers, therefore the effect is **negligible and not significant**. However, the area that exceeds TTS has the potential to impact a significant percentage of the local grey seal population, although regionally and nationally the percentage of grey seal population potentially experiencing TTS is predicted to be below 1%. As such, the significance of effect to grey seals was initially assessed as **moderate and significance**.

16.13.5 Low-frequency cetaceans (baleen whales) are predicted to have the largest extent of impact, exceeding PTS and TTS thresholds within a distance of 3,030 m (7.65 km^2) and 12,950 m (15.90 km^2) respectively. This assumes the low-frequency cetaceans swim directly away from the noise source and results in the potential for PTS <0.01% of the regional population. Using a modified fleeing method for low-frequency cetaceans, whereby they are assumed to flee to the nearest exit, results in marginally smaller distance for PTS of 2,770 m (TTS remains the same), and the area the impact for PTS reduces to 2.3 km^2 instead of 7.65 km^2. Again, the results in PTS to less than 0.01% of the regional population. However, the shallow water depth in the region means that there is a low likelihood of low-frequency whales being present in much of the area affected by the noise. At MHWS, approximately 3 km^2 and 10 km^2 of the area is less than 10 m and 20 m deep respectively. The area at which PTS is exceeded is limited to these shallower waters and, thus, effects from PTS are considered to be **negligible and not significant**.

16.13.6 TTS impact would affect 0.01% of the population. In reality, the result is likely to lie somewhere between the two fleeing methods. Overall, taking into account the fact that the area is relatively shallow, the effect to low-frequency cetaceans, assuming standard mitigation and fleeing via the nearest exit, was deemed to be **minor and not significant**.

16.13.7 Mid-frequency cetaceans (which include a wide range of species found locally, including dolphins), are less impacted by underwater noise than the other mammal groups, and are predicted to receive dosages that are below threshold for both the TTS and PTS. Thus, effects were assessed as **negligible and not significant**.

16.13.8 High-frequency cetaceans (harbour porpoise) are predicted to have the second largest extent of impact, exceeding PTS and TTS thresholds within a distance of 340 m (0.01 km^2) and 3,080 m (8.60 km^2) respectively. This assumes the high-frequency cetaceans are swimming directly away from the noise source and results in the potential for TTS to more than 1% of the local population. Using a modified fleeing method for high-frequency cetaceans, whereby they are assumed to flee to the nearest exit, results in marginally smaller distances for PTS and TTS (30 m and 3,070 m), and in terms of total area the impact is 7.9 km^2 instead of 8.6 km^2 for TTS.

16.13.9 Overall, for harbour porpoise using either the swim directly away or the quickest escape method for fleeing, the PTS thresholds are only expected to be exceeded within the standard 500 m mitigation zone. As a pre-piling search will be undertaken to ensure the mitigation zone is clear of marine mammals prior to piling commencing, PTS to an individual is not expected to occur. Furthermore, due to the pre-piling search of the mitigation zone, the number of individuals impacted is a

conservative estimate. None the less, as TTS could occur to >1% of the local population, the overall significance of effect (due to TTS) was deemed to be **moderate and significant**.

16.13.10 As there is the potential for moderate impacts to both local grey seal and harbour porpoise populations, the use of additional mitigation has been investigated. Namely, the use of a bubble curtain.

16.13.11 The use of a bubble curtain, in addition to standard mitigation, results in no exceedance of the PTS threshold for any marine mammal hearing group. The predicted distances for TTS for seals also reduces to zero when both standard mitigation and the bubble curtain are applied. As such the residual effect to grey seals is **negligible and not significant**.

16.13.12 For low-frequency cetaceans, the addition of a bubble curtain results in a maximum distance of 3,030 m for TTS, reducing slightly to 2,760 m if the animals are assumed to swim to the nearest exit. This results in the potential for TTS to <0.001% of the regional population. Thus residual effect to low-frequency cetaceans is **minor and not significant**.

16.13.13 Using a bubble curtain, the impact distance for TTS to harbour porpoise reduce to a maximum distance of 50 m and 300 m for the 'nearest exit' and 'swim directly away' fleeing methods, respectively, which is within the standard 500 m mitigation zone. The residual effect to harbour porpoises using bubble curtain mitigation is, therefore, deemed to be **minor and not significant.**

16.13.14 Behavioural disturbance of the marine mammals is predicted to occur over a larger area compared to the areas of potential injury described above. Under standard mitigation (soft-start only) the maximum distance within which low-level disturbance (140 dB re 1µPa) may occur for marine mammals is predicted to be approximately 19 km, covering an area of 26.6 km^2. High-level disturbance is predicted to occur at a distance of up to 3.4 km (8.0 km^2). Using a pile driving cushion, the low-level and high-level disturbance distances are reduced to 6.5 km (10.9 km^2) and 2.7 km (2.5 km^2), respectively. The distances are reduced more when using the bubble curtain mitigation option, to 4 km (9.1 km^2) and 0.42 km (0.1 km^2). Although the areas are quite large, behavioural impacts are temporary and reversible and the percentage of marine mammals impacted at regional and population levels is low; <1% of all species when the bubble curtain is applied. As such the effects from behavioural disturbance are deemed to be **negligible and not significant** for all marine mammal species assessed.

Table 16.24 – Summary of Effects

Description of Effect	Significance of Potential Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Damage to hearing in local seal population	Moderate and significant	Adverse	Use of a bubble curtain	Negligible and not significant	Adverse
Damage to hearing in local low-frequency cetaceans population	Minor and not significant	Adverse	Use of a bubble curtain	Minor and not significant	Adverse
Damage to hearing in local mid-frequency cetaceans population	Negligible and not significant	Adverse	Use of a bubble curtain	Negligible and not significant	Adverse
Damage to hearing in local high-frequency cetaceans population	Moderate and significant	Adverse	Use of a bubble curtain	Minor and not significant	Adverse
Operation					
Vessel movements during maintenance visits	Negligible and not significant	Adverse	None considered		
Decommissioning					
The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be less as piling would not be required for removal. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.					

Table 16.25 – Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Marine mammals	Hearing loss and behavioural disturbance	None in the area	No effect	N/A

16.14 References

Ainslie, M.A., de Jong, C.A., Robinson, S.P. and Lepper, P.A., (2012). *What is the source level of pile-driving noise in water?* Advances in experimental medicine and biology, 730, pp. 445-448.

Babushina, Y.S., Zaslavskii, G.L. and Yurkevich, L.I., (1991). *Air and underwater hearing characteristics of the northern fur seal: Audiograms, frequency and differential thresholds*. Biophysics, 36, pp:909-913.

Boyd IL, Frisk G, Urban E, Tyack P, Ausubel J, Seeyave S, Cato D, Southal B, Weise M, Andrew R, Akamatsu T, Ling RD, Erbe C, Farmer D, Gentry R, Gross T, Hawkins A, Li F, Metcalf K, Miller JH, Moretti D, Rodrigo C, Shinke T (2011) *An international quiet ocean experiment*. Oceanography 24:174-181.

Brooker, A., R. Barham, and T. Mason. 2012. *Underwater Noise Modelling Technical Report*. E287R0919. Subacoustech Ltd.

BSP International Foundations (2021). *SL Hydraulic Hammer Data Sheet.* Available at: https://bsp-if.com/sl-hydraulic-hammer/. Accessed on: 18 January 2021.

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

Council Directive 2014/89/EU establishing a framework for maritime spatial planning (Marine Spatial Planning Directive). Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0089

Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (the Habitats Directive). Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31992L0043

Dahl, P.H., de Jong, C.A.F. & Popper, A.N. (2015). *The Underwater Sound Field from Impact Pile Driving and Its Potential Effects on Marine Life*. Acoustics Today, 11.

De Jong, CAF, Ainslie, MA (2008). U*nderwater radiated noise due to piling for the Q7 Offshore Wind Park*. Conf. proceedings: Acoustics 2008, Paris. pp. 117-122.

Deng, Q., Jiang, W., and Zhang, W. (2016). *Theoretical investigation of the effects of the cushion on reducing underwater noise from offshore pile driving*. The Journal of the Acoustical Society of America 140, 2780 (2016); doi: 10.1121/1.4963901.

Elmer, K. H. and Savery J. (2014). *New hydro sound dampers to reduce piling underwater noise. Proceedings of Inter-noise 2014*. 43rd International Congress on Noise Control Engineering November 16-19, 2014, Melbourne, Australia.

Hammond, P.S., Lacey, C., Gilles, A., Viquerat, S., Börjesson, P., Herr, H., Macleod, K., Ridoux, V., Santos, M.B., Scheidat, M., Teilmann, J., Vingada, J., Øien, N. (2017). *Estimates of cetacean abundance in European Atlantic waters in summer 2016 from the SCANS-III aerial and shipboard surveys.* Available at: https://synergy.st-andrews.ac.uk/scans3/files/2017/05/SCANS-III-design-based-estimates-2017-05-12-final-revised.pdf. Accessed on 20 January 2021.

Harris, R. E., Miller, G. W., & Richardson, W. J. (2001). *Seal responses to airgun sounds during summer seismic surveys in the Alaskan Beaufort Sea*. Marine Mammal Science, 17(4), 795–812.

Hemilä, S., Nummela, S., Berta, A. and Reuter, T., (2006). *High-frequency hearing in phocid and otariid pinnipeds: An interpretation based on inertial and cochlear constraints*. Journal of the Acoustical Society of America, 120, pp:3463-3466.

HESS (2007). *Summary of Recommendations Made by the Expert Panel at the HESS Workshop on the Effects of Seismic Sound on Marine Mammals*. Presented at the High Energy Seismic Survey Team, Pepperdine University,

HR Wallingford (2013a). *Eco-Hydro acoustic modelling: HAMMER noise module development phase 2.* HR Wallingford report DHY0446-RT004-R01-00.

HR Wallingford (2013b). *Eco-Hydro-Acoustic Modelling: Acoustic Model Test Case, SeaGen Tidal Turbine, Strangford Lough.* HR Wallingford report DHY0446-RT05-R02-00.

HR Wallingford (2015a). *Rampion wind farm - Underwater noise modelling.* Report DLR5374-RT001, Release R03-00, April 2015

HR Wallingford (2015b). *Brighton Marina Phase 2: Marine licence application – Marine noise impact assessment.* Report DLM7208, Release R02-00, November 2015.

HR Wallingford (2020) *Hammersmith temporary pedestrian and cycle bridge – Underwater noise assessment.* Report DER6237-RT002, Release R03-00, February 2020

HR Wallingford (2012). *Eco-hydro-acoustic modelling: Proof of concept.* HR Wallingford report DHY0446-RT001-R01-00.

JNCC (2015). Marine Mammal Management Unit (MMMU) populations. Available at: http://data.jncc.gov.uk/data/f07fe770-e9a3-418d-af2c-44002a3f2872/JNCC-Report-547-FINAL-WEB.pdf. Accessed on: 20 January 2021.

JNCC (2020). Faray and Holm of Faray. Available at https://sac.jncc.gov.uk/site/UK0017096. Accessed on: 01 December 2020

Joint Nature Conservation Committee (2010). *Statutory Nature Conservation Agency Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise. Report by Joint Nature Conservation Committee (JNCC).* Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/50006/jncc-pprotocol.pdf. Accessed on: 17 January 2021.

Kastak, D. and Schusterman, R.J., (1999). *In-air and underwater hearing sensitivity of a northern elephant seal (Mirounga angustirostris).* Canadian Journal of Zoology, 77, pp:1751-1758.

Kastelein, R.A., Wensveen, P.J., Hoek, L., Verboom, W.C. and Terhune, J.M., (2009). *Underwater detection of tonal signals between 0.125 and 100 kHz by harbor seals (Phoca vitulina)*. Journal of the Acoustical Society of America, 125, pp:1222-1229.

Kongsberg (2010) *Underwater noise propagation modelling and estimate of impact zones for seismic operations in the Moray Firth* FINAL REPORT 37399 – FR1 (C). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/851548/Annex_II_-_Underwater_Noise_Propogation_Modelling_and_Estimate_of_Impact_Zones_for_Seismic_Operations_in_the_Moray_Firth.pdf.

Koschinski, S. and Lüdderman, K. (2013). *Development of Noise Mitigation Measures in Offshore Wind Farm Construction*. Report for Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN).

Laughin, J. (2006). *Underwater sound levels associated with pile driving at the Cape Disappointment boat launch* facility, wave barrier project. Available at: https://tethys.pnnl.gov/publications/underwater-sound-levels-associated-pile-driving-cape-disappointment-boat-launch. Accessed on: 17 January 2021

Lepper, P., Robinson, S., Ablitt, J., Dible, S. (2007). *Temporal and Spectral Characteristics of a Marine Piling Operation in Shallow Water*, in: Proceedings of the NAG/DAGA 2009 International Conference on Acoustics Including the 35th German Annual Conference. pp. 266 – 268.

Lippert T, Galindo-Romero M, Gavrilov AN, von Estorff O. (2015). *Empirical estimation of peak pressure level from sound exposure level. Part II: Offshore impact pile driving noise*. J Acoust Soc Am. 2015 Sep;138(3):EL287-92. doi: 10.1121/1.4929742. PMID: 26428828.

Lucke, K., Lepper, P. A., Blanchet, M.-A., & Siebert, U. (2008). *Testing the acoustic tolerance of harbour porpoise hearing for impulsive sounds*. Bioacoustics, 17(1-3), 329–331.

Malibu, California.

Marine Scotland (2014). *Evaluating and Assessing the Relative Effectiveness of Acoustic Deterrent Devices and other Non-Lethal Measures on Marine Mammals.* Available at: https://www.gov.scot/publications/evaluating-assessing-relative-effectiveness-acoustic-deterrent-devices-non-lethal-measures/. Accessed on: 17 January 2021.

Marine Scotland (2015a): *Marine Noise Input: Technical Note on Underwater Noise A-100142-S20-TECH-001.* Xodus Group Ltd. Available at: http://marine.gov.scot/sites/default/files/underwater_noise_technical_assessment_a-100142-s20-tech-001-a01_0.pdf

Marine Scotland (2015b) *Brims Underwater Noise Assessment - Underwater Noise Assessment Report*, SSE Renewables Developments (UK) Ltd. Available at: http://marine.gov.scot/datafiles/lot/Brims_Tidal/Supporting_Documents/Brims%20Underwater%20Noise%20Assessment%20Report.%20Xodus%20(2015).pdf. Accessed on: 17 January 2021.

Marine Scotland (2019) *Draft Environmental Management Plan - Moray Offshore Windfarm (West) Limited - Technical Appendix 4.1*. Available at: https://www.moraywest.com/download_file/force/650/219 Accessed on: 22 February 2021.

Marine Scotland (2020) *The protection of Marine European Protected Species from injury and disturbance. Guidance for Scottish Inshore Waters.* July 2020 Version. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2020/07/marine-european-protected-species-protection-from-injury-and-disturbance/documents/marine-european-protected-species-guidance-july-2020/marine-european-protected-species-guidance-july-2020/govscot%3Adocument/EPS%2Bguidance%2BJuly%2B2020.pdf. Accessed on: 20 January 2021.

McKirdy, A (2010). *Orkney and Shetland: A Landscape Fashioned by Geology.* Scottish Natural Heritage. Available at: https://www.nature.scot/landscape-fashioned-geology-orkney-and-shetland. Accessed on: 17 January 2021.

National Physical Laboratory (NPL) (2014) *Good Practice Guide No. 133 Good Practice Guide for Underwater Noise Measurement.* Avalilable at: http://www.npl.co.uk/upload/pdf/gpg133-underwater-noise-measurement.pdf. Accessed on: 17 January 2021.

Nedwell, J.R., Parvin, S.J., Edwards, B., Workman, R., Brooker, A G., Kynoch, J.E. (2007). *Measurement and interpretation of underwater noise during construction and operation of offshore windfarms in UK waters*. Available at :

https://tethys.pnnl.gov/sites/default/files/publications/COWRIE_Underwater_Noise_Windfarm_Construction.pdf. Accessed on: 13 January 2021.

NMFS (2005). *Scoping Report for NMFS EIS for the National Acoustic Guidelines on Marine Mammals*. National Marine Fisheries Service.

NOAA (2016). *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts.* National Oceanic and Atmospheric Administration, Technical Memorandum NMFS-OPR-55, July 2016.

NOAA (National Oceanic and Atmospheric Administration) (2013). *Draft Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammals: Acoustic Threshold Levels for Onset of Permanent and Temporary Threshold Shifts*, National Oceanic and Atmospheric Administration

Reichmuth, C., Holt, M.M., Mulsow, J., Sills, J.M. and Southall, B.L., (2013). *Comparative assessment of amphibious hearing in pinnipeds*. Journal of Comparative Physiology A: Neuroethology, Sensory, Neural, and Behavioral Physiology, 199, pp:491-507.

Rossington, K., and Benson, T. (2019). *An Agent-Based Model to predict fish collisions with tidal stream turbines.* Renewable Energy, 151, pp. 1220-1229.

Rossington, K., Benson, T., Lepper, P. & Jones, D. (2013). *Eco-hydro-acoustic modeling and its use as an EIA tool.* Marine Pollution Bulletin, 75, pp. 235-243.

RSK Environmental Ltd (2012). *Rampion Offshore Windfarm: ES Section 10 - Marine Mammals.* Document 6.1.10. Prepared for E.ON Climate and Renewables UK Rampion Offshore Wind Limited.

Russel DJF, Morris CD, Duck CD, Thompson D and Hiby H (2019). *Monitoring long-term changes in UK grey seal pup production.* In *Aquatic Conservation: Marine and Freshwater Ecosystems. 2019;29(S1):24–39*

Russell, D. J. F., Hastie, G. D., Thompson, D., Janik, V. M., Hammond, P.S., Scott-Hayward, L. A. S., Matthiopoulos, J., Jones, E. L., and McConnell, B. J. (2016). *Avoidance of wind farms by harbour seals is limited to pile driving activities*, J. Appl. Ecol. 53, 1642–1652.

SCOS (Special Committee on Seals) (2019). *Scientific Advice on Matters Related to the Management of Seal Populations: 2019*. Available at http://www.smru.st-andrews.ac.uk/research-policy/scos/. Accessed on: 20 January 2020.

Scottish Government (2010). Marine (Scotland) Act 2010. Available at https://www.legislation.gov.uk/asp/2010/5/contents

Scottish Government (2013). Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013. Available at https://www.legislation.gov.uk/ssi/2013/286/contents/made

Scottish Government (2014). *The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014*. Available at https://www.legislation.gov.uk/ssi/2014/185/contents/made

Scottish Government (2015). *Scotland's National Marine Plan. A single framework for managing our seas*. Available at https://www.gov.scot/publications/scotlands-national-marine-plan/ Accessed on: 20 January 2020.

Scottish Government (2016). *Pilot Pentland Firth and Orkney Waters Marine Spatial Plan.* Available at: https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/ Accessed on: 17 January 2020.

Southall, B.L., Bowles, A.E., Ellison, W.T., Finneran, J.J., Gentry, R.L., Greene, Jr C.R., Kastak, D., Ketten, D.R., Miller, J.H., Nachtigall, P.E., Richardson, W.J., Thomas, J.A., Tyack, P.L. (2007). *Marine mammal noise exposure criteria: Initial scientific recommendations*. Aquatic Mammals 33:pp. 521.

Subacoustech (2018). *Underwater noise propagation modelling at Port of Cromarty Firth, Invergordon, Scotland*. Subacoustech Environmental Report No. P226R0103.

UK Government (1981). *The Wildlife and Countryside Act 1981 (as amended)*. Available at: https://www.legislation.gov.uk/ukpga/1981/69/contents

UK Government (1994). The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations). Available at: https://www.legislation.gov.uk/primary+secondary?title=The%20Conservation%20%28Natural%20Habitats%2C%20%26c.%29%20Regulations%20

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

Weilgart LS (2007) *The impacts of anthropogenic ocean noise on cetaceans and implications for management*. Canadian Journal of Zoology-Revue Canadienne De Zoologie 85:1091-1116.

Whyte,K. F. and Russell,D. J. F. and Sparling,C. E. and Binnerts,B. and Hastie,G. D. (2020*)* Estimating the effects of pile driving sounds on seals: Pitfalls and possibilities. The Journal of the Acoustical Society of America 147(6), 3948-3958.

This page is intentionally blank

17 Marine Water and Sediment Quality

Contents

17.1	Executive Summary	17-3
17.2	Introduction	17-4
17.3	Legislation, Policy and Guidelines	17-5
17.4	Consultation	17-9
17.5	Assessment Methodology and Significance Criteria	17-10
17.6	Baseline Conditions	17-20
17.7	Receptors Brought Forward for Assessment	17-23
17.8	Standard Mitigation	17-24
17.9	Likely Effects	17-24
17.10	Additional Mitigation and Enhancement	17-28
17.11	Residual Effects	17-28
17.12	Cumulative Assessment	17-28
17.13	Summary	17-28
17.14	References	17-31

This page is intentionally blank.

17 Marine Water and Sediment Quality

17.1 Executive Summary

17.1.1 As part of the Proposed Development there is a requirement for a new extended slipway and a new landing jetty to be constructed on the south-east of Faray. This would include works below the Mean High Water Spring (MHWS) line. This chapter provides an assessment of marine water and sediment quality impacts of this requirement for marine works.

17.1.2 The relevant components of the Proposed Development comprise:

- A new extended slipway to replace the existing facility. The existing slipway is c.20 m long by 3.5 m wide, though this was originally longer. This would be upgraded to a maximum 36 m long and 8 m wide. The design of the slipway would be sufficient to enable access by larger vessels with the bow or stern gate and would be built to a standard design for the Orkney Islands to allow access for local vessels. The slipway may require dredging to allow access to a c.600 m^2 area to the south of the slipway as indicated in Figure 17.1.
- A new landing jetty to accommodate abnormal loads. The jetty would comprise a causeway up to 55 m long and 10 m wide, terminating in square structure for docking measuring up to 20 m by 20 m. The square docking structure would likely be constructed on site from sheet piles. The causeway would be in-filled and capped-off with concrete batched onsite. The landing jetty may require dredging to allow access to a c.2400 m^2 area at the seaward end of the docking area as indicated in Figure 17.1.

17.1.3 Dredging to increase the access areas will be required for c. 3,000 m^3 of sediment. The dredge areas are provided in (Figure 17.1) to a maximum dredge depth of 1 m, which will require disposal at sea of dredged sediment. It is anticipated that the dredged material will be disposed of at a licenced disposal site close to the Proposed Development. The likely disposal site will be Stromness A. Dredging is expected to be completed in 1-2 weeks. A marine licence application has been submitted for the dredging works under the Marine (Scotland) Act 2010.

17.1.4 This chapter describes the assessment carried out to assess the potential impact of the Proposed Development on marine water and sediment quality from the proposed dredging activities. The assessments provided within this chapter are supported by a desk study of the dredging required and an estimation of the disturbance, and resettlement of sediments as a result.

17.1.5 This assessment of potential impacts on marine water and sediment quality does not include assessment of disposal on the basis that the disposal is at a site that is already an accepted and regulated activity. However, a Best Practical Environmental Options (BPEO) has been prepared to accompany the dredging marine licence application. This includes an assessment of alternative options, outlining why disposal at sea was determined as the BPEO in this instance. In addition, as requested by the Northern Lighthouse Board (NLB), disposal plans will be included within the Port Management Plan (see Chapter 18 for further details).

17.1.6 A survey to collect sediment samples, which was subsequently subjected to Particle Size Analysis (PSA) and contaminants at an accredited laboratory, show that the material to be dredged is almost entirely sand with a very low content of fine material.

17.1.7 Sand particles released into the water column during the dredging activity will re-deposit onto the bed within a few hundred metres of the dredging. The desk study estimates the distribution of this re-depositing sediment by considering the rate at which these sand particles will fall back onto the bed and the distance moved by the sand particles (under the influence of tidal currents) over that period. The release of sand particles is estimated to be 5% of the material that would be dredged (though this figure will reduce depending on the prevalence of sandstone boulders). This means that

around 150 m^3 of sand will be deposited, a portion of which will redeposit in the dredging areas and be re-dredged.

17.1.8 The estimated depths of sand deposition are in the region of:

- 8-14 mm within 50 m of the slipway and causeway,
- 2-8 mm within 50-150 m of the slipway and causeway; and,
- falling to below 1 mm at a distance of 200 m.

17.1.9 The levels of sediment deposition as a result of the dredging activity is likely to result in a temporary **minor and not significant** effect within 150 m of the dredging activity and will reduce to **negligible and not significant** at distances further than that.

17.1.10 The chemical analysis of the sediment samples collected as part of the planning process, show that sediment in the areas to be dredged contains very low concentrations (or below levels of detection) of heavy metal, organotin, polyaromatic hydrocarbons, polychlorinated biphenyls and pesticides. Where chemicals were found in very low concentrations, all were well below the all available action levels, such as Marine Scotland action levels and the Canadian temporary effect level, in most cases by an order of magnitude lower.

17.1.11 On this basis there is considered to be **no effect** on water quality chemical parameters as a result of the dredging activity and a **negligible and not significant effect** during the limited time period required for the dredging for suspended sediments.

17.2 Introduction

17.2.1 This chapter describes and evaluates impacts from dredging in marine water and sediment quality associated with the construction of the new extended slipway and landing jetty. It documents the baseline conditions, includes an assessment of the likely effects of dredging on marine water and sediment quality and defines mitigation measures where significant effects are predicted.

17.2.2 As part of the Proposed Development there is a requirement for a new extended slipway and a new landing jetty to be constructed on the south-east of Faray, this would include dredging works below the Mean High Water Spring line (MHWS). Under the Marine (Scotland) Act 2010, an application for a marine licence will be submitted to Marine Scotland (MS-LOT) for the dredging works below MHWS. The structures are illustrated in Figure 17.1.

17.2.3 The specific objectives of this chapter are to:

- Describe the marine water and sediment baseline conditions below MHWS.
- Summarise the scope of the marine water and sediment assessment.
- Assess the magnitude of the impacts and significance of effect on marine water and sediment due to the dredging activity. The assessment draws upon a Dredging Desk Study (Appendix 17.2) carried out by HR Wallingford and also includes an assessment of sediment sample analysis.
- Provide additional mitigation measures to address significant effects (if applicable) and assess any residual effects.
- Provide an impact assessment for marine water and sediment receptors, to accompany the marine licence application.

17.2.4 This chapter has been authored by HR Wallingford and ITPEnergised (ITPE) and is supported by the following appendices:

- Appendix 17.1 – Marine Water and Sediment Quality Inception Report.
- Appendix 17.2 – Dredging Desk Study.
- Appendix 17.3 – Sediment Sample Plan and Marine Scotland approval.
- Appendix 17.4 – Sediment Sample Analytical Report.

Statement of Competence

17.2.5 This chapter has been prepared by John Bleach of HR Wallingford and reviewed by Gemma Tait of ITPE.

17.2.6 John Bleach (MSc, BSc) is a Principle Marine Ecologist Consultant at HR Wallingford, with over 17 years' experience in the marine and freshwater field, including EIA, marine monitoring and marine policy.

17.2.7 Gemma Tait (MA, MSc) is a Principal Environmental Consultant at ITPE, an EIA specialist with over 10 years' experience.

Proposed Development

17.2.8 As discussed in Chapters 3 and 12, the following construction works would include works below MHWS.

New Extended Slipway

17.2.9 A new extended slipway would be required to replace the existing facility would need to be replaced regardless of the Proposed Development as the current slipway is badly damaged and access to the island is still required for agricultural purposes. The new extended slipway would be built in the same location as the existing slipway. It would be refurbished and extended to allow for preliminary site works to be undertaken. The design of the slipway would be sufficient to enable access by larger vessels with the bow or stern gate and would be built to a standard design for the Orkney Islands to allow access for local vessels. The extant slipway is c.20 m long by 3.5 m wide, though this was originally longer. This would be upgraded to a maximum 36 m long and 8 m wide.

New Landing Jetty

17.2.10 The new landing jetty will accommodate abnormal loads, such as turbine components. The jetty would comprise a causeway up to 55 m long and 10 m wide, terminating in a square structure for docking measuring up to 20 m by 20 m. The square docking structure would likely be constructed on site from sheet piles. The causeway would be in-filled and capped-off with concrete batched onsite.

17.2.11 Localised dredging will be required for the construction of both the slipway and the jetty, in addition there is the potential for dredging to allow for vessel access to the jetty. Locations of dredging required at these two structures are shown in Figure 17.1. An estimated dredging of up to 3,000m^3 of sand will be required, taking 1-2 weeks to complete.

17.3 Legislation, Policy and Guidelines

17.3.1 Relevant legislation, policy and guidance documents have been reviewed and taken into account as part of this assessment. Of particular relevance are:

- Council Directive 2014/89/EU establishing a framework for maritime spatial planning (Marine Spatial Planning Directive);

- Council Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive, MSFD);
- Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy (Water Framework Directive);
- Council Directive 2006/7/EC monitor and assess bathing waters and inform the public about bathing water quality and beach management (Bathing Waters Directive);
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (the Habitats Directive);
- Council Directive 2013/39/EU Priority Substances Directive;
- Marine (Scotland) Act 2010;
- The Marine Strategy Regulations 2010;
- Water Environment and Water Services (WEWS) (Scotland) Act 2003;
- The International Convention for the Prevention of Marine Pollution by Ships 73/78 (IMO) (MARPOL);
- Bathing Waters (Scotland) Amendment Regulations 2012;
- Marine Scotland Action Levels for the disposal of dredged material (Marine Scotland, 2017);
- Scotland's National Marine Plan (NMP) (Scottish Government, 2015);
- The Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016);
- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations); and
- The Wildlife and Countryside Act 1981 (as amended) (WCA).

Legislation

Marine Strategy Framework Directive

17.3.2 Under the Marine Strategy Regulations 2010, which ratify the MSFD into UK law, the Secretary of State and devolved authorities must take necessary measures to achieve or maintain "good environmental status". Good environmental status is defined within the regulations as*: "the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations, i.e.Contaminants are at a level not giving rise to pollution effects."*

Marine Licence

17.3.3 Under the Marine (Scotland) Act 2010, two applications for marine licences will be submitted to MS-LOT for the Proposed Development works below the MHWS. Namely one application for construction and a separate application for the dredging works associated with the new extended slipway and new landing jetty.

17.3.4 This chapter details the assessment which will accompany the dredging marine licence application. In line with the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013, a pre-application consultation event was held for the marine licensable activities on 4th March 2021. Comments received have been considered and detailed within a pre-application consultation report which will accompany the marine licence applications.

Water Framework Directive

17.3.5 The Water Framework Directive (WFD) was designed to produce an integrated approach to the protection, improvement and sustainable use of Europe's water bodies, which requires surface water bodies, such as lakes, streams, rivers, estuaries, and coastal waters, and groundwater bodies to be ecologically sound (i.e. achieving Good Ecological Status) by 2015.

17.3.6 In 2003, the WFD was transposed into Scottish law by the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act). The Act created a new River Basin Management Planning (RBMP) process to achieve environmental improvements to protect and improve the water environment in a sustainable way. In addition, it provides a framework of regulations designed to control any activities likely to have an impact on the water environment.

17.3.7 The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (commonly known as CAR), were introduced under the WEWS Act. In Scotland, SEPA regulates activities which impact on the water environment, including activities such as discharges to groundwater, discharges to surface water, abstractions and removal of sediments. Under the WFD, water quality is monitored out to three nautical miles (nm) in coastal waters.

Priority Substances Directive

17.3.8 One of the WFD assessment areas is for chemicals that may be contained within the water. The level of chemicals found within water samples are assessed against a number of Environmental Quality Standards (EQS). The EQSs are under the Priority Substances Directive (PSD) and, where relevant, the limit values originally under the Dangerous Substances Directive (DSD), establish the water quality standards for WFD compliance.

17.3.9 Accordingly, these EQSs are used as reference criteria in the assessments of the Proposed Development's potential impacts on water quality and are identified in Section 17.5 below.

Planning Policy

Scottish NMP

17.3.10 The Scottish NMP sets out strategic policies for the sustainable development of Scotland's marine resources out to 200 nm, taking into account various EU Directives on marine management, including those listed above, and the Marine (Scotland) Act 2010. The following General Policies of the NMP are applicable to this assessment (Scottish Government, 2015):

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

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

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

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

- GEN 12 Water quality and resource: Developments and activities should not result in a deterioration of the quality of waters to which the Water Framework Directive, Marine Strategy Framework Directive or other related Directives apply.

- GEN 18 Engagement: *"Early and effective engagement should be undertaken with the general public and all interested stakeholders to facilitate planning and consenting processes".*

- GEN 21 Cumulative impacts: *"Cumulative impacts affecting the ecosystem of the marine plan area should be addressed in decision making and plan implementation".*

Pilot Pentland Firth and Orkney Waters Marine Spatial Plan

17.3.11 To satisfy the requirements of the Scottish NMP, the planning policy for Orkney is covered under the Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (Scottish Government, 2016) developed by a collaboration between Marine Scotland, Orkney Islands Council and Highland Council. This planning policy, referred to hereon as 'the Plan', sets out an integrated planning policy framework to guide marine development, activities and management decisions, whilst ensuring the quality of the marine environment is protected.

17.3.12 Under General Policy 5A (Water Environment) of the Plan, it is a requirement that applications for a marine development or an activity that a project:

- does not cause any water body to deteriorate in status nor prevent the achievement of established objectives set out in the RBMP for the Scotland river basin district;
- where possible, towards objectives improve the ecological status of coastal water bodies and the environmental status of marine waters;
- does not cause deterioration in the standard of waters designated under European Commission Directives and national legislation;
- is accompanied by sufficient information to enable a full assessment of the likely effects, including cumulative effects, on the water environment; and
- has taken into account existing activities in the proposed location for development and undertaken early consultation to ensure that activities that may not be compatible (e.g. development of an incompatible activity near an established legitimate activity, such as a licensed discharge) are not located together.

17.3.13 Currently, all water bodies in the Plan area are at "good ecological status" and any development or use of the marine environment should not cause a deterioration in this status.

Guidance

Marine Scotland Action Levels

17.3.14 Marine Scotland guideline Action Levels (Marine Scotland, 2017) for the disposal of dredged material are not statutory contaminant concentrations for dredged material but are used as part of a weight of evidence approach to decision-making on the disposal of dredged material to sea. These values are used in conjunction with a range of other assessment methods as well as historical data and knowledge regarding the dredging site, the material's physical characteristics, the disposal site characteristics and other relevant data, to make management decisions regarding the fate of dredge material.

17.3.15 The Action Levels are therefore not 'pass/fail' criteria but triggers for further assessment. In general, contaminant levels in dredged material below Action Level 1 are of no concern and are unlikely to influence the licensing decision. However, dredged material with contaminant levels above Action Level 2 is generally considered unsuitable for sea disposal. Dredged material with contaminant levels between Action Levels 1 and 2 requires further consideration and testing before a decision can be made.

Canadian Sediment Quality Guidelines (CSQGs)

17.3.16 The CSQGs were developed by the Canadian Council of Ministers of the Environment (CCME) as broadly protective tools to support the functioning of healthy aquatic ecosystems (CCME, 2001). The CSQGs have been derived from an extensive database containing direct measurements of the toxicity of contaminated sediments to a range of aquatic organisms exposed in laboratory tests and under field conditions (CCME, 2001). As a result, the CSQGs provide an indication of likely toxicity of sediments to aquatic organisms.

17.3.17 Although this chapter of the EIA Report does not consider the potential impacts on biological receptors (see Chapter 16), the CSQGs are useful reference criteria for establishing baseline sediment quality conditions and for indicating the potential for the Proposed Development to have impacts on marine sediment and water quality during activities; albeit noting that the CSQGs were designed specifically for use in Canada and are based on the protection of unmodified environments.

17.4 Consultation

Summary of Consultation

17.4.1 A summary of consultation undertaken to date is provided in Table 17.1, full details are provided in Appendix 4.4.

Table 17.1 – Consultation Relevant to the Marine Assessment

Consultee	Summary of consultation	Key consultee comments	Applicant action
MS-LOT	Communication following submission of the sediment plan to MS-LOT, replied on 4 March 2021.	Sediment sampling plan (which is required to assess impacts from dredging) approved.	Results from sediment sampling survey are included in this Chapter (Chapter 17: Marine Water and Sediment Quality) which assesses the impacts associated with dredging.
NatureScot	Methodology of assessment of impacts to marine water and sediment quality shared with NatureScot on the 26th of March 2021 for comment.	NatureScot advised that the scope seemed reasonable, but that SEPA/Marine Scotland would usually provide comment on this.	No action required as scope was also shared with Marine Scotland and due to SEPA's ongoing issues following their cyberattack in December 2020 they are not contactable and advise to follow available guidance.
MS-LOT	Methodology of assessment of impacts to marine water and sediment quality shared with MS-LOT on the 26th of March 2021 for comment.	MS-LOT advised that the methodology and assessment appears to be proportionate to the level of the dredge and assumptions made about potential for contamination and sediment movement. However, MS-LOT noted that this is not an official scoping response and that the methodology has not been consulted upon with	Coastal processes are discussed in Chapter 18: Other Issues.

Consultee	Summary of consultation	Key consultee comments	Applicant action
		other stakeholders or Marine Scotland science. The inclusion of coastal processes was also queried, with MS-LOT stating that the EIA should provide information on the scoping out of this topic.	

17.5 Assessment Methodology and Significance Criteria

Introduction

17.5.1 A number of statutory standards and non-statutory guidelines have been used as quantifiable criteria to assist in the assessment of potential impacts of the Proposed Development on marine sediment and water quality. The statutory standards are related to water quality (e.g. EQSs), whereas the non-statutory guidelines are related to sediment quality (e.g. Marine Scotland Action Levels (ALs)). They are identified in Table 17.2 and are described in more detail in the following paragraphs.

Table 17.2 - Directives and Industry Guidance Used as Impact Assessment Criteria for Marine Sediment and Water Quality

Forecasting methodology	Relevance to the impact assessment
Dangerous Substances Directive (DSD)	Water Quality: Compliance with these standards forms the basis of good surface water chemical status under the WFD
Priority Substances Directive (PSD)	Water Quality: Compliance with these standards forms the basis of good surface water chemical status under the WFD
Marine Scotland Action Levels (ALs)	Sediment Quality: To inform the baseline sediment quality survey, and to assess the level of contamination in marine sediments
Canadian Sediment Quality Guidelines (CSQGs) for the Protection of Aquatic Life (CCME, 2001)	Sediment Quality: To assess the level of contamination in marine sediments

Environmental Quality Standards

17.5.2 The EQSs under the PSD and, where relevant, the limit vales under the DSD establish the water quality standards for WFD compliance, both within freshwater and seawater. Accordingly, these EQSs are used as reference criteria in the assessments of the Proposed Development's potential impacts on marine water quality and are identified below.

17.5.3 The EQSs under the PSD and DSD for selected List I substances (substances for which uniform emission standards are stipulated) are shown in the Table 17.3.

Table 17.3 - Selected List I Dangerous Substances (Annual Averaged EQS Type)

Substance	EQS under PSD (µg/l)	EQS under DSD (µg/l)
Mercury (dissolved)	0.05	0.3
Cadmium (dissolved)	0.2	0.25
HCH (Lindane)	0.002	0.02
Total DDT	0.025	0.025
ppDDT	0.01	0.01
Pentachorophenol	0.4	2
Aldrin	0.005	0.01
Dieldrin	0.005	0.01
Endrin	0.005	0.005
Isodrin	0.005	0.005
Totaal 'Drins'	-	0.03
Hexachlorobenzene	0.01	0.03
Hexachlorobutadiene	0.1	0.1
Carbon tetrachloride	12	12
Chloroform	-	12
1,2-dichloroethane	10	10
Trichloroethyleme	10	10
Perchloroethylene	-	10
Trichlorobenzene	0.4	0.4

17.5.4 The EQSs for selected List II substances (substances for which member states have determined EQSs) are shown in Table 17.4 below. The table also includes relevant EQSs under the PSD (where they exist).

Table 17.4 - Selected List II Dangerous Substances

Substance	EQS type	EQS under PSD (µg/l)	EQS under DSD (µg/l)
Arsenic (dissolved)	Annual average	-	25
Chromium (dissolved)	Annual average	-	15
Copper (dissolved)	Annual average	-	5
Lead (dissolved)	Annual average	7.2	25
Nickel (dissolved)	Annual average	20	30
Tributyl tin (TBT)	Maximum concentration	0.0002	0.002
Zinc (total)	Annual average	-	40

Marine Scotland Action Levels (ALs)

17.5.5 The ALs are, in effect, quantified sediment quality guidelines (i.e. not statutory standards) that are used to assess the suitability of dredged material for disposal at sea in relation to marine licensing within Scottish waters (Marine Scotland, 2017).

17.5.6 It is likely that the Proposed Development will require the disposal of dredged sediments. The assessment of potential impacts on marine water and sediment quality provided within this chapter does not include assessment of disposal on the basis that the disposal is at a site that is already an accepted and regulated activity. However, the ALs provide useful reference criteria for establishing baseline sediment quality conditions and for indicating the potential for the Proposed Development to have impacts on marine sediment and water quality in the vicinity of the dredging to be conducted.

17.5.7 The ALs comprise two action levels (AL1 and AL2; Table 17.5) that are used to identify the following decision-making responses with regard to the suitability of dredged material for disposal at sea in relation to the receiving marine environment (Marine Scotland, 2017):

- Below AL1 - contaminants in the sediment/dredged material are generally of no concern and are unlikely to influence a decision about disposal at sea (i.e. the sediment is generally uncontaminated);
- Between AL1 and AL2 - contaminants in the sediment/dredged material require further consideration and testing before a decision can be made about sea disposal (i.e. the sediment is contaminated, and may potentially be significantly contaminated); and,
- Above AL2 - contaminants in the sediment/dredged material are generally considered unsuitable for sea disposal (i.e. significantly contaminated).

Table 17.5 - Marine Scotland ALs (Marine Scotland, 2017)

Contaminant	Revised AL1 mg/kg dry weight (ppm)	Revised AL2 mg/kg dry weight (ppm)
Arsenic (As)	20	70
Cadmium (Cd)	0.4	4
Chromium (Cr)	50	370
Copper (Cu)	30	300
Mercury (Hg)	0.25	1.5
Nickel (Ni)	30	150
Lead (Pb)	50	400
Zinc (Zn)	130	600
Tributyltin	0.1	0.5
Polychlorinated Biphenyls	0.02	0.18
Polyaromatic Hydrocarbons		
Acenaphthene	0.1	
Acenaphthylene	0.1	
Anthracene	0.1	
Fluorene	0.1	
Naphthalene	0.1	
Phenanthrene	0.1	
Benzo[a]anthracene	0.1	
Benzo[b]fluoranthene	0.1	
Benzo[k]fluoranthene	0.1	
Benzo[a]pyrene	0.1	
Benzo[g,h,i]perylene	0.1	
Dibenzo[a,h]anthracene	0.01	

Contaminant	Revised AL1 mg/kg dry weight (ppm)	Revised AL2 mg/kg dry weight (ppm)
Chrysene	0.1	
Fluoranthene	0.1	
Pyrene	0.1	
Indeno (1,2,3cd) pyrene	0.1	
Total hydrocarbons	100	

Canadian Sediment Quality Guidelines (CSQGs)

17.5.8 The CSQGs comprise two effects levels (i.e. threshold effect levels (TELs) and probable effect levels ((PELs); Table 17.6) that are used to identify the following three ranges of chemical concentrations in sediments with regard to biological effects (CCME, 2001):

- Below the TEL - the minimal effect range within which adverse effects rarely occur;
- Between the TEL and PEL - the possible effect range within which adverse effects occasionally occur;
- Above the PEL - the probable effect range within which adverse effects frequently occur.

17.5.9 The CSQG TEL are a useful assessment tool as they provide some additional considerations to the more standard set of criteria set out in the ALs. For example there is a more refined list of PAH levels when compared to the blanket AL1 of 0.1 mg/kg for all PAHs (except Dibenzo[a,h]anthracene which has an AL1 of 0.01 mg/kg). They also provide a second level as well, the PEL as there is no associated AL2 for PAHs.

Table 17.6 - Selected CSQG Values (CCME, 2001)

Substance	Units	ISQG/TEL	PEL
Metals			
Arsenic	mg/kg	7.24	41.6
Cadmium	mg/kg	0.7	4.2
Chromium	mg/kg	52.3	160
Copper	mg/kg	18.7	108
Lead	mg/kg	30.2	112
Mercury	mg/kg	0.13	0.7
Zinc	mg/kg	124	271

Substance	Units	ISQG/TEL	PEL
Polychlorinated biphenyls (PCBs)			
PCBs: total PCBs	mg/kg	21.5	189
Polyaromatic hydrocarbons (PAHs)			
Acenaphthene	µg/kg	6.71	88.9
Acenaphthylene	µg/kg	5.87	128
Anthracene	µg/kg	46.9	245
Benz(a)anthracene	µg/kg	74.8	693
Benzo(a)pyrene	µg/kg	88.8	763
Chrysene	µg/kg	108	846
Dibenzo(a,h)anthracene	µg/kg	6.22	135
Fluoranthene	µg/kg	113	1494
Fluorene	µg/kg	21.2	144
2-Methylnaphthalene	µg/kg	20.2	201
Naphthalene	µg/kg	34.6	391
Phenanthrene	µg/kg	86.7	544
Pyrene	µg/kg	153	1398

Scope of Assessment

17.5.10 The scope of the assessments required for this marine water and sediment quality chapter, is provided in more detail within a supplementary report: Marine Water and Sediment Quality – Inception Report (HR Wallingford, 2021) (provided in Appendix 17.1). The inception report was shared with NatureScot and Marine Scotland on 26 March 2021 as part of the consultation process. Feedback from both regulators confirmed they were generally satisfied with the scope of the assessment as provided in the Inception Report.

17.5.11 The relevant receptors that are considered are:

- Marine water quality; and
- Marine sediment quality.

17.5.12 The assessment of potential impacts on these two receptors includes consideration of potential for increases in suspended sediment concentration and the potential for resuspension of chemicals that may be associated with the sediments to be dredged, within the vicinity of the Proposed Development.

17.5.13 In addition, this chapter also considers the potential impacts of accidental spills and leaks on marine water and sediment quality.

17.5.14 The approach to assessing impacts is guided by the use of an Impact Assessment Matrix (IAM) that establishes a consistent framework for determining impact significances by considering the sensitivity and value of a receptor along with the magnitude of the effect to which the receptor is exposed. The approach to assessing impacts takes into account the likelihood (i.e. probability) that a receptor will be exposed to the effect.

17.5.15 It should be noted that this assessment will not consider secondary effects upon other human or ecological receptors, as these are addressed elsewhere in the EIA Report, as required.

17.5.16 Construction will require local capital dredging at the Proposed Development site, likely to be conducted by a backhoe dredger, supported by a barge, which have the potential to have local and temporary effects upon marine water and sediment quality. This will be mainly by sediment disturbance from dredging activity and this is the focus of this assessment.

17.5.17 In terms of timing, frequency and duration of the impact, it is estimated that it will take between one to two weeks for the entire dredging activity to be completed, with dredging occurring during daylight hours only. Because of the limited duration of the works the impact of the works the resultant effects are likely to be temporary. Therefore, the construction stage is the main focus of this assessment.

17.5.18 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the effects would be less than that of construction as dredging would not be required for decommissioning. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan. This is discussed in this assessment.

Study Area

17.5.19 The new slipway and landing jetty will be situated on the south-east end of the island of Faray. As discussed in Chapter 8, the Proposed Development site partially overlaps with the Faray and Holm of Faray SAC and SSSI, shown in Figure 8.1. The area considered for the assessment of marine water and sediment quality is the area over which sediment, disturbed by the proposed dredging, has the potential to travel and settle. A study area of 2 km is considered sufficient for this assessment.

Assessment of Effects

17.5.20 Significance of effects has been determined using the methods outlined in Chapter 4. To summarise, as shown in Table 4.1, the magnitude of the impact and sensitivity of receptor are considered in order to determine if the effects are of major, moderate, minor or negligible significance. Table 4.1 has been repeated in Table 17.7 for reference.

Table 17.7 - Guide to the Inter-Relationship between Magnitude of Impact and Sensitivity of Receptor

		Sensitivity of Receptor / Receiving Environment to Change			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Impact/Change	**High**	major	moderate to major	minor to moderate	negligible
	Medium	moderate to major	moderate	minor	negligible
	Low	minor to moderate	minor	negligible to minor	negligible
	Negligible	negligible	negligible	negligible	negligible

Magnitude of Impact

17.5.21 The magnitude of a potential impact is defined by the extent of environmental change caused by the development. The extent of change can be defined by the area over which the impact occurs (i.e. the spatial dimension of the impact), the duration over which the impact occurs (i.e. the temporal dimension of the impact), and the reversibility of an impact (i.e. whether the impact is reversible (e.g. due to natural recovery, or intervention to mitigate the impact), or is irreversible).

17.5.22 Table 17.8 identifies the guideline descriptions for the range of impact magnitudes used in this Chapter. Impact magnitude has been categorised with reference to the definitions in Table 17.8, this is based on the methods used in Chapter 4.

Table 17.8 – Impact Magnitude

Magnitude of impact	Definition
Negligible	Noticeable but very small scale change or barely discernible changes to a marine physical process receptor over a small part of the development area and potentially beyond. A temporary effect on water or sediment quality standards whose magnitude may be detectable but would not cross threshold levels. Indicatively, those effects potentially extending <0.5 km from the Proposed Development.
Low	Noticeable but small scale changes to a marine physical process receptor over part of the development area and potentially beyond. A temporary effect on water or sediment quality standards whose magnitude are detectable but would not risk exceedance of threshold levels. Indicatively, those effects potentially extending 0.5-1 km from the Proposed Development.

Magnitude of impact	Definition
Medium	Medium scale changes to a marine physical process receptor over the majority of the development area and potentially beyond. A temporary effect on quality standards that may cross water or sediment threshold levels. Indicatively, those effects potentially extending 1-3 km from the Proposed Development.
High	Large scale changes to a marine physical process receptor over the whole development area and potentially beyond. A permanent effect on quality standards or potential risk of downgrades to water body status. Indicatively, those effects potentially extending over >3 km from the Proposed Development.

Sensitivity and Value

17.5.23 The sensitivity and value of receptors in relation to marine sediment and water quality is shown in Table 17.9. Unlike some other environmental receptors, there are not generally attributable values for seawater quality receptors. Nonetheless, in order to provide as transparent an assessment as possible, receptor values have been identified in Table 17.9. These values are often related to other topic receptors.

Table 17.9 - Receptor Value and Sensitivity for Marine Water and Sediment Quality

Value and sensitivity	Example receptor value and sensitivity
High	**Value:** The presence of designated sites for water quality (e.g. designated bathing waters, shellfish waters) or coastal geological interest. The presence of other protected sites that are reliant on water or sediment quality (SACs, SPAs etc). Many pathways for environmental change exist between the project activities and receptors. Critical social or economic uses, e.g. water supply. WFD classification of 'high'. **Sensitivity:** No available headroom within EQS for a particular chemical or group of chemicals.
Medium	**Value:** Supports aquatic species that are protected by national or international law. Few pathways for environmental change exist between the project activities and receptors. Receptor is close to threshold levels and does not show wide natural variability. Important social or economic uses, e.g. water supply. WFD classification of 'good'. **Sensitivity:** Low available headroom within EQS for a particular chemical or group of chemicals.
Low	**Value:** Receptor is not protected by specific water quality designations but is protected by wider water quality legislation. Limited or no pathways from between the project and receptors. Receptor is well

Value and sensitivity	Example receptor value and sensitivity
	within threshold levels and/ or is subject to wide natural variability. WFD classification of 'moderate' **Sensitivity:** Medium available headroom within EQS for a particular chemical or group of chemicals.
Negligible	**Value:** The receptor is tolerant of any changes which may occur and has no legislative thresholds controlling it. No pathways exist under which the receptor could be exposed to the project's activities under consideration. WFD classification of 'fail'. **Sensitivity:** Almost all available headroom within EQS for a particular chemical or group of chemicals.

17.5.24 To note, the sensitivity criteria provided above is not necessarily linked to the overall WFD water body status. For example, a waterbody may be at 'high' status, however have very little headroom for a number of chemical EQSs (headroom denotes how close to the EQS level the waterbody is for a particular chemical), and as such is highly sensitive. However, it may also be at 'high' status and have a lot of available headroom for a number of chemical EQSs, and therefore have much lower sensitivity to change.

Requirements for Mitigation

17.5.25 If significant likely effects are identified appropriate mitigation will be implemented to remove and reduce the significance of the effects where possible.

Assessment of Residual Impact Significance

17.5.26 Where the potential for a moderate to major effect was identified, further investigation of effects using appropriate additional mitigation measures, was undertaken and the residual impact identified. Residual impacts are assessed following a similar methodology as the likely effects but taking into consideration the identified mitigation.

Limitations to Assessment

17.5.27 There are a number of limitations to the data availability and uncertainties over the construction method, which mean that a relatively conservative approach has been adopted to the assessment. These limitations are:

- Sediment releases from dredging during the construction activities have been assessed via a desk study on sediment dispersion and settling rates, based on the low-risk nature of the dredging associated with the slipway and jetty. The desk assessment can be seen in Appendix 17.2 - Dredging Desk Study.
- The detailed specifics of the dredging method will be dependent on future procurement of contractors and are not known at the time of writing (May 2021), therefore appropriate professional judgement has been used to estimate a likely and suitable dredger to complete the works (Appendix 17.2 - Dredging Desk Study).

17.6 Baseline Conditions

Overview

17.6.1 The site comprises the island of Faray, an uninhabited island to the north and west of Eday and south-east of Westray in the Orkney Islands. A smaller uninhabited island Holm of Faray is immediately to the north and can be reached from Faray on foot at low tide. Faray is approximately 17 km north-east of the Mainland of Orkney, and approximately 25 km from Kirkwall. The island extends to approximately 168 hectares (ha) and is centred on British National Grid (BNG) 353112, 1036752 (refer to Figure 1.1).

WFD Waterbody Classification

17.6.2 The Proposed Development is located within the Westray Firth which is a coastal water body (ID: 200243) in the Scotland river basin district. It is 378.5 square kilometres in area. The waterbody has an overall status of 'good', with an overall ecology status of 'good', a hydromorphology status of 'good' and chemical status of 'high' (SEPA, 2018). As reported by SEPA (2018), the water body is expected to maintain this status in 2021 and 2027. Full classification details of this waterbody are provided in Table 17.10.

Table 17.10 - Classification Status of Westray Firth Coastal Water Body (ID: 200243) in 2018

WFD Parameter	Status
Overall status	Good
Overall ecology	Good
Physio-Chem	High
Dissolved Oxygen	High
Dissolves inorganic nitrogen	High
Biological elements	Good
Invertebrate animals	Good
Benthic invertebrates (IQI)	Good
Macroalgae	High
Phytoplankton	High
Specific pollutants	Pass
Unionised ammonia	Pass
Hydromorphology	High
Morphology	High

Bathing Waters

17.6.3 The Proposed Development is not located near any bathing waters. There are no classified bathing waters in Orkney (Orkney Island Council, 2020).

Shellfish Waters

17.6.4 The Proposed Development is not located near any shellfish waters. There are no classified shellfish waters in Orkney (Orkney Island Council, 2020).

Designated Nature Conservation Sites

17.6.5 The Proposed Development partially overlaps the Faray and Holm of Faray SAC and SSSI (JNCC, 2020), which is designated for grey seals. The site is of particular importance to breeding seals, supporting the second-largest breeding colony in the UK and is one of the most important breeding and haul out sites for grey seal in Orkney (Figure 8.1).

17.6.6 There are no other designated nature conservation sites within 2 km.

Suspended Sediment Concentrations

17.6.7 Measurements of background suspended sediments in the Orkney area are limited but satellite-based measurements of sea surface suspended sediment concentrations are available (Marine Scotland, 2020). These show that sediment concentrations at the surface at Orkney are generally in the region of 1 mg/l but increase up to 3 mg/l at times.

Sediment Quality

17.6.8 A diver sediment collection survey was completed by Leask Marine Limited on 24 March 2021 to obtain surface sediment samples to determine the particle size of sediments present at the Proposed Development site and to determine if there are any contaminants present within the material to be dredged.

17.6.9 A sediment sampling plan was shared with MS-LOT (see Table 17.1 and Appendix 17.3) and was approved as being suitable and sufficient for the Proposed Development. Locations of the sampling can be seen on Figure 17.1.

17.6.10 A geotechnical site investigation survey was subsequently undertaken in April 2021. Using handheld cores, sediment cores within the footprint of the dredge area were collected (Figure 17.1). Sediment samples were then sent to a certified laboratory (James Hutton Limited) for chemical and physical analysis.

17.6.11 The results of the chemical and physical analysis can be seen in the Appendix (Appendix 17.4 - Sediment sample analytical report). A summary of the results is provided below for ease.

Particle Size Analysis (PSA)

17.6.12 The PSA show that the sediment present are almost entirely made up of sands, which range from very fine sand up to very coarse sand, but in general mostly fine-medium sand. There are very low amounts of fine material (silts and clays) within the sediment samples.

Heavy Metals and Organotins

17.6.13 Concentrations of heavy metals were found to be low at all four sample locations. The average concentration of each metal and organotin (averaged from the four samples taken) is shown in Table 17.11 and an assessment made against each AL or CSQG criteria. In the case of CSQG criteria, the temporary effect level (TEL) is used as levels are very low and would not require assessment against the permanent effect level (PEL).

Table 17.11 - Average Metals and Organotin Concentrations and Assessment Against ALs and CSQG

Contaminant	Average sediment concentration (mg/kg)	Assessment against criteria (AL and CSQG given in brackets in mg/kg)
Arsenic (As)	1.63	Below AL1 (20) and below TEL (7.24)
Cadmium (Cd)	0.045	Below AL1 (0.4) and below TEL (0.7)
Chromium (Cr)	5.45	Below AL1 (50) and below TEL (52.3)
Copper (Cu)	0.833	Below AL1 (30) and below TEL (18.7)
Mercury (Hg)	<LOD	Below AL1 (0.25) and below TEL (0.13)
Nickel (Ni)	2.82	Below AL1 (30). There is no TEL for Nickel
Lead (Pb)	0.92	Below AL1 (50) and below TEL (30.2)
Zinc (Zn)	3.98	Below AL1 (130) and below TEL (124)
Tributyltin	<LOD	Below AL1 (0.1)

17.6.14 Levels of heavy metals and organotins contaminants were very low, or below the levels of detection (for mercury and tributyltin) and are therefore not of concern.

Polyaromatic Hydrocarbons

17.6.15 Levels of polyaromatic hydrocarbons (PAH) were generally found to be below the level of detection (LOD) for all analysed PAHs, except for naphthalene (average of two samples of 6.5 µg/kg) and phenanthrene (one sample of 5 µg/kg), which were present just over the LOD.

17.6.16 The AL1 for PAHs is 100 µg/kg. As such the levels detected for the two chemicals identified above are an order of magnitude lower than the AL1. The corresponding CSQG TEL is 34.6 µg/kg (naphthalene) and 86.7 (phenanthrene), for the two chemicals that were detected above the LOD.

17.6.17 Levels of PAH contaminants were very low, or below the levels of detection and are therefore not of concern.

Polychlorinated Biphenyls

17.6.18 Levels of polychlorinated biphenyls (PCB) were all found to be below the level of detection and are therefore not of concern.

Organochlorine/Organophosphorus Pesticide

17.6.19 Overall, samples were not found to contain detectable pesticides. One sample (Location 1) did contain detectable levels of tributylamine. This compound is reported to be used as an insecticide besides having other uses. Overall, the levels of pesticides are therefore not of concern.

17.7 Receptors Brought Forward for Assessment

17.7.1 The assessment focuses on the two receptors of marine water quality and sediment quality. The sensitivity and value for these two receptors are provided below.

Marine Water Quality

17.7.2 The sensitivity and value for the marine water quality receptor are:

- Medium value – as there are no designations that rely on water quality, however there are aquatic species present that are listed as Priority Marine Features (PMFs), which are species and habitats identified as being of conservation importance in Scotland, specifically, seagrass (see Chapter 18 for further details);
- Low sensitivity – as the WFD classification for the area is generally high or good and chemical concentrations are generally not close to their EQS level.

Marine Sediment Quality

17.7.3 The sensitivity and value for the sediment quality receptor are:

- Medium value – as there are no designations that rely on sediment quality, however there are PMFs present (seagrass – see Chapter 18);
- Low sensitivity – as there are very low levels of chemicals within the sediments present and as such they are very far from any levels of concern.

17.7.4 The impacts brought forward for the assessment of the Proposed Development on marine water and sediment quality are:

- Impact of dredging during construction on marine water quality – suspended sediment parameters;
- Impact of dredging during construction on marine water quality – chemical parameters;
- Impact of dredging during construction on marine sediment quality – chemical parameters and deposition parameter; and
- Impacts of accidental spills and leaks during construction on marine water and sediment quality.

Consideration is given to the above construction impacts and also to the potential impacts during operation and decomissioning of the Proposed Development in the sections below.

Future Baseline

17.7.5 It is important to recognise that the baseline physical environment does not remain static and may exhibit considerable variability due to cycles of natural change. This can include short-term effects from storms and surges and the longer-term effects of sea-level rise associated with global climate change. Climate change may alter rainfall patterns and bring heavier downpours. Coupled with the increased risk of storm level surges the frequency of flooding events within coastal areas is expected to increase in the future.

17.7.6 However, it is not anticipated that this would result in a significant change in the current marine water and sediment quality environment at the Proposed Development in Faray.

17.8 Standard Mitigation

17.8.1 In terms of marine construction, all vessels will be MARPOL compliant to manage emissions to air and water and have Shipboard Oil Pollution Emergency Plan (SOPEPs) in place.

Construction Environmental Management Plan (CEMP)

17.8.2 As part of the construction contract, the Applicant will produce, and adhere to, a CEMP. The CEMP shall be developed in accordance with the joint Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Environment Scotland guidance on Good Practice During Windfarm Construction (2019). This includes guidance and references that are applicable to the Proposed Development works.

17.8.3 The CEMP (as described in more detail in Chapter 3) shall describe how the Applicant will ensure suitable management of project activities. In relation to marine water and sediment quality this will include details on the dredging operation and, although not assessed within this Chapter, subsequent disposal of dredge material. The CEMP will also include details of pollution incident response for the marine environment.

Operational Environmental Management Plan (OEMP)

17.8.4 To ensure the risks of accidental spills and leaks during the operational phase which will include some maintenance boats visiting the island, it is expected that an OEMP is produced in the same way as the CEMP to mitigate the potential risks associated with the operational activities.

17.9 Likely Effects

17.9.1 An assessment is provided below for likely effects of the Proposed Development on marine sediment and water quality. These are provided for construction, operational and decommissioning stages.

Impact of Dredging on Marine Water Quality During Construction – Suspended Sediments

Introduction

17.9.2 The marine construction works associated with the Proposed Development, notably the capital dredging of the two dredge areas (Figure 17.1) could impact a number of different water quality parameters. This principally comprises suspended sediment.

17.9.3 Capital dredging will release sediment into the water column where there is disturbance during the removal by backhoe activity and can also include sediment that is lost during the retrieval process.

17.9.4 The sediment released by dredging will disperse in the receiving water and will cause an increase in suspended sediment concentrations (i.e. increases over background concentrations) known as a sediment plume. This may negatively impact marine water quality, until the sediment drops out of suspension and deposits onto the seabed, which could negatively impact sediment quality (see impact sections below).

17.9.5 This impact assessment is informed by a desk study of the likely disturbance of sediments that is predicted to arise from capital dredging (Appendix 17.2 – Dredging Desk Study).

Impact Assessment

17.9.6 The results of the Dredging Desk Study indicate that:

- within 50 m of the dredging the predicted increase in suspended sediment concentration over background concentrations will be around 16 mg/l on neap and 11 mg/l on spring tides;

- within 100 m of the dredging the predicted increase in suspended sediment concentration over background concentrations will be around 3 mg/l on neap and 6 mg/l on spring tides; and,
- within 200 m of the dredging the corresponding concentration increases will be 1 mg/l or less.

17.9.7 Note that as the released particles are sand-sized (rather than silt/clay-sized) there will be a much reduced effect on turbidity (compared to a similar concentration increase composed of silt/clay particles).

17.9.8 Measurements of background sediments suspended in the Orkney area from satellite-based measurements of sea surface suspended sediment concentrations (Marine Scotland, 2020) show that sediment concentrations at the surface around Orkney are generally in the region of 1 mg/l but increase up to 3 mg/l at times. Therefore, within around 200 m of the dredging area, the dredging plume is likely to have reduced to levels which lie within this range of natural variability.

17.9.9 In practice the range of natural concentrations will be higher due to storms which the episodic satellite measurements will not take into consideration, and therefore the impact of the proposed dredging will be even smaller compared to the natural range of conditions.

17.9.10 Dredging is estimated to last up to two weeks. The sediment plume from dredging will persist for the period of the dredging operation but is not likely to be detectable within a few days (at most) from the cessation of dredging operations.

17.9.11 Overall, the effects of the increases in suspended sediment as a result of the dredging activity are considered to be **negligible and not significant** for marine water quality.

Mitigation

17.9.12 No additional mitigation is required to reduce the effect significance.

Monitoring

17.9.13 No monitoring of water quality is recommended.

Residual effects

17.9.14 As no additional mitigation is required, the residual effect is also considered to be **negligible and not significant** for marine water quality.

Impact of Dredging on Marine Water Quality During Construction – Chemical Parameters

Introduction

17.9.15 The marine construction works associated with the Proposed Development – notably the capital dredging, could also impact a number of different chemical water quality parameters including chemical parameters such as metals, organo-metals, PAHs, PCBs and pesticides.

17.9.16 The principal mechanism for an impact related to chemical parameters in the water body is the disturbance of contaminant-laden sediment (if present), by the dredging activity.

17.9.17 Chemical parameters may be present in the water column where they are either attached to the surfaces of suspended sediment (including inorganic particles and organic matter) in adsorbed and precipitated forms (particularly metal parameters), or attached to the surfaces of dissolved organic matter in adsorbed or complexed forms (particularly organic parameters), or dissolved in the surrounding water in free forms (both metal and organic parameters).

Impact Assessment

17.9.18 As described in Section 17.6, a survey of the sediment in the areas to be dredged found that the sediment contains very low concentrations, or below levels of detection of heavy metal, organotin PAH, PCB, and pesticides. Where chemicals were found in very low concentrations, all were well below the ALs and Canadian TEL, in most cases by an order or magnitude lower.

17.9.19 As there are no or very low concentrations of contaminants present within the sediment disturbed by dredging, there is likely to be **no effect** on water quality chemical parameter as a result of the dredging activity.

Mitigation

17.9.20 No additional mitigation is required to reduce the effect significance.

Monitoring

17.9.21 No monitoring of water quality is recommended.

Residual effects

17.9.22 As no additional mitigation is required, the residual impact is also considered to be **no effect** on water quality chemical parameter.

Impact of Dredging on Marine Sediment Quality During Construction – Chemical Parameter and Deposition Parameter

Introduction

17.9.23 The marine construction works associated with the Proposed Development – notably the capital dredging, could impact sediment quality.

17.9.24 The principal mechanism for an impact relates to the release of sediment into the water column in the vicinity of the Proposed Development. This release may manifest as a plume of suspended sediment in the water column that disperses and dilutes within the water column, and then deposits on the seabed and thereby alters the seabed sediment properties.

Impact Assessment

17.9.25 As described in Section 17.6, a survey of the sediment in the areas to be dredged found that the sediment contains very low concentrations, or below levels of detection of heavy metal, organotin PAH, PCB, and pesticides. Where chemicals were found in very low concentrations, all were well below the ALs and Canadian TEL, in most cases by an order or magnitude lower.

17.9.26 On that basis there is expected to be no effect on the sediment quality chemical parameter as a result of the contaminant levels that may be transported to new locations as a result of the sediment settling out of the water column associated with the dredging activity.

17.9.27 However, the amount of sediment that is deposited, although unlikely to affect sediment quality chemical parameters, will increase the depth of sandy sediment locally to the dredging operation and has the potential to impact the PMF seagrass identified within the area (see Chapter 18).

17.9.28 The sand particles released into the water column will be likely to re-deposit onto the bed within a few hundred metres of the dredging. It is possible to estimate the distribution of this re-depositing sediment by considering the rate at which these sand particles will fall back onto the bed and the distance moved by the sand particle (under the influence of tidal currents) over that period.

17.9.29 Approximate transport distances for the average particle sizes (Appendix 17.2 – Dredging Desk Study) were estimated using settling velocities calculated using the method of Soulsby (1997). Fine sands (d_{10} (µm)) are estimated to travel up to 234 m before settling to the seabed, medium sand particles (d_{50} (µm)) up to around 83 m. The larger and heavier sand particles will not travel as far and are likely to settle out within approximately 35 m of the dredging activity.

17.9.30 The release of sand particles is estimated to be 5% of the material that would be dredged (though this figure will reduce depending on the prevalence of sandstone boulders). This means that around 150 m^3 of sand will be deposited, a portion of which will redeposit in the dredging areas and be re-dredged (Appendix 17.2 – Dredging Desk Study).

17.9.31 The Dredge Desk Study (Appendix 17.2) provides an estimation of the distribution of sand depositing from the plume released during the dredging activity for the Proposed Development.

17.9.32 The distribution of sediment disturbed as a result of the dredging activity is provided in Appendix 17.2 – Dredging Desk Study and summarised below. The deposition is estimated to be in the region of:

- 8-14 mm within 50 m of the slipway and landing jetty;
- 2-8 mm within 50-150 m of the slipway and landing jetty; and,
- to fall below 1 mm at a distance of 200 m.

17.9.33 The levels of sediment deposition as a result of the dredging activity is considered to result in a temporary **minor and not significant** effect within 150 m of the dredging activity, including potential sediment deposition on the PMF seagrass within the area, and will reduce to **negligible and not significant** at distances further than that.

Mitigation

17.9.34 No additional mitigation is required to reduce the effect significance.

Monitoring

17.9.35 No monitoring of water quality is not recommended.

Residual effects

17.9.36 As no additional mitigation is required, the residual effect is **negligible** for chemical parameters and of **minor significance** for increases in sediment depth within 150 m of the dredging activity.

Construction: Impact of Accidental Spills and Leaks on Marine Water and Sediment Quality

Impact Assessment

17.9.37 Construction works have the potential to release a range of potentially polluting materials in and around the Proposed Development. Spills and leaks of potentially polluting substances are not planned as part of the Proposed Development, but there is a risk that they may occur due to accidents and incidents.

17.9.38 Potentially polluting materials may be spilled and leaked directly into water in the vicinity of the Proposed Development where they could affect the quality of the marine water and/or sediment. In addition, potentially polluting materials may be spilled and leaked directly onto the land and infiltrate into underlying ground where they may affect the quality of the groundwater and, potentially, any hydrologically connected surface water.

17.9.39 Given the scope of construction materials and equipment that will be used during the construction works, it is possible that unplanned accidental or incidental spills and leaks will occur. Generally, spills and leaks are likely to be small in scale (both in terms of volume of polluting materials released into the environment, and the spatial extent of the affected environment), but larger spills and leaks cannot be ruled out.

17.9.40 The potentially polluting materials associated with the construction works, spills and leaks have the potential to affect water and sediment quality. However, embedded mitigation measures will be in place to reduce the risk of a spill or leak causing a pollution event. These measures will include obligations in relation to the environmental performance of the construction works. Many of the measures, including measures relating to hazardous materials, will be implemented and monitored by the Contractor through a CEMP. Notably, the CEMP will include provisions for pollution incident preparedness such that emergency plans and procedures will in place to respond to any environmental incidents, including incidents involving hazardous materials.

17.9.41 The embedded mitigation measures will reduce the risk of spills and leaks of potentially polluting materials to a level considered to be as low as reasonably practicable (ALARP) and will necessitate emergency response and clean-up measures should a spill or leak occur. With these measures in

place, the potential effects of spills and leaks will be avoided or reduced, such that the magnitude of effects is considered to be low, small in scale and temporary in duration.

17.9.42 On the basis that embedded mitigation measures will be successfully implemented and the risk will be ALARP, spills and leaks of potentially polluting materials associated with the construction of the Proposed Development are considered to be a **negligible and not significant** effect on water and sediment quality.

Operational Impacts

17.9.43 Operational impacts to marine water and sediment quality will be limited to occasional vessel movements during maintenance visits, which bring about the associated potential for accidental spills and leaks and very local sediment disturbance. The measures outlined in the section above for potential constructional effects of accidental spills and leaks are expected to remain during the operational phase.

17.9.44 As above, with embedded mitigation measures during maintenance activities will be implemented and the risk will be ALARP, spills and leaks of potentially polluting materials associated with the operation of the Proposed Development are considered to have a **negligible and not significant** effect on water and sediment quality.

Decommissioning Impacts

17.9.45 The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the effects would be less than that of construction as it is unlikely that dredging would be conducted and there would likely be a lower number of vessels required. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan, are considered to have a **negligible and not significant** effect on water and sediment quality.

17.10 Additional Mitigation and Enhancement

17.10.1 The levels of effect identified above are negligible for all receptors, apart from sediment depth in the vicinity (<150 m) of the dredging operations. The latter is assessed to be temporary, minor and not significant. Therefore, it is not necessary to provide additional mitigation or enhancement for the Proposed Development.

17.11 Residual Effects

17.11.1 There is no change to the identified impacts as there is no requirement for additional mitigation or enhancement.

17.12 Cumulative Assessment

17.12.1 There are no other planned developments in the area that may intersect with the impacts discussed in this chapter. Therefore, there are considered to be no cumulative effects.

17.13 Summary

17.13.1 An assessment was carried out of the potential impacts on marine water and sediment quality as a result of the dredging required for construction and vessels required during construction, operation and decommissioning required for the Proposed Development. A summary of the effects are provided in Table 17.12 and Table 17.13 below.

Table 17.12 - Summary of Effects

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Construction					
Impact of dredging on marine water quality – suspended sediments	Negligible and not significant	Adverse	None required	Negligible and not significant	Adverse
Impact of dredging on marine water quality – chemical parameters	Negligible and not significant	Adverse	None required	Negligible and not significant	Adverse
Impact of dredging on sediment quality – chemical parameter and deposition parameter	Minor and not significant	Adverse	None required	Minor and not significant	Adverse
Impact of accidental spills and leaks on marine water and sediment quality	Negligible and not significant	Adverse	CEMP	Negligible and not significant	Adverse
Operation					
Impact of accidental spills and leaks on marine water and sediment quality by vessels required during maintenance visits	Negligible and not significant	Adverse	OEMP	Negligible and not significant	Adverse
Decommissioning					
The Applicant is seeking in-perpetuity consent for the Proposed Development. In the event of decommissioning, or replacement of turbines, it is anticipated that the levels of effect would be less as it is unlikely that dredging would be required for removal. Decommissioning would be undertaken in line with best practice processes and methods at that time and will be managed through an agreed Decommissioning Environmental Management Plan.					

Table 17.13 - Summary of Cumulative Effects

Receptor	Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Marine water and sediment quality	Effects on suspended sediments, and chemical parameters	None in the area	No effect	N/A

17.14 References

Canadian Council of Ministers of the Environment (CCME) Freshwater sediment quality guidelines (2001), available at: https://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/. Accessed 10 May 2021.

Council Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive, MSFD). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0056 Accessed on: 05 May 2021.

Council Directive 2014/89/EU establishing a framework for maritime spatial planning (Marine Spatial Planning Directive). Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0089 Accessed on: 05 May 2021.

Council Directive 92/43/EEC on the Conservation of Natural Habitats and Wild Flora and Fauna (the Habitats Directive). Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31992L0043 Accessed on: 05 May 2021.

Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy (Water Framework Directive). Available at https://ec.europa.eu/environment/water/water-framework/index_en.html Accessed on: 05 May 2021.

Council Directive 2006/7/EC monitor and assess bathing waters and inform the public about bathing water quality and beach management (Bathing Waters Directive). Available at https://ec.europa.eu/environment/water/water-bathing/summary.html Accessed on: 05 May 2021.

Council Directive 2013/39/EU Priority Substances Directive. Available at: https://ec.europa.eu/environment/water/water-dangersub/pri_substances.htm. Accessed 11 May 2021.

HR Wallingford (2021). Marine Water and Sediment Quality – Inception Report. DEM8784-TR01-00. 18 March 2021.

International Maritime Organisation (IMO). The International Convention for the Prevention of Pollution from Ships (MARPOL). Available at https://www.imo.org/en/About/Conventions/Pages/International-Convention-for-the-Prevention-of-Pollution-from-Ships-(MARPOL).aspx Accessed on: *05 May 2021*.

JNCC (2020). Faray and Holm of Faray. Available at https://sac.jncc.gov.uk/site/UK0017096. Accessed on: 29 April 2021.

Marine Scotland (2017) *Pre-disposal Sampling Guidance Version 2 – November 2017.* Available at https://www.gov.scot/binaries/content/documents/govscot/publications/advice-and-guidance/2020/02/marine-licensing-applications-and-guidance/documents/guidance/pre-disposal-sampling-guidance/pre-disposal-sampling-guidance/govscot%3Adocument/Pre-disposal%2Bsampling%2Bguidance.pdf?forceDownload=true Accessed on: 05 May 2021.

Marine Scotland (2020) Marine Scotland Assessment, Physical characteristics and ocean acidification Suspended particulate inorganic matter (turbidity). https://marine.gov.scot/sma/assessment/suspended-particulate-inorganic-matter-turbidity. Accessed 10/05/2021.

Orkney Island Council (2020). Orkney Islands Marine Region: State of the Environment Assessment.

Scottish Renewables, SNH, SEPA, Forestry Commission Scotland and Historic Environment Scotland guidance on Good Practice During Windfarm Construction (2019). Available at: https://www.scottishrenewables.com/publications/498-guidance-good-practice-during-wind-farm-construction Accessed 12 May 2021.

SEPA (Scottish Environment Protection Agency) (2018). Water Environmental Hub. Annual update, 2018. Available at https://www.sepa.org.uk/data-visualisation/water-environment-hub/. Accessed on 29: April 2021.

Scottish Government (2003). *Water Environment and Water Services (WEWS) (Scotland) Act 2003*. Available at https://www.legislation.gov.uk/asp/2003/3/contents Accessed on: 29 April 2021.

Scottish Government (2010). *Marine (Scotland) Act 2010.* Available at https://www.legislation.gov.uk/asp/2010/5/contents Accessed on: 29 April 2021.

Scottish Government (2011). The Water Environment (Controlled Activities) (Scotland) Regulations 2011. Available at: https://www.legislation.gov.uk/ssi/2011/209/contents/made Accessed on May 12 2021.

Scottish Government (2012). *The Bathing Waters (Scotland) Amendment Regulations 2012.* Available at: https://www.legislation.gov.uk/ssi/2012/243/contents/made Accessed 12 May 2021.

Scottish Government (2013). *Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013*. Available at https://www.legislation.gov.uk/ssi/2013/286/contents/made Accessed 05 May 2021.

Scottish Government (2015). *Scotland's National Marine Plan. A single framework for managing our seas*. Available at https://www.gov.scot/publications/scotlands-national-marine-plan/ Accessed on: 05 May 2021.

Scottish Government (2016). *Pilot Pentland Firth and Orkney Waters Marine Spatial Plan.* Available at: https://www.gov.scot/publications/pilot-pentland-firth-orkney-waters-marine-spatial-plan/ Accessed on: 29 April 2021.

Soulsby R L (1997) Dynamics of marine sands, Thomas Telford Publications, London.

UK Government (1981). *The Wildlife and Countryside Act 1981 (as amended)*. Available at: https://www.legislation.gov.uk/ukpga/1981/69/contents Accessed on: 29 April 2021.

UK Government (1994). *The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the Habitats Regulations).* Available at: https://www.legislation.gov.uk/primary+secondary?title=The%20Conservation%20%28Natural%20Habitats%2C%20%26c.%29%20Regulations%20 Accessed on: 29 April 2021.

UK Government (2010). *Marine Strategy Regulations 2010.* Available at: https://www.legislation.gov.uk/uksi/2010/1627/contents Accessed on: 05 May 2021.

18 Other Issues

Contents

18.1	Executive Summary	18-1
18.2	Telecommunications	18-4
18.3	Air Quality	18-7
18.4	Carbon Savings	18-9
18.5	Coastal Processes	18-13
18.6	Benthos	18-16
18.7	Marine Navigation and Radar	18-21
18.8	Commercial Fisheries	18-24
18.9	Summary	18-27
18.10	References	18-30

This page is intentionally blank.

18 Other Issues

18.1 Executive Summary

Telecommunications

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

Air Quality

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

Carbon Savings

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

Marine Licensable Activities

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

Coastal Processes

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

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

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

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

Benthos

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

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

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

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

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

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

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

Marine Navigation and Radar

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

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

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

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

Commercial Fisheries

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

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

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

18.2 Telecommunications

Introduction

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

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

Legislation, Policy and Guidelines

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

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

Consultation

18.2.4 Consultation was undertaken with relevant statutory and non-statutory stakeholders to identify any fixed wireless links or scanning telemetry links in the area, and a summary of their responses are set out in Table 18.1 below.

Table 18.1 – Consultee Responses

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

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

Assessment Methodology

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

Telecommunications

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

Television

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

Baseline Conditions

Telecommunications

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

Television

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

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

Likely Effects

Telecommunications

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

Television

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

Mitigation

Telecommunications

18.2.13 Although no impacts or effects are anticipated on telecommunication links, the Proposed Development will have a micro-siting allowance of up to 50 m in all directions in respect of each turbine and its associated infrastructure should a new telecommunication link be identified prior to consent being granted.

Television

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

Residual Effects

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

Cumulative Effects

18.2.16 As no residual effects from the Proposed Development alone are anticipated, the Proposed Development will not have cumulative effects with other wind farm developments on telecommunication or television links.

Summary

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

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

18.3 Air Quality

Introduction

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

Consultation

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

Table 18.2 - Consultation with OIC

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

Methodology

Baseline

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

Traffic Assessment

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

Table 18.3 – Criteria for Air Quality Assessment

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

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

Dust Assessment

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

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

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

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

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

Baseline

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

Likely Effects

Construction

Traffic

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

Dust

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

Operation

Traffic

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

Mitigation

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

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

18.3.14 Refer to Appendix 3.1 for further details.

Residual Effects

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

18.4 Carbon Savings

Introduction

18.4.1 Increasing atmospheric concentrations of greenhouse gases (GHGs), including carbon dioxide (CO_2) – also referred to as carbon emissions – is resulting in climate change. A major contributor to this increase in GHG emissions is the burning of fossil fuels. Climate change is deemed such a concern that many local authorities and indeed organisations around the world – including Orkney Islands Council – have declared a climate emergency. Therefore, reducing the cause of climate change is of utmost importance. The replacement of traditional fossil fuel power generation with renewable energy sources provides high potential for the reduction of GHG emissions. This is reflected in UK and Scottish Governments climate change and renewable energy policy.

18.4.2 The Intergovernmental Panel on Climate Change (IPCC) has warned that human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels and at the current rate global warming is likely to reach 1.5°C between 2030 and 2052 (IPCC, 2018).

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

Following this, the Scottish Government and Orkney Islands Council both declared a climate emergency in May 2019, with OIC stating "*This declaration serves to leave no doubt of the Council's focus on and commitment to reducing our carbon footprint…we'll seek to continue to support the pioneering renewables scene in Orkney – whether that is tidal, wave, wind, hydrogen or biofuels*" (OIC, 2019b).

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

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

18.4.5 The aim of this section is to provide clear information about the whole life carbon balance of the Proposed Development to provide a context for carbon payback, and to respond to queries during public consultation, regarding the Proposed Development's carbon budget.

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

Legislation, Policy and Guidelines

Legislation

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

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

18.4.8 These create the statutory framework for greenhouse gas emissions reductions in Scotland and the recent Climate Change Act set a target of net-zero emissions by 2045. Decarbonisation of grid electricity through increasing the percentage of electricity generated by renewables is identified as one of the key ways to deliver carbon emission reductions.

Policy

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

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

Guidance

18.4.10 In 2008 the Scottish Government funded a research report called Calculating carbon savings from wind farms on Scottish peat lands: a new approach (Nayak *et al,* 2008 and 2010 and Smith et al., 2011) and associated Microsoft Excel tool (referred to henceforth as the "Carbon Calculator") which utilises a life cycle methodology approach to estimating the wider emissions and savings of carbon associated with wind farms and for calculating how long the development will take to 'pay back' the carbon emitted during its construction. However, this tool was not designed for sites with no peat, like the Proposed Development site, and therefore is not appropriate to assess the carbon balance of the Proposed Development.

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

Methodology and Limitations

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

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

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

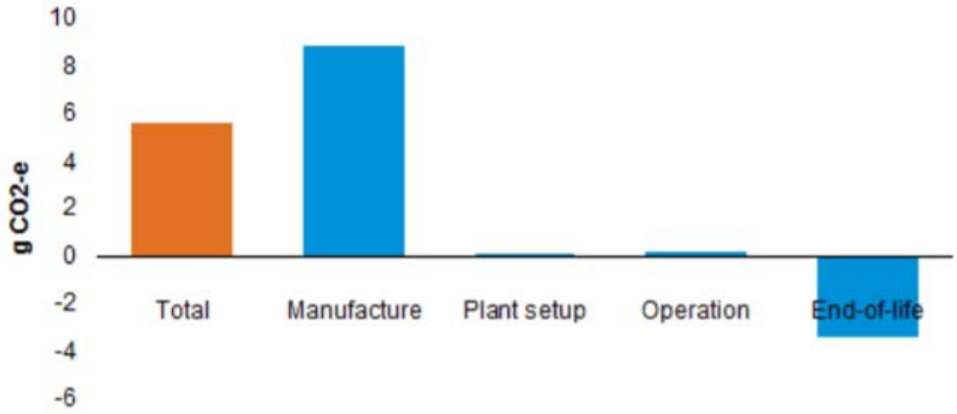
18.4.15 Transport distances from manufacturing facility to site is based on regional level analysis. The lifecycle analysis report states that the baseline represents a conservative assumption and shows transport to account for c.9 % of GHG production. The project specific levels of GHG production will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

Results

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Summary

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

18.5 Coastal Processes

Introduction

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

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

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

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

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

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

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

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

Legislation, Policy and Guidelines

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

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

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

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

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

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

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

Consultation

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

Assessment Methodology

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

Table 18.4 – Coastal Processes Impact Magnitude

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

Table 18.5 – Coastal Processes Sensitivity

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

Baseline Conditions

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

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

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

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

Likely Effects

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

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

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

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

Mitigation

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

Cumulative Effects

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

18.6 Benthos

Introduction

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

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

Legislation, Policy and Guidelines

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

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

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

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

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

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

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

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

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

Consultation

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

Assessment Methodology

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

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

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

Table 18.6 – Benthos Impact Magnitude

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

Table 18.7 – Benthos Sensitivity

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

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

Baseline Conditions

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

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

Landing Jetty

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

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

New Extended Slipway

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

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

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

Likely Effects

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

Table 18.8 – Seabed disturbance

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

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

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

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

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

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

Mitigation and Residual Effects

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

Cumulative Effects

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

18.7 Marine Navigation and Radar

Introduction

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

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

- false detections (turbine detections);
- ghost targets (fake targets in the wrong place caused by reflections);
- side lobe detections (turbine detections shown at the right range but in the wrong place/azimuth);
- shadowing (loss of probability of detection behind the turbines); and
- receiver saturation (reduced probability of detection) in the area of the turbines.

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

Consultation

18.7.4 OIC's Marine Services and Harbour Authority department, Orkney Ferries Ltd, the Northern Lighthouse Board (NLB) and the Maritime and Coastguard Agency (MCA) have been consulted with respect to any marine and shipping radar installations and the potential for the Proposed Development to create conflicts with any such installations (refer to Table 18.9).

Table 18.9 – Consultation Responses

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

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

Assessment Methodology

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

Baseline

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

Likely Effects

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

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

Mitigation and Residual Effects

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

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

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

Cumulative Effects

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

Summary

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

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

18.8 Commercial Fisheries

Introduction

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

Legislation, Policy and Guidelines

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

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

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

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

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

Consultation

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

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

Assessment Methodology

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

Table 18.10 – Commercial Fisheries Impact Magnitude

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

Table 18.11 – Commercial Fisheries Sensitivity

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

Baseline

ICES Rectangle

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

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

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

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

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

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

ScotMap

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

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

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

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

Likely Effects

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

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

Mitigation and Residual Effects

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

Cumulative Effects

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

18.9 Summary

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

Table 18.13 – Summary of Effects

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

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

18.10 References

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

19 Schedule of Environmental Commitments

Contents

19.1 Introduction 19-1

This page is intentionally blank.

19 Schedule of Environmental Commitments

19.1 Introduction

19.1.1 Best practice in Environmental Impact Assessments (EIA) recommends the use of a Schedule of Environmental Commitments, which can act as a quick reference for anyone interested in the mitigation measures which the Applicant has committed to implementing and upon which the assessment of residual effects presented within the EIA Report has been based. It will be utilised by the Applicant throughout development of the detailed design, and the appointed contractors will be required to allow for, and ultimately implement, each of the measures in this schedule as a minimum.

19.1.2 Table 19.1 presents a Schedule of Environmental Commitments for the Proposed Development, listed according to the relevant environmental topic area. Individual EIA Report chapters should be referred to for full details of the mitigation.

Table 19.1 - Schedule of Environmental Commitments

Subject Area	Commitment	Timing
3. Proposed Development		
Construction Environmental Management Plan (CEMP)	As part of the construction contract, the Applicant will produce, and adhere to, a CEMP. The CEMP shall be developed in accordance with the joint Scottish Renewables, NatureScot, SEPA, Forestry Commission Scotland and Historic Environment Scotland guidance on Good Practice During Windfarm Construction (2019). The CEMP shall describe how the Applicant will ensure suitable management of, but not limited to, the following environmental issues during construction of the Proposed Development: ▪ noise and vibration; ▪ dust and air pollution; ▪ surface and ground water; ▪ ecology (including protection of habitats and species); ▪ agriculture (including protection of livestock and land); ▪ cultural heritage; ▪ waste (construction and domestic); ▪ underwater noise; ▪ dredging; ▪ pollution incidence response (for both land and water); and ▪ site operations (including maintenance of the construction compound, working hours and safety of the public). The Applicant shall provide the following for integration within the CEMP:	Pre-construction / construction

Subject Area	Commitment	Timing
	▪ details of the all the environmental mitigation which is described within this chapter that is required during construction of the Proposed Development, and of how the Applicant will implement this mitigation and monitor its implementation and effectiveness; ▪ details of how the Applicant will abide by the local and national legislative requirements e.g. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended); ▪ details of how the Applicant will implement and monitor construction best practice techniques e.g. the control of noise and dust; ▪ details of how the Applicant will implement the Joint Nature Conservation Committee (JNCC) piling protocol to minimise potential impacts to marine mammals from underwater noise associated with piling of the new landing jetty; ▪ details of any additional underwater noise mitigation measures, specifically the use of a bubble curtain; ▪ details of a Waste Management Plan which will include opportunities to reduce and re-use waste on-site, recycling of waste which cannot be reused and disposal of waste to landfill; ▪ details of dredging disposal plans; and ▪ details on how the Applicant will liaise with the public and local landowners and how they will respond to any queries and/or complaints. The Applicant shall consult with NatureScot, SEPA, Historic Environment Scotland and OIC on the relevant aspects of the CEMP. The Applicant shall amend and update the CEMP as required throughout the construction and decommissioning period. The CEMP shall, where applicable, cross-reference and correspond with the Construction Traffic Management Plan (CTMP). The CTMP will detail the management of traffic to and from site, including abnormal loads and daily workers commute. It shall also include mitigation for impacts to public transport, local private access and public footpaths.	

Subject Area	Commitment	Timing
	The Applicant shall amend and update the CTMP as required throughout the construction and decommissioning period. Specific requirements of the CEMP for each of the environmental topics assessed in the EIA are provided in the relevant EIA Report chapters and an outline CEMP is provided in Appendix 3.1.	
Design	There will be a micro-siting allowance of up to 50 m in respect of each turbine and its associated infrastructure in order to address any potential difficulties which may arise in the event that preconstruction surveys identify unsuitable ground conditions or environmental constraints that could be avoided.	Pre-construction
Pollution Prevention Strategy	A pollution prevention strategy, contained within the CEMP, will be agreed with SEPA to ensure that appropriate measures are put in place to protect watercourses and the surrounding environment. Any fuel or oil held on-site will only be of an amount sufficient for the plant required. This will be stored in a bunded area within the temporary construction compound, to prevent pollution in the event of a spillage. There will be no long-term storage of lubricants or petrochemical products on-site at the Proposed Development. High standards of health and safety will be established and maintained. At all times, all activities will be undertaken in a manner compliant with applicable health and safety legislation and with relevant good practice as defined under applicable statutory approved codes of practice and guidance.	Pre-construction and construction
Operation Environmental Management Plan (OEMP)	The OEMP will be developed in consultation with NatureScot, SEPA and OIC and will include but not be limited to: ▪ details on the track and turbine maintenance; ▪ the control and monitoring of noise; ▪ the control and monitoring of surface and groundwater; ▪ a pollution prevention plan and a pollution incidence response plan; ▪ details of how the Applicant will abide by the local and national legislative requirements e.g. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended); and	Operation

Subject Area	Commitment	Timing
	▪ a Habitat Management Plan and relevant protected species management plans (if required).	
7. Ornithology		
CEMP	All ornithological mitigation measures will be incorporated into a Construction Environmental Management Plan (CEMP). This CEMP will outline all required mitigation for ornithological receptors, providing details of key sensitivities present and timings. A Site Restoration Plan (SRP) will be developed as part of the CEMP to ensure the regeneration of those areas of habitat that have been temporarily lost through development.	Pre-construction and construction
Ecological Clerk of Works (ECoW)	A suitably experienced Ecological Clerk of Works (ECoW) will oversee all works to ensure adherence to the mitigation measures.	Construction
Targeted checks	Prior to any construction of the Proposed Development, the Applicant will undertake a series of pre-construction ornithological targeted checks to update the baseline information reported in Chapter 7 of the EIA. The full scope and requirements of the pre-construction checks will be agreed with the Planning Authority and involve engaging a Suitably Qualified Ecologist (SQE). This would be in addition to completing a final check prior to construction for protected species and would be discussed and agreed with NatureScot.	Construction
Site clearance works	Wherever possible, all vegetation clearance will occur outside the bird breeding season (i.e. between December – March, inclusive), to ensure that no active nests are damaged or destroyed by the proposed works. If work is required after March 31st, the SQE will search areas of clearance in advance of works and buffer active nests as appropriate. This would include any areas of clearance and vegetation removal for access tracks, compounds or turbine bases due to the populations of ground nesting birds on and around the site.	Construction
Ecological toolbox talk	An ecological toolbox talk with supporting literature will be given to all site personnel as part of site induction on the potential presence of ornithological species and any measures that need to be undertaken should such species be discovered during construction activities. The toolbox talk will also include the requirement to report and log any bird casualties (including due to the met-mast) at the Proposed Development during construction and operation of the site.	Construction/ operation

Subject Area	Commitment	Timing
Restoration	In order to facilitate restoration, disturbed ground will be restored as soon as practicably possible using materials removed during the construction of access tracks, excavation of cable trenches and turbine foundations. To achieve this, any excavated soil will need to be stored in such a manner that is suitable to facilitate retention of the seed bank. This will aid site restoration and help conserve the pre-construction floristic interests at the site.	Construction
The prevention of increased predation	During the construction and operation of the wind farm, strict biosecurity measures will be put in place and followed to prevent the introduction of potential predators accessing the island and desecrating not only nesting storm petrel but other ground nesting birds across the island, such as waders, gulls and terns. Prior to the construction and operation of the wind farm a 'Biosecurity Plan' is required to be drafted and agreed with NatureScot and Orkney Islands Council and will be put in place to prevent rodents being introduced to the site.	Pre-construction / construction / operation
New Storm Petrel breeding habitat	The main storm petrel breeding colony is located along the north-west corner of the island within a partially collapsed dry-stone dyke that shows signs of ongoing decay. In order to further support the storm petrel colony on the site, it is proposed that collapsed sections of the dyke are carefully re-built with suitable petrel breeding burrows located within. The location of the newly created structure will be completed out with both the seal and bird breeding seasons (i.e. between the end of December and end of March) and created so not to modify areas already used by petrel or impinge on the seal breeding grounds.	Construction
Storm Petrel Monitoring	A full monitoring program of the storm petrel colony is proposed, focusing on the newly created nesting habitat with a yearly full island callback count to be completed in late June / July in each of the first five years following construction of the nest wall. This will be repeated every three years thereafter throughout the operation of the Proposed Development. Further monitoring will include a minimum of two visits a year for the first five years and again each three years thereafter for another five visits, throughout a total of 20 years of operation, for ringing and monitoring of the storm petrel on the island.	Operation
Storm Petrel Relocation	There is a single storm petrel nesting location in a boulder pile directly alongside the track in the south of the island. If disturbance to the nesting location is unavoidable then it is required to relocate (and rebuild or recreate if unable to move in complete condition) the boulder pile a minimum of 100 m away from site infrastructure and turbines. In advance of being moved either whole or brick by brick the boulder pile will first be checked by an archaeologist. In	Construction

Subject Area	Commitment	Timing
	addition to the relocation of the above nest, it is proposed to ensure the pointing and stone work within the small structure adjacent to the landing area is maintained in order to prevent the structure, which is currently assessed as unsuitable for breeding storm petrels, deteriorating and providing suitable habitat for breeding petrels. The maintenance of this structure will prevent colonisation by storm petrels in an area likely to be highly disturbed during both construction and operation of the wind farm and encourage newly colonising birds to use habitat elsewhere on the island away from site infrastructure, most notably the newly constructed 'stone petrel wall'.	
Waders and other ground nesting species	The island is a working sheep farm and the entire island is grazed by sheep at certain times of year. The current grazing regime involves the use of temporary fencing to prevent sheep accessing certain areas around the island during lambing in particular the sections of higher cliffs, in order to prevent lambs falling over cliff edges. In order to provide areas of longer grassy sward and a mosaic of grassland swards on the island for the benefit of ground nesting birds it is proposed to extend these fenced off areas (using a combination of permanent or currently standing fencing and temporary fencing). Sheep will be excluded out of these fenced off areas between the start of April and the end of June to allow the completion of incubation of ground nesting species such as lapwing, snipe and oystercatcher. In agreement with the tenant, a total of 16.6 hectares will be included in the areas of restricted grazing and the variable sward heights in these areas will also provide good foraging areas for some wading species as well as cover for incubating and newly hatched birds.	Construction
8. Terrestrial Ecology		
ECoW	A suitably qualified Ecological Clerk of Works (ECoW) will be appointed prior to the commencement of any construction activities. The ECoW will be present and oversee construction activities as well as providing toolbox talks to all site personnel with regards to priority species and habitats, as well as undertaking monitoring works and briefings to relevant staff and contractors as appropriate.	Pre-construction / construction
Standard Mitigation	Adherence to current environmental protection policies and guidance (refer to Chapter 8). Development of Method Statements for use during construction (i.e. part of the CEMP), to include current good practice and prescribed use of low noise and vibration plant and construction techniques to reduce potential for acoustic disturbance to the surrounding marine habitats, including "soft-start" procedures (i.e. gradually increasing a	Pre-construction / construction

Subject Area	Commitment	Timing
	disturbance activity up to full operation of a minimum of 20 minutes) to limit wildlife avoidance behaviours when working near the shore. Development of Method statements to control dust-generating activities, such as aggregate extraction and vehicle movements. Standard mitigation includes damping-down surfaces. [Redacted] Development of a Species Protection Plan for seals. In order to prevent pollution of watercourses/field drains and waterbodies within the site (particulate matter or other pollutants, such as fuels), best practice techniques will be employed (refer to Chapter 8). Regular monitoring of watercourses/field drains will be required during construction. The monitoring will include a responsive element, with an on-site ECoW checking areas where active works are taking place and areas where sediment run-off may be a concern during periods of high rainfall. A Site Restoration Plan (SPR) will be developed and implemented. In order to facilitate restoration, including of the borrow pits, disturbed ground will be restored as soon as practicably possible using materials removed during the construction of access tracks, excavation of cable trenches and turbine	

Subject Area	Commitment	Timing
	foundations. To achieve this, any excavated soil will need to be stored in such a manner that is suitable to facilitate retention of the seed bank. Additionally, as part of this process, there will be development of an Operational Site Management Plan (OSMP) and maintenance task Method Statements.	
Designated seal haul-outs	Delivery of staff, plant and materials to the island will be controlled though development of method statements to provide the least-disturbing route to site; this could potentially include varying the route from the port of origin (likely to be Hatston Quay for personnel movements).	Construction
Habitats	Identification of appropriate exclusion zones around sensitive features (e.g. waterbodies), to prevent construction vehicles tracking through these areas. Operative awareness education, in the form of toolbox talks, to ensure the value of the island and its coastal environment is understood. Careful wash-down of plant and other equipment will be mandatory prior to access to (i.e. before embarking on the vessel for transport to the island) or egress from the Proposed Development site, to prevent potential biosecurity risks associated with plant movements; potentially contaminated materials will be identified and the handling of such strictly controlled.	Construction
[Red	[Redacted]	Construction
Seals	A Landing facilities construction Method Statement.	Construction

Subject Area	Commitment	Timing
	The potential for collision with marine traffic will require consideration when planning navigation routes from port to site and procedures. Navigational Method Statements will be developed to cover port to Faray transport and use of the island landing facilities. In the case of seals using the extended slipway and landing jetty area, the approach of a vessel is likely to cause an unavoidable dispersal. Given the use of the area, visual, olfactory and acoustic deterrents, such as those described in MMO (2018 & 2020) for use with fishing gear are considered unsuitable. Consultation will be undertaken with NatureScot with regards to the possibility of disturbance licence requirements. Control of borrow pit works to limit duration of disturbance events caused by material extraction. This will be covered through development of a borrow pit operations Method statement. Use of sound barriers along the coastal edge of the secondary borrow pit to reduce noise propagation from extraction operations. Construction plant will be selected for the lowest noise output possible, with sound barriers also to be available for deployment around stationary plant, such as generators. Restrict extraction of material from the secondary borrow pit to periods when no seals are present within the landing facility and Scammalin Bay area. Where this is not possible, use of a standard “soft-start” procedure (i.e. slowly increasing the level of noise in the works area, prior to commencing full operations), to avoid causing a potentially stressful “scare” reaction to a sudden noise, may reduce the intensity of any such disturbance events. With the Proposed Development to be constructed onshore, the impact of any piling activity on the surrounding marine habitat is likely to be reduced (i.e. insulated by the surface geology), but low impact methodologies will be selected for base construction and use of these methodologies will be programmed such that there are no sustained periods of disturbance. Formation of any piled foundations will also be programmed, as far as possible, for the earliest part of the construction “season”, in order to avoid the times of highest seal presence. Though of a lower potential for disturbance impact, use of vibromatic compaction will also be limited to short periods of time, with a minimum of two hours between any compaction operations, if displacement behaviour is observed in any nearby seals. Strict control of potential for human presence near hauled-out seals. In general, no personnel should approach within 50 m of a seal resting on the shore. However, Method Statements and site staff protocols/toolbox talks will be in place	

Subject Area	Commitment	Timing
	prior to all construction activities commencing, with the sensitivities of the adjacent habitats and their wildlife (and how to reduce/avoid impacts) explained to site personnel prior to commencement.	
Faray and Holm of Faray SAC/SSSI and designated haul-outs	Maintenance checks, including normal repair works/replacement of parts timed to avoid the seal breeding season (15th September to 31st December), where possible; if visits are still required, then these will be limited to the minimum, in order to reduce the potential for adverse impacts to any breeding seals close to the landing facility. Repair works to the turbines, including large operations such as replacing a blade, required within the breeding season would be considered as a major, unplanned procedure. Any major planned maintenance will be programmed to avoid the seal breeding season. In the unlikely event that unplanned major maintenance is required (e.g. turbine failure), the OEMP, which will include emergency plans and appropriate mitigations, will be followed. This will include method statements for such unplanned major maintenance events and the required mitigations. These method statements will be discussed and agreed with NatureScot prior to works commencing. Regular, detailed inspections will be undertaken during the non-breeding season, this will reduce the likelihood of major maintenance works occurring during the breeding season. In the very unlikely event that major unplanned maintenance work is required during the breeding season, NatureScot will be notified in accordance with the method statement. Maintenance check vessel routing to follow the same method statement as applied to the construction phase, in order to minimise disturbance to the seal populations on the haul-outs passed en route to the island.	Operation
Habitats	Exclusion of sheep from the restored borrow pit areas to permit habitat recovery free from grazing pressure (which otherwise has the potential to degrade the surface).	Operation
Species	Maintenance check vessel routing and final approach to the island landing facility to follow the same method statement as applied to the construction phase, in order to minimise disturbance and collision risk, with particular reference to the seals present within Scammalin Bay. Application of a site driving Method Statement for maintenance works, should vehicles be required to facilitate completion of tasks, including application of speed limits.	Operation

Subject Area	Commitment	Timing
9. Noise		
Good practice measures	The following good practice measures will be implemented during construction to limit unnecessary noise: • avoid unnecessary revving of engines and switching off plant when not required (i.e. no idling); • haul routes to be kept well maintained; • minimising the drop height of materials during delivery to, and movement around, site; • starting up plant and vehicles sequentially, rather than all together; • specification of plant with white-noise or directional reversing alarms, rather than beeper type alarms; • where possible, selection of quiet / noise reduced plant; • vehicles accessing the site will have regard to the normal operating hours of the site and the location of nearby NSRs; and • use and siting of equipment will be considered such that noise is minimised. For example, any generators or powered cabins within the construction compound will be sited such that noise from the generator exhaust is directed away from the closest NSRs, and cabins and other infrastructure are used to screen noise from such plant wherever possible. The measures outlined above, plus additional measures put in place relating to specific construction challenges associated with access to the island will be formalised in a Construction Environmental Management Plan (CEMP).	Construction
Fixed (non-turbine) plant noise	Noise from non-turbine operational plant will comprise noise from substations only. The sound power level and final location of the substation(s) are yet to be finalised, however, noise from the final type and location of the substation will be attenuated by acoustic enclosure (if required), such that it meets the derived non-turbine noise limits. A total sound power level of 93 dB(A), equivalent to a sound pressure level of 75 dB(A) at 10 m, would enable the noise limit to be met. The installed plant will meet these criteria.	Operation

Subject Area	Commitment	Timing
Noise limits	The Applicant commits to meeting the noise limits, however, and should the Proposed Development be determined to be exceeding its noise limits at any Noise Sensitive Receptors (NSR), mitigation will be put in place. As required, a noise management plan will be enacted under specific wind speeds and directions, when operational wind turbine noise exceeds the noise limits. Potential options to control wind turbine noise will comprise curtailment of the closest turbines to the affected NSRs, either by operation in low-noise modes, or switching individual turbines off.	Operation
10. Cultural Heritage		
Archaeological sites	Following completion of the survey all known heritage assets within 50 m of the proposed working areas, including all areas to be used by construction vehicles, will, where appropriate, be fenced off under archaeological supervision prior to construction. This fencing will be maintained throughout the construction period to ensure the preservation of these assets.	Pre-construction/ construction
Archaeological evaluation	A geophysical survey of the proposed access routes, cable routes, turbine locations, crane pads and other infrastructure will be undertaken. The geophysical survey will cover a 60 m buffer on either side of the proposed centrelines for the access tracks and cable routes so as to allow for micro-siting in the event of significant remains being identified during the trial trenching. A 50 m buffer around each of the proposed turbine locations will be covered to allow for micro-siting and the future presence of the turbines, as once constructed their magnetic signatures will prevent further magnetometry geophysical surveys from being undertaken within their vicinity. The geophysical survey will be followed by trial trenching which will be targeted on any possible anomalies that were identified and will also include a representative percentage of the total footprint of the development infrastructure. Depending on the results of these investigations further works during construction including further excavations and/or an archaeological watching brief may be required. The purpose of the geophysical survey and the archaeological trial trenching will be to identify any archaeological remains threatened by the Proposed Development, to assess their significance and to mitigate any impact upon them either through avoidance or, if preservation in situ is not warranted, through preservation by record. Depending upon the results of the geophysical survey and the trial trenching there is the potential that further works, such as excavation and post-excavation	Pre-construction/ construction

Subject Area	Commitment	Timing
	analyses, could be required. Details of mitigation will be agreed with OIC in consultation with the Orkney Country Archaeologist through a Written Scheme of Investigation (WSI).	
11. Geology, Hydrology, and Hydrogeology		
CEMP	With specific reference to the SEPA 'Guidelines for Water Pollution Prevention from Civil Engineering Contracts' and 'Special Requirements', the contractor will produce a CEMP (refer to Chapter 11 and Appendix 3.1).	Pre-construction / Construction
Weather	Site management will check the local weather forecast daily and prime all site staff to ensure that everyone is aware of their responsibilities to maintain the pollution control system during wet weather.	Construction
Pre-construction Site Investigations	Detailed pre-construction site investigations would be conducted, focusing on areas where construction is proposed to be undertaken to inform suitable micro-siting of the turbines and associated infrastructure. Targeted monitoring and assessment of the groundwater levels and flows beneath the site would also be carried out to inform micro-siting and to assist in the detailed design of infrastructure, the selection of appropriate materials for use during the construction process, and the requirement for any additional measures required to ensure protection of groundwater during construction. This will help to clarify whether identified areas of potential GWDTE are in fact groundwater fed and if any micro-siting or additional protective measures are required to minimise impacts to groundwater quality and flow in these areas.	Pre-construction / construction
Control of Pollution from Chemical Contaminated Runoff	All fuel and other chemicals will be stored in accordance with best practice procedures, including in a designated fuelling site located at a safe distance from existing drainage ditches and in appropriate impermeable bunded containers/areas which will be defined within the CEMP. These will be designed to capture any leakage, whether from a tank or from associated equipment such as filling and off-take points, sighting gauges etc., all of which will be located within the bund. Oil booms and soakage pads will be maintained in all work areas and spill kits kept in all vehicles to enable a rapid and effective response to any accidental spillage or discharge. All construction staff will be trained in the effective use of this equipment.	Construction

Subject Area	Commitment	Timing
	Construction vehicles and plant will be regularly maintained and all maintenance, fuelling and vehicle washing will be undertaken on appropriate impermeable surfaces away from drainage ditches in order to minimise risks of leaks to soil and surface waters. The contractor will develop a method statement to address the transport, transfer, handling and pouring of liquid concrete at foundations. Cement, grout and unset concrete will not be allowed to enter the water environment. No operations involving concrete transfer between vehicles or into vehicles will take place within 30 m of water bodies. As noted in Chapter 3, it is likely that concrete batching will be undertaken on site. The mobile concrete batching plant will be sited away from watercourses and ditches, within an enclosed or shielded area. The plant will incorporate a suitable wastewater collection and treatment system to minimise potential pollution impacts on local ditches/watercourses. Environmental controls specific to the concrete batching plant will be incorporated into the CEMP. All vehicles used for delivery of concrete will only be washed out at locations to be agreed with SEPA. Excess concrete or wash-out liquid will not be discharged untreated to drains or drainage ditches on site or at compounds. Drainage from washout facilities will be collected and treated or removed to an appropriate treatment point/licensed disposal site. The requirement for dewatering will be minimised in all locations by timely and efficient excavation of the foundation void and subsequent concrete pouring and backfilling.	
Surface Water Drainage	Prior to construction, a detailed Drainage Strategy (DS) will be developed and agreed with SEPA and OIC. The DS would detail the site drainage design, including the type of surface to be used for the access track, the soft engineering and habitat enhancement measures proposed to slow surface water flows and any necessary ponds, swales, cross drains and bunds, to ensure that runoff from hard surfaces will be controlled. Should the detailed DS incorporate the existing site drainage into the Proposed Development drainage, then this will be agreed with SEPA. Where topography dictates that working platforms are needed, these would be formed to ensure that surface water drains away from watercourses.	Pre-construction / construction / operation

Subject Area	Commitment	Timing
12. Traffic and Transport		
Construction Traffic	Subject to consent, the Applicant will prepare a Construction Traffic Management Plan (CTMP) for agreement with Orkney Islands Council prior to construction works commencing. The following measures would be implemented through the CTMP during the construction phase: • All materials delivery lorries (dry materials) will be sheeted to reduce dust and stop spillage on public roads. • Traffic originating from Cursiter Quarry could be fully or part routed via Zion's Loan to avoid integration with other road users in Finstown. This option will be further considered by the Balance of Plant (BoP) contractor in liaison with OIC prior to commencement of construction activities on site. • Specific training and disciplinary measures will be established to ensure the highest standards are maintained to prevent construction vehicles from carrying mud and debris onto the carriageway. • Provision of construction updates on the project website and distribution of a newsletter to study area road residents on material delivery routes. • Requirement for all delivery drivers supplying bulk materials for export to Faray from Hatston to attend an induction to include a safety briefing, the need for appropriate care and speed control, particularly in sensitive areas, identification of specific sensitive areas, identification of the specified route, and the requirement not to deviate from the specified route. • The production and implementation of a Staff Travel Plan for use on the Orkney Mainland or where staff are to be billeted during construction, which will include pick up times and car sharing information for those travelling to and from site.	Pre-construction/construction
Pre-construction phase	Video footage of the pre-construction phase condition of the abnormal loads access route and the construction vehicles route will be recorded to provide a baseline of the state of the road prior to any construction work commencing. This baseline will inform any change in the road condition during the construction stage of the Proposed Development. Any necessary repairs will be coordinated with Orkney Islands Council. Any damage caused	Pre-construction/construction

Subject Area	Commitment	Timing
	by traffic associated with the Proposed Development, during the construction period that would be hazardous to road users, will be repaired immediately.	
Abnormal loads	All abnormal load deliveries would be undertaken at appropriate times (to be discussed and agreed with the OIC Marine Services) with the aim to minimise the effect on other port users. It is likely that the abnormal load movements will avoid ferry and passenger vessel embarking / disembarking periods.	Construction
Abnormal loads	Advance warning signs would be installed on the approaches to the pier. Information signage could be installed to help assist drivers and to improve general safety.	Construction
Abnormal loads	An Abnormal Load Transport Management Plan would be developed. This will include: • procedures for liaising with OIC Ports and ferry operators to ensure that vehicles are not impeded by the loads; • a diary of proposed delivery movements to liaise with port operators and users to avoid key dates and times; and • proposals to establish a construction liaison committee to ensure the smooth management of the project / public interface with the applicant, the construction contractor and port stakeholders. This committee would form a means of communicating and updating on forthcoming activities and dealing with any potential issues arising.	Pre-construction / construction
Port Management Plan	Following consent, the Applicant will need to undertake a procurement exercise with the turbine suppliers to agree timescales for the import of components through Hatston Pier. As part of this process, the turbine suppliers will be required to formulate a Port Management Plan with the OIC Marine Services. The management plan will: • agree timescales for deliveries to be made; • agree quay space and temporary storage areas; • agree crane and stevedore access arrangements;	Pre-construction/construction

Subject Area	Commitment	Timing
	• book quay space; • detail the vessels that will undertake the deliveries; • dredge disposal plans; and • agree access rights along the access road from the pier and the convoy management with Orkney Islands Council, OIC Marine Services and Police. To ensure that there are no detrimental issues at Hatston Pier, the Applicant would produce a Port Management Plan secured by planning condition that will be agreed prior to the delivery of the first turbine component.	
13. Socio-economic, Recreation and Tourism		
Procurement	Best practice is set out in a 2014 report by RenewableUK (2014), which considered how developers can increase economic impacts in the local area. There are six main recommendations, which the Applicant has indicated a commitment to, subject to procurement processes and procedures: ▪ maximise local presence and begin early – identify potential suppliers and increase visibility in the local area; ▪ work with local authorities and business groups to gain information on local expertise and spread the message to local businesses; ▪ leverage primary contractors – ensure that primary contractors also consider the impact that they can make in the local area; ▪ provide the right information – give information in plenty of time and in the right format so that local businesses are able to prepare; ▪ communicate technical requirements early – provide opportunities for local companies to upskill and form local consortia; and ▪ having inserted local-content commitments in the planning application where applicable, undertake post-construction auditing.	Pre-construction

Subject Area	Commitment	Timing
14. Aviation and Radar		
Turbine lighting	Medium intensity fixed red LED obstruction lights (2000 cd) on every turbine; daylight hours only. The intensity can be reduced in conditions of high visibility. If the horizontal meteorological visibility in all directions from every wind turbine generator is more than 5 km, the intensity for the light may be reduced to not less than 10 % of the minimum peak intensity; i.e. 200 cd. The lighting specified to suppliers will meet CAA and ICOA lighting requirements for medium intensity obstruction lighting. The MOD request for aviation lighting will be met with the installation of IR lighting on every turbine. The MOD specifies the lighting requirement. This specification will be stipulated to suppliers to ensure appropriate lighting is fitted.	Operation
16. Underwater Noise Assessment		
Timing of operations	Piling will not take place any later than 15 August. This will ensure piling is out with the breeding season and the month prior where seals may be returning to the island for breeding purposes	Construction
JNCC Piling Protocol	The JNCC piling protocol will be followed to minimise potential impacts to marine mammals from underwater noise associated with piling of the new landing jetty, specifically – ▪ **Mitigation zone:** implementation of a mitigation zone where the area will be monitored either visually and/or acoustically (via Passive Acoustic Monitoring, PAM) for marine mammals prior to piling commencing. Monitoring will be undertaken by a suitably qualified Marine Mammal Observer (MMO) / PAM operative. The extent of the mitigation zone, assumed to be 500 m for the Proposed Development, will be agreed with the consenting authority prior to the works taking place. ▪ **Pre-piling search and delayed start:** the mitigation zone will be monitored visually by the MMO and/or acoustically via PAM for a period of at least 30 minutes. Piling will not commence if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual or acoustic detection.	Construction

Subject Area	Commitment	Timing
	▪ **Avoid piling at night or in poor visibility:** piling activities will not commence during periods of darkness, poor visibility (e.g. fog) or a rough sea state where it is not conductive to visual mitigation as there is a greater risk of failing to detect a marine mammal within the mitigation zone. ▪ **Soft-start:** the piling activities will employ a soft-start, where the piling power is gradually ramped up incrementally until full power is achieved. This is to allow for any marine mammals within the area to move away from the noise source and will reduce the likelihood of exposing marine fauna to sounds which can cause injury. The soft-start period should be a minimum of 20 minutes. If a marine mammal enters the area during the soft start then, wherever possible, the piling should cease, or at the least the power should not be increased until the marine mammal exits the mitigation zone and there is no further marine mammal detection for 20 minutes. When piling at full power, there is no requirement to cease piling or reduce the power if a marine mammal is detected in the mitigation zone as it is deemed to have entered "voluntarily". JNCC does recognise in the piling protocol that it may not be technically possible to stop piling at full power until the pile is in position. ▪ **Break in piling activity:** If there is a pause in the piling operations for a period of greater than 10 minutes, then the pre-piling search and soft-start procedure will be repeated before piling recommences. If a watch has been kept during the piling operation, the MMO or PAM operative should be able to confirm the presence or absence of marine mammals, and it may be possible to commence the soft-start immediately. However, if there has been no watch, the complete pre-piling search and soft-start procedure should be undertaken.	
Bubble curtain	A bubble curtain will be used to further reduce potential impacts to marine mammals from underwater noise associated with piling of the new landing jetty	Construction
17. Marine Water and Sediment Quality		
CEMP	The CEMP will include details on dredging and dredging disposal along with pollution incidence response (for both land and water.	Construction

Subject Area	Commitment	Timing
OEMP	The OEMP will include a pollution prevention plan and a pollution incidence response plan.	Operation
18. Other Issues		
Television	Although no impacts or effects are anticipated on television signals, the Applicant will fully investigate and provide alternative television reception, for example a satellite dish, should it be determined that the Proposed Development is the cause of an unacceptable level of interference. It is proposed that this is secured through a mitigation scheme requirement condition attached to the permission.	Operation
Dust	The CEMP will contain standard best practice for the control of dust from both construction activities and aggregate extraction from the borrow pits which will be implemented during construction.	Construction
Coastal processes	Suitable vessels will be determined by the turbine manufacturer. Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the infrastructure and channel dredging requirements.	Pre-construction
Benthos	Suitable vessels will be determined by the turbine manufacturer. Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the infrastructure and channel dredging requirements.	Pre-construction
Marine radar	Following consent, the Applicant will need to undertake a procurement exercise with the turbine suppliers to agree timescales for the import of components through Hatston Pier. As part of this process, the turbine suppliers will be required to formulate a Port Management Plan with the OIC Marine Services (see above).	Pre-construction/construction
	The following notifications will be made: ▪ Marine Safety Information and Notice to Mariners will be published prior to, and during, the works ▪ following completion of the construction works, the UK Hydrographic Office will be notified of the as-built layout of the new slipway and jetty, along with the revised depths as a result of dredging	Pre-construction/construction

Subject Area	Commitment	Timing
Commercial fisheries	Consultation with the local fleet, via Orkney Fisheries, will continue as the design develops to ensure fishermen are aware of any works being undertaken and any potential temporary displacement as a result of the works.	Pre-construction/construction

20 Summary of Residual Effects

Contents

20.1 Introduction 20-1

Table 20.1 - Summary of Residual Effects – Construction Phase *20-2*

Table 20.2 Summary of Residual Effects - Operation *20-22*

Table 20.3 Cumulative Effects *20-34*

This page is intentionally blank.

20 Summary of Residual Effects

20.1 Introduction

20.1.1 Table 20.1 and Table 20.2 provide a quick reference to residual environmental effects identified in the technical sections of the EIA, as well as a cross reference to the relevant mitigation measures identified.

20.1.2 Table 20.3 provides a summary of the cumulative effects of the Proposed Development in combination with other proposed, consented and operation developments within the area.

Table 20.1 - Summary of Residual Effects – Construction Phase

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
6. Landscape and Visual					
Agricultural Land	Not significant	Adverse	None	Not significant	Adverse
Coast with Sand LCT Mussetter LCU	Significant			Significant	
Holms LCT Holm of Faray LCU	Significant			Significant	
Holms LCT Rusk Holm LCU	Significant			Significant	
Inclined Coastal Pastures LCT Central Eday LCU	Significant – northern and central parts Not significant – southern part			Significant – northern and central parts Not significant – southern part	
Inclined Coastal Pastures LCT Fersness LCU	Significant – northern and central parts Not significant – southern parts			Significant – northern and central parts Not significant – southern parts	
Moorland Hills LCT South Eday LCU	Significant			Significant	

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Moorland Hills LCT North Eday LCU	Significant			Significant	
Moorland Hills LCT: North-east Rousay LCU	Not significant			Not significant	
Ridgeline Island Landscapes LCT Westray LCU	Significant – southern part Not significant – northern part	Adverse	None	Significant – southern part Not significant – northern part	Adverse
Undulating Island Pastures LCT: Sanday LCU	Not significant			Not significant	
Undulating Island Pastures LCT: Westray LCU	Not significant			Not significant	
Whaleback Islands LCT: Faray LCU	Significant			Significant	
Whaleback Islands LCT: Egilsay LCU	Not significant			Not significant	
RCCA 3 Sanday West	Not significant			Not significant	
RCCA 5 Eday: LCCA 5c Red Head to Greenan Nev	Significant – southern and central section			Significant – southern and central section	

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
	Not significant – northern section			Not significant – northern section	
RCCA 5 Eday: LCCA 5d Fersness Bay	Significant			Significant	
RCCA 5 Eday: LCCA 5e Faray	Significant			Significant	
RCCA 5 Eday: LCCA 5f Holm of Faray	Significant	Adverse	None	Significant	Adverse
RCCA 8 Westray North and East	Significant – southern coast Not significant – eastern and northern coasts			Significant – southern coast Not significant – eastern and northern coasts	
RCCA 10 Rousay North: LCCA 10b Saviskaill Bay	Not significant			Not significant	
RCCA 11 Rousay South: LCCA 11d Point of Avelshay to Scock Ness	Not significant			Not significant	
RCCA 12 Egilsay and Wyre	Not significant			Not significant	
Viewpoint 1: Guith, Eday	Significant			Significant	
Viewpoint 2: Vinquoy Hill, Eday	Significant			Significant	

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Viewpoint 3: Sands of Mussetter, Eday	Significant			Significant	
Viewpoint 4: Westray Ferry Terminal, Westray	Significant	Adverse	None	Significant	Adverse
Viewpoint 5: Ness of Tuquoy, Westray	Significant			Significant	
Viewpoint 6: Spur Ness, Sanday;	Not significant			Not significant	
Viewpoint 7: North Bay, Sanday	Not significant			Not significant	
Viewpoint 8: John's Hill, North Stronsay	Not significant			Not significant	
Viewpoint 9: Kierfea Hill, East Rousay	Significant			Significant	
Viewpoint 10: Hatston, Kirkwall	Not significant			Not significant	
Viewpoint 11: Westray Ferry	Significant			Significant	
Northern Isles Ferries	Significant – out to 12 km south, 8 km north-west			Significant – out to 12 km south, 8 km north-west and 7 km north-east	

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
	and 7 km north-east Not significant – all remaining sections			Not significant – all remaining sections	
B9066, Westray	Significant – out to 7.5 km north-west Not significant – beyond 7.5 km north-west			Significant – out to 7.5 km north-west Not significant – beyond 7.5 km north-west	
B9063, Eday	Significant – northern and central sections Not significant – southern section			Significant – northern and central sections Not significant – southern section	
ED1 Eday Heritage Walk	Significant			Significant	
ED5 Newark	Significant			Significant	
ED6 Sands of Mussetter	Significant	Adverse	None	Significant	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
W8 Castle o' Burrian and the Bay of Tafts; and	Significant – central sections Not significant – eastern and western sections			Significant – central sections Not significant – eastern and western sections	
R6 Faraclett Head	Significant			Significant	
7. Ornithology					
Greylag goose disturbance and displacement. [Redacted]	Barely Perceptible and not significant	Adverse	None	Barely Perceptible and not significant	Adverse
Curlew disturbance and displacement.	Barely Perceptible and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Lapwing disturbance and displacement.	Low and not significant		Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	
Golden plover disturbance and displacement.	Barely Perceptible and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Oystercatcher disturbance and displacement.	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
[Redacted]	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Redshank disturbance and displacement.	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Snipe	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Arctic tern disturbance and displacement.	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Storm petrel disturbance and displacement	Medium and not significant	Adverse	Minimum 100 m exclusion zone from nesting locations, timing of works and pre-construction check for nesting birds. Enforced biosecurity plan.	Low and not significant	Adverse
Gulls	Low and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Great skua	Barely Perceptible and not significant	Adverse	Timing of works or pre-construction check for nesting birds. Exclusion zones during breeding season.	Barely Perceptible and not significant	Adverse
Shag, Black guillemot	Barely Perceptible and not significant	Adverse	None	Barely Perceptible and not significant	Adverse
8. Terrestrial Ecology					
Designated sites: Faray and Holm of Faray SAC and SSSI. Main borrow pit operation	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Designated sites: Faray and Holm of Faray SAC and SSSI. Secondary borrow pit operation	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated sites: Faray and Holm of Faray SAC and SSSI. Landing jetty and Extended slipway construction – habitat changes	Negligible	Adverse	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated sites: Faray and Holm of Faray SAC and SSSI. Landing jetty and Extended slipway – breeding grey seals	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated sites: Faray and Holm of Faray SAC and SSSI. Extended slipway and landing jetty operation	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated sites: Faray and Holm of Faray SAC and SSSI. General construction	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Designated haul-outs, Calf of Eday, Weather Ness, Seal Skerry and Rusk Holm: Borrow pit operations	No impact	n/a	Borrow pit operations Method statement to control works to limit duration of disturbance events caused by material extraction; use of sound barriers along the coastal edge of the secondary borrow pit to reduce extraction noise propagation; selection of plant for the lowest noise and vibration output possible, with sound barriers also to be available for deployment around stationary plant, such as generators	No impact	n/a
Designated haul-outs, Calf of Eday, Weather Ness Seal Skerry and Rusk Holm: General site operations	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Designated haul-outs, Calf of Eday, Weather Ness Seal Skerry and Rusk Holm: General site operations	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Designated haul-outs: shipping route/s from Hatston Quay/other ports used for transportation of staff, plant and materials	Negligible and not significant	Adverse	Method Statement to ensure the least-disturbing route to site	Negligible and not significant	Adverse
Disturbance to standing water	No impact	n/a	Establishment of exclusion zones around waterbodies; operative awareness education to ensure the value of the island and its coastal environment is understood; development and application of a biosecurity plan	No impact	n/a
Intertidal boulders/rocks: habitat loss	Negligible and not significant	Adverse	Loss not possible to reverse. No further mitigation required beyond the embedded mitigation described	Negligible and not significant	Adverse
Disturbance to GWDTE marshy grassland with springs	Negligible and not significant	Adverse	No further mitigation required beyond the embedded mitigation described	No impact	n/a
Intertidal boulders/rocks	Negligible and not significant	Adverse	Loss not possible to reverse. No further mitigation required beyond the embedded mitigation described	Negligible and not significant	Adverse
[Redacted]	No impact	n/a	No further mitigation required beyond the embedded mitigation described	No impact	n/a

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
[Redacted]	Negligible and not significant	Adverse	In addition to the embedded mitigation described, use of sound barriers around the shoreward side of the secondary borrow pit; soft start procedures	No impact	n/a
[Redacted]	No impact	n/a	[Redacted]	No impact	n/a
[Redacted]	Negligible, local level and only locally significant	Adverse	[Redacted]	Negligible, local level and not significant	Adverse
[Redacted]	Negligible, local level and locally significant	Adverse	Method Statements for vessel movements and Extended slipway and landing jetty operations	Negligible, local level and not significant	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
[Redacted]	Negligible and not significant	Adverse	[Redacted]	No impact	n/a
Non-breeding grey seal: main borrow pit operation	Negligible and not significant	Adverse	Restrict extraction of material from the secondary borrow pit to periods when no seals are present within the landing facility and Scammalin Bay area. Where this is not possible, use of a standard "soft-start" procedure and Species Protection plan	No impact	n/a
Non-breeding grey seal: secondary borrow pit operation	Minor and not significant	Adverse	Restrict extraction of material from the secondary borrow pit to periods when no seals are present within the landing facility and Scammalin Bay area.; where this is not possible, use of a standard "soft-start" procedure and sound	Negligible	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
			barriers around the shoreward side of the secondary borrow pit		
Non-breeding grey seal: Extended slipway and landing jetty construction – habitat loss (haul-out and foraging resource)	Negligible and not significant	Adverse	Method Statement for responsible construction; Strict control of potential for human presence near hauled-out seals.	Negligible and not significant	Adverse
Non-breeding grey seal: Extended slipway and landing jetty construction and use during the construction phase – disturbance/ displacement	Minor and not significant	Adverse	Method Statement for responsible construction and landing facility operation; Strict control of potential for human presence near hauled-out seals.	Negligible and not significant	Adverse
9. Noise					
Noise from construction activities	Minor and not significant	Adverse	Implementation of appropriate noise controls regarding hours of work, timing of site deliveries, and use of best practice to minimise unnecessary noise.	Minor and not significant	Adverse
10. Cultural Heritage					
Direct impacts on non-designated assets of negligible importance recorded from historic maps (Sites 5, 12 and 109)	Minor and not significant	Adverse	A mitigation strategy in four stages is proposed; geophysical survey and trial trenching will be undertaken in the first instance. Should the results of the trial trenching indicate that further works are	Negligible and not significant	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
			required further excavation and post-excavation analysis will be undertaken.		
Direct impacts on known non-designated remains of low importance that are present on the site (Sites 73, 74, 114 and 119).	Minor and not significant	Adverse	A mitigation strategy in four stages is proposed; geophysical survey and trial trenching will be undertaken in the first instance. Should the results of the trial trenching indicate that further works are required further excavation and post-excavation analysis will be undertaken.	Negligible and not significant	Adverse
Direct impacts on previously unrecorded non-designated archaeological remains of potential medium or high importance that could be present on the site.	Major and significant	Adverse	A four-stage mitigation strategy is proposed; survey and trial trenching will be undertaken initially and will be followed by excavation and post-excavation analysis as necessary. Any significant remains will be preserved in situ wherever possible.	Negligible and not significant	Adverse
Temporary significant effects on the setting of Quoy Chambered Cairn (Site 1) during construction operation	Moderate and significant	Adverse	Effects on setting from heavy traffic movement and associated noise would cease on completion of construction.	Neutral	-
11. Geology, Hydrology and Hydrogeology					

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Pollution from silt-laden runoff	Negligible to Minor (non-significant)	Adverse	No additional mitigation than the standard mitigation identified.	Negligible to Minor (non-significant)	Adverse
Pollution from chemical contaminated runoff	Negligible to Minor (non-significant)	Adverse		Negligible to Minor (non-significant)	Adverse
Effect on groundwater quality and flow	Minor (non-significant)	Adverse		Minor (non-significant)	Adverse
12. Traffic and Transport					
Traffic impacts within the study area road network	Negligible and not significant	Adverse	No additional mitigation than the standard mitigation and provision of a Port Management Plan.	Negligible and non-significant	Adverse
13. Socio-economic, Recreation and Tourism					
Economic impact of £2.6 million GVA and 39 job years in Orkney	Minor and Not Significant	Beneficial	n/a	Minor and Not Significant	Beneficial
Economic impact of £10.4 million GVA and 161 job years in Scotland	Negligible and not significant.	Beneficial	n/a	Negligible and not significant.	Beneficial

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Economic impact of £0.2 million GVA and 5 job years in Orkney	Negligible and not significant.	Beneficial	n/a	Negligible and not significant.	Beneficial
Economic impact of £0.8 million GVA and 11 job years in Scotland	Negligible and not significant.	Beneficial	n/a	Negligible and not significant.	Beneficial
14. Aviation and Radar					
No construction phase effects anticipated.					
15. Shadow Flicker					
Shadow flicker nuisance on residential receptor	None	N/A	None required.	None	N/A
16. Underwater Noise Assessment					
Damage to hearing in local seal population from piling activities	Moderate and significant	Adverse	Use of a bubble curtain	Negligible and not significant	Adverse
Damage to hearing in local low-frequency cetaceans population from piling activities	Minor and not significant	Adverse	Use of a bubble curtain	Minor and not significant	Adverse
Damage to hearing in local mid-frequency cetaceans population from piling activities	Negligible and not significant	Adverse	Use of a bubble curtain	Negligible and not significant	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Damage to hearing in local high-frequency cetaceans population from piling activities	Moderate and significant	Adverse	Use of a bubble curtain	Minor and not significant	Adverse
17. Marine Water and Sediment Quality					
Impact of dredging on marine water quality – suspended sediments	Negligible and not significant	Adverse	None required	Negligible and not significant	Adverse
Impact of dredging on marine water quality – chemical parameters	Negligible and not significant	Adverse	None required	Negligible and not significant	Adverse
Impact of dredging on sediment quality – chemical parameter and deposition parameter	Minor and not significant	Adverse	None required	Minor and not significant	Adverse
Impact of accidental spills and leaks on marine water and sediment quality during construction	Negligible and not significant	Adverse	CEMP	Negligible and not significant	Adverse
18. Other Issues					
Installation of the new extended slipway and landing jetty interrupting the natural coastal processes within the area	Negligible and not significant	Adverse	Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the	Negligible and not significant	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
			infrastructure and channel dredging requirements.		
Seabed disturbance via the installation of the new extended slipway and landing jetty	Minor and not significant	Adverse	Where possible, efforts will be made to identify vessels, such as barges, that would not require anchoring or dredging, in order to limit the size of the infrastructure and channel dredging requirements.	Minor and not significant	Adverse
Installation of the new extended slipway and landing jetty, including construction vessel movements, interrupting marine navigation	Negligible and not significant	Adverse	Turbine suppliers will be required to formulate a Port Management Plan with the OIC Marine Services (see above). Marine Safety Information and Notice to Mariners will be published prior to, and during, construction works following completion of the construction works, the UK Hydrographic Office will be notified of the as-built layout of the new slipway and jetty, along with the revised depths as a result of dredging	Negligible and not significant	Adverse
Construction of the new extended slipway and landing jetty could result in localised, temporary exclusion of	Negligible and not significant	Adverse	Consultation with the local fleet, via Orkney Fisheries, will continue as the design develops to ensure fishermen are aware of any works being undertaken	Negligible and not significant	Adverse

Description of Effect	Significance of Likely Effect		Additional Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
commercial fishing within the area of construction			and any potential temporary displacement as a result of the works.		

Table 20.2 Summary of Residual Effects - Operation

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
6. Landscape and Visual					
Agricultural Land	N/A	N/A	None	N/A	N/A
Coast with Sand LCT Mussetter LCU	Significant	Adverse		Significant	Adverse
Holms LCT Holm of Faray LCU	Significant			Significant	
Holms LCT Rusk Holm LCU	Significant			Significant	
Inclined Coastal Pastures LCT Central Eday LCU	Significant – northern and central parts Not significant – southern part			Significant – northern and central parts Not significant – southern part	
Inclined Coastal Pastures LCT Fersness LCU	Significant – northern and central parts Not significant – southern parts			Significant – northern and central parts Not significant – southern parts	
Moorland Hills LCT South Eday LCU	Significant			Significant	

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Moorland Hills LCT North Eday LCU	Significant		None	Significant	
Moorland Hills LCT: North-east Rousay LCU	Not significant			Not significant	
Ridgeline Island Landscapes LCT Westray LCU	Significant – southern part Not significant – northern part	Adverse		Significant – southern part Not significant – northern part	Adverse
Undulating Island Pastures LCT: Sanday LCU	Not significant			Not significant	
Undulating Island Pastures LCT: Westray LCU	Not significant			Not significant	
Whaleback Islands LCT: Faray LCU	Significant			Significant	
Whaleback Islands LCT: Egilsay LCU	Not significant			Not significant	
RCCA 3 Sanday West	Not significant			Not significant	
RCCA 5 Eday: LCCA 5c Red Head to Greenan Nev	Significant – southern and central section	Adverse		Significant – southern and central section	Adverse

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
	Not significant – northern section			Not significant – northern section	
RCCA 5 Eday: LCCA 5d Fersness Bay	Significant		None	Significant	
RCCA 5 Eday: LCCA 5e Faray	Significant			Significant	
RCCA 5 Eday: LCCA 5f Holm of Faray	Significant			Significant	
RCCA 8 Westray North and East	Significant – southern coast Not significant – eastern and northern coasts			Significant – southern coast Not significant – eastern and northern coasts	
RCCA 10 Rousay North: LCCA 10b Saviskaill Bay	Not significant			Not significant	
RCCA 11 Rousay South: LCCA 11d Point of Avelshay to Scock Ness	Not significant			Not significant	
RCCA 12 Egilsay and Wyre	Not significant			Not significant	
Viewpoint 1: Guith, Eday	Significant	Adverse		Significant	Adverse
Viewpoint 2: Vinquoy Hill, Eday	Significant			Significant	

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Viewpoint 3: Sands of Mussetter, Eday	Significant		None	Significant	
Viewpoint 4: Westray Ferry Terminal, Westray	Significant			Significant	
Viewpoint 5: Ness of Tuquoy, Westray	Significant			Significant	
Viewpoint 6: Spur Ness, Sanday;	Not significant			Not significant	
Viewpoint 7: North Bay, Sanday	Not significant			Not significant	
Viewpoint 8: John's Hill, North Stronsay	Not significant			Not significant	
Viewpoint 9: Kierfea Hill, East Rousay	Significant			Significant	
Viewpoint 10: Hatston, Kirkwall	Not significant			Not significant	
Viewpoint 11: Westray Ferry	Significant			Significant	
Northern Isles Ferries	Significant – out to 12 km south, 8 km north-west and 7 km north-east Not significant – all remaining sections			Significant – out to 12 km south, 8 km north-west and 7 km north-east Not significant – all remaining sections	

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
B9066, Westray	Significant – out to 7.5 km north-west Not significant – beyond 7.5 km north-west	Adverse	None	Significant – out to 7.5 km north-west Not significant – beyond 7.5 km north-west	Adverse
B9063, Eday	Significant – northern and central sections Not significant – southern section			Significant – northern and central sections Not significant – southern section	
ED1 Eday Heritage Walk	Significant			Significant	
ED5 Newark	Significant			Significant	
ED6 Sands of Mussetter	Significant			Significant	
W8 Castle o' Burrian and the Bay of Tafts; and	Significant – central sections Not significant – eastern and western sections	Adverse		Significant – central sections Not significant – eastern and western sections	Adverse

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
R6 Faraclett Head	Significant		None	Significant	
7. Ornithology					
[Redacted]	Low and not significant	Adverse	None	Low and not significant	Adverse
Lapwing and golden plover – collision risk	Low and not significant	Adverse	None	Low and not significant	Adverse
Greylag goose / great skua /other wader collision risk	Barely Perceptible and not significant	Adverse	None	Barely Perceptible and not significant	Adverse
Storm Petrel	Low and not significant	Adverse	Creation of new breeding habitat in north of site with potential to double the island population. Continued biosecurity measures.	High and significant	Beneficial
Ground nesting waders and other species displacement	Low and not significant	Adverse	Grazing management to remain in place throughout the lifetime of scheme.	Low and not significant	Beneficial
8. Terrestrial Ecology					

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Designated sites: Faray and Holm of Faray SAC and SSSI. Disturbance of breeding grey seals during maintenance visits	Negligible and not significant in terms of the overall SAC population; moderate and significant to individual animals within the EZoI	Adverse	Maintenance checks, including normal repair works/replacement of parts timed to avoid the seal breeding season (15th September to 31st December inclusive), where possible; if visits are still required, then these will be limited to the minimum, in order to reduce the potential for adverse impacts to any breeding seals close to the landing facility	Negligible effect to SAC population and individual animals; not significant	Adverse
Designated sites: Faray and Holm of Faray SAC and SSSI. Disturbance of breeding seals during unplanned major maintenance	Negligible and not significant in terms of the overall SAC population; minor and not significant to individual animals within the EZoI	Adverse	Method Statements and timing controls to reduce potential disturbance if in-season repair works are required: emergency plans and appropriate mitigations to be Method Statement controlled, with these agreed with NatureScot prior to works commencing. Maintenance check vessel routing to follow the same method statement as applied to the construction phase, in order to minimise disturbance to the seal haul-out populations	Negligible and not significant in terms of the overall SAC population; minor and not significant to individual animals within the EZoI	Adverse

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Disturbance to standing water	No impact	n/a	None required	No impact	n/a
Disturbance to GWDTE marshy grassland with springs	No impact	n/a	None required	No impact	n/a
Intertidal boulders/rocks	No impact	n/a	None required	No impact	n/a
[Redacted]	Negligible and not significant	Adverse	Application of maintenance and driving Method Statements	No impact	n/a
Non-breeding grey seals: general wind farm operation	No impact	n/a	None required	No impact	n/a
Non-breeding grey seals: maintenance disturbance	Minor and not significant	Adverse	Application of maintenance Method Statement; Maintenance check vessel routing to follow the same method statement as applied to the construction phase, in order to	Negligible and not significant	Adverse

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
			minimise disturbance to the seal haul-out populations		
Non-breeding grey seals: major maintenance works disturbance	Minor and not significant	Adverse	Application of maintenance Method Statement; maintenance check vessel routing to follow the same method statement as applied to the construction phase, in order to minimise disturbance to the seal haul-out populations	Negligible and not significant	Adverse
9. Noise					
Noise from non-turbine fixed plant	Minor and not significant	Adverse	Selection of plant which complies with specified maximum sound power level such that the derived noise limits are met.	Minor and not significant	Adverse
Noise from wind turbines	Neutral to moderate and not significant to significant	Adverse	A noise management plan may be required such that Residual Noise Limits are met at all NSRs at all wind speeds under down-wind conditions, however, predicted exceedances of noise limits are minor (≤1.9 dB).	Neutral to minor and not significant	Adverse

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
10. Cultural Heritage					
Moderate significant effects on the settings of Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Vinquoy Hill Chambered Cairn (Site 40) and the Faray post-medieval landscape.	Moderate and significant	Adverse	Historic Building Recording to be undertaken to ensure better understanding and appreciation of the surviving extent and condition of upstanding built heritage remains on Eday and ensure a lasting legacy of their preservation by record for future generations prior to any further deterioration. Measured survey and recording of assets eroding from the coastal edge will help to preserve a record of their extent and nature before they are lost to coastal erosion.	Moderate and significant	Adverse
11. Geology, Hydrology and Hydrogeology					
Change in surface water drainage	Negligible (non-significant)	Adverse	No additional mitigation than the standard mitigation identified.	Negligible (non-significant)	Adverse
Long-term changes to groundwater flow regime	Minor (non-significant)	Adverse	No additional mitigation beyond the standard mitigation identified	Minor (non-significant)	Adverse
12. Traffic and Transport					

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
No significant operational effects anticipated.					
13. Socio-economic, Recreation and Tourism					
Annual O&M economic impact of £0.3 million GVA and 4 jobs in Orkney	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a
Annual O&M economic impact of £0.5 million GVA and 9 jobs in Scotland	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a
Contribution to the case for the interconnector	Moderate and significant.	Beneficial	n/a	Moderate and significant.	Beneficial
Annual payment of an estimated £0.5 million in non-domestic rates	Minor and not significant.	Beneficial	n/a	Minor and not significant.	Beneficial
Annual payment of £144,000 in a location specific community benefit fund	Minor and not significant.	Beneficial	n/a	Minor and not significant.	Beneficial
Annual profit of £2.88 million from ownership	Minor and not significant.	Beneficial	n/a	Minor and not significant.	Beneficial
Effect on tourism assets	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a
Effect on core paths and recreational access	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a

Description of Effect	Significance of Likely Effect		Mitigation Measure	Significance of Residual Effect	
	Significance	Beneficial/ Adverse		Significance	Beneficial/ Adverse
Effect on accommodation providers	Negligible and not significant.	n/a	n/a	Negligible and not significant.	n/a
14. Aviation and Radar					
No operational effects anticipated.					
15. Shadow Flicker					
Shadow flicker nuisance on residential receptor	Not significant	Adverse	None required.	None	N/A
16. Underwater Noise Assessment					
Vessel movements during maintenance visits	Negligible and not significant	Adverse	None considered		
17. Marine Water and Sediment Quality					
Impact of accidental spills and leaks on marine water and sediment quality by vessels required during maintenance visits	Negligible and not significant	Adverse	OEMP	Negligible and not significant	Adverse
18. Other Issues					
No operational effects anticipated.					

Table 20.3 Cumulative Effects

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
6. Landscape and Visual				
Agricultural Land	Landscape & Visual	N/A	N/A	N/A
Coast with Sand LCT Mussetter LCU		Sandy Banks, Westray Development Trust, Gallowhill, Newark, Spurness Point	Low or negligible Not significant	Adverse
Holms LCT Holm of Faray LCU		Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Newark, Gallowhill, Westray Development Trust	Low or negligible Not significant	
Holms LCT Rusk Holm LCU		Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Newark, Gallowhill, Westray Development Trust	Low or negligible Not significant	
Inclined Coastal Pastures LCT Central Eday LCU		Spurness Point, Stronsay Development Trust, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Newark, Gallowhill, Westray Development Trust	Low or negligible Not significant	
Inclined Coastal Pastures LCT Fersness LCU		Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Gallowhill, Westray Development Trust	Low or negligible Not significant	

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Moorland Hills LCT South Eday LCU		Spurness Point, Stronsay Development Trust, Barnes of Ayre, Sandy Banks, Quanterness, Rennibister, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Newark, Gallowhill, Westray Development Trust	Low or negligible Not significant	
Moorland Hills LCT North Eday LCU	Landscape & Visual	Spurness Point, Stronsay Development Trust, Barnes of Ayre, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Gallowhill, Westray Development Trust	Low or negligible Not significant	Adverse
Moorland Hills LCT: North-east Rousay LCU		Newark, Sandy Banks, Barnes of Ayre, , Kingarly, Work Farm, Hammers Hill, Hammers Hill Extension, Holodykes, Burgar Hill, Costa Head	Low or negligible Not significant	
Ridgeline Island Landscapes LCT Westray LCU		Newark, Spurness Point, Sandy Banks, Upper Stove, Howe, Qaunterness, Kingarly, Burgar Hill, Costa Head, Gallowhill, Westray Development Trust	Low or negligible Not significant	
Undulating Island Pastures LCT: Sanday LCU		Stronsay Development Trust, Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Westray Development Trust, Gallowhill	Low or negligible Not significant	

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Undulating Island Pastures LCT: Westray LCU		Newark, Spurness Point, Sandy Banks, Upper Stove, Howe, Qaunterness, Kingarly, Burgar Hill, Costa Head, Gallowhill, Westray Development Trust	Low or negligible Not significant	
Whaleback Islands LCT: Faray LCU		Spurness Point, Stronsay Development Trust, Barnes of Ayre, Upper Stove, Howe, Sandy Banks, Quanterness, Rennibister, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Newark, Gallowhill Westray Development Trust	Low or negligible Not significant	
Whaleback Islands LCT: Egilsay LCU		Newark, Spurness Point, Sandy Banks, Barnes of Ayre, Upper Stove, Howe, Kingarly, Work Farm, Berriedale, Quanterness, Hammers Hill, Hammers Hill Extension, Holodykes, Burgar Hill, Costa Head	Low or negligible Not significant	
RCCA 3 Sanday West		Stronsay Development Trust, Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Westray Development Trust, Gallowhill	Low Not significant	
RCCA 5 Eday: LCCA 5c Red Head to Greenan Nev	Landscape & Visual	Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Gallowhill, Westray Development Trust	Low Not significant	Adverse

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
RCCA 5 Eday: LCCA 5d Fersness Bay		Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Gallowhill, Westray Development Trust	Low Not significant	
RCCA 5 Eday: LCCA 5e Faray		Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Gallowhill, Westray Development Trust	Low Not significant	
RCCA 5 Eday: LCCA 5f Holm of Faray		Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Newark, Gallowhill, Westray Development Trust	Low Not significant	
RCCA 8 Westray North and East		Newark, Spurness Point, Sandy Banks, Upper Stove, Howe, Qaunterness, Kingarly, Burgar Hill, Costa Head, Gallowhill, Westray Development Trust	Low Not significant	
RCCA 10 Rousay North: LCCA 10b Saviskaill Bay		Newark, Spurness Point, Sandy Banks, Barnes of Ayre, Upper Stove, Howe, Kingarly, Work Farm, Berriedale, Quanterness, Hammers Hill, Hammers Hill Extension, Holodykes, Burgar Hill, Costa Head	Low Not significant	
RCCA 11 Rousay South: LCCA 11d Point of Avelshay to Scock Ness		Newark, Spurness Point, Sandy Banks, Barnes of Ayre, Upper Stove, Howe, Kingarly, Work Farm, Berriedale, Quanterness, Hammers Hill, Hammers Hill Extension, Holodykes, Burgar Hill, Costa Head	Low Not significant	

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
RCCA 12 Egilsay and Wyre		Newark, Spurness Point, Sandy Banks, Barnes of Ayre, Upper Stove, Howe, Kingarly, Work Farm, Berriedale, Quanterness, Hammers Hill, Hammers Hill Extension, Holodykes, Burgar Hill, Costa Head	Low Not significant	
Viewpoint 1: Guith, Eday		Stronsay Development Trust, Sandy Banks, Quanterness, Rennibister, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Westray Development Trust, Gallowhill, Newark	Medium-low Not significant	
Viewpoint 2: Vinquoy Hill, Eday		Spurness Point, Stronsay Development Trust, Barnes of Ayre, Upper Stove, Howe, Sandy Banks, Quanterness, Rennibister, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Newark, Gallowhill Westray Development Trust	Medium-low Not significant	
Viewpoint 3: Sands of Mussetter, Eday	Landscape & Visual	Sandy Banks, Westray Development Trust, Gallowhill, Newark, Spurness Point	Negligible Not significant	Adverse
Viewpoint 4: Westray Ferry Terminal, Westray		Spurness Point, Sandy Banks, Howe, Work Farm, Crowness Business Park	Negligible Not significant	
Viewpoint 5: Ness of Tuquoy, Westray		Newark, Spurness Point, Sandy Banks, Upper Stove, Howe, Qaunterness, Kingarly, Burgar Hill, Costa Head, Gallowhill, Westray Development Trust	Low Not significant	

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
Viewpoint 6: Spur Ness, Sanday;		Spurness Point, Northfield, Berriedale, Howe, Quanterness,	Low Not significant	
Viewpoint 7: North Bay, Sanday		Stronsay Development Trust, Spurness Point, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Westray Development Trust, Gallowhill	Negligible Not significant	
Viewpoint 8: John's Hill, North Stronsay		Barnes of Ayre, Stronsay Devleopment Trust, Berriedale, Northfield, Work Farm, Howe, Crowness Business Park, Quanterness, Rennibister, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Sandy Banks, Westray Development Trust, Gallowhill, Newark, Spurness Point	Low Not significant	
Viewpoint 9: Kierfea Hill, East Rousay		Newark, Spurness Point, Sandy Banks, Barnes of Ayre, Upper Stove, Howe, Kingarly, Work Farm, Berriedale, Quanterness, Hammers Hill, Hammers Hill Extension, Holodykes, Burgar Hill, Costa Head	Low Not significant	
Viewpoint 10: Hatston, Kirkwall		Kingarly Hill, Sandy Banks, Spurness, Stronday Development Trust, Howe, Work Farm, Crowness Business Park	Medium-low Not significant	
Viewpoint 11: Westray Ferry		Newark, Westray Development Trust, Gallowhill, Spurness Point, Upper Stove, Howe, Work Farm, Crowness Business Park, Quanterness, Rennibister,	Low Not significant	

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
		Hammers Hill, Hammers Hill Extension, Kingarly Hill, Sandy Banks		
Northern Isles Ferries		Newark, Westray Development Trust, Gallowhill, Spurness Point, Upper Stove, Howe, Work Farm, Crowness Business Park, Quanterness, Rennibister, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Sandy Banks	Medium-low Not significant	
B9066, Westray	Landscape & Visual	Newark, Spurness Point, Sandy Banks, Upper Stove, Howe, Qaunterness, Kingarly, Burgar Hill, Costa Head, Gallowhill, Westray Development Trust	Low Not significant	Adverse
B9063, Eday		Spurness Point, Stronsay Development Trust, Barnes of Ayre, Upper Stove, Howe, Sandy Banks, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Newark, Gallowhill Westray Development Trust	Low Not significant	
ED1 Eday Heritage Walk		Spurness Point, Stronsay Development Trust, Barnes of Ayre, Upper Stove, Howe, Sandy Banks, Quanterness, Rennibister, Hammers Hill, Hammers Hill Extension, Kingarly Hill, Burgar Hill, Costa Head, Newark, Gallowhill Westray Development Trust	Low Not significant	
ED5 Newark		Stronsay Development Trust, Sandy Banks, Quanterness, Rennibister, Hammers Hill, Hammers Hill Extension,	Low Not significant	

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
		Kingarly Hill, Burgar Hill, Costa Head, Westray Development Trust, Gallowhill, Newark		
ED6 Sands of Mussetter		Sandy Banks, Westray Development Trust, Gallowhill, Newark, Spurness Point	Low Not significant	
W8 Castle o' Burrian and the Bay of Tafts; and		Newark, Spurness Point, Sandy Banks, Upper Stove, Howe, Qaunterness, Kingarly, Burgar Hill, Costa Head, Gallowhill, Westray Development Trust	Low Not significant	
R6 Faraclett Head		Newark, Spurness Point, Sandy Banks, Barnes of Ayre, Upper Stove, Howe, Kingarly, Work Farm, Berriedale, Quanterness, Hammers Hill, Hammers Hill Extension, Holodykes, Burgar Hill, Costa Head	Low Not significant	
7. Ornithology				
[Redacted]	Collision mortality	A combined annual collision risk of 0.21 birds is predicted which is not considered to be significant	Barely Perceptible and not significant	Adverse
Wader collision risk / nest displacement	Disturbance, displacement and collision mortality	Wader data is not available for a number of developments across Orkney. Cumulative collision risk values for these species are very low. Some temporary displacement is likely during construction however with a HMP in place this will be offset	Barely Perceptible and not significant	Adverse
8. Terrestrial Ecology				

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
No significant cumulative effects anticipated.				
9. Noise				
All NSRs	Cumulative wind turbine noise	Multiple small turbine developments on Eday.	Minor and not significant	Adverse
10. Cultural Heritage				
Burn of Musetter standing stone (Site 22). Chambered cairns at The Manse (Site 23), Eday Church Hall (Site 24), Calf of Eday (Site 28) Bay of London (Site 33), Vinquoy Hill (Site 40), Fitty Hill (Site 124) and Howa Tower (Site 125	Settings Effect	Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill Rennibister and Crowness Business Park turbines on Mainland	Minor and not significant	Adverse
Quoy Chambered Cairn (Site 1), Muckle Hill of Linkataing Chambered Cairn (Site 17), Dale Burnt Mound (Site 35) Helzie Windmill (Site	Settings Effects	Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill Rennibister and Crowness Business Park turbines on Mainland	No additional cumulative effect	N/A

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
48) Rusk Holm (Site 49) Sangar croft house (Site 50) and the Faray post-medieval landscape.				
Direct impacts on known non-designated assets on Faray	Direct Effects	Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill Rennibister and Crowness Business Park turbines on Mainland	Negligible and not significant	N/A
Unknown archaeological remains	Direct Effects	Spurness Point on Sanday, Gallowhill and Westray Development Trust on Westray and Hammars Hill Rennibister and Crowness Business Park turbines on Mainland	Negligible and not significant	N/A
11. Geology, Hydrology and Hydrogeology				
No significant cumulative effects anticipated.				
12. Traffic and Transport				
Traffic impacts within the study area	Minor	Costa Head Wind Farm (assuming construction date of 2023)	No cumulative effects	Adverse
Traffic impacts within Finstown	Minor	Costa Head Wind Farm (assuming construction date of 2024)	Minor and not significant	Adverse

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
13. Socio-economic, Recreation and Tourism				
Local Supply Chain Cumulative Effects	Minor and not significant	Beneficial	Minor and not significant	Beneficial
Cumulative Tourism Effects	Negligible and not significant	N/A	Negligible and not significant	n/a
14. Aviation and Radar				
No significant cumulative effects anticipated.				
15. Shadow Flicker				
No receptors found	No effect	None	None	N/A
16. Underwater Noise Assessment				
Marine mammals	Hearing loss and behavioural disturbance	None in the area	No effect	N/A
17. Marine Water and Sediment Quality				
Marine water and sediment quality	Effects on suspended sediments, and chemical parameters	None in the area	No effect	N/A
18. Other Issues				

Receptor	Description of Effect	Cumulative Developments	Significance of Cumulative Effect	
			Significance	Beneficial/ Adverse
No cumulative effects anticipated.				

This page is intentionally blank.