ORKNEY ISLANDS COUNCIL
Harbour Authority

envirocentre

Orkney Logistics Base (Hatston)
Volume 1: Environmental Impact Assessment Report

June 2023

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Report Amendments

Version	Date	Amendments
1	06/09/2023	Removed reference to sea disposal in Sections 2.7.4, Table 9-4 and Section 9.2.4. Table 3.1 updated.
2		

PREFACE

This Environmental Impact Assessment Report (EIAR) has been prepared under the Town & Country Planning (Environmental Impact Assessment) (Scotland) 2017 Regulations ("the EIA Regulations") and the Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 ("the marine EIA Regulations"). The EIAR has been prepared to support an application for Planning Permission to Orkney Islands Council (OIC) as well as applications for a marine construction and dredging licence to Marine Scotland Licensing Operations Team (MS-LOT).

Hatston Pier and Terminal (to be rebranded as Orkney Logistics Base (Hatston) and referred to as such in this Report) is located on the Orkney Mainland coast to the immediate northwest of Kirkwall. It is Orkney's primary commercial terminal and gateway to Aberdeen and north to Shetland. The longest existing berth is 385m in length, offering 10.5m draft. The original pier was built in 2002, and a 160m extension was completed in 2013. The proposed expansion comprises:

- ✓ 300m outer quay extension.
- ✓ Water depth of 10m below Chart Datum.
- ✓ 125m inner berth with fixed ramp & provision for future link span together with adjacent boat lift facility7.5 hectares of additional land close to the quay through reclamation.
- ✓ Ex-pipe fuel supply and storage, with ability to offer low or zero carbon fuels in the future.

Plate 0-1- Orkney Logistics Base (Hatston).

Key activities will include the establishment of an offshore wind Operations and Maintenance (O&M) base, oil and gas supply, freight and ferries, boat repair, aquaculture and logistics. This location could also be a hub for servicing other marine renewable (e.g. tidal and wave) devices in the future.

This EIAR reports the findings of an EIA which has been co-ordinated and written by EnviroCentre Ltd, with specialist input from technical co-consultants.

This EIAR comprises the following elements:

- Volume 1: Environmental Impact Assessment Report
  - Providing a detailed description of the proposed development and its potentially significant environmental effects, detailing alternative options where applicable, reporting the findings of the EIA, as well as any proposed mitigation measures and providing other relevant background information;
- Volume 2: Relevant figures and plans too large to be presented within Volume 1; and
- Volume 3: Technical Appendices
  - Containing detailed technical reports and baseline studies which act as background reports to Volume 1.

The following documents have also been prepared to support the application. These form part of the overall submission, but they do not form part of the EIAR:

- Planning Application;
- Design and Access Statement;
- Planning Support Statement;
- Planning Application Consultation Report;
- Best Practicable Environmental Option Report (for dredging application);
- Marine Construction Licence Application – the application for construction in the marine environment is required to consent activities up to Mean High Water Springs (MHWS); and
- Dredging Licence Application – the dredging application is required to consent the removal of sediment from the marine environment.

A Non-Technical Summary (NTS) has also been prepared which is a condensed synopsis of the EIAR. Members of the public can view hardcopy of the full EIAR at the following locations during normal office hours:

- Customer Services, Council Offices, Kirkwall, Orkney KW15 1NY (10:00 to 13:00 and 14:00 to 16:00 Monday to Friday);
- Warehouse Buildings, 2-12 Victoria Street, Stromness, Orkney KW16 3AA (10:00 to12:00 and 14:00 to 16:00 Monday to Friday and 12:00 to 15:00 on Saturdays); and
- Orkney Harbours, Kiln Corner Office (see local media and www.orkneyharboursmasterplan.com for public drop in opening times)

Hardcopies of the NTS will also be available for free of charge at the above locations.

Electronic copies of the NTS and EIAR can also be downloaded from www.orkneyharboursmasterplan.com. Full hard copies of the EIAR can be supplied for £250 per copy by request to Orkney Islands Council Customer Services, Kirkwall.

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1 INTRODUCTION

1.1 Terms of Reference

EnviroCentre Ltd has been appointed by Orkney Islands Council Harbour Authority (OICHA) to undertake an Environmental Impact Assessment (EIA) of the proposed expansion of the existing Hatston Quay and adjacent land to create a Logistics Base (to be rebranded as Orkney Logistics Base (Hatston) and referred to as such in this Report). This Environmental Impact Assessment Report (EIAR) comprises the written findings of the EIA process undertaken under both the Town & Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment (Scotland) Regulations 2017 ('the Marine EIA Regulations').

1.2 Report Usage

The information and recommendations contained within this report have been prepared in the specific context stated above and should not be utilised in any other context without prior written permission from EnviroCentre.

If this report is to be submitted for regulatory approval more than 12 months following the report date, it is recommended that it is referred to EnviroCentre for review to ensure that any relevant changes in data, best practice, guidance or legislation in the intervening period are integrated into an updated version of the report.

Whilst the Client has a right to use the information as appropriate, EnviroCentre Ltd do not accept liability to any third party for the contents of this report unless written agreement is secured in advance, stating the intended use of the information. EnviroCentre accept no liability for use of the report for purposes other than those for which it was originally provided, or where EnviroCentre have confirmed it is appropriate for the new context.

1.3 The Applicant and Background

OICHA are the Applicant for the proposed development.

In August 2020, OICHA launched the Orkney Harbours Masterplan Phase 1, (after OIC Members approval in April 2020) a proposed and ambitious £230 million infrastructure vision to be completed over a 20 year period. Proposals focus on harbour infrastructure enhancements that will generate jobs, additional revenue and attract new business. It represents the first step in a review of Orkney Harbour Authority owned infrastructure to create a base for innovation and secure the long-term future for the community.

The Masterplan embraces decarbonisation and transition away from fossil fuels. The infrastructure proposals have been designed to enable Orkney to manage this transition while continuing to generate social and economic benefit from ongoing oil and gas activity. Harbour users and key stakeholders were consulted from the outset to help gain an understanding of the issues, constraints and opportunities associated with the harbour infrastructure around Orkney through workshops and interviews. The range of stakeholders includes local communities, harbour users, potential funders and environmental bodies such as NatureScot.

Phase 1 of the Masterplan considers five main locations on the Orkney mainland, namely and in no priority:

1. Scapa Deep Water Quay;
2. Hatston Pier and Harbour;
3. Existing Scapa Pier;
4. Kirkwall Pier and Harbour; and
5. Stromness.

It is proposed that a future Phase 2 will address development of smaller harbours and piers across the archipelago.

Full details of the Masterplan can be found at http://www.orkneyharboursmasterplan.com/.

1.4 The Project Team

The EIA carried out in relation to the proposed development has been undertaken by specialist environmental and technical consultants as provided in Table 1-2.

Table 1-1: Project Team and Competent Expertise

Project Role	Organisation	Lead Author & Reviewer	No. of Years' Experience	Qualifications & Professional Memberships
Inputs to EIA Process				
Project Director	EnviroCentre	Dr Campbell Fleming	33+	PhD CGeol FGS
Project Manager	EnviroCentre	Emma Cormack	20+	BSc (Hons), MIEnvSc
Project Co-ordinator for SWECO	SWECO	Rebecca McLean	18+	BSc (Hons), Cenv, MIEMA
Engineering – Project Director	Arch Henderson	Andrew Sandison	37+	BSc (Hons) PG Dip Ceng FICE FIES
Engineering – Project Manager	Arch Henderson	Shane Jamieson	10+	Beng (Hons) MSc Ceng MICE
Volume 1: Environmental Impact Assessment Report				
Chapter 1, 2, 3, 9 & 10	EnviroCentre	Emma Cormack	20	BSc (Hons), MIEnvSc
Water Environment	EnviroCentre	Martin Nichols	10+	BSc (Hons) MSc, C.WEM MCIWEM
Biodiversity	EnviroCentre	Gemma Nixon	9+	MSc Cecol MCIEEM
Ornithology	EnviroCentre	Matthew Sullivan	17+	MSc ACIEEM
Benthic Surveys	Seastar Survey Ltd	Steve Dewey	25+	MSc Oceanography
	Physalia	Dr Simon Foster	32+	BSc PhD
Underwater Noise Modelling	Irwin Carr	Shane Carr	20+	MSc PgDip CenvH MIOA
		Rasmus Sloth Pedersen	8+	MSc PgDip MIOA
Archaeology & Cultural Heritage	ORCA	Paul Clark	20+	BA (Hons), MCIfA

Seascape, Landscape & Visual	SWECO	Philip Black	20+	Ba (Hons) Landscape Architecture – Leeds Metropolitan University (1997) Graduate Diploma in Landscape Architecture – University College Dublin and Leeds Metropolitan University (1999) Chartered Member of the Landscape Institute (2002)
Air Quality	SWECO	Jen Simpson	29+	BSc in Industrial Chemistry (Sandwich 1990), ADMS URBAN, CERC (2002), ADMS, CERC (2008), ADMS ROADS, CERC (2008), MAPINFO, Pitney (2010), GASSIM, Golder Associates (2012), BOSIET, FALK (2012) Full Member of the IAQM/ Full Member of the IES EMAQ(+) Trainer Jennifer sits on the Environmental Protection Scotland (EPS) Air Quality Expert Group
Airborne Noise	EnviroCentre	Craig Cloy	11+	MA (Hons) MIOA
		Andrew Hood	8+	MSc Audio Acoustics, Salford University Meng (Hons) Electronics with Music, Glasgow University MIOA, Member of Institute of Acoustics
Carbon, Climate Change & Greenhouse Gas Assessment	SWECO	David Jackson	11+	BSc (Hons) Geography – University of St Andrews (2008), MSc Carbon management – University of Edinburgh (2016), PhD Carbon Management – University of Edinburgh (2021), Chartered Environmentalist (Cenv) and Full Member of IEMA. Associate Member ICE.
Socio-Economics	SWECO	Mark Murphy	10+	BSc (Geography, 2010) and MSc (Global Water Sustainability, 2011) Full member of IES Affiliate member of IEMA
Transport	SWECO	Ruth Mustard	21+	Meng, MSc, MCIHT

2 PROPOSED DEVELOPMENT

2.1 Introduction

Orkney Islands Council is the Statutory Harbour Authority responsible for the safe and efficient operation of the 29 piers and harbours located throughout the Orkney Islands.

The range of ports and harbours is diverse, in terms of size and nature of operational activity.

The major facilities of Orkney Logistics Base, Kirkwall and Stromness accommodate a range of operational activity across many sectors – aquaculture, cargo, cruise, ferries, oil and gas, fishing, marine leisure and marine renewables.

The strategically located Scapa Flow, with its unique deep water sheltered anchorage, hosts multiple ship-to-ship (STS) transfer operations of crude oil, LNG and liquefied petroleum gas (LPG) as well as the Flotta Oil Terminal. Scapa Flow now also accommodates semi-submersible rigs and accommodation platforms at anchor for maintenance and stand-down.

There are numerous smaller piers and harbours throughout the North and South Isles of Orkney, as well as around the Orkney Mainland: many of these accommodate lifeline island ferry services, aquaculture, fishing and marine leisure activities. These piers are critical in ensuring the viability of small island communities.

The economy of Orkney is shaped by the marine environment and maritime activities taking place around the archipelago's coasts and harbours. There are many vessel movements within the Orkney archipelago each year, as well as circa 8,000 vessels passing through the Pentland Firth, with cargoes in transit between Europe and North America.

The proposed Orkney Logistics Base development at Hatston includes the following key elements:

- Initial phase of reclamation – creation of land to the east of the existing causeway;
- Construction of 320m of new quay, west of the existing quay with fixed ramp and provision for future link span together with adjacent boat lift facility;
- Dredging of areas adjacent to the new length of quay; and
- Further reclamation phases – creation of land to the west of the existing causeway.

The general arrangement and layout of these elements of Works are shown in Figure 2.3.

The remainder of this chapter describes the need for the development, alternatives considered, how the design has been developed, and activities associated with the construction and operational phases of the development as a whole.

2.2 The Site and Surrounding Area

2.2.1 The Site

Hatston Pier and current operational land is located to the northwest of Kirkwall (see Figure 2.2).

Figure 2-1: Site Location

It is Orkney's primary commercial terminal and lifeline link south to Aberdeen and north to Shetland. It is also Scotland's longest deep-water commercial berth with a total of 884 metres of quay side available for multi-purpose use. The longest berth is 385 metres, offering 10.5 metre draft. The original pier was built in 2002 and the 160-metre extension was completed in 2013. This multi-purpose infrastructure has been hugely successful in accommodating a range of operational activities including the largest cruise ships, renewable energy, ferries, oil and gas and cargo/ livestock (see Figure 2.2).

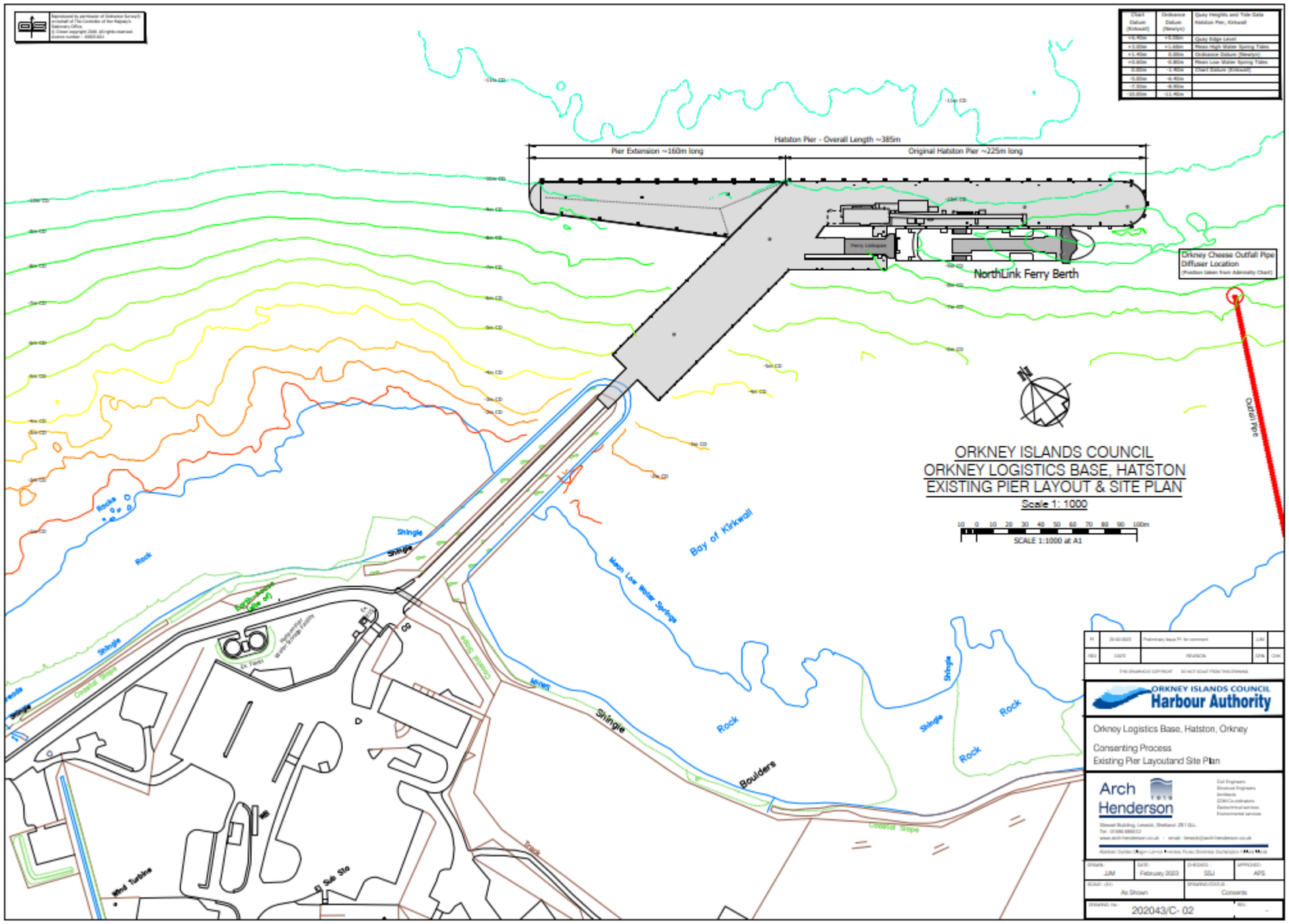

Figure 2-2: Current Layout

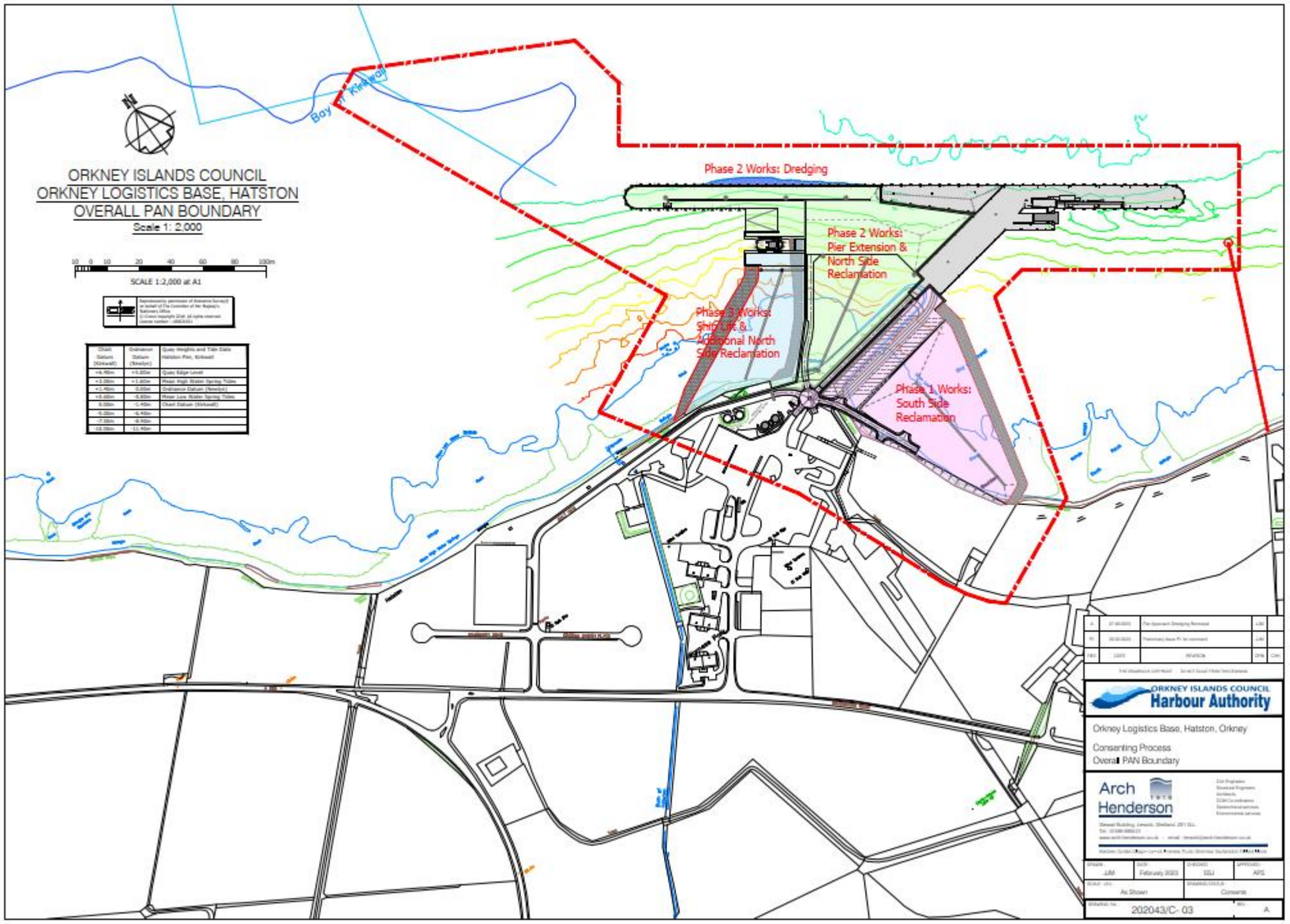

Figure 2-3: General Arrangement and Layout of the Proposed Works

Currently the operational land adjacent to Hatston Quay comprises land used for short/long term parking, freight, a marshalling area and storage. There are a number of commercial / industrial buildings situated adjacent to the access road (see Plate 2.1).

Plate 2-1: View North of Access Road

A narrow causeway edged with rock armour extends out towards a 'T'-shaped suspended deck pier formed from piles topped by a concrete slab and includes a single Ro-Ro berth for the Aberdeen-Kirkwall-Lerwick ferry service on the inner south-eastern arm (Plate 2.2).

Plate 2-2: View of the eastern edge of Hatston looking North

2.2.2 The Surrounding Area

The facility is located on a section of coastline which has commercial industrial use within adjacent grazing land. There are a number of isolated residential properties located at the closest point approximately 750m south-southwest of the site. Access is from the A965 Grainshore Road which connects the site to Kirkwall in the southeast and Finstown in the west (Figure 2.2).

The North Orkney Special Protection Area (SPA) bounds the site to the north. There are several aquaculture sites located within the area with the closest one situated circa 1.25km to the northwest of the site. This aquaculture site is an active marine cage Atlantic salmon farm operated by Cooke Aquaculture Scotland Ltd. At the time of writing the fish farm had submitted a screening and scoping request to OIC (Planning Ref 22/443/MARSS) to move circa 1km northwest of its current site location. The operator has indicated timescales for the move, if approved, to be an estimated 18 months from the time of writing of this report.

2.3 Existing Operations

The site is an operational pier and ferry terminal. Current site operations include:

- Ship berthing and mooring;
- Ship loading / unloading activities, including operation of cranes;
- Plant and HGV movements within quay and laydown area;
- Loading / unloading of HGV's;
- Pumping of fuel between pier and storage areas;
- Boat lifting and transport between pier and storage areas; and
- Maintenance activities.

2.4 The Need for Development

The proposed development at Hatston is focussed on reducing conflicts between users and operational activity as well as enabling growth across a range of economic sectors. Currently the seasonal lack of availability of berths due to cruise activities results in a year-round constraint on other vessel use. In addition, the shore-side infrastructure and storage areas are located a significant distance from the quay across a narrow causeway access route.

To alleviate this pressure on site operations, core proposals comprise a significant extension to the existing pier and expansion of the landside area through phased reclamation. This will allow freight and traffic to be handled more efficiently and effectively while accommodating expansion and economic growth.

It is also intended that the design of the new infrastructure is future proofed so as to (in the future) potentially accommodate provision and storage of alternative (less polluting/carbon-free) fuels and provision of shore power to smaller vessels where viable.

With the additional space and quay length current operations can co-exist with such new activities. The current thought on the types of activity or features that will or could be introduced to the site or surrounds as a result of the proposed development are:

- Areas for car and freight marshalling will be reconfigured with better defined pedestrian routes to and from the quayside: for example, to the long stay car park and the main road;
- Upgraded/extended ferry passenger reception facility;
- Establishment of an offshore wind Operations & Maintenance (O&M) base;
- Boat repair including a boat lift facility;
- Oil and gas supply operations;
- Handling renewable energy devices (requiring sufficient laydown area);
- Storage of alternative fuels;
- Aquaculture development and storage; and
- Reconfigured pedestrian access within the harbour area to connect to the proposed coastal path identified within the Kirkwall Urban Design Framework (KUDF).

Options to promote sustainable transport have also been considered, such as the provision of electric vehicle charging points, electric bicycles, electric vehicles as part of car-pooling schemes and linkages with existing and future walking and cycling networks.

2.5 Alternatives

As mentioned in Section 1.3 of this EIAR, OICHA launched the Orkney Harbours Masterplan Phase 1 in August 2020. The projects included in the Masterplan (in which Orkney Logistics Base Hatston (OLBH) is one) were identified by their potential to meet the aims and objectives of the Masterplan. As required by the Environmental Assessment (Scotland) Act 2005 the development of the Masterplan was undertaken in parallel with a Strategic Environmental Assessment (SEA). A Habitats Regulations Assessment (HRA) was also undertaken as part of the SEA process.

At the start of the Masterplan development, optioneering was undertaken through stakeholder discussions / workshops, OICHA internal discussions with staff, market assessments in conjunction with desk-based research. Through this process an extensive list of proposals for harbour improvements were identified as listed in Table 2.1.

Table 2-1: List of Proposals Considered in the Draft Orkney Harbours Masterplan

Geographical Area	Locations of Piers/Harbours initially proposed for Enhancement	Description
Kirkwall Bay & Tingwall	Kirkwall Pier	New quayside infrastructure, reclamation and marina expansion
	Hatston	New quayside infrastructure, reclamation and areas identified for particular uses, such as boat repair, aquaculture, freight handling, etc.
	Hatston Slip	Potential enhancements including improving the surface of the slipway, provision of shore facilities, slipway extension and provision of boat repair facilities.
	Shapinsay	Potential enhancements including reconfiguration of the ferry terminal and parking areas.
	Tingwall	Consideration of options to improve wave climate and create more berthing space which could be done through building new quayside infrastructure or extending the existing pier, coupled with landside reclamation.
Scapa Flow	Scapa Pier	Extension of existing pier, with dredging and reclamation to create laydown area and marine berths.
	New Scapa Quay (10m depth)	New quayside infrastructure with depth of -10m chart datum (CD) and circa 5 hectares of laydown area.
	New Scapa Quay (20m depth)	New quayside infrastructure with depth of -20m chart datum (CD) and circa 5 hectares of laydown area.
	Lyness	Creation of hard standing area.
	Burray	Quay extension and dredging.
	Stromness	Reclamation and infilling between fenders at Copland's Dock and marina expansion in Stromness.
	Houton	Additional berthing space for small boats.
	Longhope	Additional berthing space for small boats.
	Graemsay	Additional berthing space for small boats.
	Moaness	Additional berthing space for small boats.
	Burwick	Enhancements to quayside infrastructure for ferry services.
North Isles	All harbours	Enhancements to quayside infrastructure.

The Masterplan objectives were then used to identify viable options for taking forward into the Masterplan which were subsequently assessed against the SEA Objectives. The SEA also considered the likely changes to the environment as a result of not implementing the Masterplan.

The SEA considered the effects of the Masterplan on the environment using a systematic methodology as prescribed in the Environmental Assessment (Scotland) Act 2005. The SEA process aims were to

- Integrate environmental factors into the preparation of the Masterplan;
- Highlight potential environmental impacts as a result of the Masterplan implementation and provide high level mitigation measures to be considered at the detailed stages of individual projects;
- Involve members of the public in the development of the Masterplan; and
- Enable the decision-making process to be transparent.

The outcomes of the SEA were used to inform a draft Orkney Harbours Masterplan Phase 1 with details of the process including alternatives considered, reasons for discounting or taking forward options and potential environmental impacts as reported in the Strategic Environmental Assessment – Environmental Report[1].

The draft Orkney Harbours Masterplan Phase 1 and accompanying SEA Environmental Report were then consulted on in summer 2019. The consultation comprised public meetings and 'drop-in' sessions with copies of the documents available to the public both online and as a hard copy. Comments from the consultation process were then fed into the Masterplan prior to finalisation and adoption August 2020. The SEA – Post Adoption Statement[2] provides information on how the SEA and consultee's views have been taken into account within the finalised Masterplan.

Given that the planned development at Hatston has gone through the above process it was not considered necessary to look further at geographical alternatives to the Hatston development.

2.6 The Proposed Development and Design Principles

2.6.1 Introduction

The following sections provide a summary of the proposals. Additional engineering details are provided in the document 'Hatston – Project Description & Potential Methods' contained in Technical Appendix 2.1 (Volume 3 of this EIAR).

The Drawings listed below present illustrative layouts of the planned development and are located in Volume 2 of this EIAR:

- Phase 1: South Side Reclamation (Drawing No 202043/C- 10 (P1), dated 21-02-2023);
- Phase 2: Pier Extension and North Side Reclamation (Drawing No 202043/C -20 Rev P1, dated 21/02/2023);
- Phase 2: Dredging Layout (Drawing No 202043/C-21 Rev A, dated 02/05/2023); and
- Phase 3: Ship Lift and Reclamation Layout (Drawing No 202043/C-30 A. Dated 06/06/2023).

2.6.2 Design Principles

It is proposed to extend the existing outer quay by 320m (with minimum water depth of -10m CD) which would also form a 125m inner berth. This would create substantially more quayside which would be available for both current and future operations.

In addition to the above, circa 7.5 hectares of additional land extending from the current shoreline outwards would be made available for harbour-related operations through reclamation. The design includes a ship lift, additional link span and fuel facility.

The development is designed to be built in three phases as noted below. These phases should not be considered consecutively but allow for a degree of flexibility which can be adapted to suit the requirements, budget and programme of OICHA. The currently expected timings of construction are provided below in Section 2.7.8.

Phase 1

- Reclaim the area by depositing appropriate material to form a platform on the southeastern side of the current pier causeway and thereby create 3Ha of hard-core surfaced marshalling / storage area along with an HGV trailer park for the ferry service which will be covered by a reinforced concrete slab;
- A sheet pile wall is to be installed to allow a retained interface with the current suspended deck; and
- Place rock armour along the northern and eastern edges of the infill area.

Phase 2

- Extend the current quay to the west by circa 320m with a 25m return and a 150m inner berth to facilitate the proposed linkspan berth and fixed ramp. The extension will comprise a steel sheet pile wall and will initially interface with the alignment of the existing suspended deck on the north-west inner face before forming the new quay extension;
- Reinforced concrete slabs will form the new main deck areas;
- Reclaim the shoreline by depositing appropriate material to form a platform on the southwestern side of the current pier causeway to create an additional 3.71Ha to be used as a multi-use laydown/work area surfaced with hard-core, as well as establish a separate access road to the new quay extension;
- Place rock armour along the western edge of the infill area; and
- Small scale dredging activity adjacent to new and existing quay volumes estimated at 650m^3.

Phase 3

- Reclaim the shoreline to the south-west of Phase 2 to form a platform on the southwestern side of the current pier causeway to be used as a multi-use laydown/work area as well as create a ship lift;
- The ship lift will extend from the linkspan fixed ramp installed in Phase 2 and will comprise piles and reinforced concrete pads designed for the boatlift wheel-loads;
- The rest of the area will be infilled to provide extra yard / storage; and
- Place uplifted and re-used rock armour along the western edge of the infill area.

2.6.3 Reclamation Material Volumes and Potential Sources

The development infill requirements will be substantial with an estimated total of 1.46M tonnes of suitable inert stone material needed to create all three phases. There are currently 3 options to source the rock infill, these are:

1. Cursiter Quarry which is approximately 7km to the west of the development site;
2. Heddle Quarry which is approximately 9.5km to the west of the development site; or
3. Import from elsewhere and brought to the development site by sea.

In relation to Option 3 this is considered likely to be economically disadvantageous except for the import of outer protective armour stone if this cannot be sourced locally . However, if local quarries are unable to provide the quantity required import of stone from elsewhere may have to be carried out.

The infill volume for each phase of the works along with the estimated duration of infilling is provided in Table 2-2. This table also provides an estimation on the number of HGV movements envisaged transporting the material from the quarries to the development site per hour and per day.

[1] Orkney Harbours Masterplan Phase 1 (V1) Strategic Environmental Assessment – Environmental Report, *Intertek Report No P2214_R4666_Rev1, dated 1 March 2019*

[2] Orkney Harbours Masterplan Phase 1 Strategic Environmental Assessment – Post Adoption Statement, *Intertek Report No P2214_RN5054_Rev1, dated 16 June 2020*

Table 2-2: Estimated Rock Fill Quantities and HGV Movements

Construction Phases	Est. Total (Tonnes)	Est. Duration (Months)	No. HGV / Hr over a 10 hr day	Avg. No. HGV / Day
Phase 1	394,000	10	6 to 7	66
Phase 2	880,000	22	6 – 7	67
Phase 3	183,000	10	3 – 4	31

The HGV routes from both quarries are shown on Existing Commercial Quarries Location Plan (See Figure 2.4)

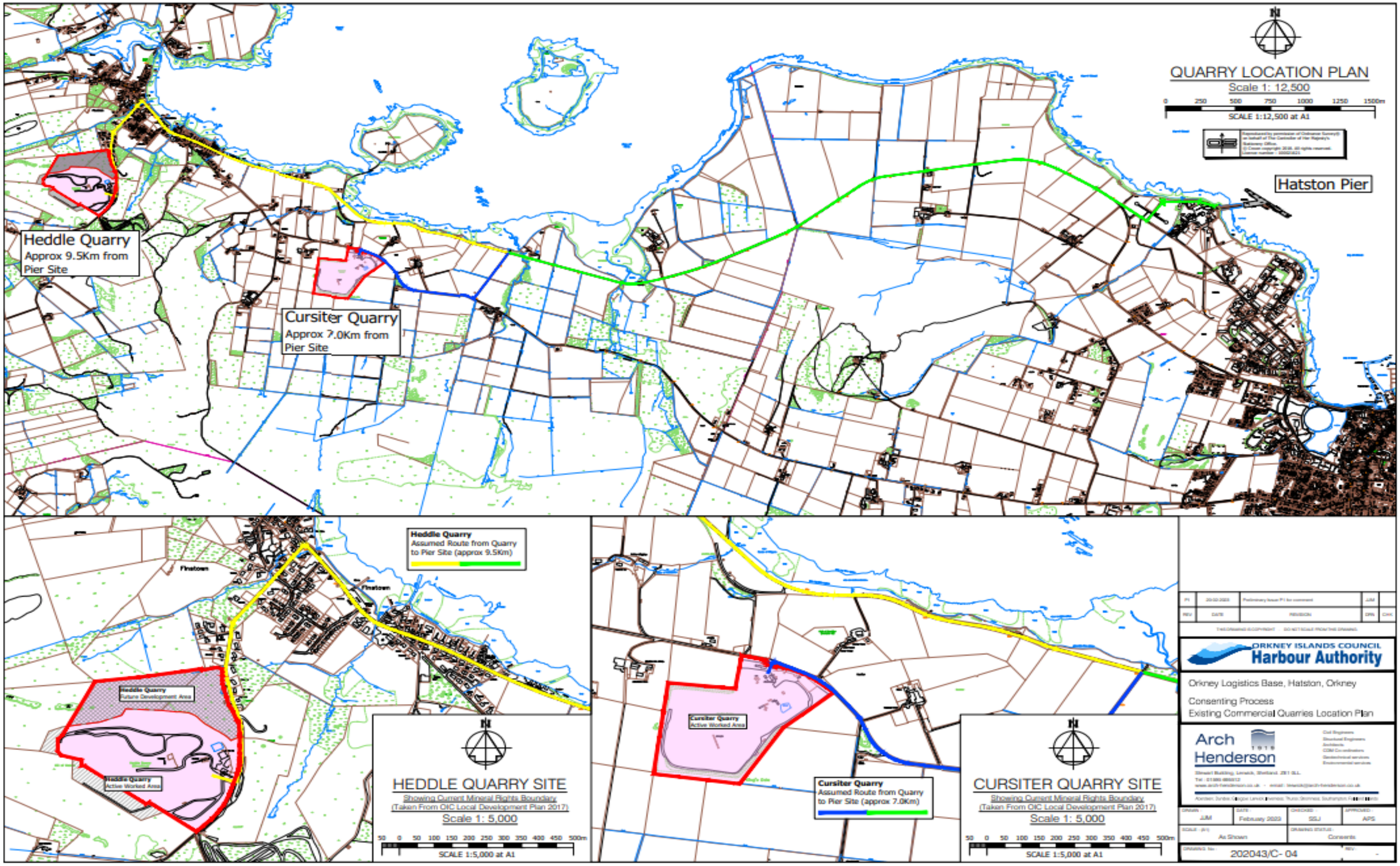

Figure 2-4: Quarry Locations and Routes to OLBH

2.7 Construction Phase

It is important to note that the contract for construction of the facility may be awarded on a design and build basis. Therefore, while exemplar tender designs have been completed by Arch Henderson (Project Technical Advisors), until the preferred contractor is identified and procurement complete the exact detail of the construction methodologies cannot be confirmed at this stage in the development process. However, based on professional advice from the Project Technical Advisors, Arch Henderson, the following construction activities are summarised below and provided in detail in Technical Appendix 2.1, Volume 3 of this EIAR. There are three Phases (Phase 1 to Phase 3), with Stages within each Phase also described below.

2.7.1 Phase 1 – South-East Reclamation Area

- Prior to work commencing a silt boom will be moored out from the foreshore and construction drainage works installed;
- On the eastern perimeter a bund will be formed from suitable materials extending from the shoreline outwards to the existing pier causeway. To minimise potential release of suspended solids into the marine environment only inert stone free of all fine clay or organic material will be used in forming the reclamation outer bund;
- The advancing head of the perimeter core bund will be protected by the silt boom which shall advance in front of the work;
- As the bund progresses, geotextile will be placed on the eastern slope to mitigate the migration of fines;
- Secondary armour and primary armour stone to be placed on top of the geotextile;
- Existing rock armour stone shall be uplifted and stored for reuse as outer slope protection for Stage 2 (Refer to Figure 2.6).

Figure 2-5: Phase 1 Reclamation – Stage 1

- Stage 2 works commence with the installation of the sheet pile retaining wall at the boundary with the existing suspended deck using a vibro piling hammer (see Figure 2-6 blue line in inset for line of sheet piling).

Figure 2-6: Phase 1 Reclamation – Stage 2

- Suitable reclamation fill will be deposited in the area between the newly formed bund and the existing shoreline; and
- Once reclamation works are completed the area will be capped and compacted with graded hard core with the surface falling to a V ditch and French drains (See Figure 2.7).

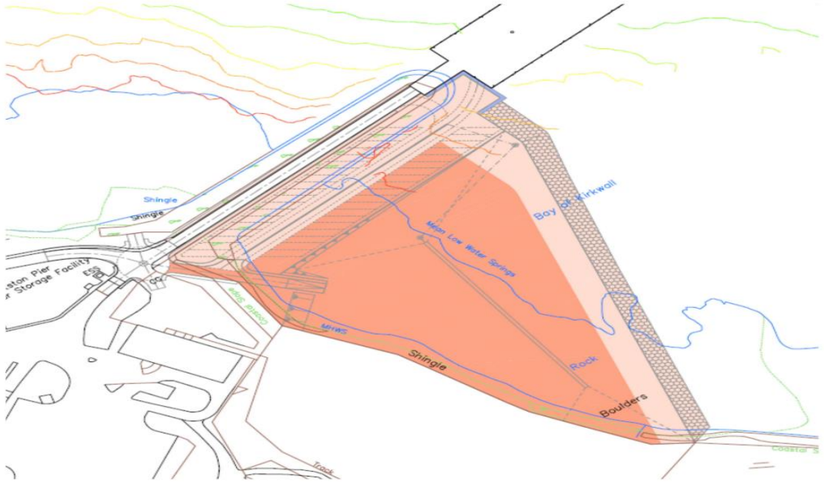

Figure 2-7: Phase 1 Reclamation – Stage 3 & 4

2.7.2 Phase 2 – Quay Extension and South-Western Reclamation Area

- A works access approach will be formed using infill material parallel to the existing causeway in order to ensure complete demarcation of the freight access to the existing Hatston Pier (see Figure 2-8);

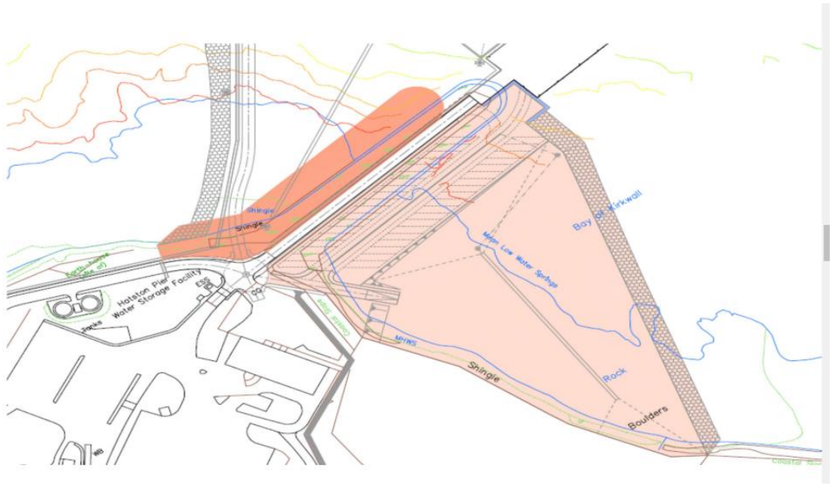

Figure 2-8: Phase 2 – Access approach channel to existing ferry causeway

- The reclamation access will continue to the end of the existing pier.
- Sheet piling will be installed adjacent to the existing suspended deck pier (see Figure 2.9 blue line on western side existing harbour for line of sheet piling)

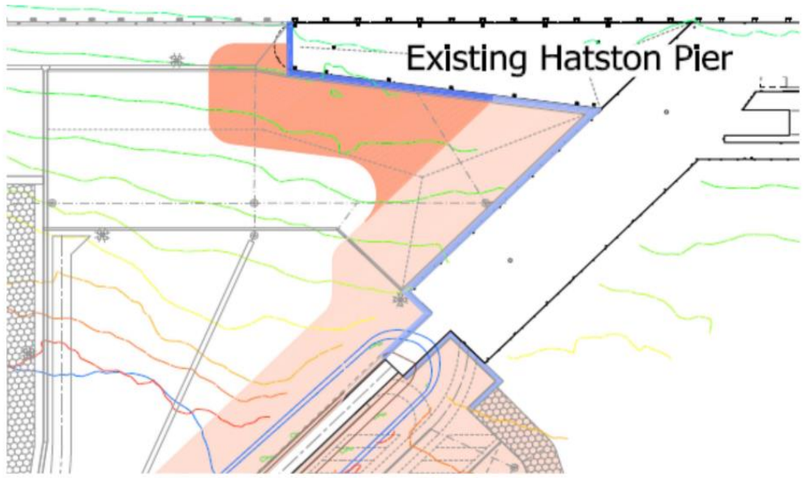

Figure 2-9: Phase 2 – Line of western sheet piling

- The rock strata will then be pre-treated prior to sheet piles being installed by vibro piling to form the new quay walls (Refer to Section 2.7.3 for pre-treatment methodology);
- To install the sheet piles the drill rigs will work over water from temporary piling platforms from the existing pier or a jack up barge;
- Sheet piles will be installed by vibro-hammer to the required depth;
- Tie rods will then be installed and secured between the front face and rear sheet pile wall and a concrete cope formed;
- The new quay form to be infilled and vibro-treated to compact and reduce future consolidation and settlement;
- The infilling of the reclamation area of Phase 2 will follow in a similar manner of that for Phase 1. (See Figure 2.10).

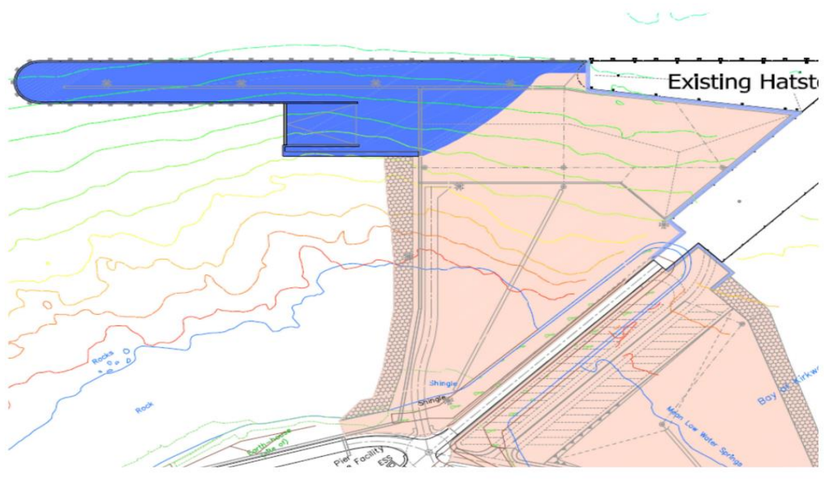

Figure 2-10: Phase 2 – Area of rock pre-treatment and sheet piling installation (in blue) and Phase 2 reclamation area (brown area to west of current access road)

2.7.3 Rock Pre-Treatment

In advance of installing sheet piles it is necessary to pre-treat (blast) the bedrock beneath the line of the new quay piles. This involves the following:

- A spud leg pontoon, carrying a tracked drill rig (with rotary percussive hammer drilling capability) will position itself along the piling line;
- The hole will be drilled (cased to bedrock to prevent any loss of material to the sea) with all cutting collected for onshore disposal;
- The drill hole or short series of holes will be charged and then blasted ensuring each hole is fired individually to reduce the maximum instantaneous blast velocity; and
- The jack up barge shall then reposition for the next set of drill holes and blasting (See Plate 2.3).

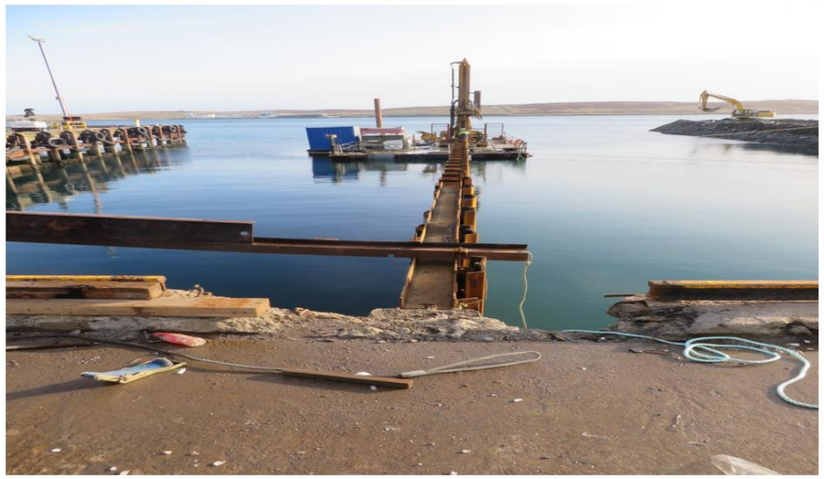

Plate 2-3: Photograph showing a tracked drilling rig set up for pre-treatment of bedrock

2.7.4 Dredging

- Once all Phase 2 quay works are complete a small amount of dredging is required along the line of the quay extension to provide a deeper berth area (Refer to Figure 2.11).
- Dredging will be undertaken by either cutter suction, or back hoe dredger;
- A total of approximately 650m^3 of sediment will be dredged;
- Sediment dredged will be reused on site as infill material in reclamation works.

2.7.5 Phase 3 – South-West Reclamation Area

- Phase 3 layout is shown in Figure 2-12.
- Prior to work commencing a silt boom will be moored out from the foreshore;
- On the western perimeter a bund will be formed from suitable materials extending from the shoreline outwards to the proposed pier extension;
- The advancing head of the perimeter core bund will be protected by the silt boom which shall advance in front of the work.
- As the bund progresses, geotextile will be placed on the eastern slope to mitigate the migration of fines
- Secondary armour and primary armour stone to be placed on top of the geotextile
- As the western bund extends out from the foreshore suitable reclamation fill would be deposited in the area between the newly formed bund and the existing shoreline.
- Once reclamation works are completed the area will be capped and compacted with graded hard core with the surface falling to V ditch and French drains.

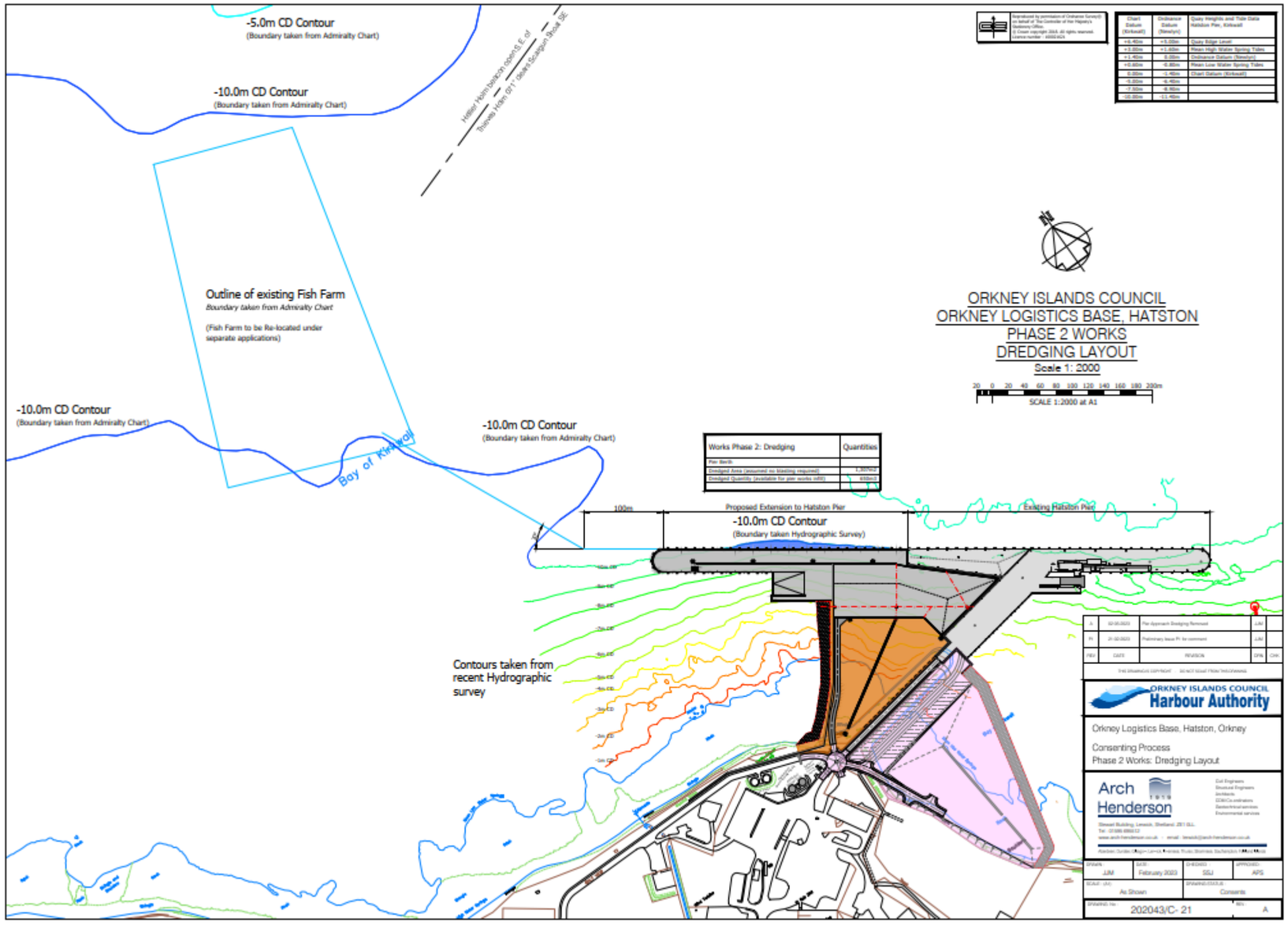

Figure 2-11: Phase 2 Dredge Areas

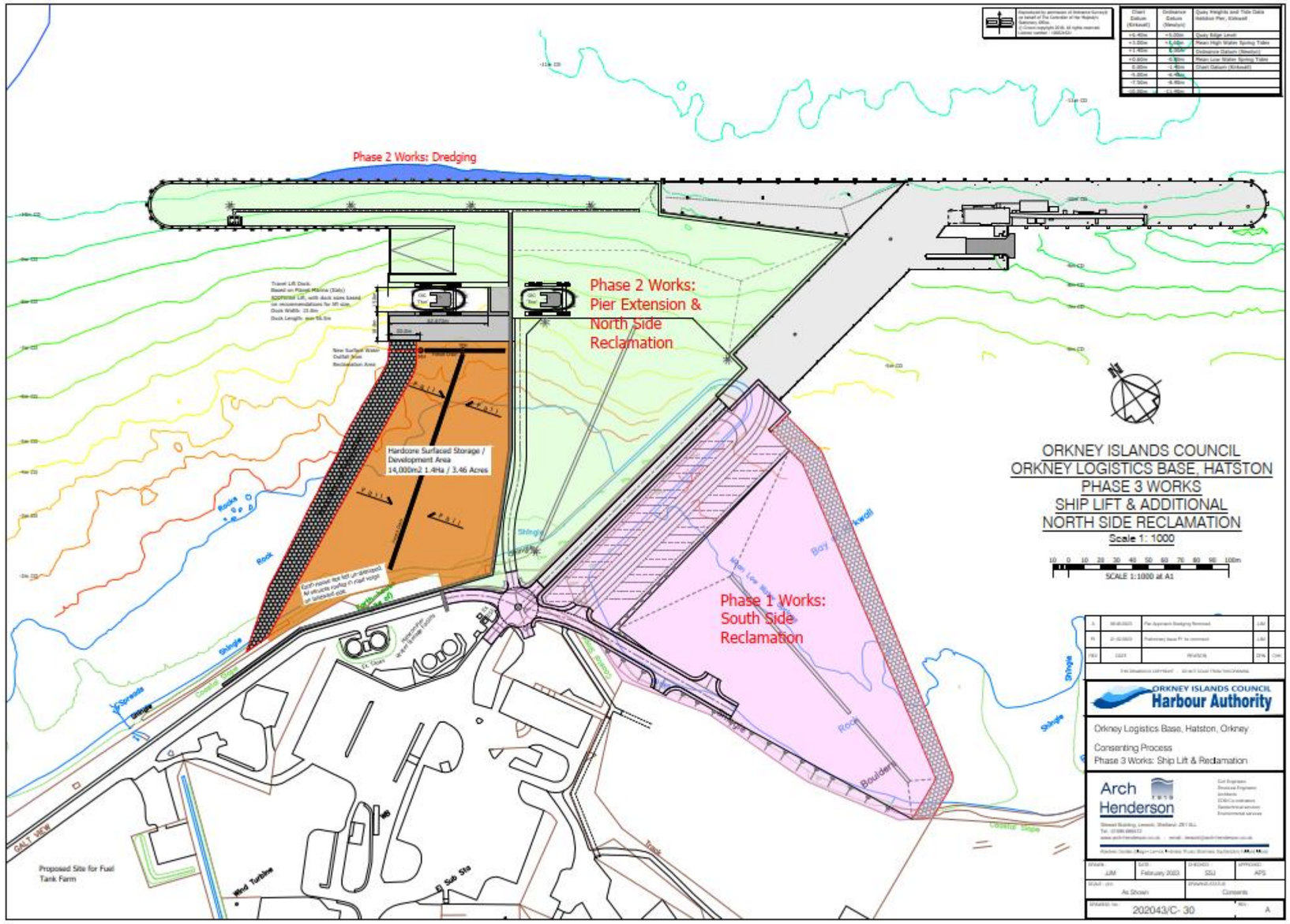

Figure 2-12: Phase 3 Infill Area

2.7.6 Site Drainage and Water Management

During the construction phase temporary drainage and water management measures will be implemented to protect the water environment (these are discussed in Chapter 4 of this EIAR).

During the construction phase the permanent drainage infrastructure will be installed. This permanent infrastructure is designed to incorporate Sustainable Urban Drainage Systems (SUDS) designed in accordance with the CIRA SUDS Manual (C697). This includes permeable surfaces with a French drain collection system leading to a SUDS filtration device before outfall discharge to open sea.

2.7.7 Vessel Movements

The proposed development will result in additional vessel movements to and from Hatston. A full Navigation Risk Assessment (NRA) considering the effects of both the construction and operation phases of the new quay has been undertaken (contained within Volume 3 of this EIAR, Technical Appendix 2.2). The findings of the NRA are also described in Chapter 9.* Accidents and Disasters.

The NRA contains information on existing and predicted vessel movements which are summarised in this section.

Whilst OIC cannot predict the working methods of the Contractor, nor any future planning issues / restrictions with designated quarry sources, they would anticipate all fill material except for rock armour to come from Orkney-based resources via land.

The only construction phase vessels imports expected would be one or two cargo vessels delivering steel piles and approximately 4 to 5 cargo rock carrying vessels delivering imported rock armour stone from mainland UK, or more likely Norway or another Scandinavian neighbour.

2.7.8 Overall Construction Timescales and Working Hours

The exemplar design is now well established for Orkney Logistics Base (Hatston) and the anticipated timetable for works is expected to be:

- Phase 1 tendered late in 2023 or early 2024 with the Phase 1 project starting on site in 2024 assuming planning and marine licences can be obtained. Phase 1 shall be operational by 2025 with the aim of supporting the existing operations at Hatston, particularly the lifeline freight and passenger ferry services; and
- Phase 2 and Phase 3 are not likely to be undertaken until 2027.

The normal working hours for construction are expected to be Monday – Saturday 7am to 7pm and Sunday 7am until 2pm.

2.7.9 Environmental Management During Construction

Only experienced marine contractors will be invited to tender for the Works. The successful tenderer will be required to submit:

- A Construction Environmental Management Plan (CEMP);
- Risk Assessments and Method Statements (RAMS) for all major aspects of the Works; and
- A Site Waste Management Plan (SWMP).

The above documents will be submitted for approval by the Statutory Authorities prior to any Works commencing on site.

Implementation of the CEMP and other environmental control procedures will be checked by an independent environmental clerk of works, through site visits, inspections and audit of the Contractors records throughout the Works.

2.8 Operational Phase

2.8.1 Expected Site Activities

For the operational phase the existing activities at the site (as described in Section 2.3 above) shall continue and are expected to grow. Additional activities which can be readily accommodated through having the additional quay length and additional laydown area are:

- Operations and maintenance services for offshore windfarms; and
- Oil and gas supply and maintenance services.

2.8.2 Propellor Wash

Propeller wash (or prop wash) and the potential for scour on the seabed was raised as a potential concern during consultation. This is not expected to be a significant issue given the following:

- Large deeper draught vessels approaching the quay will be moving slowly at safe navigational speed and have a vessel draft well above final dredge level which is only required for non-propulsion floating renewable components.
- Their main propeller(s) will therefore not be generating significant wash or turbulence on approach; and
- On final approach most vessels will be manoeuvring on thrusters which should not cause significant vertical turbulence.

Therefore, any effects to the seabed would be expected to be small and limited to immediately adjacent to the quay. The area adjacent to the quay would be subject to dredging during construction and effects on the seabed in this area are therefore considered in the EIAR within Section 5 – Biodiversity.

2.8.3 Dredging

During the operational phase maintenance dredging is not expected to be required. This is discussed in Chapter 4 Water Environment.

2.8.4 Additional Staff Numbers

Additional staff numbers at the Hatston facility are estimated at an initial 94 in total, however this could increase in future dependent on other developments at the site.

2.8.5 Additional Vessel Movements

From information contained in the NRA (see Technical Appendix 2.2) it is evident that expected vessel calls per year will increase by +104 for oil and gas supply, offshore wind and freight/cargo categories (or +208 vessel movements (arrival/departure)) at Hatston. The more aspirational vessel calls associated with potential boat repair and aquaculture would amount to an additional +230 vessel calls per year (or +460 vessel movements).

Existing vessel movements to and from Kirkwall/Hatston are also described in the NRA, with a strong seasonality being demonstrated. Vessel movements are 998 in winter and 2,104 in summer, a total of 3102 vessel movements through the approaches to Hatston and Kirkwall piers over a calendar year.

On this basis the increases expected at Hatston as a result of oil and gas supply, offshore wind and freight/cargo vessels would equate to an additional 208 vessel movements compared to an existing 3102 movements per year or a 6.7% increase. Should the boat repair and aquaculture initiatives also be realised then this would rise to a total of 668 additional vessel movements or a 21.5% increase over existing annual marine traffic.

2.9 Decommissioning Phase

For a development of this type, decommissioning is not envisaged. Should decommissioning ever be planned in the future Statutory Regulators would be consulted and applications made at that time under whatever future regulatory regime exists at that point in the future.

2.10 Biodiversity Enhancement Considerations

Biodiversity enhancement proposals are included within Chapter 5 of the EIAR.

3 EIA METHODOLOGY AND SCOPE

3.1 Introduction

The purpose of an EIA is to identify and evaluate the likely significant effects of a proposed development on the environment, both direct and indirect, and identify measures to mitigate or manage any significant adverse effects. The EIA process also provides an opportunity to 'design out' adverse effects wherever possible. Where adverse effects cannot be designed out, mitigation measures are proposed to avoid, compensate or reduce significant environmental effects to an acceptable level where possible. The findings of the EIA process must be documented in a clear and understandable manner within the EIAR. The EIAR is then submitted to assist the Regulators in determining any planning and / or marine licence applications required.

The EIAR submission includes a Non-Technical Summary (NTS). This is a concise, stand-alone document which provides a project description, the baseline environmental conditions along with the findings of the EIAR in an accessible and easy-to-read format. The NTS does not use technical terms, detailed data or scientific discussion.

The EIA work is undertaken by specialist environmental and technical consultants on the basis of project information supplied by the Applicant and their engineers and following consultation with statutory consultees, other bodies and members of the public.

EIA is an iterative process which allows feedback from stakeholder consultation and the results from baseline studies to be fed into the design process of the proposed development.

3.2 EIA Objectives

The objectives of the EIA are:

- To establish a robust environmental baseline upon which to base environmental assessment, incorporating field surveys, desk study and consultation;
- To provide an assessment of the potential environmental impacts of the proposed development and to determine which of these, if any, are likely to result in a significant effect on the receiving environment; and
- Where significant effects are predicted, to determine mitigation measures to reduce the residual effects to acceptable levels where possible and document residual effects.

3.3 EIAR Content

Schedule 4 of both EIA Regulations requires that the following information is provided:

- A description of the location of development, its physical characteristics and land-use requirements during construction and operation;
- A description of the main characteristics of the operational phase of the development;
- An estimate of residues and emissions produced during the construction and operation phases;
- A description of reasonable alternatives, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects;
- A description of the relevant aspects of the current state of the environment and an outline of the likely evolution thereof without implementation of the development as far as reasonable;
- A description of environmental receptors likely to be significantly affected by the development;
- A description of the likely significant effects of the development on the environment;
- A description of the forecasting methods or evidence used to identify and assess the significant effects;
- A description of the measures envisaged to mitigate significant effects;
- A description of expected significant adverse effects deriving from the vulnerability of the development to risks of major accidents and/or disaster; and
- A non-technical summary of the aforementioned information.

3.4 EIA Key Stages

Whilst each environmental topic discussed within the EIAR establishes its own methodology based upon good practice and relevant industry guidance, there is a basic methodological framework which is applied to all EIA technical chapters.

The EIA process involves the following key stages:

- Baseline Studies – identification of existing environmental conditions through review of existing information, monitoring and field studies as required, to provide a baseline against which to assess the likely impacts of the proposed development;
- Potential Significant Impacts – identification of potential impacts and their resulting effects during the construction and operational phases, in relation to the design mitigation already implemented and where applicable, taking alternatives into account;
- Impact Assessment – evaluation of the effects, resulting from the identified potential impacts, to determine their significance, both positively and negatively, and incorporating cumulative effects;
- Mitigation and Monitoring – the identification of measures to avoid, reduce or compensate likely significant effects and any steps required to monitor these potential environmental effects; and
- Residual Effects – identification of residual effects assuming successful implementation of mitigation.

For consistency where possible, the above headings have been used within the technical chapters of this EIAR.

3.5 Risk Assessment Approach

3.5.1 Introduction

The risk assessment approach uses the source – pathway – receptor linkages to assess the significance of the impact(s). The significance of an impact is defined by the probability of the impact occurring and its likely consequences (i.e. the Magnitude of Impact / Change). When a significant impact is identified then appropriate mitigation measures are identified to avoid or reduce that impact if possible and the residual risk following implementation of the mitigation measures is then considered. The risk assessment approach includes consideration of cumulative impacts with other developments.

Further information on the risk assessment approach is provided in the subsections below.

3.5.2 Sensitivity/Importance of Receptors

The sensitivity of the baseline conditions/receptors is defined according to the relative importance of existing environmental features on or in the vicinity of the site, or by the sensitivity of receptors which would potentially be affected by the proposed development.

Criteria for the determination of sensitivity (e.g. high, medium or low) or of importance (e.g. international, national, regional or authority area) were established for each topic assessment based on prescribed guidance, legislation, statutory designation and/or professional judgement relevant to that topic.

3.5.3 Magnitude of Impact/Change

The methods for predicting the nature and magnitude of potential impacts vary according to the subject area. Quantitative methods of assessment can predict values that can be compared against published thresholds and indicative criteria in Government guidance and standards. However, it is not always possible to ascribe values to environmental assessments and therefore qualitative assessments are sometimes used. Such assessments rely on previous experience and professional judgement. The methodologies used for assessing each topic area are described within the specialist chapters of this EIAR and supporting assessments.

In general terms, the magnitude of impact on environmental baseline conditions is identified through detailed consideration of the proposed development, taking due cognisance of any legislative or policy standards or guidelines, and/or the following factors:

- The degree to which the environment is affected, e.g. whether the quality is enhanced or impaired;
- The scale or degree of change from the existing situation;
- Whether the impact is temporary or permanent, indirect or direct, short-term, medium-term or long-term; and
- Any in-combination effects and potential cumulative effects.

In some cases, the likelihood of impact occurrence may also be relevant and, where this is a determining feature of the assessment, this is clearly stated.

3.5.4 Significance of Effect

Significant effects are predicted where important resources, or numerous sensitive receptors, could be subject to impacts of considerable magnitude. Effects are unlikely to be significant where low value or non-sensitive resources are subject to minor effects.

The criteria for determining the significance of an effect have been developed giving due regard to the following, where applicable;

- Sensitivity, importance or value of the resource or receptor;
- Extent and magnitude and duration of the impact; and
- Performance against environmental quality standards.

The criteria and assessment methodology used for each topic considered within this EIAR are set out within the ‘Methodology’ section of the respective EIAR technical chapter.

Unless otherwise stated, reported effects are considered to be adverse. It is however possible that some effects may be positive and these are stated and explained where appropriate.

The EIAR reports on the significance of the environmental effects as per the EIA Regulations. Although a significant effect does not always have to equate to an unacceptable effect, in order to ensure impartiality, the EIAR does not comment on acceptability.

3.5.5 Design Mitigation and Residual Effects

Design mitigation is integral to providing an environmentally robust development whereby suggestions for mitigation are incorporated into the project prior to ‘design freeze’. This in-built mitigation represents, where applicable, environmental good practice and places a responsibility upon the Applicant to provide environmentally sustainable design solutions.

Design rationale is further discussed within the Design and Access Statement which accompanies the wider applications, along with a section within each EIAR chapter that comments on design mitigation that has been incorporated into the development before the assessment is carried out. Therefore, where design mitigation has been employed, the impact assessment is carried out with this design mitigation in place as it forms a constituent part of the proposed development. Residual effects are generally then the effects that follow the assessment of proposed development with design incorporated.

Residual effects of the proposed development are those that remain, assuming successful implementation of the identified mitigation measures. All remaining effects of the proposed development, following the application of mitigation measures, are summarised clearly and their significance stated, within the ‘Residual Effects’ section of each specialist chapter.

Where applicable, the EIAR also reports on opportunities for enhancement which could be incorporated into planning permission or marine licence conditions.

3.5.6 Cumulative Impact Assessment

Consideration of cumulative effects is a requirement of the EIA Regulations. By definition, these are effects that result from incremental changes caused by past, present and reasonably foreseeable actions together with the proposed development. There are different types of cumulative effects (such as in-combination and sequential effects) and typically cumulative impact assessment is assessed within each technical chapter.

3.6 Screening as Part of the EIA Process

In determining the requirement for an EIA, Schedule 1 of both EIA Regulations sets out the types of development for which EIA is a mandatory requirement, whilst Schedule 2 lists the projects where the need for EIA is judged on a case-by-case basis, depending on whether a proposal is likely to cause significant environmental effects or is located in a sensitive area as defined by the EIA Regulations.

As the proposed development contains elements which transcends the intertidal zone (i.e. the area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS), which constitutes the dividing line between terrestrial and marine planning, consents will be required from both OIC (for any elements not covered under OICHAs’ Permitted Development Rights) and MS-LOT. A Screening Request was submitted to both OIC and MS-LOT in July 2020 to confirm if the proposed development, was deemed to fall within either Schedule 1 or 2 development as defined by the EIA Regulations and the Marine EIA Regulations.

OIC confirmed that the proposed development is considered to be EIA development. MS-LOT confirmed in their Screening Opinion, dated 22 July 2020, that the proposed works are considered to constitute Schedule 1 development as it falls under paragraph 21 *“Any change to or extension of projects listed in this schedule where such a change or extension in itself meets the thresholds, if any, or description of projects set out in this schedule.”*

By virtue of its nature, size and location, the proposed development could potentially have (if unmitigated) significant adverse effects on the environment. The remainder of this chapter discusses where and how the EIAR meets the requirements of the EIA Regulations and the Scoping exercise.

3.7 Scoping as Part of the EIA Process

3.7.1 Introduction

The sections below set out the EIA Scoping process for this development and accordingly documents how the EIAR was shaped into what is currently included and offers rationale to why other topics have been excluded, based on the likelihood of likely potential significant effects.

3.7.2 Scoping Requests and Opinions

A request for a formal Scoping Opinion was submitted to OIC and MS-LOT on 31st March 2021 under Regulation 17(1) of the EIA Regulations and Regulation 14(1) of the Marine EIA Regulations. This was accompanied by an EIA Scoping Report (Refer to Technical Appendix 3.1, Volume 3 of this EIAR) provided to assist OIC, MS-LOT, statutory and non-statutory consultees to form an opinion upon the likelihood of potentially significant environmental effects and hence the topics to be assessed in the EIA (i.e. those topics where significant environmental effects could potentially result if unmitigated). The Scoping Report also provided an opportunity for consultees to comment upon suggested methodologies for technical assessment.

A Scoping Opinion was provided by OIC dated 13th October 2021 (Refer to Technical Appendix 3.2, Volume 3 of this EIAR). This contained formal responses were received from internal Council departments, Historic Environment Scotland (HES), Marine Scotland, Marine Services, Northern Lighthouse Board, Orkney Fisheries Association, Orkney Trout Fishing Association, Royal Society for the Protection of Birds (RSPB), Royal Yachting Association Scotland (RYA Scotland), Scottish Environment Protection Agency (SEPA), NatureScot and Scottish Water.

A Scoping Opinion was provided by MS-LOT dated 22nd October 2021 (Refer to Technical Appendix 3.3, Volume 3 of this EIAR). This also contained formal responses were received from Defence Infrastructure Organisation (Ministry of Defence), HES, Maritime and Coastguard Agency (MCA), NatureScot, Northern Lighthouse Board (NLB), OIC and RSPB with specific advice sought from Marine Scotland Science (MSS), the Marine Scotland – Marine Analytical Unit (MAU), Marine Scotland Planning and Policy and Transport Scotland (TS).

3.7.3 Scoping Opinion – Defined Scope

The Scoping Responses from both OIC and MS-LOT are summarised in Table 3.1. This table provides a signpost of where these issues have been addressed, or where applicable why they have been Scoped out of the EIA.

Where the same issue has been raised by more than one consultation body, it has only been referred to once in order to avoid duplication. Further information is available within each technical chapter regarding where this information is held within that chapter.

Table 3-1: Summary of Scoping Responses

Consultee	Item	Point for Inclusion	EIA Report Section	Justification
Historic Environment Scotland	Archaeology	Potential direct construction impacts upon submerged marine paleoenvironmental remains – more information requested on paleoenvironmental potential	SI Cores assessed by Dr Scott Timpany; Section 6.5.3	
	Archaeology	Potential direct construction impacts upon possible aircraft wrecks	6.6.1.3	No known aircraft wrecks or paleoenvironmental remains in site; Written Scheme of Investigation/ Protocol for Archaeological Discoveries (WSI/PAD) to be implemented
	Archaeology	Potential direct impact by dredging upon submerged marine paleoenvironmental remains and aircraft wrecks	6.6.1.3, 6.6.1.4 & 6.6.1.5	No known aircraft wrecks or paleoenvironmental remains in site; WSI/PAD to be implemented
Marine Scotland Licensing Operations Team	Biodiversity	Aquaculture Animal Health; here are currently several aquaculture sites registered with Marine Scotland Science located in the vicinity of the Haston pier development in Kirkwall proposed by Orkney Islands Council (see map). The nearest aquaculture site is situated ~1.25km north west of the proposed development; it is an active marine cage Atlantic salmon site, operated by Cooke Aquaculture Scotland Ltd.	Chapter 5, section 5.5.6.3, 5.6.14 and 5.8	Aquaculture has been included within the assessment for welfare purposes, with mitigation recommended to avoid impacts which may be harmful to fish.
	Biodiversity	The Scottish Ministers advise that the above listed designated sites (North Orkney pSPA, Orkney Mainland Moors SPA, Faray and Holm of Faray SAC, Sanday SAC, Eynhallow SSSI and Muckle and Little Green Holm) are scoped in to the EIA Report for a full assessment during both the construction and operation phases. The Scottish Ministers also advise that this does not negate the need for a HRA, covering the European sites, to be submitted alongside the EIA Report.	Chapter 5, sections 5.5.1, 5.6.1, 5.6.2, 5.6.3	Designated sites all included in the assessment. It is the regulatory authority's duty to conduct the HRA, however, a shadow HRA has been provided in Technical appendix 5.5 to assist in the process.
	Biodiversity	The Scottish Ministers advise that benthic ecology and PMFs are scoped in to the EIA Report, and surveys of the intertidal and subtidal habitats in the area of the Proposed Works must be undertaken in order to inform the assessment.	Chapter 5, section 5.5.4, 5.6.5, 5.6.6	Benthics survey has been undertaken using the recommended methodology. PMFs have been scoped in to the impact assessment.
	Biodiversity	The Scottish Ministers note the Applicant's proposal in Section 5.5.1 of the Scoping Report to carry out a pre-construction otter survey. The Scottish Ministers support this proposal and advise the Applicant to review and adhere to NatureScot's comments on otters and to refer to NatureScot's website for further information on requirements.	Chapter 5, section 5.8.1	Pre-works check and good practice mitigation included.
	Biodiversity	Marine mammals; The Scottish Ministers agree with the assessment in the Scoping Report that impacts on marine mammals and their prey during the construction phase should be included in the EIA Report. Scottish Ministers also agree with the representations from OIC, NatureScot and MSS which advised that an assessment of the impact of the Proposed Works on marine mammals should be undertaken for all phases of the Proposed Works, including operations, and this should be used to identify mitigation measures to minimise the risk of disturbance. This assessment must include but not be limited to the impact of underwater noise.	Chapter 5, section 5.2.1, 5.5.5, 5.6.9-5.6.11, 5.8.1	Included. Although the full list of species was considered within the baseline, only the species most likely to be present within the Zone of Influence have been taken forward for assessment within the EIA, in accordance with the comments received from Marine Scotland Science.

		The Scottish Ministers direct the Applicant to the representation from NatureScot for a complete list of cetacean species which must be included within the assessment. The Scottish Ministers also refer the Applicant to the advice from MSS regarding sources of data to be used to inform the assessment.		
	Biodiversity	The Scottish Ministers wish to highlight the advice from MSS and representation from OIC which discuss the recent serious decline in harbour seal populations on the east coast of Scotland which is reflected in the small potential biological removal limit for the seal management area. This must be considered in the EIA Report and also the HRA in relation to the Sanday SAC.	Chapter 5, section 5.5.5.2	Considered within the assessment.
	Biodiversity	In addition to underwater noise, the Scottish Ministers advise that disturbance from vessels, impacts to prey species and physical injury from dredging and deposit of dredged material must also be assessed for the construction phase in line with the advice from MSS.	Chapter 5 section 5.6.8	All included apart from the assessment of deposit of dredged material as there will be no sea disposal.
	Biodiversity	The Scottish Ministers agree with NatureScot and MSS that impacts to marine mammals during the operation phase of the Proposed Works must also be assessed in the EIA Report. This must consider impacts from increased vessel traffic as well as other maintenance activities.	Chapter 5 section 5.6.8-5.6.11	Included.
	Biodiversity	The Scottish Ministers advise that basking sharks are scoped in for assessment in the EIA Report.	Chapter 5, section 5.6.12	Scoped in
	Biodiversity	The Scottish Ministers advise that diadromous fish, including sea trout, salmon and eel, are scoped in for further assessment in the EIA Report.	Chapter 5, section 5.2	Diadromous fish were considered in scoping but based on desk study information, were not taken forward for further consideration. Whilst individuals may be present, there are no spawning or feeding grounds within the predicted Zone of Influence and significant effects are considered unlikely.
	Biodiversity	The Scottish Ministers advise that marine fish ecology is scoped into the EIA Report.	Chapter 5, section 5.5.6.2 and 5.6.13	Included.
	Biodiversity	The Scottish Ministers advise that commercial fisheries is scoped in to the EIA Report.	Chapter 5, section 5.5.6.3, 5.6.14	Included.
	Biodiversity	The Scottish Ministers advise that mINNS are scoped in for assessment during both the construction and operation phases and site-based biosecurity plans must be included in the EIA Report.	Chapter 5 sections 5.2.1, 5.6.5, 5.6.6, 5.8.1 and 5.8.4	The potential for marine non-native and/or invasive species has been considered within the sub-tidal habitat assessment and mitigation and monitoring recommended to reduce this risk of spread or further introductions. Biosecurity plans have been included in mitigation. Due to the design and build nature of the proposed development details on anticipated methods and therefore biosecurity measures to be implemented are not known in full at this

				stage. Biosecurity plans will be prepared and agreed after a contractor has been awarded.
Marine Scotland Science	Water	Comments were as above, represented by MS-LOT, however it should be noted that with regards to marine mammal species to be scoped into the assessment the advice is contradictory: MSS agree with the list of potential marine mammal species occurring in the waters around Orkney provided by the applicant. We acknowledge the list of additional cetacean species outlined by NatureScot that have previously been recorded in Orkney waters, however MSS consider that due the extremely low likelihood of occurrence of these additional species in the waters proximal to the development, and the atypical nature of any such occurrences, they can be scoped out of further assessment. However we advise that a full assessment of any potential impacts on the cetacean species listed in the scoping report, along with both seal species, is undertaken as part of the EIA.	Chapter 5, section 5.2	Based on desk study information we have followed this approach to scoping marine mammals, with most of the additional species recommended by NatureScot scoped out due to very low occurrences.
	Biodiversity	Comments were as above, represented by MS-LOT, however it should be noted that with regards to marine mammal species to be scoped into the assessment the advice is contradictory: MSS agree with the list of potential marine mammal species occurring in the waters around Orkney provided by the applicant. We acknowledge the list of additional cetacean species outlined by NatureScot that have previously been recorded in Orkney waters, however MSS consider that due the extremely low likelihood of occurrence of these additional species in the waters proximal to the development, and the atypical nature of any such occurrences, they can be scoped out of further assessment. However we advise that a full assessment of any potential impacts on the cetacean species listed in the scoping report, along with both seal species, is undertaken as part of the EIA.	Chapter 5, section 5.2	Based on desk study information we have followed this approach to scoping marine mammals, with most of the additional species recommended by NatureScot scoped out due to very low occurrences.
	Socioeconomics	The Scottish Ministers advise that socio-economic impacts are scoped in, and an SEIA considering both the construction and operation phases must be included within the EIA Report. Engage with any other marine users and sectors in the vicinity of the Proposed Works, including marine farm operators, who may be impacted by the Proposed Works.	Chapter 8 Socioeconomics	Assessment of likely significant effects (including impacts) for socioeconomics have been scoped into the EIA process and reported in the EIA Report. Marine users have been included in the methodology (including consultation) of the assessment.
	Airborne Noise	The Scottish Ministers advise that airborne noise is scoped in for both construction and operation phases and a construction noise impact assessment must be included in the EIA Report. If construction methodologies have not been confirmed then the worst case scenario must be assessed.	Chapter 9: Sections 9.2.4 to 9.2.6 and Vol. 3 Technical Appendix 9.2.	Assessment of worst case construction and operational airborne noise have been included.
	Air Quality	Agree that the temporary impacts can be controlled through developing a site-specific dust management plan as part of the CEMP.	Vol. 3, Technical Appendix 9.3 Construction Dust Risk Assessment	A medium risk of dust impact during the construction phase was identified. Construction phase dust mitigation measures will therefore be included within the Construction Environmental Management Plan.

	Climate change	Include a Greenhouse Gas (GHG) Assessment of the pre-construction, construction, operational and decommissioning phases, including consideration of the supply chain as well as benefits beyond the life cycle of the proposed works. The assessment should be based on a Life Cycle Assessment ("LCA") approach taking into account the "Assessing Greenhouse Gas Emissions and Evaluating Their Significance" guidance produced by IEMA.	Section 9.4.3	A carbon assessment has been produced as a technical note to the ES. The assessment provides an overview into the carbon assessment methodology, summary of results and carbon mitigation opportunities.
Maritime and Coastguard Agency	Accidents and Natural Hazards	Include consideration of a Navigation Risk Assessment (NRA) to accompany the EIA to identify impacts and likely effects and their significance will be assessed in the EIA	Section 9.1	NRA carried out and included in assessments of Accidents and Disasters
NatureScot	Water	At present due to the scale of the development and without any detailed information regarding construction methodology, dredging and disposal of dredged material, impacts from reclamation or mitigation measures, it is recommended that potential impacts on coastal processes and subsequent impacts on benthic habitat and foraging marine birds are assessed within the EIA.	Addressed throughout chapter with the assessment informed by hydrodynamic modelling within TA 4.1 and wave modelling within TA 4.2. Assessment of sediment transport has been informed by the above technical appendices, along with the Site Investigation report[3]. Further information on sediment transport is provided in Section 4.5.7.3 Impacts upon water quality are discussed in Sections 4.7.2.2 and 4.7.3.2. Impacts upon sediment transport are discussed in Sections 4.7.2.5 and 4.7.3.5. Impacts to benthic habitats and other ecological features are considered in Chapter 5 of this EIAR.	Coastal processes have been included within the assessment supported by hydrodynamic modelling within TA 4.1 and wave modelling within TA 4.2.
	Biodiversity	North Orkney SPA; The proposal is located partially within the North Orkney pSPA designated for its breeding red-throated diver and	Chapter 5, sections 5.5.1.1 and 5.6.1,	Eider, Long-tailed Duck Red-breasted Merganser and Shag have not been

[3] Causeway Geotech (2022). Hatston Pier Development – Ground Investigation. Interpretative Report.

		non-breeding eider, velvet scoter, great northern diver, long-tailed duck, red-breasted merganser, shag and Slavonian grebe. Potential impacts to marine bird features may arise from the permanent displacement of birds from the development footprint; disturbance of birds in the vicinity of the proposal during site investigation, construction and/or operational phases and the temporary or permanent loss of or damage to prey-supporting habitats in the development vicinity or at dredge spoil disposal sites. Of potentially greater importance than direct impacts is the associated increased levels of vessel traffic that are the intended consequence of the proposal.Many of the features of this site exhibit high or very high levels of behavioural sensitivity to vessel movements and the potential for impact on site integrity is highest for those species with relatively high levels of habitat specialisation and/or relatively small populations within this site. It remains unclear how the nature, routing and frequency/volume of vessel traffic through the North Orkney pSPA are anticipated to change as a consequence of this development. Therefore, it is important that the EIA and HRA also includes an assessment of these wider operational phase impacts.		included in the assessment as they are not designated features of the site. (The site has moved from a pSPA to an SPA and it is assumed these additional species did not qualify for SPA protection). The impacts described have all been consider in the assessment apart from sea disposal as this will not happen.
	Biodiversity	Orkney Mainland Moors SPA; there is the potential for red-throated divers foraging in the vicinity of the proposed development to be those associated with the Orkney Mainland Moors SPA breeding population.	Chapter 5, sections 5.1.1.2 and 5.6.2	Red-throated diver feature has been considered in the assessment.
	Biodiversity	Scapa Flow pSPA; We would not consider there to be any connectivity for assessment purposes with the Scapa Flow pSPA, unless there are associated vessel movements during the construction phase (e.g. to deliver equipment or materials or to remove dredge spoil).	Chapter 5, section 5.2	No vessel movements or other activities are anticipated within the Scapa Flow SPA during construction or operation of the development and so this feature has been scoped out of further assessment.
	Biodiversity	Faray and Holm of Faray SAC; Although the harbour is not within this buffer the activities may have a pressure overlap and taking a precautionary approach we recommend this site is included for assessment.	Chapter 5, section 5.5.1.3 and 5.6.3	Included in assessment.
	Biodiversity	Sanday SAC; potential impacts to the harbour seal feature in all phases should be assessed.	Chapter 5, section 5.5.1.4 and 5.6.3	Included in assessment.
	Biodiversity	Sites of Special Scientific Interest (SSSIs); Eynhallow SSSI designated for harbour seal and Muckle and Little Green Holm designated for grey seal. Impacts to these sites in all phases will need to be considered further in the assessment.	Chapter 5, section 5.5.1.5, 5.5.1.6 and 5.6.3	Included in assessment.
	Biodiversity	Otter; It is noted and welcomed that an otter survey will be undertaken. We have advice on survey requirements, mitigation and licensing on our website. If any impacts on otters are identified then mitigation measures should be provided in a Species Protection Plan.	Chapter 5, section 5.5.3.1 and 5.6.7	Included in assessment. A pre-works otter survey will be conducted prior to works with a SPP submitted for approval if required. Standard good practice mitigation recommended.
	Biodiversity	Cetaceans; the list of species to be scoped in for assessment should also include humpback, fin, sperm, long-finned pilot and sei, curvier's beaked whale along with striped dolphin.	Chapter 5, section 5.2, 5.5.5, 5.6.7, 5.6.8-56.11 and 5.8	The additional species were considered, and with the exception of long-finned pilot whale, where scoped out for further assessment. There are very limited records for these species and the

		Marine mammals, including cetaceans should be scoped in for all phases of the development. We previously provided advice on underwater noise modelling as part of the consultation on the Orkney Harbour Masterplan and can provide further advice to the applicant if required. Mitigation should be proposed relating to the findings of this modelling and the applicant should be made aware that they may require a licence.		chances of them being impacted by works are negligible. Marine Scotland agreed with this approach. All other marine mammals are included in the assessment. Underwater noise modelling has been completed and used to inform mitigation. Licence requirements agreed.
	Biodiversity	Benthics ecology and Priority Marine Features; we recommend benthic survey work is undertaken to inform the EIA. Where PMFs are identified, the extent and quality (e.g. condition, density etc.) of the features should be confirmed to help inform assessment. A combination of video/photo methods and grab sampling would be appropriate, but of these two methods collection of video/photo data would be the priority.	Chapter 5, section 5.5.4, 5.6.5, 5.6.6	Benthic survey has been undertaken using the recommended methodology. PMFs have been scoped into the impact assessment.
	Biodiversity	Seals; We agree that there is the potential for impacts to both grey and harbour seals from the proposed development, andat this stage we recommend impacts to seals are assessed for all phases of the development. As above we previously provided advice to the applicant on underwater noise modelling and can provide further advice if needed. Mitigation should be proposed relating to the findings of this modelling.	Chapter 5, section 5.5.5.1, 5.5.5.2, 5.6.8 and 5.8	Included in assessment and mitigation informed by underwater noise modelling.
	Biodiversity	Basking shark; an assessment on potential impacts on this species should be undertaken as part of the EIA and any mitigation should be detailed in the EIAR. The applicant should be made aware that they may require a basking shark licence.	Chapter 5, section 5.5.6.1, 5.6.12 and 5.8	Included in assessment and mitigation recommended. Licence requirements agreed.
	Biodiversity	Marine Invasive Species; we recommend that the potential impacts of mINNS be considered in the EIAR. There is the potential for introduction and spread of mINNS as a result of the proposed development during construction and operation. Furthermore, a number of mINNS are already present in Orkney waters and activities during construction and operation could facilitate spread. We recommend that site-based biosecurity plans for the proposal at the construction and operational phases to assist with managing the spread and introduction of mINNS are produced. There are a wide range of additional potential biosecurity measures that could be developed and we would be happy to advise further and on biosecurity plans if required.	Chapter 5 sections 5.2.1, 5.6.5, 5.6.6, 5.8.1 and 5.8.4	The potential for marine non-native and/or invasive species has been considered within the sub-tidal habitat impact assessment and mitigation and monitoring recommended to reduce this risk.
	Biodiversity	Cumulative assessment; the cumulative assessment needs to take into consideration other sectors including aquaculture, renewable energy developments, cable installations etc... further information on cumulative assessment was provided to the applicant as part of the consultation on the Orkney Harbour Masterplan. We consider that the Orkney Islands Council are best placed to advise the applicants on which proposals to include in the cumulative assessment.	Chapter 3, section 3.5.6 and Chapter 5, section 5.7	Cumulative impacts put forward by OIC have been included.

	Biodiversity	Monitoring; ongoing surveys may be required to monitor construction and operational impacts.	Chapter 5, section 5.8.4	Monitoring recommendations have been made for both construction and operation of the development.
	Biodiversity	Assessment of alternatives; The EIAR should also include an assessment of alternative locations or layouts to the proposed development.	Chapter 2, section 2.5	Included.
	Biodiversity	Biodiversity enhancements; as part of the SEA process it was hoped that consideration could be given to the inclusion of opportunities for environmental enhancement as well as economic and social benefits. Potential examples of this was provided as part of the SEA consultation and we would be happy to discuss this further with the applicant.	Chapter 5, section 5.8.3	Biodiversity enhancements for onshore and intertidal habitat have been included.
	Seascape, Landscape and Visual Impact	General. Scoping Stage Consultation Response (appended to OIC scoping opinion): NatureScot stated: 'We are not able to comment on the landscape and visual impacts of this proposal. We are currently providing detailed landscape and visual advice in only the highest priority circumstances, where the effects of proposals approach or surpass levels that raise issues of national interest. Our advice is that from the information provided this proposal does not raise landscape issues of national interest.'	Chapter 7 – SLVIA	NA
	Seascape, Landscape and Visual Impact	Viewpoint consultation.	Chapter 7 – SLVIA	ZTV and proposed viewpoints shared with NatureScot. Sian Haddon from NatureScot responded by email on 28.10.22 stating that 'given the information provided in the ZTV, we have nothing to add in relation to the development at Hatston'.
	Seascape, Landscape and Visual Impact	Treatment of seascape in the SLVIA.	Chapter 7 – SLVIA	Email received from Sian Haddon at NatureScot on 01.12.22. Seascape confirmed as requiring reference to the relevant SNH guidance document and to the Orkney and North Caithness Coastal Character Assessment (August 2016). This supports the approach taken in the chapter.
	Climate Change	"It is noted in Section 3.3.1 of the Report that it is proposed to exclude climate change impacts on the grounds that any negative impacts would be insignificant, as the facility may be used to support decarbonisation of marine fuels and support future offshore windfarm developments. However, it states in Section 2.2.1 potential use of the facility by the oil and gas sector. Due to the scale of the development, we would expect some impacts from construction. If there are potentially significant positive or negative climate change benefits, including from the construction phase, these should be considered within the EIA"	Section 9.4.3	See response given to Marine Scotland Science above

Northern Lighthouse Board		Northern Lighthouse Board are content with the proposed EIA study and will respond in full to the Planning Permission application		
Orkney Islands Council	Water	**Policy Officer** The potential effects of all stages of the development on the water environment should be assessed and addressed, including impacts on the Burn of Hatston. The assessment of effects on coastal processes should be informed by advice from NatureScot regarding sediment transport in the vicinity of the proposed development and benthic habitat surveys to determine proximity to and interactions with potentially sensitive habitat features, particularly PMFs. Further information is also required to determine the nature of the sediment proposed to be dredged and the proposed method of disposal of dredged materials and associated effects. **Engineering** *Fluvial Flood Risk* No indication of significant flood risk for watercourses within the development– it is accepted that this should be scoped out. *Coastal Flood Risk:* With up to 20km of fetch from the NNE, the joint probability of 1:200 and 1:1000 year extreme sea levels coincident with significant wave action to exposed faces within the anticipated lifespan of the development should be considered. *Erosion* There is significant and ongoing erosion of the sea bank approximately 400m SSE of the proposed development site at Crow Ness	The potential impacts of the development are discussed in section 4.7. Coastal processes are considered within section 4.7and informed by hydrodynamic modelling within TA 4.1 and wave modelling within TA 4.2. Further information on existing flood risk is provided in Section 4.5.8. Further consideration of flood risk has been scoped out from the assessment. Tidal water levels, and extreme tidal water levels, are described in section 4.5.6. Further information on sediment transport and morphology is provided in Section 4.5.7.3.	Coastal processes have been included within the assessment supported by hydrodynamic modelling within TA 4.1 and wave modelling within TA 4.2. Assessment of coastal flood risk are included within the assessment.
	Biodiversity	Designated sites; The EIA Report should give full consideration to: • European protected areas for all phases of the development - North Orkney pSPA, Orkney Mainland Moors SPA, Faray and Holm of Faray Special Area of Conservation Area (SAC) and Sanday SAC, including potential for impacts on qualifying interests including red-throated divers. These sites are also designated as SSSIs and therefore impacts to SSSIs should be covered by assessment of SPAs and SACs. • Provide sufficient information for the Competent Authority to be able to undertake appropriate assessments in view of these site's conservation objectives for their qualifying interests. • Impacts on species with high levels of behavioural sensitivity to vessel movements from wider operational impacts from	Chapter 5, section 5.5.1, 5.6.1, 5.6.2, 5.6.3	Included in assessment.

		the expected changes to the nature, routing and frequency/volume of vessel traffic through the North Orkney pSPA.•Scapa Flow pSPA (only if there are associated vessel movements during the construction phase). • The applicant has noted that the EIA will include an assessment of impacts on Faray and Holm of Faray SAC, this should specifically relate to connectivity for grey seals. • Impacts on Sanday SAC (and specifically harbour seal) as it is well within the 50km connectivity buffer of the harbour seal feature. Impacts on Eynhallow SSSI and Muckle and Little Green Holm SSSI designated for harbour and grey seals respectively		
	Biodiversity	Marine Mammals, habitats and fish; the following should be given consideration within the EIA Report: • Impacts on otters (as confirmed in scoping report). • Impacts to grey and harbour seals for all phases of the development. • Impacts on cetaceans (European Protected Species) should be scoped in for all phases of the development in relation to potential noise disturbance and exclusion from feeding areas. In addition to those identified in the scoping report, the list of species to be scoped in for assessment should also include humpback, fin, sperm, long-finned pilot and sei, curvier's beaked whale along with striped dolphin. • Benthic survey work to establish the benthic habitats and species present at the development location, particularly Priority Marine Features (PMF). • Potential impacts to Basking Sharks. • Potential impacts to intertidal habitats.	Chapter 5, sections 5.2, 5.6.5 – 5.6.12	All features considered during the process. Additional cetaceans other than long-finned pilot whale scoped out of further assessment as no significant impacts likely. Similarly intertidal habitats were scoped out based on no significant effects.
	Biodiversity	The EIA Report should include baseline data on fish	Chapter 5, section 5.5.6	Included.
	Biodiversity	The habitat 'Burns and Canalised Burns' is identified in the Orkney Local Biodiversity Action Plan as a locally important habitat and should be added to the list in Section 5.2.2. The Burn of Hatston may support spawning habitat for seatrout, a Priority Marine Species. The developer is advised to contact the Orkney Trout Fishing Association for further information.	Chapter 5 section 5.2,	Contact was made with the Orkney Trout Fishery and the burn is not a known spawning location for sea trout. The burn was visited to assess habitat suitability and it is considered that access is limited by the culverted sections.
	Biodiversity	Biosecurity; NatureScot recommend that site-based biosecurity plans for the proposal, at the construction and operational phases, to assist with managing the spread and introduction of Marine Invasive Non-Native Species (mINNS) are produced, as there is a risk of introduction and spread through the implementation of the proposed development. The EIA Report should consider potential for significant adverse effects relating to mINNS, and should include measures to avoid and	Chapter 5 sections 5.2.1, 5.6.5, 5.6.6, 5.8.1 and 5.8.4	The potential impacts relating to marine non-native and/or invasive species has been considered within the sub-tidal habitat impact assessment and mitigation and monitoring recommended to reduce this risk.

		prevent this possible significant adverse effect on the environment, along with any proposed monitoring arrangements, in accordance with the RSPB's advice.		Biosecurity plans have been included in mitigation. Due to the design and build nature of the proposed development details on anticipated methods and therefore biosecurity measures to be implemented are not known in full at this stage. Biosecurity plans will be prepared and agreed after a contractor has been awarded.
	Archaeology	It is recommended that the developer should consider potential options for delivering such positive effects for biodiversity at the earliest opportunity. The process for identifying options should be documented in the introductory section of the EIA Report and where relevant in the mitigation section of the Ecology/Natural Heritage Chapter.	Chapter 2, section 2.10, Chapter 5, section 5.8.3.	Biodiversity enhancements for onshore and intertidal habitat have been included.
	Archaeology	Potential for indirect impacts upon the settings of designated heritage assets, including St Magnus Cathedral, Quanterness Chambered Tomb Earth Houses and Balfour Castle	Significance of potential impacts are considered in Section 1.6.2.1	
	Biodiversity	Natural Heritage; The applicant should refer to the Orkney Local Biodiversity Action Plan and the Pilot Pentland Firth and Orkney Waters Marine Spatial Planning preparation of the EIA Report.	Chapter 5, section 5.2 and 5.3	These plans were taken into consideration during the impact assessment.
	Seascape, Landscape & Visual Impacts	Scoping opinion (6.1): Request that seascape, landscape and visual impact be addressed in the EIA report (the preceding scoping report had suggested scoping out).	Chapter 7 – SLVIA	Chapter included.
	Seascape, Landscape & Visual Impacts	Scoping opinion (6.3.2): Request for ZTV.	Chapter 7 – SLVIA	ZTV provided in chapter.
	Seascape, Landscape & Visual Impacts	Scoping opinion (6.3.2): Request for assessment of cumulative effects.	Chapter 7 – SLVIA	The potential for significant cumulative effects has been considered but no developments have been identified with the potential to generate significant cumulative effects.
	Seascape, Landscape & Visual Impacts	Scoping opinion (6.3.2) and subsequent discussions with Jamie Macvie of OIC: Suggestion that heritage sites might be considered as visual receptors due to their attracting visitors.	Chapter 7 – SLVIA	Matter considered but no heritage sites attracting significant visitor numbers identified within the study area and ZTV of the proposed development.
	Seascape, Landscape & Visual Impacts	Scoping opinion (6.3.3): Request that assessment should be undertaken in accordance with the recommendations of the DaMP in its response of 18 May 2021.	Chapter 7 – SLVIA	Approach to chapter reflects all requirements identified by DaMP.
	Seascape, Landscape & Visual Impacts	Scoping opinion (6.3.4): Request for ZTV.	Chapter 7 – SLVIA	ZTV provided in chapter.
	Seascape, Landscape & Visual Impacts	Scoping opinion (6.3.4): Request to consult with LPA regarding viewpoints.	Chapter 7 – SLVIA	Consultations on viewpoint selection including an oral conversation with Jamie Macvie of OIC on 28.11.22 undertaken. No written responses received. Oral request on 28.11.22 for viewpoint from Ferry included in chapter.

	Seascape, Landscape & Visual Impacts	Verbal consultation with Jamie Macvie of OIC on 28.11.22: Request to include view from ferry.	Chapter 7 – SLVIA	Oral request for viewpoint from Ferry included in chapter.
	Socioeconomics	It is possible that there could be some significant beneficial socio-economic effects, during the construction and operational phases of the proposed development. The EIA should therefore include an assessment of socio-economic effects following the advice of Orkney Islands Council DaMP.	Chapter 8 Socioeconomics	Assessment of likely significant effects for socioeconomics have been scoped into the EIA process and reported in the EIA Report.
	Airborne Noise	The EIA should define the source of infill material and if this is not known at the time of submission, should outline the potential options ensuring assessment of the potential impacts associated with the worst case scenario through providing information of likely HGV movements associated with that option and appropriate mitigation, including a Framework CEMP/Dust Mitigation Strategy. With appropriate mitigation of the worst case scenario outlined in the introductory sections of the EIA, noise and air quality during the construction phase of the proposed development can be scoped out of the EIA.	The source of infill material and associated worst case assumptions adopted in this NIA are described in Section 9.2.4.	
	Airborne Noise	It is agreed that operational noise can be scoped out of the assessment for the reasons set out in the Scoping Report.	Assessment of operational noise is presented in Sections 9.2.4 to 9.2.6.	Assessment of operational noise has been included in the EIA to address Marine Scotland requirements.
	Air Quality	EIA should assess construction and operational impacts on the amenity of local residents and businesses due to noise, vibration, dust or other impacts. Asked to define the source of infill material and if this is not known at the time of submission, should outline the potential options ensuring assessment of the potential impacts associated with the worst case scenario through providing information of likely HGV movements associated with that option and appropriate mitigation, including a Framework CEMP/Dust Mitigation Strategy	Vol. 3 Technical Appendix 9.3 Construction Dust Risk Assessment Air Quality Supporting Assessment	Mitigation measures have been provided for dust emissions associated with HGV movements during the construction phase. These measures will be included within the Construction Environmental Management Plan.
	Climate Change	It is considered that the matter of Climate Change Resilience will be successfully covered in relevant technical chapters of the EIA Report and there is no requirement for a stand-alone chapter. The introductory sections of the EIA Report should include a section on climate change, including analysis of the carbon cost of the development and signposting where climate change matters are considered within the technical EIA chapters and information explaining how the development will ensure it operates as a decarbonised shipping port which would produce only negligible increases in emissions, as stated in the Scoping Report. It may be possible to scope out greenhouse gas emissions during the construction and operational phases, but more evidence will be required to justify this approach.	Section 9.4.4	The carbon assessment identifies carbon mitigation opportunities and provides guidance on how the development can decarbonise in the operational phase.
Royal Society for the Protection of Birds	Biodiversity	Recommend Biosecurity is fully considered and advise that measures to avoid and prevent this possible significant adverse effect on the environment, along with any proposed monitoring arrangements are included within the scope of the Ecology chapter.	Chapter 5 sections 5.2.1, 5.8.1 and 5.8.4	The potential for marine non-native and/or invasive species has been considered and mitigation and monitoring recommended to reduce this risk.

	Biodiversity	Kirkwall harbour (planning reference 20/240/SCR) to be included in the cumulative assessment.	Chapter 3, section 3.5.6 and Chapter 5, section 5.7	This project is not being progressed and has not been included within the cumulative assessment.
Royal Yachting Association		No Scoping Opinion responses were returned.		
Scottish Environment Protection Agency	Water	We are satisfied with this approach but advise, Section 4.3.2 Tidal Water Levels references the extreme sea levels and "The SEPA derived extreme sea levels, predicted at a point within Kirkwall, are 2.83m Above Ordnance Datum (AOD) for the 1 in 200 year return period event." We highlight that, whilst the Coastal Flood Boundary (CFB) dataset has been revised, it is a national dataset which has not taken sufficient account of local data from tide gauges or past floods, and which SEPA do not consider an improvement for the area. As such, we would recommend that the previous level of 3.1m AOD is used as this is most likely more representative of the 200-year level.	The previous 1 in 200 year return period tidal elevation value of 3.1 m AOD has been adopted as recommended in the SEPA consultation response. Tidal water levels, and extreme tidal water levels, are described in section 4.5.6.	The 1 in 200 year return period tidal elevation value of 3.1 m AOD has been adopted as recommended by SEPA.
Transport Scotland	Transport	Recommended that thresholds within IEMA guidance are used as a screening process	Transport	The thresholds have been used and show insignificant impact.
	Transport	Ensure abnormal loads can navigate routes		The client has advised there is no requirement for abnormal load assessment.

3.7.4 Projects for Cumulative Assessment

The cumulative schemes identified by OIC in Appendix 2 of their Scoping Opinion (Refer to Technical Appendix 3.2, Volume 3 of the EIAR) are provided in Table 3.2. MSLOT did not specify a list of projects to be considered other than Scapa Deep Water Quay.

Table 3-2: Cumulative Schemes for Consideration in the EIAR (Council Recommendations)

Planning Ref	Address	Description of Development	Status
21/015/SCR	Hatson HWRC/Former Abattoir, Sparrowhawk Road/Grainshore Road, Hatson Industrial Estate, KW15 1FL.	Screening opinion request to demolish household waste and recycling centre and former abattoir and create an integrated waste facility.	Screening opinion issued 19.03.21. EIA not required.
20/037/TPPMAJ	Quanterness (Land Near), St Ola, Orkney	Erect 6 wind turbines (maximum height 149.9 metres, maximum wind farm capacity 50MW), erect a meteorological mast (maximum height 90 metres) and a substation, create an access and construct access tracks, and associated infrastructure.	Consent issued December 2021, limited potential for cumulative impacts to be considered before construction commences.
20/240/SCR	Kirkwall Pier, Kirkwall	Screening opinion request to extend a pier to provide additional quay infrastructure, reclaim land to create a mixed-use development area, and reconfigure and expand marina	Submitted 02.07.2020.However, this project has since been dropped and is no longer proceeding. Therefore, it is not included in the cumulative assessment.

The Quanterness wind farm development (Table 3-2) does not present a material cumulative impact apart from a potential for cumulative considerations to be required during the construction phase regarding construction workers and construction traffic. This should be considered by the contractor prior to commencement and involve consultation with the relevant authorities. Therefore, it is not included in the cumulative assessment.

In addition, consideration has been given to the recently consented onshore windfarm developments located on the islands of Hoy and Faray. These are not considered to present a cumulative impact and are not considered further in this EIA.

3.8 Further Consultation

For each individual technical assessment further consultation was undertaken as required and is detailed within the corresponding chapter.

During the development of the Phase 1 Masterplan proposals which included the proposed development there were:

- A minimum of 60 face to face meetings with statutory and non-statutory stakeholders;
- Three workshops with more than 40 harbour users to consider issues constraints and opportunities, as well as possible design options including for the proposed development; and
- A public community consultation exercise which comprised presentations, drop-in events and an online questionnaire. These events were attended by more than 60 stakeholders.

A Stakeholder Engagement Plan (SEP) was subsequently prepared to set out the intentions for communing and wider engagement – the intention being to share information about the proposed projects as well as to provide feedback, and flag any concerns, which will require considered as part of the project development.

Between 2020 and 2022, there has been ongoing dialogue with more than 40 statutory and non-statutory stakeholders in relation to the Masterplan which includes the proposed development.

From mid-2022 wider and more targeted community and stakeholder engagement was initiated which incorporated the statutory Pre Application Consultation procedures relating specifically to the proposed development. A summary of activities and events held are provided below:

- Specific activities and engagement approaches as of February 2023 have included:
  - Opening of Kiln Corner and showcasing of the project models for public drop ins. Weekly opportunities – morning, afternoon, and evening sessions.
  - Three project newsletters to share with Masterplan distribution list, and project database of Kiln Corner visitors that have left contact details to receive project updates.
  - Support to Highlands and Islands Enterprise and Economic Development in establishing regular Business Breakfasts for the prospective supply chain associated with offshore energy.
  - Liaison and discussions with marine users to inform detailed design and scope complimentary opportunities.
  - Liaison and discussions with variety of other stakeholders, individuals and groups, focussing on key complimentary and possible causal impacts, e.g. feeding into and learning from the development of the Orkney Housing Strategy.
  - Supporting and hosting offshore wind developers in their own community engagement activities.

- As part of these engagement undertakings, the following key activities were undertaken as of February 2023:
  - Three community newsletters distributed.
  - Around 400 visitors to Kiln Corner.
  - Multiple harbour user meetings, including OIC staff, and other users, to inform detailed design.
  - More than 40 attendees (38 in person) at an offshore wind-focussed meeting of the Orkney Renewable Energy Forum hosted at Kiln Corner in January 2023.
  - Holm Community Council meeting in January 2023 and Kirkwall and St Ola Community Council Meeting in February 2023.
  - Public Open Days (Example opening times from May 2022 to March 2023).

Consultation has been a key part of the application strategy for the proposed development. The objective was to ensure that all those with an interest in the project were kept informed of the design progression. Where possible, the project team worked with them at all stages to share relevant information and agree suitable mitigation to remove, reduce or minimise the impacts from the project.

3.9 Final Content and Structure of the EIAR

Based on the consultation responses and initial baseline collection, it was possible to complete the EIA with a clear focus on the main topics requiring full and detailed impact assessment. These topics are listed in Table 3-3 and this Volume contains a chapter for each. The EIAR is presented within three volumes, which are set out within Table 3-3 below:

Table 3-3: Structure of the EIAR

Item	Description	Author
Volume 1: Environmental Impact Assessment Report		
Chapter 1: Introduction	This chapter sets the context for the EIA and introduces the development in a broad context	EnviroCentre
Chapter 2: Proposed Development	This chapter sets out the development description upon which the environmental assessment is based, as well as examining the design, alternatives considered and biodiversity enhancement considerations.	EnviroCentre (with marine engineering input by Arch Henderson)
Chapter 3: EIA Methodology and Scoping	This chapter introduces the EIA methodology by which the proposed development was designed, along with an outline of how the EIAR has responded to comments throughout the process.	EnviroCentre
Chapter 4: Water Environment	This chapter assesses the impact of the proposed development upon the water environment, including water quality, hydrodynamic modelling, pollution and flood risk.	EnviroCentre
Chapter 5: Biodiversity	This chapter assess the impact of the proposed development upon the terrestrial and marine environment. It considers designated sites, terrestrial habitats and mammals, benthic habitats and fauna, marine mammals and fish.	EnviroCentre (with technical support from Seastar Surveys Ltd, Physalia and Irwin Carr)
Chapter 6: Archaeology & Cultural Heritage	This chapter presents the Archaeology and Cultural Heritage receptors of relevance to the proposed development and assesses the potential impacts from the construction of the proposed development on these receptors. These effects may result from physical loss or changes in the assets' settings.	Orkney Research Centre for Archaeology (ORCA)
Chapter 7: Seascape, Landscape & Visual Impacts	This chapter assesses the effect of the proposed development on coastal character (including seascape), on landscape character, (both environmental resources), and on visual amenity (the effect on views experienced by people living, working and visiting the area).	SWECO
Chapter 8: Socio-Economics	This chapter assesses likely significant effects as a result of direct / indirect economic and demographic impacts for the local area.	SWECO
Chapter 9: Supporting Assessments	This chapter covers areas of the environment which are important to note but have not been identified as having potentially significant effects throughout the EIA process (as detailed within Chapter 3: EIA Methodology and Scoping). These include • Airborne Noise, • Air Quality, • Accidents & Natural Disasters, • Carbon, Climate Change & Greenhouse Gas Appraisal, • Population & Human Health, and • Transport, incl. Shipping & Navigation.	EnviroCentre and SWECO
Chapter 10: Schedule of Mitigation	This chapter sets out a summary of all mitigation measures proposed within the EIAR within a schedule which can then be used to inform an overarching Construction Environmental Management Document (CEMD) and individual Construction Environmental Management Plans (CEMP's)	EnviroCentre
Chapter 11: Conclusions	This chapter summarises the key findings of the EIAR, discusses CEMD principles, and provides a Statement of Significance in relation to the proposed development.	EnviroCentre
Volume 2:	This volume provides the figures relevant to each chapter within Volume 1 which are too large to present within the EIAR itself and is provided as a standalone volume to aid comparative assessment.	All
Volume 3: Technical Appendices	This volume provides the relevant technical background papers and studies which have informed each chapter.	All

The following documents have also been prepared to accompany the planning and marine licence applications, which do not form part of the EIAR but are nevertheless associated with it.

- **Design and Access Statement** – this provides a description of the design issues in the terrestrial environment relevant to the proposed development and more specifically an explanation of site selection process, the principles and concepts that have driven the design and the approach to access provisions;
- **Planning Statement** – this document assesses the level of compliance of the landward elements of the proposed development, drawing upon the evidence contained within the EIAR, in relation to the Development Plan and other material considerations.
- **Pre-Application Consultation (PAC) Report** – this provides information on the community engagement which has been undertaken prior to this submission with regards to the proposed development, and details public engagement initiatives and attitudes towards the proposed development. It covers both terrestrial and marine based PAC requirements; and
- **Marine Construction and Dredging Licence Applications** – The dredging application is accompanied by a Best Practicable Environmental Option (BPEO) appraisal.

A Non-Technical Summary (NTS) has also been prepared.

3.10 Key Terms

To ensure clarity and consistency through the EIAR, the following key terms have been used:

- ‘the proposed development’ refers to the construction and operation of the proposed development as described in Chapter 2: Proposed Development;
- ‘the site’ is the land and sea bound by the red-line boundary in which the proposed development lies, and is illustrated within Figure 2.1 of this EIAR; and
- The ‘Study area’ is the area over which desk based or field assessments have been undertaken and are identified within each chapter. The core study area varies depending on the nature of the potential effects within each discipline, as informed by professional guidance and best practice regarding EIA. All of the core study areas cover the site and are described within the methodology section of the relevant chapters within this EIAR.

4 WATER ENVIRONMENT

4.1 Introduction

This chapter of the EIAR provides an assessment of the implications of the proposed development on the water environment and coastal processes. The water environment is considered to encompass hydrology, hydrogeology and water quality, whilst coastal processes are considered to encompass tides, waves and sediment transport processes.

The Water Framework Directive (WFD) (Council Directive 2000/60/EC) aims to protect and enhance water bodies within Europe and covers all estuarine and coastal waters out to 1 nautical mile. This requires that there is no deterioration in the quality of surface or groundwater bodies and aims to achieve good ecological status or potential. The implications of the WFD must be considered when assessing this project and the details of how compliance will be achieved provided in the EIAR.

Details of the site and the proposed development are provided in Chapter 2: Proposed Development. The assessment will identify sensitive issues within the site by establishing the current baseline and examining the proposed development within this context.

This chapter is supplemented by the following appendices within Volume 3 of this EIAR, along with the relevant figures within Volume 2.

- Technical Appendix 4.1: Orkney Logistics Base Hatston – Coastal Hydrodynamic Modelling Study; and
- Technical Appendix 4.2: Significant Wave Height Desktop Study – Technical Report – Hatston Pier.

4.2 Scoping and Consultation

Scoping Opinions have been received from Marine Scotland and Orkney Islands Council (OIC), comments are contained within these from other consultees, including SEPA and NatureScot. A summary of the relevant scoping responses is set out in Table 3-1, Section 3.9, with details of how the scoping consultation has been taken into consideration when conducting this assessment.

4.3 Policy, Legislation and Guidance

The assessment for the water environment and coastal processes has been undertaken with reference to the following relevant planning policy, legislation and guidance.

4.3.1 Relevant Planning Policy

- Scottish Planning Policy (SPP) (2014);
- UK Marine Policy Statement (2011); and
- Scotland's National Marine Plan (2015).

4.3.2 Relevant Legislation

- Water Framework Directive (WFD) 2000;
- Water Environment and Water Services (Scotland) Act 2003;
- Marine (Scotland) Act 2010;
- Coast Protection Act 1949;
- Flood Risk Management (Scotland) Act 2009;
- Water Environment (Controlled Activities) (Scotland) Regulations 2011, as amended (CAR);
- Water Environment (Miscellaneous) (Scotland) Regulations 2017;
- National Planning Framework 4
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (The Habitats Directive);
- Environmental Impact Assessment (EIA) Directive (2014/52/EU);
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017; and
- The Marine Works (Environmental Impact Assessment) Regulations (Scotland) 2017;.

4.3.3 Relevant Guidance

- Guidelines for Water Pollution Prevention from Civil Engineering Contracts;
- Land Use Planning System (LUPS) SEPA Guidance CC1: Climate change allowances for flood risk assessment in land use planning;
- LUPS-GU24: Flood Risk and Land Use Vulnerability Guidance;
- Pollution Prevention Guidance 1 (PPG): General guide to the prevention of pollution;
- PPG3: Use and design of oil separators in surface water drainage systems (to be read in conjunction with 'Oil Separator Manufacturers – Version 7 – November 19th 2007);
- PPG 6: Working at construction and demolition sites;
- PPG 7: Refuelling facilities;
- PPG 18: Managing for water and major spillages;
- PPG 22: Incident response – dealing with spills;
- PPG26: Storage & handling of drums & intermediate bulk containers;
- Guidance for Pollution Prevention (GPP) 2: Above ground oil storage tanks;
- GPP 5: Works and maintenance in or near water;
- GPP 8: Safe storage and disposal of used oils;
- GPP 13: Vehicle washing and cleaning;
- GPP 21: Pollution incident response planning;
- WAT-SG-26: Good Practice Guide – Sediment Management; and
- WAT-SG-29: Good Practice Guide – Construction Methods.

4.4 Methodology

4.4.1 General

The assessment follows standard EIA procedures which include:

- Desk based review of the design of the proposed development in relation to the local water environment, soils and coastal processes;
- Consultation with key stakeholders to obtain relevant information and to ensure their concerns are addressed within the study;

- Establishing the existing baseline conditions:
  - Review topography, soils, geology and ground conditions at the site and environs;
  - Review of hydrology, catchment characteristics, and water quality conditions;
  - Review of coastal processes including bathymetry, tidal levels, and tidal flow currents, wave action, bed sediment type and distribution, sediment transport and deposition, geology;
  - Review of detailed hydrodynamic modelling report displayed within Technical Appendix 4.1: Orkney Logistics Base Hatston – Coastal Hydrodynamic Modelling Study;
  - Review of detailed wave modelling report displayed within Technical Appendix 4.2 Significant Wave Height Desktop Study – Technical Report – Hatston Pier: and
  - Reporting of baseline conditions to provide a basis for assessment of the potential impact.
- Impact Assessment:
  - Identification of sensitive receptors and environmental constraints;
  - Identification of potential impacts;
  - Assessment of impact magnitude;
  - Identification and assessment of mitigation measures to reduce or avoid any potential impacts of the proposed development; and
  - Statement of residual effects.

Potential impacts arising from the proposed development have been predicted and evaluated. The observed baseline data was used along with professional opinion to qualitatively assess the potential impacts and the significance to receptors.

4.4.2 Assessment Criteria

The assessment criteria set out in Table 3-1 has been used to develop a matrix to assess the significance of effects from the proposed development on the local water environment (Table 4.4). The assessment of residual effects also takes into consideration the probability of the effect occurring (certain, likely, possible or unlikely) and the duration of the effect (short (less than 2 years), medium (2 – 5 years), long term (more than 5 years) or permanent. All direct and indirect impacts causing moderate or major effects as identified in Table 4-3 are considered to be significant.

Table 4-1: Criteria for Assessing Receptor Sensitivity

Receptor Sensitivity	Description
Low	Receptors with a high capacity to accommodate change, low value or poor condition and no significant uses, for example: • Receptor is not an internationally, nationally or locally designated site. • Not classified as a surface water body for the River Basin Management Plan (RBMP). • Surface water body not significant in terms of fish spawning and no other sensitive aquatic ecological receptors e.g. freshwater pearl mussels. • Surface water body not used for abstraction. • Surface water body not used for recreation directly related to water quality e.g. angling, swimming, watersports. • Surface water body not used by commercial or recreational vessels. • Low or very low productivity aquifer with no identified abstractions.
Medium	Receptors with a moderate capacity to accommodate change, medium value or condition and limited use, for example: • Receptor is not an internationally or nationally designated site. May be a locally designated site. • Salmonid species may be present and surface water body may be locally important for spawning. No other sensitive aquatic ecological receptors e.g. freshwater pearl mussels. • Surface water body used for private water supply or medium scale industrial/ agricultural abstractions. • Surface water body used for occasional or local recreation e.g. local angling clubs. • Navigable surface water body used by commercial or recreational vessels. • Moderate productivity aquifer. • Groundwater body supports identified private water supplies or medium scale industrial/ agricultural abstractions.
High	Receptors with a low capacity to accommodate change, high value or condition and significant use, for example: • Receptor is an internationally or nationally designated site. • Surface water body supports sensitive aquatic ecological receptors e.g. freshwater pearl mussels. • Surface water body used for public water supply or large scale industrial/ agricultural abstractions. • Surface water body important for recreation directly related to water quality e.g. swimming, watersports, angling. • High or very high productivity aquifer. • Groundwater body supports public water supply or large scale industrial/ agricultural abstractions.

Table 4-2: Criteria for Assessing Impact Magnitude

Receptor Sensitivity	Description
Negligible	Very light change from baseline conditions. Change barely distinguishable, approximating to the 'no change' situation.
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of the baseline condition will be similar to pre-development circumstances/patterns.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post-development character/ composition/ attributes of baseline will be partially changed.
High	Total loss or major alteration to key elements/features of the baseline (pre-development) conditions such that post-development character/composition/attributes will be fundamentally changed.

Table 4-3: Criteria for Assessing Effects

Receptor Sensitivity	Magnitude of Impact	Predicted Effect
High	High	Major
High	Medium	
Medium	High	
High	Low	Moderate
Low	High	
Medium	Medium	
Medium	Low	Minor
Low	Medium	
Low	Low	
High, Medium or Low	Negligible	Negligible

4.5 Baseline

4.5.1 Site Description

The proposed development is located on the eastern shore of the Orkney mainland, approximately 2km north-west of Kirkwall town centre. It is located on the Hatston coastline within the Bay of Kirkwall, 1.7km northwest of the Peerie Sea and 1.8km west of the Bay of Weyland. The proposed development does not lie within any Marine Protected Areas (MPA) or Special Areas of Conservation (SAC). The proposed development lies partially within the North Orkney Special Protection Area, which is designated for breeding and non-breeding birds. The site is shown in relation to water environment receptors in Drawing 674795-GIS087: Hydrological Overview, Volume 2 of this EIAR.

4.5.2 Topography and Bathymetry

Topographic and bathymetric survey data is available for the site and surrounds. Bathymetric levels slope from around 3 metres relative to Chart Datum (mCD) at the shoreline to around -10mCD at the existing berth, on the outer face of Hatston Pier, and -13mCD further out in the centre of the Bay of Kirkwall. Further information on wider bathymetry is presented in Technical Appendix 4.1, Volume 3 of this EIAR.

4.5.3 Geology and Hydrogeology

The online British Geological Survey (BGS) 1:50,000 map identifies that the development site is underlain by bedrock of the Upper Stromness Flagstone Formation of siltstone, mudstone and sandstone.

The BGS 1:50,000 map identifies that eastern and western areas of the site are underlain by superficial deposits comprising Till Devensian – Diamicton, with no superficial deposits mapped within the centre of the site.

The site is underlain by a moderately productive aquifer of sandstone, siltstones, mudstones and conglomerates yielding small amounts of groundwater. Groundwater at the Site is classified under the Water Framework Directive (WFD) monitoring programme as belonging to the Orkney groundwater body (ID: 150678) and has an overall classification of ‘Good’.

[4] Causeway Geotech (2022). Hatston Pier Development – Ground Investigation. Interpretative Report.

Site Investigation has been undertaken for locations to the northwest of the existing pier to characterise seabed deposits[4]. These are summarised as an approximate stratigraphic order comprising superficial marine deposits (loose to medium dense sands and gravels with occasional cobbles and interspersed with layers of sandy gravelly clay) overlying glacial till which overlies limestone and siltstone bedrock.

4.5.4 Hydrology, Water Quality and Water Body Status

The Burn of Hatston is a watercourse that flows to the west of the proposed site. It is culverted to the outfall into Bay of Kirkwall at approximately 250m south west of the existing Hatston Pier and has a surface water catchment size of 1.36km^2 upstream of the point of discharge.

There is an unnamed watercourse which is present approximately 1.6km east of the Hatston Pier which has a surface water catchment of 3.29km^2. This watercourse discharges into the Bay of Kirkwall.

Within 5km of the proposed development other surface water features identified include the Easdale Burn which is located approximately 3.0km south east of Hatston, the Papdale Burn located approximately 3.4km east of the site, the Peerie Sea loch or pond 1.7km south-east of the site, and an unnamed watercourse located 2.7km west of the site.

There are likely other small freshwater inflows discharging into the bay around Hatston and Kirkwall, as well as piped drainage outfalls. However, the inflow of freshwater remains insignificant relative to the much larger volume of seawater exchanged within the Bay of Kirkwall.

The coastal waters of Kirkwall are classified under the WFD monitoring programme as a coastal waterbody. The waterbody is classified as being of overall ‘Good’ status in 2020 with a hydromorphological status of ‘High’. There are no watercourses large enough to be classified under the WFD.

Hydrological features are shown in Figure 4.1, Volume 2 of this EIAR.

4.5.5 Existing Outfalls

Existing outfalls are considered likely to be present related to local drainage and the nearby industrial estate, located 0.5 km southeast of the existing pier. An outfall from industrial units, including the Orkney Cheese factory, located southeast of the existing pier is visible within aerial imagery, and marked on marine hydrographic charts, with a discharge located at National Grid Reference HY 44231 12629, as shown in Figure 4.1, Volume 2 of this EIAR.

4.5.6 Tidal Water Levels

The closest port referenced in Admiralty tide tables is Kirkwall (standard port). Tidal water levels at the Kirkwall Standard Port as presented within the Admiralty tide tables are shown in Table 4-5[5]. The mean tidal range at Kirkwall is 2.4m during spring tides and 1.1m during neap tides. Kirkwall has a semi-diurnal tidal curve, with two high tides and two low tides each day, as is the case around the UK.

Table 4-4: Tidal range at Kirkwall Standard Port

Tide Condition	Chart Datum (mCD)	Ordnance Datum (mAOD)

[5] UK Hydrographic Office, 2023 (Admiralty Tide Tables – Volume 1B)

Highest Astronomical Tide (HAT)	3.5	2.1
Mean High Water Spring (MHWS)	3.0	1.6
Mean High Water Neap (MHWN)	2.4	1.0
Mean Low Water Neap (MLWN)	1.3	-0.1
Mean Low Water Spring (MLWS)	0.6	-0.8

*Chart datum correction for Ordinance datum is -1.4 (relative to OD at Newlyn)

Extreme sea levels have been predicted around the whole UK coastline and published by the Environment Agency[6]. These extreme levels include the effects of both tides and storm surge but not the effect of amplification within estuaries or sea lochs. In order to provide better estimates around the Scottish coastline, a second dataset provides extreme sea levels within estuaries[7]. The Coastal Flood Boundary (CFB) extreme sea levels, predicted at a point within Kirkwall Bay, are 2.83m Above Ordnance Datum (AOD) for the 1 in 200 year return period event and 2.95mAOD for the 1 in 1,000 year return period event. Through their scoping response SEPA advised, as detailed in Table 4-1, that a previously identified level for the 1 in 200 year return period event of 3.1 mAOD is considered more representative of local conditions and should be used instead of the CFB level. SEPA recommend a 2100 climate change uplift of 0.93m for coastal levels within the Orkney river basin region[8]. Therefore the 1 in 200-year return period plus climate change event has a level of 4.03mAOD.

4.5.7 Coastal Processes

4.5.7.1 Tidal Currents

Tidal Currents along the nearshore within the Bay of Kirkwall near to Hatston are insignificant[9]. A coastal hydrodynamic modelling study has been undertaken, as detailed in Technical Appendix 4.1, Volume 3 of this EIAR. Baseline model results show that relatively strong currents (>1.5m/s) are present in The String channel to the north-west of Kirkwall Bay during spring tides, whilst weak currents occur in Kirkwall Bay (spring tide peak current <0.2m/s) and at Hatston (spring tide peak current <0.1m/s). The main local tidal stream moves through The String channel and Wide Firth around the south-western tip of Shapinsay, with the Bay of Kirkwall and Hatston located in sheltered waters outwith the main tidal stream. The direction of the flood tide is broadly from north-west to south-east, and the ebb tide in the opposite direction.

Current speed peaks are observed during mid-flood and ebb tides, and lowest speeds around high and low water. The phasing is more complex adjacent to Hatston, considered a result of local flow patterns and eddies, however, peak flood tide current speeds are marginally higher than corresponding ebb tide current speeds within Kirkwall Bay and around Hatston Pier.

Model results show that bed shear stress is strongly correlated with tidal current speed, with peak shear stress occurring with peak current speeds. The vicinity of Hatston shows generally low bed shear stress, as would be anticipated with the weak tidal currents observed. Peak bed shear stress predictions are around 0.1N/m^2 during spring tides.

Further details of tidal currents are presented within Technical Appendix 4.1, Volume 3 of this EIAR.

4.5.7.2 Wave Climate

The fetch lengths are restricted so the wave conditions tend to be locally generated wind-waves. Within the Bay of Kirkwall waves lose their directional nature due to refraction effects within the bay[10].

A spectral wave modelling study has been undertaken, as detailed in Technical Appendix 4.2, Volume 3 of this EIAR. Potential wave conditions at Hatston have been predicted for a number of scenarios using the spectral wave model. The model results show that the predicted maximum significant wave height (Hs) under existing conditions is approximately 2.0 m for the 1-in-50 year wind condition from a northerly direction. The maximum peak wave period (Tp) is also predicted for the 1-in-50 year wind condition from a northerly direction. This is the direction with the second longest fetch and with a strong extreme wind speed, allowing the waves to build up to the area of interest. The results presented in the modelling study represent a fully developed sea for a constant wind direction, and therefore include a degree of conservatism (as wind speed and direction will vary temporally and spatially on a local scale).

Model sensitivity tests have identified that storm/swell waves propagating into the Orkney Islands from either the North Sea or North Atlantic do not reach Hatston with sufficient height or energy to be of any significant concern to the proposed development.

Further details of wave climate are presented within Technical Appendix 4.2, Volume 3 of this EIAR.

4.5.7.3 Morphology and Sediment Transport

Much of the coastline near to Hatston is fronted by a rock platform with shingle and sand beaches. There is little littoral transport other than erosion caused by extreme events[11]. The European Nature Information System (EUNIS) seabed habitat map shows the dominant seabed habitat around the Hatston Pier to be infralittoral coarse sediment, present within a low energy environment[12].

Sandy gravel is shown immediately north and east of the existing pier[13], no seabed sediment is indicated to the west of the existing pier, whilst bedrock outcrop is visible on the surrounding shoreline. Site Investigation characterised marine deposits west of the existing pier as loose to medium dense sands and gravels occasionally with cobbles interspersed with layers of sandy gravelly clay[14].

Due to the nature of the seabed substrate in the vicinity of the development site, the lack of fine sediment, and the low tidal current speeds and associated low bed shear stresses, it is considered that there are no significant local active sediment transport processes, with the exception of occasional storm wave driven transport.

Analysis of historical coastline alignments show that the major changes to the coastline since 1890 have been the addition of manmade structures such as Kirkwall pier and Hatston pier, whilst there has been no significant erosion observed within the Dynamic Coast analysis[15]. As outlined in Table 3-1, OIC have highlighted in their scoping

[6] Coastal Design Sea Levels - Coastal Flood Boundary Extreme Sea Levels (2018). Environment Agency.
[7] Coastal Design Sea Levels - Coastal Flood Boundary Extreme Sea Levels Estuary (2018). Environment Agency.
[8] Climate change allowances for flood risk assessment in land use planning Version 2. SEPA, 2022.
[9] Ramsay and Brampton, 2000. Coastal Cells in Scotland: Cell 10 – Orkney.
[10] Ramsay and Brampton, 2000. Coastal Cells in Scotland: Cell 10 – Orkney
[11] Ramsay and Brampton, 2000. Coastal Cells in Scotland: Cell 10 – Orkney.
[12] EUNIS 2017 (https://emodnet.eu/en).
[13] Marine Scotland (https://marinescotland.atkinsgeospatial.com/nmpi/)
[14] Causeway Geotech (2022). Hatston Pier Development – Ground Investigation. Interpretative Report.
[15] Dynamic coast online map available at: http://www.dynamiccoast.com/webmap.html

response that there has been on-going erosion of the sea bank at Crow Ness around 400m south-east of Hatston. It is considered that this erosion will be related to storm driven wave action.

4.5.8 Flood Risk

The SEPA flood maps do not indicate any fluvial flood risk from the watercourses identified in the vicinity of the development site. Isolated areas of pluvial flood risk are identified within low lying areas.

A review of the SEPA online flood maps identifies that the lower coastal edge and the existing pier of the proposed development site are at high risk of coastal flooding[16]. This prediction does not account for the potential effects of climate change, local bathymetry or wave action. Tidal water levels, and extreme tidal water levels, are described in section 4.5.6, with an identified 1 in 200 year extreme tidal water level of 3.1mAOD at Hatston. SEPA recommend a 2100 climate change uplift of 0.93m for coastal levels within the Orkney river basin region[17]. Therefore the 1 in 200-year return period plus climate change event has a level of 4.03mAOD.

Further details of local wave climate are summarised in the previous section 4.5.7, and presented in Technical Appendix 4.2, Volume 3 of this EIAR.

Further consideration of flood risk is scoped out of the EIA, in line with scoping responses outlined in Section 3.7.

4.5.9 Future Projections and Effects of Climate Change

The UK government has published a range of climate projection reports and data for use in the assessment of climate change risks to help plan how to adapt to a changing climate. The latest set of comprehensive reports produced by UK Climate Projections (UKCP18) was published in 2018 and provides future climate projections for land and marine regions for the UK.

The UKCP18 projections are presented for a range of different scenarios or Representative Concentration Pathways (RCPs). RCPs are a method for capturing assumptions required on future economic, social and physical changes to our environment that will influence climate change. The increase in in global mean surface temperature (°C) by 2081 – 2100 for the different RCP's is outlined below:

- RCP2.6 = 1.6°C (0.9 – 2.3°C)
- RCP4.5 = 2.4°C (1.7 – 3.2°C)
- RCP6.0 = 2.8°C (2.0 – 3.7°C)
- RCP8.5 = 4.3°C (3.2 – 5.4°C)

Diagram 4.1 presents the UKCP18 RCP predictions for carbon dioxide concentrations, along with resulting changes in global mean surface temperatures. Diagram 4.2 presents UKCP18 RCP predictions for time-mean sea level change based on an average of UK ports, along with the spatial pattern of sea level change around the UK coastline at year 2100. Review of these predictions highlights that the proposed development is within a zone of moderate sea level change in a UK context.

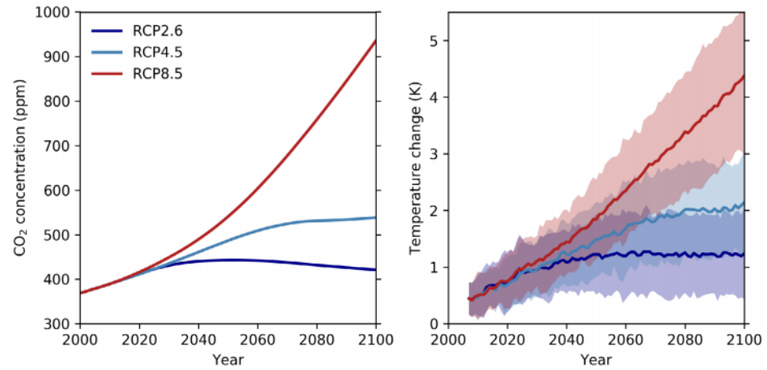

Figure 4-1: UKCP18 RCP predictions over the 21st century for carbon dioxide concentrations (left) and global mean surface temperature change resulting from carbon dioxide and other climate forcings (right)

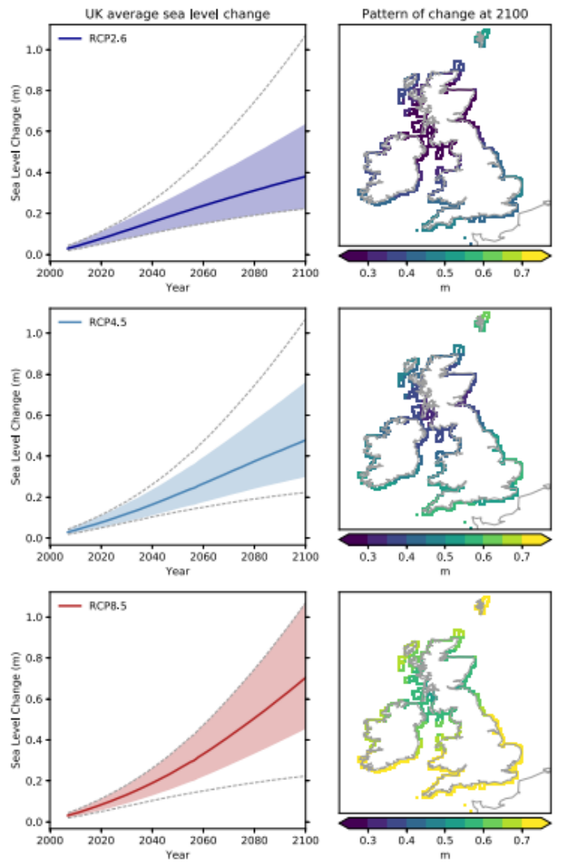

Figure 4-2: UKCP18 time series of time-mean sea level change for RCPs based on average of UK ports (left) and the spatial pattern of change at 2100 (right)

[16] SEPA, 2020 (http://map.sepa.org.uk/floodmap/map.htm)

[17] Climate change allowances for flood risk assessment in land use planning Version 2. SEPA, 2022.

It should be noted that there is a wide range of uncertainty associated with these projections, and that these values represent an average relative sea-level rise across a range of return period scenarios. Under the United Nations Climate Change Paris Agreement the UK is committed to attempt to hold the increase in global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit warming to 1.5°C. These targets are in line with those allowed for within UKCP18 RCP 2.6, or the lower end of RCP 4.5, in terms of median global temperature increase by 2100.

The UKCP18 values for sea-level rise at the proposed development have been obtained based on the best available guidance. Cumulative rise from 2017 to 2100 for the region within which the proposed development is located (Orkney) is 0.93 m, derived from the 95th percentile estimate for RCP8.5.

4.5.10 Sensitive Receptors

On the basis of the baseline assessment the sensitive receptors to potential impacts on the water environment, soils and coastal processes have been identified as the coastal waters and sediment of the proposed development and the wider Bay of Kirkwall, the Burn of Hatston, and the existing outfalls in the vicinity of the site.

Consideration of ecological receptors, including associated designations, is included within Chapter 5, Biodiversity.

4.6 Receptor Sensitivity

On the basis of the baseline assessment, Table 4-5 identifies the receptor sensitivity using the criteria outlined in Table 4-1.

Table 4-5: Receptor Sensitivity

Receptor	Sensitivity	Comment
Coastal waters and sediment of the Bay of Kirkwall	High	Within Special Protection Area (North Orkney); Classified waterbody under WFD; and Navigable waterbody used by commercial & recreational vessels.
Burn of Hatston	Medium	Of local importance
Existing Outfalls	Medium	Infrastructure of local importance

4.7 Impact Assessment

4.7.1 Potential Impacts

This section identifies the potential environmental impacts on the water environment, soils and coastal processes, at and around the site during the construction and operational phases of the proposed development.

The proposed works will involve the following key activities which have the potential to impact the water environment within the site and environs:

- Dredging of quay approach and berths;
- Construction activities (land reclamation, quay extension and logistics base infrastructure);
- Site surface water drainage; and
- Logistics base operations.

The potential impacts on the water environment, soils and coastal processes include:

- Water Environment:
  - Hydrology alterations including increased run-off and alteration of flow patterns.
  - Contamination of coastal water and sediments through spillages, leakages and/or sediment transfer (oils, fuels, welfare facilities, and suspended solids).
- Coastal Processes:
  - Changes in local wave climate.
  - Changes in local tidal regime.
  - Changes in local sediment transport regime.

The potential interactions between water environment impacts and ecology are assessed within Chapter 5: Biodiversity.

The following sections consider the potential impacts and provide an assessment of likely level of significance.

4.7.2 Construction Phase

The potential impacts identified are assessed under the following headings:

- Hydrology;
- Water and sediment quality;
- Tidal regime;
- Wave climate;
- Sediment transport; and
- Existing outfalls.

The degree of potential environmental impact is provided as appropriate.

4.7.2.1 Hydrology

During construction there is potential for increased run-off due to the introduction of impermeable and semi-permeable surfaces arising from the compaction of soils and construction of proposed infrastructure. This will reduce the infiltration capacity and increase the rate and volume of direct surface run-off, and potentially concentrate diffuse flows. The potential environmental effect of this is to increase or alter groundwater and surface water flow rates and routes, potentially leading to increases in erosion and sediment transport.

No direct impacts to the Burn of Hatston are anticipated which is located 180 m west of the proposed development. Topographic levels surrounding the site are relatively flat and Hatston Pier Road and Galt View road form a hydrological barrier to any potential runoff from the development.

Due to the small catchment, presence of hydrological barriers, the potential impacts of surface water flow alterations and increased run-off to coastal waters and the Burn of Hatston would be of a **negligible magnitude** prior to mitigation.

4.7.2.2 Water and Sediment Quality

Sediment Discharge and Dispersion from Dredging Works and the Disposal of Dredged Sediment

The proposed dredging works could potentially cause plumes of suspended solids and a reduction in water quality with a resultant impact on aquatic life.

The dredge volume is estimated to be 650m^3, based on the bathymetry surveys and proposed channel design. As outlined in section 4.5.3, the marine deposits within the dredge area (as shown in Phase 2: Dredging Layout (Drawing No 202043/C-21 Rev A, dated 02/05/2023, Volume 2) comprise as loose to medium dense sands and gravels occasionally with cobbles interspersed with layers of sandy gravelly clay. A Dredging Best Practicable Environmental Option Report[18] (BPEO) has been produced for the proposed development, it is understood that dredged material is to be used as fill within the reclaimed areas.

Given the relatively coarse nature of the dredge budget, small proposed dredge volume, and the weak tidal currents within the vicinity of the proposed dredge pocket (as demonstrated by the Hydrodynamic Modelling carried out, Technical Appendix 4.1, Volume 3 of this EIAR), it is considered that any plumes generated as a result of the dredging works and their disposal will be very localised close to the existing quay and short term in duration.

Overall it is considered that prior to mitigation the magnitude of impact of sediment discharge and dispersion from dredging works will be **low** within the immediate dredge area, and **negligible** out with this area.

Reclamation

The proposed reclamation fill (potentially both imported quarried material and dredged material) could potentially result in plumes of suspended solids and a reduction in water quality with a resultant impact on aquatic life. As outlined above, the fill material will be a mixture of sediment locally generated by quarries and potentially dredging, the coarse nature of which, in combination with the locally weak tidal currents, would act to limit the duration and spread of any plume generated.

It is considered that prior to mitigation the magnitude of impact of sediment discharge and dispersion from excavation and reclamation works will be **low** within the immediate vicinity of the reclamation area, and **negligible** out with this area.

Pollution Incidences

During construction there is a risk of accidental pollution incidences affecting the water environment (i.e. coastal waters and sediment) from the following sources:

- Spillage or leakage of oils and fuels stored on site;
- Spillage or leakage of oils and fuels from construction machinery or site vehicles;
- Spillage of oil or fuel from refuelling machinery on site;
- Spillage or leakage from on-site toilet facilities;
- Suspended solids from construction works; and
- The use of concrete and cement in construction works.

The main risk is considered to be posed by refuelling activities. Oil or fuel spillages to the water environment would be detrimental to water/sediment quality and could affect fauna and flora.

Concrete (specifically the cement component) is generally highly alkaline and any spillage to the water environment and/or soils could be detrimental to water/sediment quality, fauna and flora.

The effect of the potential pollution incidences during construction on water quality would be dependent on the scale and nature of the incident, therefore the magnitude of impact prior to mitigation may range from **low to high** prior to mitigation.

4.7.2.3 Tidal Regime

The proposed construction works could result in alterations to local tidal levels and currents. Hydrodynamic modelling results presented within Technical Appendix 4.1, Volume 3 of this EIAR, highlight that the proposed development would have no impact on tidal water surface elevations. The model results show that minor changes in peak current speed are predicted at point output locations in the immediate vicinity of the proposed development (<0.06m/s change), with no change observed in the wider surrounds.

Minor increases in current speed are observed around the north-western end of the new quay during both flood and ebb tides, with minor decreases in current speed in the shelter of the proposed development, more extensively during the flood tide. Small local eddies are predicted during the ebb tide, resulting in localised areas of decreased current speed just offshore of the new quay. No significant changes to tidal currents are predicted in the vicinity of the Orkney Cheese factory outfall.

Minor changes in bed shear stress are predicted in a similar pattern to the changes in current speed described above.

The model results show that in the post-development scenario low current speeds and corresponding low bed shear stresses observed remain, as under existing baseline conditions, indicative of a low energy environment.

It is considered that prior to mitigation the magnitude of impact of the proposed development on the local tidal regime will be **negligible**.

4.7.2.4 Wave Climate

The proposed construction works could result in alterations to the local wave climate. Wave modelling results presented within Technical Appendix 4.2, Volume 3 of this EIAR, highlight that the proposed development would result in minor changes to significant wave heights (Hs) in the immediate vicinity. For waves approaching during 1 in 50 year winds from a north-westerly direction, model results show minor increases in Hs (up to +0.3m height) along the outer face of the new pier extension. Elsewhere, minor decreases in wave height are predicted where the proposed development provides shelter, with most significant decreases observed under and around the suspended decking of the existing quay, and in the lee of the solid quay structure. Similar changes are predicted for waves approaching during winds from the north and north-east, whilst waves under wind from the east are shown to be the smallest. These impacts to wave height in the immediate vicinity of the proposed development are considered to be minor, with resultant wave climate remaining of similar character to pre-development conditions.

No impact to wave climate is predicted outwith the immediate vicinity of the proposed development.

[18] EnviroCentre (2023), Hatston Pier Dredging Best Practicable Environmental Option Report

Therefore, the magnitude of impact on the wave climate is considered to be of **negligible magnitude**, prior to mitigation.

4.7.2.5 Sediment Transport

The proposed construction works could result in alterations to local sediment transport processes. As outlined in section 4.5.7.3, the coarse local sediment character and prevailing weak tidal currents (see Technical Appendix 4.1, Volume 3 of this EIAR), will result in no significant local sediment transport processes, other than occasional storm wave driven transport.

In the absence of significant sediment transport processes, and given the negligible impact on tidal velocities predicted by the hydrodynamic modelling, and limited localised impact to wave climate predicted by the wave modelling, as detailed in the sections above, it is considered that there will be a **negligible impact** on sediment transport, prior to mitigation.

4.7.2.6 Existing Outfalls

The existing outfalls, including the outfall from industrial units southeast of the proposed development are outside the footprint of the proposed works and will therefore not be physically impacted. The impact of the proposed development during the construction phase on tidal conditions and wave climate within the vicinity of the existing outfalls is considered to be negligible. Therefore the magnitude of impact on existing outfalls is considered to be **negligible**, prior to mitigation.

4.7.3 Operational Phase

The potential impacts identified are assessed under the following headings:

- Hydrology;
- Water and sediment quality;
- Tidal regime;
- Wave climate;
- Sediment transport; and
- Existing outfalls.

The degree of potential environmental impact is provided as appropriate.

4.7.3.1 Hydrology

As during construction, there is potential for increased run-off due to the presence of impermeable and semi-permeable surfaces. The impact of surface water flow alterations and increased run-off would be of a **negligible magnitude** prior to mitigation measures due to the small contributing catchment and coastal location of the proposed development.

4.7.3.2 Water and Sediment Quality

Maintenance dredging is not predicted to be required. However, in the circumstance that a maintenance dredge was required in the future, the likely effects would be of a similar nature, albeit lower order, to that of the capital dredge during construction.

There is unlikely to be any groundworks during the operational phase, and therefore the risk of sedimentation will be much lower than during construction. The potential risk of pollution as a result of spillages, will however remain during the operational phase. Additionally, there is the potential risk of contamination of surface water run-off from the proposed development platform, as well as contamination of coastal waters as a result of discharges from boats. The impacts on water quality would therefore range from **low to high magnitude** prior to mitigation measures.

4.7.3.3 Tidal Regime

The impact of the proposed development during the operational phase on the tidal regime is considered to be the same as during the construction phase. Therefore the magnitude of impact on the tidal regime is considered to be of **negligible magnitude** within the immediate vicinity of the site, **negligible magnitude** in the surrounds and **negligible magnitude** within the wider Bay of Kirkwall.

4.7.3.4 Wave Climate

The impact of the proposed development during the operational phase on the wave climate is considered to be the same as during the construction phase. Therefore the magnitude of impact on the wave climate is considered to be of **negligible magnitude**, prior to mitigation.

4.7.3.5 Sediment Transport

The impact of the proposed development during the operational phase on sediment transport is considered to be the same as during the construction phase. Therefore the magnitude of impact on sediment transport is considered to be of **negligible magnitude**, prior to mitigation.

4.7.3.6 Existing Outfalls

The impact of the proposed development during the operational phase on existing outfalls the same as during the construction phase. Therefore the magnitude of impact on existing outfalls is considered to be **negligible**, prior to mitigation.

4.8 Mitigation and Monitoring

Mitigation aims to avoid, manage, control and further minimise environmental impacts and is discussed within the following sections.

4.8.1 Construction Phase Mitigation

4.8.1.1 General Management

A Construction Environmental Management Plan (CEMP) will be developed to ensure that the mitigation measures outlined in the EIAR are followed during the proposed construction works. The CEMP includes surface water management and pollution prevention measures (e.g. Pollution Prevention Plan), and will be in place during construction and operation. The CEMP will remain a live document and will be continually updated as the work progresses. The CEMP is a practical tool to facilitate the management of environmental mitigation measures and to provide a clear roadmap of the key roles and responsibilities during construction.

A suitably qualified Environmental Clerk of Works (EnvCoW) will monitor the construction works to ensure that the CEMP and associated mitigation measures are being implemented effectively.

Best practice will be adopted throughout all phases of development, following current guidance. The programme of works, including timing, direction and method of capital dredge and reclamation, will be planned, monitored and managed to minimise the potential negative environmental impacts.

A Pollution Incident Response Plan will be developed relating to the construction of the proposed development, statutory requirements and identification of areas of highest sensitivity. This will provide site spill response procedures, emergency contact details and equipment inventories and their location. All staff will be made aware of this document and its content during site induction. A copy will be available in the site office at all times.

All activities above Mean High Water Springs (MHWS) with potential to affect the water environment require to be authorised under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR). The level of authorisation required is dependent on the anticipated environmental risk posed by the activity to be carried out. These activities could include construction drainage. Construction activities below MHWS with potential to affect the water environment require to be authorised under a Marine Licence.

4.8.1.2 Dredged Material

Mitigation measures will be delivered by the principal contractor through detailed Construction Environment Management Plans (CEMPs) that will be produced following appointment. The contractor will be responsible for producing a site specific Pollution Prevention Plan (PPP) that will apply the principles of the agreed mitigation to show how the mitigation is implemented effectively down to the specific site.

4.8.1.3 Surface Water Management

The surface water drainage will be designed to ensure that there are no untreated surface water discharges directly to surrounding coastal waters. It is proposed to replicate natural drainage around construction areas and to use source control to deal with rainwater in proximity to where it hits the ground in line with current Sustainable Drainage Systems (SuDS) guidance. Suitable prevention measures will be in place at all times to prevent the release of pollutants to the water environment, including adjacent coastal waters. These will be regularly inspected and maintained to ensure optimal performance.

4.8.1.4 Site Compounds

Run-off from compounds will be captured and passed through construction drainage features prior to discharge. Foul drainage will either be contained in a closed system and disposed of at a suitable off-site facility with private treatment and discharge or, where possible, directed via a connection to the local foul drainage network.

4.8.1.5 Concrete

In the case that concrete batching was to be undertaken on-site the following mitigation measures would be implemented to minimise the potential impact of concrete batching on the water environment in line with PPG6:

- Concrete batching will take place on an impermeable designated area and at least 10m from any waterbody.
- Equipment and vehicles will be washed out in a designated area that has been specifically designed to contain wet concrete/ wash water.
- A closed loop system will be used for wash waters. Wash waters will be stored in a contained lined pond for settlement before being reused (e.g. for mixing and washing).
- No discharge of wash waters will occur on-site. All excess wash water that cannot be reused will be disposed of off-site.

The following mitigation is proposed for concrete handling and placement:

- Pouring of concrete will take place within well shuttered pours to prevent egress of concrete from the pour area.
- Pouring of concrete during adverse weather conditions such as prolonged heavy rain will be avoided.

The CEMP will include a Pollution Incident Response Plan, and drivers of vehicles carrying concrete will be informed so as to raise awareness of potential effects of concrete and of the procedures for clean-up of any accidental spills.

Concrete acidity (pH) will be as close to neutral (or site-specific pH) as practicable as a further precaution against spills or leakage. This should be managed by the Contractor as part of their normal concrete mix selection.

4.8.1.6 Oil, Fuel, Site Vehicle Use and Storage

The risk of oil contamination will be minimised by good site working practice (further described below) but should a higher risk of oil contamination be identified then installation of an oil separator will be considered.

The storage of oil is considered a Controlled Activity which will be deemed to be authorised if it complies with the Regulations. The mitigation measures to minimise any risk of contaminant release are in line with SEPA PPG and GPP documents and include the following:

Storage:

- Storage for oil and fuels on site will be designed to be compliant with GPP2 and GPP8.
- The storage and use of loose drums of fuel on site will not be permitted.
- Bunded tanks will provide storage of at least 110% of the tank's maximum capacity.

Refuelling and maintenance:

- Fuelling and maintenance of vehicles and machinery, and cleaning of tools, will be carried out in a designated area where possible in line with PPG7.
- Multiple spill kits will be kept on site.
- Drip trays will be used while refuelling.
- Regular inspection and maintenance of vehicles, tanks and bunds will be undertaken.

Emergency procedure: The Pollution Incident Response Plan will include measures to deal with accidental spillages.

4.8.2 Operational Phase Mitigation

4.8.2.1 General Management

An Operational Environmental Management Document (OEMD) will be in place throughout the operational phase. Best practice will be followed throughout the operational phase, with reference to the SEPA Guidance for Pollution Prevention (GPPs), and best practice guidance.

4.8.2.2 Surface Water Management

It is proposed that drainage of surface water will adopt SuDS principles and be by means of infiltration through a permeable surface, and the underlying permeable reclamation fill, providing treatment.

Details of the operational surface water management proposals and methodology will be included within the OEMD and will be submitted to SEPA's operations team for agreement consent. Plans of the surface water management system will be located within the Site office, with foul water systems clearly marked.

Where a site use or development proposal is such that it will require a Pollution Prevention and Control (PPC) authorisation from SEPA, then specific processes, techniques and technologies will be included within the surface water management system in that location in order to meet the requirements of the PPC authorisation. Such measures would be in line with best practice guidance.

4.8.2.3 Oil, Fuel, Site Vehicle Use and Storage

The proposed development's Pollution Incident Response Plan will be updated for the operational phase of the development, taking full consideration of best practice, statutory requirements and identification of areas of highest sensitivity. It will provide site spill response procedures, emergency contact details and equipment inventories and their location. All operation staff will be made aware of this document, and its contents, and it will be available in the port office. Appropriate spill kits and absorbent materials will be stored in a suitable location which is easy to access. Staff/contractors will be trained in the use of spill kits and other pollution control equipment and the operation of pollution control devices.

4.8.3 Monitoring and Enhancement

The Applicant shall undertake a planned programme of compliance monitoring to verify the effectiveness of the project's environmental management during construction. Monitoring plans will be established and implemented with the agreement of OIC, SEPA, NatureScot and Marine Scotland.

Specific auditing and monitoring plans will be developed by the Contractor and will cover the following:

- The contractor's own Environmental Management System and project monitoring plans;
- The CEMD, schedule of mitigation register, relevant legislation and industry good practice;
- All project activity;
- Roles and responsibilities for those undertaking audits and monitoring;
- Frequency of inspection activities (i.e. daily, weekly, monthly);
- Process to deal with corrective actions/non-compliance; and
- Reporting procedures (including non-compliance).

4.9 Residual Effects

The residual effects expected to arise following implementation of the mitigation measures detailed above are summarised in Table 4.7. These residual effects reflect receptor sensitivity, the post-mitigation magnitude and detail the resultant effect on each receptor.

The residual effects are considered to be negligible, and accordingly no significant effects on the water environment or coastal processes have been identified.

Table 4-6: Residual Effects

Effect	Receptor	Receptor Sensitivity	Source of Impact	Type of Effect	Duration	Probability of Occurrence	Magnitude of Impact Pre-mitigation	Magnitude of Impact Post-mitigation	Residual Effect (Post-mitigation)
Construction Phase									
Changes to hydrology	Coastal waters and sediment of Kirkwall Bay	High	Terrestrial construction works	Negative	Short	Possible	Negligible	Negligible	Negligible
	Burn of Hatston	Medium	Terrestrial construction works	Negative	Short	Unlikely	Negligible	Negligible	Negligible
Water and sediment quality – excavation and reclamation	Coastal waters and sediment of Kirkwall Bay	High	Construction Works	Negative	Short	Possible	Low	Negligible	Negligible
	Burn of Hatston	Medium	Construction Works	Negative	Short	Unlikely	Negligible	Negligible	Negligible
Water and Sediment Quality – Sediment discharge and dispersion	Coastal waters and sediment of Kirkwall Bay	High	Construction including capital dredge	Negative	Short	Possible	Low	Negligible	Negligible
	Burn of Hatston	Medium	Construction including capital dredge	Negative	Short	Unlikely	Negligible	Negligible	Negligible
Pollution incidences	Coastal waters and sediment of Kirkwall Bay	High	Construction oils, fuels & concrete	Negative	Short	Possible	Low – High	Negligible	Negligible
	Burn of Hatston	Medium	Construction oils, fuels & concrete	Negative	Short	Unlikely	Negligible	Negligible	Negligible
Changes to tidal regime	Coastal waters and sediment of Kirkwall Bay	High	Construction including capital dredge	Negative	Permanent	Certain	Negligible	Negligible	Negligible
Changes to wave climate	Coastal waters and sediment of Kirkwall Bay	High	Construction including capital dredge	Negative	Permanent	Certain	Negligible	Negligible	Negligible
Changes to sediment transport	Coastal waters and sediment of Kirkwall Bay	High	Construction including capital dredge	Negative	Permanent	Certain	Negligible	Negligible	Negligible
Change or impact to existing outfalls	Existing Outfalls	Medium	Construction including capital dredge	Negative	Short – Permanent	Unlikely	Negligible	Negligible	Negligible
Operational Phase									
Changes to hydrology	Coastal waters and sediment of Kirkwall Bay	High	Operational activities	Negative	Short – Permanent	Possible	Negligible	Negligible	Negligible
	Burn of Hatston	Medium	Operational activities	Negative	Permanent	Unlikely	Negligible	Negligible	Negligible
Water and sediment quality – excavation and reclamation	Coastal waters and sediment of Kirkwall Bay	High	Operational activities	Negative	Short	Possible	Low	Negligible	Negligible
	Burn of Hatston	Medium	Operational activities	Negative	Short	Unlikely	Negligible	Negligible	Negligible
Water and Sediment Quality – Sediment discharge and dispersion	Coastal waters and sediment of Kirkwall Bay	High	Operational activities	Negative	Short	Possible	Low	Negligible	Negligible
	Burn of Hatston	Medium	Operational activities	Negative	Short	Possible	Negligible	Negligible	Negligible

Effect	Receptor	Receptor Sensitivity	Source of Impact	Type of Effect	Duration	Probability of Occurrence	Magnitude of Impact Pre-mitigation	Magnitude of Impact Post-mitigation	Residual Effect (Post-mitigation)
Pollution incidences	Coastal waters and sediment of Kirkwall Bay	High	Operational activities	Negative	Short	Possible	Low – High	Negligible	Negligible
	Burn of Hatston	Medium	Operational activities	Negative	Short	Unlikely	Negligible	Negligible	Negligible
Changes to tidal regime	Coastal waters and sediment of Kirkwall Bay	High	Operational activities	Negative	Permanent	Possible	Negligible	Negligible	Negligible
Changes to wave climate	Coastal waters and sediment of Kirkwall Bay	High	Operational activities	Negative	Permanent	Possible	Negligible	Negligible	Negligible
Changes to sediment transport	Coastal waters and sediment of Kirkwall Bay	High	Operational activities	Negative	Permanent	Certain	Negligible	Negligible	Negligible
Change or impact to existing outfalls	Existing Outfalls	Medium	Operational activities	Negative	Short – Permanent	Unlikely	Negligible	Negligible	Negligible

4.10 Statement of Significance

Overall the effects of the proposed development on the water environment and coastal processes are not considered to be significant.

5 BIODIVERSITY

5.1 Introduction

EnviroCentre Ltd was commissioned by the Applicant to undertake an Ecological Impact Assessment (EcIA) of the proposed development, in order to identify and describe any likely significant effects arising from it. This chapter details the specialist ecological studies undertaken and the results of the assessment. The assessment has been carried out according to the latest guidance from the Chartered Institute of Ecology and Environmental Management (CIEEM)[19] and in consideration of the National Planning Frameworks 4 (NPF4)guidance requirement that all development projects should display they will conserve and enhance biodiversity. This EcIA has been produced by experienced and competent ecologists who are all Members of CIEEM and follow its Code of Professional Conduct. It is supplemented by the figures contained within Volume 2: Figures and the baseline survey reports contained within Volume 3: Technical Appendices of this EIAR, including the following:

- Technical Appendix 5.1: Preliminary Ecological Appraisal (PEA);
- Technical Appendix 5.2: Marine Mammal and Fish Baseline Report;
- Technical Appendix 5.3: Hatston Pier Ornithology Technical Report;
- Technical Appendix 5.4: Hatston Pier and Harbour Habitat Mapping Survey Report
- Technical Appendix 5.5: Habitats Regulations Appraisal (HRA);
- Technical Appendix 5.6: Underwater Noise Report (undertaken by Irwin Carr); and
- Technical Appendix 5.7: Marine Mammal Protection Plan.

Figure 2.1 and 2.3 in Chapter 2 show the site boundary, which is referred to as ‘the site’ throughout this chapter. Details of the site and the proposed development are provided in Chapter 2: Proposed Development.

The purpose of this chapter is to:

- Identify and describe the biodiversity/ecological baseline for Important Ecological Features (IEFs) which may be impacted by the proposed development.
- Identify and describe all potentially significant ecological effects associated with the proposed development;
- Set out the mitigation measures required to ensure compliance with nature conservation legislation and to address any potentially significant ecological effects;
- Identify how mitigation measures will be secured;
- Provide an assessment of the significance of any residual effects;
- Set out the requirements for post-construction monitoring; and
- Detail actions to be taken to deliver biodiversity enhancements.

5.2 Scoping and Consultation

Potential impacts to the following features have been considered within this assessment, based on the results of baseline studies (Volume 3: Technical Appendices 5.1, 5.2, 5.3, 5.4, 5.5) and in response to scoping responses (as described in Chapter 3.7):

- Designated sites
- Terrestrial, intertidal and sub-tidal habitats
- Terrestrial protected species
- Ornithology
- Marine mammals
- Fish

5.2.1 Potential Impacts and Zone of Influence

Potential impacts considered during scoping were as follows:

Construction phase:

- Direct loss of intertidal and subtidal habitat within the footprint of the development;
- Accidental spills from vessels, plant and on-site storage of fuels and chemicals leading to pollution of habitats and potential harm to a range of species and habitats;
- Increased airborne noise through construction activities (dredging, piling, blasting, plant movement, etc.) leading to disturbance and displacement of foraging, roosting or nesting species;
- Underwater acoustic noise and shock during piling leading to altered behaviour, this could include lethal and sub lethal impacts on marine mammals, birds and some fish species;
- Increased visual stimuli through construction activities (personnel and plant movement, etc.) leading to disturbance and displacement of foraging, roosting or nesting faunal species;
- Increased un-natural lighting leading to disturbance and displacement of foraging, roosting or nesting faunal species;
- Seabed excavation works during construction leading to disturbance of and potential loss of benthic communities and marine species, which in turn could lead to a reduction in or dispersal of prey items for a range of marine mammals and bird species;
- Temporary increase in suspended sediment and/or deposition from dredging and construction creating physical disturbance in the marine environment; and
- Increased vessel numbers causing disturbance in the marine environment and increased collision risk.
- Increased opportunities for transport of marine invasive non-native species (mINNS) due to increased vessel movements

Operation Phase:

- Accidental spills from vessels, plant and on-site storage of fuels and chemicals leading to pollution of habitats and potential harm to a range of species and habitats;
- Increased noise and/or visual stimuli through operational activities (plant movement, etc.) leading to disturbance and displacement of foraging, roosting or nesting species;
- Increased un-natural lighting leading to disturbance and displacement of foraging, roosting or nesting species;
- Increased vessel numbers post construction causing disturbance in the marine environment and increased collision risk.
- Increased opportunities for transport of marine invasive non-native species (mINNS) due to increased vessel movements.

The CIEEM Guidelines identify the Zone of Influence (ZoI) as the area over which ecological features may be subject to significant effects as a result of the proposed development and associated activities. This is likely to extend beyond the project site, for example where there are mobile species or hydrological links beyond the site boundaries. Features found to be present or likely to be present within the predicted Zone of Influence (ZoI) and which have potential to be significantly affected (positively and negatively) by the proposed development are included within the scope of this assessment. The features considered, associated ZoI, scoping decision and

[19] CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, version 1.2. Chartered Institute of Ecology and Environmental Management, Winchester. Available at: https://cieem.net/wp-content/uploads/2018/08/ECIA-Guidelines-2018-Terrestrial-Freshwater-Coastal-and-Marine-V1.2-April-22-Compressed.pdf (Accessed 16/01/2023)

justification are summarised in Table 5-1 below. Where impacts to features are considered to be similar, these have been grouped within the scoping and impact assessment for succinctness (eg. Marine mammals within the same hearing group).

Table 5-1: Scoping Summary

Feature	ZoI	Scoping Decision	Justification
Designated sites			
North Orkney Special Protection Area (SPA) • Great Northern Diver (*Gavia immer*), non-breeding; • Red-throated Diver (*Gavia stellata*), breeding; • Slavonian Grebe (*Podiceps 51ctive51*), non-breeding • Velvet Scoter (*Melanitta fusca*), non-breeding	Within the development and up to 750m from the boundary (considered to be the furthest disturbance distance of bird species[20])	**Scoped in**	The development is partially within the SPA and there is potential for the bird species which are features of the site to be impacted during the construction and operation.
Orkney Mainland Moors SPA (including Sites of Special Scientific Interest SSSIs; Orphir and Stenness Hills, West Mainland Moorlands and Keelylang Hill and Swartaback Burn) • Hen Harrier breeding and non-breeding; • Red-throated diver, breeding; • Short-eared Owl (*Asio flammeus*), breeding) SSSI only features: • Upland habitat assemblage • Blanket bog • Breeding bird assemblage	**For Birds:** Within the development and up to 750m from the boundary (considered to be the furthest disturbance distance for species present[10]) **For Terrestrial Habitats:** Within the development footprint or connected hydrologically.	**Scoped in: Red-throated diver only**	The development is c.4km from the designated site at its nearest point and therefore birds within the site are considered to be outside of the ZoI. However, birds breeding within the SPA may frequent the development site and adjacent habitats to forage during the breeding season. The habitat is considered sub-optimal for Hen Harrier and Short-eared Owl and so these features have been scoped out for further assessment. Red-throated diver have been scoped in as they may utilise waters within and adjacent to the proposed development. The SSSI upland assemblage and blanket bog habitats are outwith the ZoI and thus have been scoped out.
Faray and Holm of Faray Special Area of Conservation (SAC) and SSSI • Grey seal (*Halichoerus grypus*)	Within the development and the furthest extent of where noise effects marine mammals (approximately 500m from piling activities).	**Scoped in**	The site is c. 23km to the north east of the development. Grey seals from the site may utilise waters within the ZoI to travel between haul outs and for foraging. There is therefore potential for them to be impacted during construction and operation.
Sanday SAC and East Sanday SSSI • Harbour seal (*Phoca vitulina*) • Intertidal mudflats and sandflats • Reefs • Subtidal sandbanks SSSI only features: • Bar-tailed godwit (*Limosa lapponica*), non-breeding • Purple sandpiper (*Calidris maritima*), non-breeding • Ringed plover (*Charadrius hiaticula*), non-breeding • Turnstone (*Arenaria interpres*), non-breeding and passage • Vascular plant assemblage	**For Harbour seal:** Within the development and and the furthest extent of noise effects on marine mammals (approximately 500m from piling activities). **Habitats: Within the development footprint and the furthest extent of likely sediment deposition or changes to coastal processes.** **Birds:** Within the development and up to 300m (considered to be	**Scoped in: Harbour seal only**	The site is c.30km north east of the development. Harbour seals may utilise waters within the ZoI to travel between haul out sites and forage and so they have been scoped in for further assessment. It is considered that the habitat features of the SAC and SSSI and bird features of the SSSI are outside of the expected ZoI and so have been scoped out.

[20] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283. Available at: https://www.nature.scot/doc/naturescot-research-report-1283-disturbance-distances-review-updated-literature-review-disturbance (Accessed 19/01/2023)

Feature	ZoI	Scoping Decision	Justification
	the furthest disturbance distance[2])		
Scapa Flow SPA • Black-throated diver (*Gavia arctica*), non-breeding • Eider (Somateria mollissima), non-breeding • Great northern diver, non-breeding • Long-tailed duck (Clangula hyemalis), non-breeding • Red-breasted merganser (Mergus serrator), non-breeding • Red-throated diver, breeding • Slavonian grebe (Podiceps 52ctive52), non-breeding	Within the development and up to 750m from the boundary (considered to be the furthest disturbance distance of bird species[2])	Scoped out	The designated site is c.4km at its nearest point to the development and so is outside of the ZoI. No vessel movements associated with the development during construction or operation are expected to travel through the SPA as it is on the opposite side of the mainland. It is possible that birds utilising the Scapa Flow SPA also utilise waters to the north of the mainland, where they could be within the ZoI, however it is expected that those present in significant numbers would also be features of the North Orkney SPA and impacts will be assessed under that feature.
Eynhallow SSSI • Harbour Seal	Within the development and to the furthest extent of predicted noise effects on seals (approximately 1.5km from activities).	**Scoped in**	The site is c.17km north of the development. The seals may utilise waters within the ZoI to travel between haul out sites and forage and so they have been scoped in for further assessment.
The Muckle and Little Green Holm SSSI • Grey Seal	Within the development and to the furthest extent of predicted noise effects on seals (approximately 1.5km from activities).	**Scoped in**	The site is c.16km north east of the development. The seals may utilise waters within the ZoI to travel between haul out sites and forage and so they have been scoped in for further assessment.
Seal haul-outs	Within the development and to the furthest extent of predicted noise effects on seals (approximately 1.5km from activities).	Scoped out	There are numerous seal haul-outs around the Orkney mainland and isles. The closest of these to the development are Damsay and Holm of Grimbister (c.3.7km west) and Helliar, Holm North and Elwick (c.5km to the north east). The seals utilising the haul outs will be outside of the predicted ZoI and no impacts are predicted. There may be increased vessel movements in the vicinity of Helliar, Holm North and Elwick but this is already a busy vessel route approaching the existing pier and so it is expected that seals using this haul out will be accustomed to some level of shipping activity. Seals moving between haul out sites may be within the ZoI. Impacts to seals within the general marine environment are assessed separately within section 5.4.1.
Terrestrial habitats			
Semi-improved neutral grassland and other tall herb / fern – tall ruderal	Within the footprint of the development	Scoped out	These habitats are present within the Planning Application Boundary (PAN) however they are outside the area of proposed works and will be retained.
Intertidal boulders and rocks with green algal beds, intertidal boulders and rocks with brown algal beds, shingle, strandline vegetation, hard maritime cliff, artificial rock exposures	Within the footprint of the development	Scoped out	These habitats are present within the footprint of the development and will be removed to facilitate creation of the laydown area, however they are not habitats of conservation importance, and their loss is not considered to be significant for any associated protected species.

Feature	ZoI	Scoping Decision	Justification
Burns and Canalised burns	Within the footprint of the development and dispersal distance of pollutants entering the water.	**Scoped in**	There are no burns within the site boundary, however the Hatston Burn enters the bay of Kirkwall c. 250m south west of the site, within the ZoI.
Terrestrial Mammals			
Otter	Within the footprint of the development and up to 200m from the boundary	**Scoped in**	There is suitable habitat for otter foraging, rest sites and holts within the ZoI.
Ornithology Full list of species identified during baseline surveys are presented in Technical Appendix 5.3. Notable results include: • Winter roosting Curlew; • Winter roosting Golden Plover; and • Roosting site for Gulls (predominantly Herring Gull and Great Black-backed Gull.	Within the development and up to 750m from the boundary (considered to be the furthest disturbance distance of bird species[21])	Scoped out	Impacts to species associated with the Designated sites are included within the relevant SPAs. For species not covered by SPA designations, some roosting habitat will be lost within the footprint of development but there is considered to be sufficient suitable alternatives nearby and it is not considered likely that there would be significant impacts to these species.
Inter-tidal habitats			
• Littoral rock (and other hard substrata) • *Pelvetia 53ctive53n53nt53* on sheltered littoral fringe rock • *Fucus spiralis* on full salinity upper eulittoral mixed substrata • *Fucus vesiculosus* on mid eulittoral mixed substrata • *Ascophyllum nodosum* on full salinity mid eulittoral rock • *Ascophyllum nodosum* on full salinity mid eulittoral mixed substrata • Littoral coarse sediment • Barren littoral shingle • Strandline • Barren littoral coarse sand	Within the footprint of the development and within dispersal distance of pollutants entering the water	Scoped out	The following habitats are present within the footprint of the development and will be lost due during construction of the laydown areas: • Barren littoral shingle • *Pelvetia 53ctive53n53nt53* on sheltered littoral fringe rock • Littoral coarse sediment • *Fucus vesiculosus* on mid eulittoral mixed substrata • Strandline • *Ascophyllum nodosum* on full salinity mid eulittoral mixed substrata These are not habitats of conservation importance, and their loss is not considered to be significant for any associated protected species.
Sub-tidal habitats • Dense foliose red seaweeds on silty moderately exposed infralittoral rock • Grazed, mixed *Laminaria 53ctive53n53nt* and *Saccharina 53ctive53n53* on sheltered infralittoral rock • *Saccharina 53ctive53n53* on very sheltered infralittoral rock	Within the footprint of the development and within dispersal distance of pollutants entering the water	**Scoped in:** *Saccharina 53ctive53n53* and red seaweeds on infralittoral sediments and seapens	*Saccharina 53ctive53n53* and red seaweeds on infralittoral sediments are part of the Priority Marine Feature (PMF) habitat; Kelp and seaweed communities on sublittoral sediment. This habitat is within the footprint of the development and will be lost during construction. Seapens and burrowing megafauna in circalittoral fine mud is also a PMF habitat . The surveys did not identify any within the footprint of the development, but it is present in the wider consent boundary and so there is potential for impacts to occur.

[21] Goodship, N.M. and Furness, R.W. (MacArthur Green) Disturbance Distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283. Available at: https://www.nature.scot/doc/naturescot-research-report-1283-disturbance-distances-review-updated-literature-review-disturbance (Accessed 19/01/2023)

Feature	ZoI	Scoping Decision	Justification
• Grazed *Saccharina 54ctive54n54* with *Echinus*, brittlestars and coralline crusts on sheltered infralittoral rock • *Saccharina 54ctive54n54* park on very sheltered lower infralittoral rock • Infralittoral muddy sand • Seapens and burrowing megafauna in circalittoral fine mud • Infralittoral mixed sediment • *Sabella 54ctive54n* with sponges and anemones on infralittoral mixed sediment • *Cerianthus lloydii* and other burrowing anemones in circalittoral muddy mixed sediment • *Kurtiella bidentata* and *Thyasira spp*. In circalittoral muddy mixed sediment • *Saccharina 54ctive54n54* and red seaweeds on infralittoral sediments • Red seaweeds and kelps on tide-swept mobile infralittoral cobbles and pebbles		and burrowing megafauna in circalittoral fine mud only	The other habitats are either outside of the ZoI and/or are common and widespread habitats and therefore any impacts are unlikely to be significant.
Marine Mammals			
Grey and harbour seals (*Halichoerus grypus* and *Phoca vitulina*)	Within the development and to the furthest extent of predicted noise effects on seals (approximately 1.5km from activities).	**Scoped in**	These species are known to be present within the waters and coastal habitats within proximity of the site and there is suitable habitat for commuting and foraging individuals within the ZoI.
Harbour Porpoise (*Phocoena phocoena)*	Within the development and to the furthest extent of predicted noise effects (approximately 2km).	**Scoped in**	Harbour porpoise are known to be present within waters around Orkney and there is considered to be is suitable habitat for commuting and foraging individual species within the ZoI
Minke Whale (*Balaenoptera acutorostrata*)	Within the development and to the furthest extent of predicted noise effects (approximately 4km from activities)	**Scoped in**	There is suitable habitat for commuting and foraging individuals within the ZoI.
Risso's Dolphin (*Grampus griseus*), White-beaked Dolphin (*Lagenorhynchus albirostris*), long-finned pilot whale (*Globicephala melas*), killer whale (*Orcinus orca*),	Within the development and to the furthest extent of predicted noise effects (approximately 500m from activities)	**Scoped in**	These species are known to be present within waters around Orkney and there is considered to be is suitable habitat for commuting and foraging individuals species within the ZoI.
Atlantic white-sided dolphin (*Lagenorhynchus acutus*), sperm whale (*Physeter macrocephalus*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), Sei whale (*Balaenoptera borealis*), striped dolphin (*Stenella coeruleoalba*), Cuvier's beaked whale (*Ziphius cavirostris*), short-beaked common dolphin (*Delphinus delphis*), bottlenose dolphin (*Tursiops truncates*), short-finned pilot whale (*Globicephala macrorhynchus*)	Within the development and to the furthest extent of predicted noise effects (variable with species hearing group but up to approximately 4km from activities)	Scoped out	Whilst there are occasional records of these species from the waters around Orkney, they are considered to be highly infrequent visitors which are unlikely to be significantly impacted by the proposed works.
Fish			

Feature	ZoI	Scoping Decision	Justification
Diadromous fish (sea trout, *Salmo trutta*)	Within the development and to the furthest extent of predicted noise effects (approximately 1km from activities)	Scoped out	There are no burns suitable for migratory fish such as sea trout within the ZoI. The closest known feeding area (and recreational fishery) is c.6.5km to the west of the site.
Marine fish PMFs; (Anglerfish (*Lophius piscatorius*), Atlantic herring (*Clupea harengus*), flapper skate (*Dipturus intermedius*), saithe (*Pollachius virens*), sandeels (*Ammodytes marinus* and *Ammodytes tobianus*), sandy goby (*Pomatoschistus minutus*), spiny dogfish (*Squalus acanthias*), whiting (*Merlangius merlangus*)) Non-PMF; see Technical Appendix 5.2	Within the development and to the furthest extent of predicted noise effects (approximately 1km from activities)	**Scoped in:** PMFs only	Several PMF species have either been recorded as being present within the ZoI or there is suitable habitat for them and it is within their expected range and so may be present. Several non-PMF species were also identified as being present within the site however they are considered to be common and widespread species and potential impacts are not likely to result in significant impacts and so have been scoped out for further assessment.
Basking shark	Within the development and to the furthest extent of predicted noise effects (approximately 1km from activities)	**Scoped in**	Basking shark are known to be present occasionally in waters around Orkney and could enter the ZoI.
Aquaculture/fisheries	Within the development and to the furthest extent of predicted noise effects (approximately 1km from activities)	**Scoped in**	The nearest commercial fisheries is Quanterness, present c.800m north west of the site, within the ZoI and consist of Atlantic salmon (*Salmo salmo*).

5.3 Policy, Legislation and Guidance

The compilation of this chapter has taken cognisance of the legislation, planning policies, conservation initiatives and general guidance presented in Table 5-2 below.

Table 5-2: Relevant Legislation, Policy and Guidance Documents

Scope	Document
International	• International Union for the Conservation of Nature (IUCN) Red List of Threatened Species
European	• Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (The Habitats Directive) • Water Framework Directive (WFD) 2000/60/EC of the European Parliament • Environmental Impact Assessment (EIA) Directive (2014/52/EU) on assessing the potential effects of projects on the environment
Scottish	• Wildlife and Countryside Act 1981 (as amended) (WCA); • The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended); • The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017; • National Planning Framework 4[22]; • Scotland's National Marine Plan[23]; • Scottish Biodiversity List (SBL)[24] • Priority Marine Features (PMFs) list[25] • Scotland's Biodiversity Strategy to 2045[26]
Planning Policy & Other Advice Documents	• Marine Biosecurity Planning Guidance[27] • BS 42020:2013: Biodiversity Code of Practice for Planning and Development 2013 • Orkney Local Biodiversity Action Plan (LBAP)[28] • Orkney Local Development Plan[29] • Orkney Isles Harbour Authority Ballast Water Management Policy for Scapa Flow[30] • CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, Version 1.2

5.4 Methodology

5.4.1 Desk Study

A desk study was conducted in September 2020 to gather baseline data in relation to site. The following sources were checked:

- NatureScot Sitelink website for statutory designated sites up to 10km from the site;
- Orkney Local Development Plan for non-statutory designated sites up to 1km from the site;
- Online records from the Orkney Field Club;
- The LBAP; and
- The Scottish Biodiversity List (SBL).

The following sources were accessed in December 2022 to inform the marine mammal and fish baseline assessment:

- The Joint Nature Conservation Committee (JNCC) Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise [31]and Atlas of Cetacean Distribution in north-west European waters [32];
- Sea Watch Foundation (SWF) website for recent sightings of cetaceans in Orkney[33 & 34];
- NatureScot (NS) website for information on cetaceans present in Scottish waters[35];
- Whale and Dolphin Conservation (WDC) species guides [36];
- The Hebridean Whale and Dolphin Trust (HWDT) Whale Track[37];
- Orcadian Wildlife (OW)[38];

[22] Available at: https://www.gov.scot/publications/national-planning-framework-4-revised-draft/ (Accessed 16/01/2023)
[23] Scottish Government (2015) Scotlands Marine Plan, A Single Framework for Managing our Sea. Available online at: https://www.gov.scot/publications/scotlands-national-marine-plan/ (Accessed 11/012023).
[24] Available at: https://www.nature.scot/doc/scottish-biodiversity-list (Accessed 16/01/2023)
[25] Available at: https://www.nature.scot/doc/priority-marine-features-scotlands-seas-habitats (Accessed 16/01/2023)
[26] Available at: https://www.gov.scot/publications/scottish-biodiversity-strategy-2045-tackling-nature-emergency-scotland/documents/ (Accessed 16/01/2023)
[27] Payne, R.D., Cook, E.J. and Macleod, A. (2014). Marine Biosecurity Planning – Guidance for producing site and operation-based plans for preventing the introduction of non-native species. Report by SRSL Ltd. in conjunction with Robin Payne to the Firth of Clyde Forum and Scottish Natural Heritage. Available online at: https://www.webarchive.org.uk/wayback/archive/20210929132843mp_/https://www.nature.scot/sites/default/files/2019-02/Marine%20Biosecurity%20Planning.pdf (Accessed 11/01/2023)
[28] The Orkney Local Biodiversity action Plan 2018-2022 Available at: https://www.orkney.gov.uk/Files/Planning/Biodiversity/Orkney%20Local%20Biodiversity%20Action%20Plan%202018%20to%202022.pdf (Accessed 11/012023)
[29] Available at: https://www.orkney.gov.uk/Service-Directory/O/Orkney-Local-Development-Plan.htm (Accessed 11/01/2023)
[30] Available at: https://www.orkneyharbours.com/documents/ballast-water-management-policy (Accessed 10/04/2023)
[31] JNCC Statutory Nature Conservation Agency Protocol for Minimising the Risk of Injury to Marine Mammals from Piling Noise (2010) available at: http://jncc.defra.gov.uk/pdf/JNCC_Guidelines_Piling%20protocol_August%202010.pdf last accessed 12/12/2022
[32] Reid, J B, Evans, P G H, and Northridge, S P. JNCC Atlas of Cetacean Distribution in north-west European waters (2003) available at: http://jncc.defra.gov.uk/page-2713#download last accessed 12/12/2022
[33] Sea Watch Foundation Cetaceans of Orkney available at: https://seawatchfoundation.org.uk/wp-content/uploads/2012/07/Orkney2.pdf last accessed 12/12/2022
[34] Sea Watch Foundation Recent Sightings Orkney available at: https://www.seawatchfoundation.org.uk/recentsightings/ last accessed 12/12/2022
[35] SNH About Scotland's Nature: Marine Mammals available at: https://www.nature.scot/plants-animals-and-fungi/mammals/marine-mammals last accessed 12/12/2022
[36] WDC species guides available at: https://uk.whales.org/whales-dolphins/species-guide/ last accessed 12/12/2022
[37] HWDT sightings data available at: https://whaletrack.hwdt.org/sightings-map/ last accessed 12/12/2022
[38] Orcadian Wildlife information available at: http://orcadianwildlife.co.uk/wPress/cetaceans-in-orkney/ last accessed 12/12/2022

- Marine Scotland (MS) Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters [39 and appendices40];
- MS Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals[41];
- Scottish Government Designated Sites: Seal Haul out Sites[42 & 43];
- IUCN Red List[44]
- The Shark Trust basking shark sightings[45];
- Scottish Natural Heritage (SNH) Basking shark satellite tagging project, Commissioned Report[46];
- Orkney Trout Fishing Association (OTFA)[47];
- Orkney Shore Angling Association (OSAA)[48];
- MS Aquaculture – Active Fin-fish Sites (19.12.2022)[49]; and
- Scotland's Aquaculture[50]

5.4.2 Field Studies

All field survey were undertaken by EnviroCentre ecologists who are members of the Chartered Institute of Ecology and Environmental Management (CIEEM). Full details of field survey methods can be found in Technical Appendix 5.1: Hatston Pier Terrestrial Ecology and Ornithology Preliminary Ecological Appraisal and Technical Appendix 5.2: Marine Mammal and Fish Baseline Assessment, Technical Appendix 5.3: Hatston Pier Ornithology Technical Report, and Technical Appendix 5.4: Hatston Pier and Harbour Habitat Mapping Survey Report. Protected species (including but not limited to otter and birds) survey was undertaken by Principal Ornithologist Mike Coleman on 15th and 16th September 2020 when conditions were bright with a light breeze, the average air temperature was 14°C, and cloud cover was between four and eight oktas, but with a cloud base of over 600m, allowing for excellent lateral visibility at all times.

An additional field survey comprising a walk over to assess fish habitat suitability of the Hatston Burn was conducted on the 14th of February 2023 by Senior Ecologists Mhairi Mackintosh and Jennifer Paterson. Conditions during the survey were dry, with a light wind and temperature.

Ornithological surveys included low tide counts, undertaken in line with the national Wetland Bird Survey (WeBS) programme. Counts were made once per month throughout the year (Oct 2020 – August 2022), around eight days after the predetermined 'priority dates' defined in the WeBS guidance to cover the optimal low-tide period, rather than the high-tide that WeBS desires. Vantage Point (VP) surveys were also undertaken to record the bird activity around the Hatston Pier site where the most construction activity will occur, and where the highest number of SPA bird species are most likely to be observed. These surveys took place between October 2022 – March 2023.

The subtidal survey work involved the use of a drop-down camera system for the acquisition of high-definition video and high-resolution stills, and sediment sampling using a 0.1 m² Day grab for subsequent macrofaunal assessment and particle size analysis (PSA). The drop-down camera survey was undertaken on 10th December 2022, with grab sampling taking place on the 11th December 2022.

For intertidal habitats, a Phase I survey was carried out to determine the range, distribution and extent of the habitats present by assigning biotopes in situ on vertical (i.e. running from high to low shore) transects, in accordance with best practice guidance. The methods are based on the Countryside Council for Wales (CCW) 'Handbook for Marine Intertidal Phase 1 Biotope Mapping Survey' (Wyn et al., 2000) and the 'Marine Nature Conservation Review: Rationale and Methods' (Hiscock, 1996). The intertidal survey work at the Hatston Pier site was completed on the 2nd and 5th December 2022. The surveys were undertaken during the period two hours before and after low water.

5.4.3 Evaluation of Important Ecological Features

The evaluations are applied to those sites, habitats and species that have been scoped into the assessment. These are termed Important Ecological Features (IEFs).

European, national and local governments and specialist organisations have together identified a large number of sites, habitats and species that provide the key focus for biodiversity conservation in the UK and Ireland, supported by policy and legislation. These provide an objective starting point for identifying the important ecological features that need to be considered. Table 5.3 shows a procedure for determining the geographical level of importance of site designations, habitats and species. Where a feature is important at more than one level in the table, its overriding importance is that of the highest level. Usually only the highest level of legal protection is listed.

Table 5-3: Geographical Level of IEFs

Level of Importance	Sites	Habitats	Species
International	Designated, candidate or proposed Special Areas of Conservation, Special Protection Areas and Ramsar sites; UNESCO (Ecological) World Heritage Sites; UNESCO Biosphere Reserves; Biogenetic Reserves.	A viable area of habitat included in Annex I of the EC Habitats Directive; a habitat area that is critical for a part of the life cycle of an internationally important species.	A European Protected Species; an IUCN Red Data Book species that is globally Vulnerable, Endangered or Critically Endangered.
National (UK)	Sites of Special Scientific Interest; National Nature Reserve; Marine Conservation Zones (UK offshore).	An area of habitat fulfilling the criteria for designation as an SSSI or MCZ; a habitat area that is critical for a part of the life cycle of a nationally important species.	An IUCN Red Data Book species that is Vulnerable, Endangered or Critically Endangered in the UK; a species that is Rare in the UK (<15 10km grid squares); a Schedule 5 (animal) or Schedule 8 (plant) species included in the Wildlife and

[39] Marine Scotland Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters, Scottish Marine and Freshwater Science, Vol 11 No 12, available at: https://data.marine.gov.scot/sites/default/files/Scottish%20Marine%20and%20Freshwater%20Science%20%28SMFS%29%20Vol%2011%20No%2012%20Regional%20baselines%20for%20marine%20mammal%20knowledge%20across%20the%20North%20Sea%20and%20Atlantic%20areas%20of%20Scottish%20waters.pdf

[40] Regional baselines for marine mammal knowledge across the North Sea and Atlantic areas of Scottish waters: Appendix 3 - SCANS surveys Scottish Marine and Freshwater Science Vol 11 No 12, available at: https://data.marine.gov.scot/sites/default/files//Scottish%20Marine%20and%20Freshwater%20Science%20%28SMFS%29%20Vol%2011%20No%2012_%20Regional%20baselines%20for%20marine%20mammal%20knowledge%20across%20the%20North%20Sea%20and%20Atlantic%20areas%20of%20Scottish%20waters%20-%20Appendix%203%20SCANS%20surveys%20%281%29.pdf

[41] Updated Seal Usage Maps: The Estimated at-sea Distribution of Grey and Harbour Seals, Scottish Marine and Freshwater Science, Vol 8 No 25, available at: https://data.marine.gov.scot/sites/default/files//SMFS%200825.pdf

[42] Scottish Government seal Haul-out maps available at: http://www.gov.scot/Topics/marine/marine-environment/species/19887/20814/maps last accessed 12/12/2022

[43] Haul Out Maps available at: https://webarchive.nrscotland.gov.uk/20180105052418mp_/http://www.gov.scot/Resource/0045/00454617.pdf last accessed 12/12/2022

[44] IUCN Red List available at: http://www.iucnredlist.org/ last accessed 12/12/2022

[45] The Shark Trust basking shark sightings available at: https://www.sharktrust.org/basking-shark-project last accessed 12/12/2022

[46] Witt, M.J., Doherty, P.D., Godley, B.J. Graham, R.T. Hawkes, L.A. & Henderson, S.M. 2016. Basking shark satellite tagging project: insights into basking shark (Cetorhinus maximus) movement, distribution and behaviour using satellite telemetry. Final Report. Scottish Natural Heritage Commissioned Report No. 908.

[47] Contact with the Orkney Trout Fishing Association to discuss species information (09/01/2023)

[48] Contact with the Orkney Shore Angling Association to discuss species information (23/01/2023)

[49] MarineScotland Aquaculture – active Fin-fish Sites (19.12.2022), available at: https://marine.gov.scot/maps/1586, last accessed 09/01/2022

[50] Scotland's Aquaculture Site Data, available at: http://aquaculture.scotland.gov.uk/data/site_details_record.aspx?site_id=FS1305, last accessed 09/01/2022

Level of Importance	Sites	Habitats	Species
			Countryside Act (WCA) 1981; any species protected under national (UK) legislation where there is the potential for a breach of the legislation; a species that is Vulnerable, Endangered or Critically Endangered in The Vascular Plant Red Data List for Great Britain[51].
National (Scotland)	National Parks; Marine Protected Areas; Marine Consultation Areas.	Scottish Biodiversity List (SBL) Priority Habitats and Priority Marine Features (PMFs)[52] (Scotland).	Species of principal importance for biodiversity in the relevant countries[53], including; SBL Priority Species and PMFs (Scotland). Species protected under the Marine Scotland Act 2010.
Regional	Regional Parks (Scotland).	Regional Local Biodiversity Action Plan habitats noted as requiring protection.	A species that is Nationally Scarce in the UK (present in 16-100 10km grid squares); a species that is included in the Regional LBAP; an assemblage of regionally scarce species.
County / Metropolitan	Woodland Trust Sites; Royal Society for the Protection of Birds Sites; Scottish Wildlife Sites.	County LBAP habitats noted as requiring protection; semi-natural, ancient woodland >0.25ha in extent.	A species that is included in the County LBAP; an assemblage of species that are scarce at the county level.
Local		Semi-natural, ancient woodland <0.25ha in extent; semi-natural habitats that are unique or important in the local area.	Species as defined by Local Authority lists (if available).
Site		Common and widespread habitats not covered above.	Common and widespread species not covered above.
Negative			An Invasive Non-Native Species (INNS) as defined by the GB Non-Native Species Secretariat (NNSS) and supported by the GB Invasive Non-native Species Strategy (2015).or listed within OICHA Ballast Water Policy.

[51] Cheffings, C.M. & Farrell, L. (eds), Dines, T.D., Jones, R.A., Leach, S.J., McKean, D.R., Pearman, D.A., Preston, C.D., Rumsey, F.J., Taylor, I. (2005) *The Vascular Plant Red Data List for Great Britain. Species Status No. 7*. JNCC, Peterborough. Available at: https://hub.jncc.gov.uk/assets/cc1e96f8-b105-4dd0-bd87-4a4f60449907 (accessed 08/09/2020)

5.4.4 Impact Assessment

The assessment of impacts describes how the baseline conditions would change as a result of the project and its associated activities and from other developments. The term 'impact' is used commonly throughout the EIA process and is usually defined as a change experienced by a receptor (this can be positive, neutral or negative). The term 'effect' is commonly used at the conclusion of the EIA process and is usually defined as the consequences for the receptor of an impact after mitigation measures have been taken into account. The EIA Regulations specifically require all likely significant effects to be considered. Therefore, impacts and effects are described separately and the effects for the IEFs are assessed as being either significant or not according to the importance and sensitivity of the IEF.

Significant cumulative effects can result from the individually insignificant but collectively significant effects of actions taking place over a period of time or concentrated in a location, for example:

- Additive / incremental;
- Associated / connected.

5.4.4.1 Assessment Criteria – Magnitude

The CIEEM guidance states that when describing changes/activities and positive or negative impacts, reference should be made to the following parameters where relevant:

- Magnitude;
- Extent;
- Duration;
- Reversibility; and
- Timing and frequency.

Magnitude refers to the size, amount, intensity and volume of an impact, determined on a quantitative basis if possible, but typically expressed in terms of relative severity, such as major, moderate, low or negligible. Extent, duration, reversibility, timing and frequency of the impact can be assessed separately but they tie in to determine the overall magnitude.

Criteria for describing the magnitude of an impact are presented in Table 5-4 below:

Table 5-4: Criteria for Describing Magnitude of Impact

Magnitude	Description
Major	Total or major loss or alteration to the IEF, such that it will be fundamentally changed and may be lost from the site altogether; and/or loss of a very high or high proportion of the known population or range of the IEF.
Moderate	Loss or alteration to the IEF, such that it will be partially changed; and/or loss of a moderate proportion of the known population or range of the IEF.
Low	Minor shift away from the existing or predicted future baseline conditions. Change arising from the loss or alteration will be discernible but the condition of the IEF will be similar to the pre-development conditions; and/or having a minor impact on the known population or range of the IEF.
Negligible	Very slight change from the existing or predicted future baseline conditions. Change barely discernible, approximating to the 'no change' situation; and/or having a negligible impact on the known population or range of the IEF.

[52] In July 2014, Scottish Ministers adopted a list of 81 priority marine features (PMFs) – many of which are features characteristic of the Scottish marine environment. Most are on other conservation status lists so may be valued higher than this.
[53] These are all the species that were identified as requiring action in the UKBAP and continue to be regarded as conservation priorities in the subsequent UK Post-2010 Biodiversity Framework, including any additions.

5.4.4.2 Assessment Criteria – Significance

Significance is a concept related to the weight that is attached to effects when decisions are made. For the purposes of EcIA, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for IEFs. In broad terms, significant effects encompass effects on the structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution).

Significant effects are quantified with reference to an appropriate geographic scale (see Table 5-4 above). The CIEEM guidance has one 'level of importance' and a geographical 'scale of significance'. This is to deal with the fact that the geographical scale at which the effect is significant is not necessarily the same as the geographic level of importance of the IEF.

A sensitivity scale is used to assist in the determine the significance of effects, as shown in Table 5-5:

Table 5-5: Sensitivity of Important Ecological Features

Sensitivity	Definition
High	Tolerance: The IEF has a very limited tolerance of the effect.
	Adaptability: The IEF is unable to adapt to the effect.
	Recoverability: The IEF is unable to recover, resulting in permanent or long term (>10 years) change.
Medium	Tolerance: The IEF has limited tolerance of the effect.
	Adaptability: The IEF has limited ability to adapt to the effect.
	Recoverability: The IEF is able to recover to an acceptable status over the medium term (5-10 years).
Low	Tolerance: The IEF has some tolerance of the effect.
	Adaptability: The IEF has some ability to adapt to the effect.
	Recoverability: The IEF is able to recover to an acceptable status over the short term (1-5 years).
Negligible	Tolerance: The IEF is generally tolerant of the effect.
	Adaptability: The IEF can completely adapt to the effect with no detectable changes.
	Recoverability: The IEF is able to recover to an acceptable status near instantaneously (<1 year).

Consideration of conservation status is important for assessing the significance of effects of impacts on individual habitats and species. The Habitats Directive provides a helpful definition of conservation status for habitats and species (as defined by Articles 1 l and 1(i)):

For habitats, conservation status is determined by the sum of the influences acting on the habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area; and

The conservation status of natural habitats will be taken as 'favourable' when:

i. its natural range and areas it covers within that range are stable or increasing, and
ii. the species structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future, and
iii. the conservation status of its typical species is favourable as defined in Article 1(i).

For species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area.

The conservation status of species will be taken as 'favourable' when:

i. population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
ii. the natural range of the species is neither being reduced for the foreseeable future, and
iii. there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The scientific evidence gathered during the assessment process is used along with professional judgement where appropriate to determine the significance of effects according to the guidance above. Where it is not possible to justify a conclusion of no significant effect, a significant effect is assumed based on the Precautionary Principle.

5.4.4.3 Assessment Criteria – Confidence in Predictions

CIEEM does not cover levels of confidence in predictions adequately, therefore an approach has been adopted based on river conservation evaluation[54]. A simple, qualitative index based on professional judgement is assigned to each predicted effect as follows:

A: high confidence.
B: intermediate confidence.
C: low confidence.

Factors influencing confidence include:

- The frequency and effort of field sampling;
- Constraints to the field survey;
- The completeness of the data (field and desk);
- The age of the data (although recent data are not necessarily always more reliable than old data);
- The state of scientific knowledge relating to the predicted effects of development activities on the IEF (the accuracy of the magnitude assessment); and
- The accuracy of the assessment of significance.

5.4.4.4 Assessment Criteria – Success of Mitigation

The word 'mitigation' has developed a wider meaning and common usage in environmental assessment than its strict meaning related to reducing the severity of something. Mitigation can sometimes be used as a generic term for a wide range of counter-acting measures, all of which, as the Directive and Regulations prescribe, are intended to *prevent, reduce and where possible offset any significant adverse effect on the environment*. Mitigation can be used to encompass measures intended to avoid, minimise or compensate for adverse effects (this is the 'mitigation hierarchy').

Mitigation and compensation measures often carry a degree of uncertainty. Uncertainty associated with a design will vary according to a number of factors, such as:

- The technical feasibility of what is proposed;
- The overall quantity of what is proposed;
- The overall quality of what is proposed;
- The level of commitment provided to achieve what is proposed;
- The provision of long-term management; and
- The timescale for predicted benefits.

The following objective scale is used for the success of mitigation:

- Certain/near certain: probability estimated at 95% chance or higher.
- Probable: probability estimated above 50% but below 95%.
- Unlikely: probability estimated above 5% but less than 50%.

[54] SERCON: System for Evaluating Rivers for Conservation, Version 2, Technical Manual. Scottish Natural Heritage (2001).

- Extremely unlikely: probability estimated at less than 5%.

5.5 Baseline

5.5.1 Designated Sites

A map showing the location of designated sites in relation to the site can be found in Technical Appendix 5.2.

5.5.1.1 North Orkney SPA

The North Orkney SPA encompasses waters to the north of the Orkney Mainland, from Deerness in the east to Eynhallow in the west. It includes a variety of sheltered bays as well as tidal channels around some of the smaller islands including the Rousay and Eynhallow Sounds. The water depth is generally less than 20m and sediments are a mixture of mud, sand and gravel. These habitats support a variety of marine invertebrates, providing a key prey resource for large numbers of waterfowl, including the species for which the site is designated. According to the Conservation and Management Advice document[55] the SPA protects c.12% (308 birds) of the winter population of Great Northern Diver present within Great Britain (GB). It also protects c.11% (120 birds) of GB wintering Slavonian Grebe, 6% (147 birds) wintering Velvet Scooter, as well as foraging grounds for c.3.7% (47 pairs) of the summer breeding population of Red-throated Divers. Red-throated Divers travel to the site from nearby breeding grounds in freshwater lochs within moorland on the Mainland and Rousay. The SPA was designated in Feb 2022 and as such, no Condition Assessment for the designated features, has been undertaken but it is assumed that condition will not have deteriorated in this time.

5.5.1.2 Orkney Mainland Moors SPA/West Mainland Moors SSSI

The SPA comprises three separate areas which are also designated as three different SSSIs. Based on the SSSI designations, Red-throated diver are primarily located within the West Mainland Moorlands area, located within the north of the Orkney Mainland, to the north west of Kirkwall. It consists of a large area of blanket bog, wet and dry heath with several lochans which support c.18 pairs of Red-throated diver (2% of the GB population). The feature was considered to be favourable maintained at the last condition assessment (2007).

5.5.1.3 Faray and Holm of Faray SAC/SSSI

Faray and Holm of Faray is designated as an SAC and SSSI for grey seal. It is comprised of two uninhabited islands, with the SAC also encompassing the surrounding waters. The islands comprise sandy bays, rocky shores with some low cliffs and an interior of semi-improved grasslands. Grey seals primarily use the site in September and November for pupping and breeding. Around 3000 pups are born there annually, representing c.7% of the GB population. A condition assessment was last conducted in 2014 and the feature was found to be favourable maintained.

5.5.1.4 Sanday SAC and SSSI

The site comprises the north and east coast of Sanday from Holms of Ire in the north to Kettletoft bay in the south. The SAC also includes the surrounding waters, including the North Ronaldsay Firth, Otters Wick and Bay of Lopness. Harbour seal make use of the rocky shores for breeding and moulting. It is thought to be the biggest colony of harbour seals in Orkney. The seal feature was last assessed in 2013 as unfavourable declining. This is likely due to a wider decline in the harbour seal population within the Orkney, Shetland and east coast of Scotland which has been observed over the last c.20 years.

5.5.1.5 Eynhallow SSSI

Eynhallow SSSI encompasses the island of Eynhallow, between the Orkney Mainland and Rousay. The island is bound by shingle and sandy beaches which are used by harbour seal for breeding in June and July and as a moult haul out in August. Counts of up to 900 individuals have been made, however, the site is classed as being unfavourable in the latest condition assessment (2013), due to a wider decline in the north and east coast harbour seal population.

5.5.1.6 The Muckle and Little Green Holm SSSI

The site is made up of two small uninhabited islands which lie between the larger islands of Shapinsay and Eday. Their rocky coasts are used by breeding grey seals. In 2010 the pup count was estimated to be 900, representing c. 2% of the UK pups. The site was classed as being favourable maintained in the last (2014) condition assessment.

5.5.2 Terrestrial Habitat

5.5.2.1 Burns and Canalised Burns

There are no watercourses within the site, however, the Hatston Burn flows out to the Bay of Kirkwall c.250m to the west of the site. It is culverted for c.30m under an unnamed access road to the pier, immediately prior to its confluence with the sea. The burn originates at the base of the southern slopes of Wideford Hill, c.3.5km west of the outflow. The catchment area is predominantly pastural fields with moorland in the upper catchment and industrial area adjacent to the site. The watercourse has been canalised in parts to form field drainage. Burns and canalised burns are a priority habitat within the LBAP. Further details on the Burn of Hatston, in relation to fish habitat can be found in Technical Appendix 5.2: Marine Mammal and Fish Baseline.

5.5.3 Terrestrial Mammals

5.5.3.1 Otter

No evidence of otter was found during the field survey carried out in 2020, however otter are known to be present within the area. No holts have been identified within the site or a 200m buffer area. The rocky shore and coastal waters within and adjacent to the site are suitable for foraging and commuting otters. Sub-tidal habitats

5.5.3.2 Kelp and seaweed communities on sublittoral sediment

The PMF habitat 'kelp and seaweed communities on sublittoral sediment' was identified as being present within the site. The location of this habitat in relation to the development footprint can be seen in Volume 2, drawing No. 674795-GIS145 In total it was found in five of the eight sub-tidal transects. However, only one area identified is within the development footprint . Whilst the habitat type fits the PMF description, there was a low abundance of the characterising taxa and it is considered to be an impoverished version of the PMF. Within the wider area, this PMF is found frequently within sheltered sounds and bays throughout the Orkney Isles[56].

5.5.3.3 Seapens and burrowing megafauna in circalittoral fine mud

This PMF is present within the planning application boundary to the north and north west of the existing pier. The closest area identified during the survey is c.50m to the north west of the proposed pier extension. Whilst the habitat meets the PMF definition, the majority of burrows were small (<3cm) and simple structures. Larger and more complex burrows were infrequent. The seapen species *V. mirabilis* is present, however conditions are not considered suitable for the tall seapen (*Funiculina quadrangularis*).

The known distribution of this habitat within the Orkney Isles is patchy, with just four other sites recorded in the Marine Atlas[57], from western Scapa Flow and to the South of Rousay. Given the habitat at Hatston was previously unknown the patchy distribution may be, in part due to lack of recording effort.

[55] Available online at:file:///C:/Users/mmackintosh/Downloads/Conservation_and_Management_Advice_10481.pdf (accessed 06/02/2023)
[56] Distribution available on the marine atlas interactive map, available at: https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=938 (Accessed 05/05/2023)
[57]

5.5.4 Marine Mammals

This section should be read in conjunction with Technical Appendix 5.2: Marine Mammal and Fish Baseline.

5.5.4.1 Grey Seal

Orkney is a stronghold for breeding grey seals and is part of the North Coast and Orkney Seal Management Unit (SMU). It is estimated that the Orkney colonies produced nearly a third of UK pups in 2019[58]. The overall trend is for an increased numbers in the UK population but there was a slight reduction in the Orkney population estimate between 2016 and 2019.

The site is not within a designated site for grey seal and due to activities associated with the existing pier and adjacent industrial area, it is not considered that the habitat is suitable for use as a breeding or moulting haul out site. The waters surrounding the site are home to various gadoids and flat fish which are grey seal prey species. There are many seal haul outs, two SSSIs and an SAC designated for grey seals within 100km of the site, which is considered to be their typical foraging range. It is therefore likely that grey seal will utilise waters within and surrounding the site to forage and commute between haul out sites. The estimated sea usage for grey seals within the area is less than other areas of the Orkney Isles though (10 - <50 vs >100 individuals per 5km^2 to the north, east and south).

5.5.4.2 Harbour seal

The latest estimate of the UK harbour seal population is 43,750 with the Orkney and North Coast SMU being home to c.4.5% of that[59]. Whilst the overall trend for harbour seals within the UK is increasing, there has been a dramatic change in distribution. Counts within the Orkney and North Coast SMU have gone from c.9000 in the late 1990's to less than 2000 by 2020. Within Scotland there is a general pattern of population increases in the west and losses along the east and north coasts.

The site and adjacent coastline is not considered suitable for use as a haul out by harbour seals due to the relatively high level of disturbance associated with the existing pier and adjacent industrial units. The waters within and surrounding the site are known to host fish and other suitable prey items for harbour seals however, and there are several designated haul outs, an SSSI and SAC within 50km of the site, which is considered to the typical foraging range. Harbour seals may therefore use the coastal waters within and adjacent to the site for commuting between haul outs and/or foraging. Estimated at sea usage for the area around the site is c.10 - <50 individuals per 5km^2.

5.5.4.3 Harbour Porpoise

Harbour porpoise are one of the most sighted cetaceans within the UK coastal waters, however there is insufficient data to give a current estimate of population numbers and trends.

Several records of sightings were returned during the desk study, although these were mostly to the south of the Mainland. No recent records from the site or surrounding area were identified, however, there are historic sightings from the waters. Scans III density estimates for the Orkney area are for 0.6 – 2.4 individuals per km^2. The waters surrounding the site are known to be home to fish species which are favoured prey items of harbour porpoise and it is assumed they will utilise the area for foraging.

5.5.4.4 Minke Whale

There is currently no reliable estimate of the minke whale population and trends within UK waters. They are observed regularly, primarily in the summer months, with the main concentration of sightings seen around the Hebrides and Moray Firth.

No records were returned from the desk study within the site or surrounding area. The closest record was one from Scapa Flow, to the south of the site, with a further record to the south of South Ronaldsay. There are various historic records from the Orkney Islands, predominantly to the east and south of the site. Although there are no records in proximity to the site, it is considered that as they are regularly seen in other areas of the Orkney islands, they will likely be present occasionally.

5.5.4.5 Risso's Dolphin

Risso's dolphin are present in Scottish waters year round, with concentrations generally being higher in the summer months and in more offshore water, particularly to the west of the Outer Hebrides. There are currently no reliable estimates for UK wide population numbers or trends.

No records from within the site were returned during the desk study, however 8 records were identified within the wider Orkney area, with the closest being 17km to the north west, near Eynhallow. Although there are no records in proximity to the site, it is considered that as they are regularly seen in other areas of the Orkney islands, they may at times utilise waters around the site for foraging.

5.5.4.6 White-beaked Dolphin

White-beaked dolphin are considered to be present year round, although they are more abundant in summer months. They can be found in both near and offshore waters, with densities highest in the north west and east of Scotland. Data relating to population numbers and trends is not available.

No records of white-beaked dolphin were identified within or near the site. One recent record was returned c.22km to the west of the site. Historic records show infrequent sightings around the Orkney Islands. It is considered that there is suitable habitat and prey species for them within the waters surrounding the site and therefore a possibility of them being present.

5.5.4.7 Long-finned pilot whale

Long-finned pilot whales are generally found in deep waters within the north Atlantic but can seasonally be found in more coastal waters in northern Scotland. There is no current population estimate for the UK.

No records of long-finned pilot whale were returned for the site. One recent record was identified from the south west Hoy. Historic records are distributed throughout the Orkney Islands, with some sightings from the Wide Firth. Although it didn't appear in the records search, it is noted that the Orkney Council comments to the MSLOT scoping response[60] refer to a pod of pilot whales found within Kirkwall Bay, near to the Hatston Pier in May 2019.

5.5.4.8 Killer whale

Killer whales are found in Scottish waters year round. There are most likely two separate groups, one small pod present in the west, and another group associated with the Northern Isles and the wider North Atlantic. There is no reliable estimate on UK population trends.

There have been no recent records of killer whale from the site, however there were 10 records (of 43 individuals) within the wider Orkney area. The closest was within Scapa Flow, to the south of the site. There are numerous historic records of killer whale, including sightings within the Wide Firth.

5.5.5 Fish

5.5.5.1 Basking Sharks

Basking shark can be found in Scottish waters year round, although they display winter migratory behaviour, with some moving to deeper waters off the Scottish continental shelf, and others travelling south to the Bay of Biscay or

[58] Scientific Advice on Matters Related to the Management of Seal Populations: 2021, Natural Environment Research Council Special Committee on Seals. Available at: http://www.smru.st-andrews.ac.uk/files/2022/08/SCOS-2021.pdf (Accessed 08/02/2023)
[59] Scientific Advice on Matters Related to the Management of Seal Populations: 2021, Natural Environment Research Council Special Committee on Seals. Available at: http://www.smru.st-andrews.ac.uk/files/2022/08/SCOS-2021.pdf (Accessed 08/02/2023)

[60] Marine Scotland – Licensing Operations Team Scoping Opinion Scoping Opinion adopted by the Scottish Ministers under Part 4 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017. Orkney Islands Council Harbour Authority Expansion of Hatston Pier and Harbour. October 2021

the Azures. The highest concentrations of basking shark in Scotland are found along the west coast, around the Hebrides. There is a lack of data to base a population estimate on and no indication as to current population trends.

There are no records of basking shark within the site. The closest recent record was from c.40km west in 2022. There are a number of recent and more historical records for them within the wider Orkney area.

5.5.5.2 Marine Fish

There are several species of marine fish which are either known to be present within the site due to records from the Orkney Anglers Association or are considered likely to be present due to their being suitable habitat for them and the site is within the wider known distribution. Exact numbers of the populations present are not known. There may be seasonal use by some of the species, or use only within specific periods of the lifecycle. For all of the PMFs, the site makes up a relatively small proportion of the known distribution within the Orkney Islands and Scotland.

5.5.5.3 Commercial Fisheries

There is one commercial fishery, Quanterness, present c.800m to the north west of the site. It is comprised of 8 pens and stocks Atlantic salmon which are on a 22 month production cycle. At the time of writing there is a planning application to move the farm, which if successful, would take it out of the ZoI. This assessment and mitigation included is undertaken in refence to the current fish farm location.

5.5.6 Prediction of Future Baseline

The future baseline scenario, if the proposed development does not go ahead, outlined within the Orkney Harbour Masterplan Strategic Environmental Assessment[61] has been used for the basis of this impact assessment. The predicted future changes to the current baseline, without out intervention are as follows:

- Increase in plankton blooms and plankton biomass.
- Deterioration of seabird populations.
- Deterioration of harbour seals populations.
- Deterioration of sharks and rays.
- Impacts resulting from ocean acidification especially those on calcareous organisms.
- Shift in warm water species northwards due to ocean warming i.e. increased numbers of basking shark and a potential decline in cold water species.
- Marine and terrestrial Non-Native Species introductions are likely to continue and established species may become more widespread with a decline in native species.
- Damage caused by anchors and moorings and scallop dredging will continue to impact seabed habitats.

5.5.7 Evaluation

The evaluations have been applied only to those designated sites, habitats and species that have been scoped into the assessment and those where there is the potential for impacts that could result in significant adverse ecological effects as a result of the proposed development. The IEFs and the evaluations are presented in Table 5-6 below.

Table 5-6: Evaluation of Important Ecological Features

IEF	Present on site?	Present in wider area?	Importance	Justification
Orkney Mainland Moors SPA	N	Y	International	European designated site
Faray and Holm of Faray SAC and SSSI	N	Y	International	European designated site
Sanday SAC and East Sanday SSSI	N	Y	International	European designated site
Eynhallow SSSI	N	Y	National (UK)	Nationally designated site
The Muckle and Little Green Holm SSSI	N	Y	National (UK)	Nationally designated site
Burns and Canalised burns	N	Y	County	LBAP Priority Species
Kelp and seaweed communities on sublittoral sediment	Y	Y	National (Scotland)	PMF
Seapens and burrowing megafauna in circalittoral fine mud	Y	Y	National (Scotland)	PMF
Otter	Y	Y	International	European protected species (EPS)
Grey and harbour seals	N	Y	National (Scotland)	Protected under the Marine Scotland Act 2010.
Harbour porpoise	N	Y	International	EPS
Minke whale	N	Y	International	EPS
Risso's dolphin, white-beaked dolphin, long-finned pilot whale, killer whale	N	Y	International	EPS
Basking shark	N	Y	National (UK)	Protected under schedule 5 of the WCA

[61] Orkney Islands Council – Harbour Authority (2019) Draft Orkney Harbours Masterplan Phase 1 Strategic Environmental Assessment – Environmental Report.

IEF	Present on site?	Present in wider area?	Importance	Justification
Marine fish	Y	Y	National (Scotland)	PMF
Commercial Fishery	N	Y	N/A	Whilst Atlantic salmon are EPS in the wild,. There is no conservation protection for farmed salmon. They have however been included in the assessment for welfare purposes.

5.6 Impact Assessment

5.6.1 North Orkney SPA

5.6.1.1 Construction Impacts

Construction activities including dredging, blasting and piling could result in injury or death of individual birds which are features of the SPA, reducing the overall population utilising the site. This could be due to above or below water collision with vessels, plant or machinery, or indirectly through underwater shock waves. The effects of underwater noise on birds are not as well understood as other groups such as marine mammals and they have not been included within the underwater noise assessment, however, the authors have previous knowledge of blasting causing mortality in diving birds at close range, most likely caused by barotrauma.

Injury or death could also occur as a result of a pollution incident such as a fuel or oil spill. Release of toxic materials during dredging is not considered to be an issue as sediment sampling found no contaminants at levels likely to significantly affect water quality or pose a hazard to marine life. Sediment composition means there may be some suspended sediment of finer material, but it is considered that this will be localised to the work area (Hatston Pier Dredging Best Practicable Environmental Option Report).

Disturbance as a result of increased noise, vibrations and human presence could result in temporary displacement from feeding and loafing habitat, altering the distribution of the species within the SPA. There may also be indirect effects if prey species are killed or displaced as a result of collision, underwater noise or pollutants entering the water.

During vantage point surveys carried out October 2022 to March 2023, the maximum count of Great Northern Diver during any one survey was 39 individuals, representing c.12% of the SPA population. Maximum counts for Slavonian Grebes were 7 or c.6% of the SPA population and maximum counts for Velvet Scoters were 37 or c.25% of the SPA population. The majority of these observations were from waters between 1 and 2km from Hatston Pier.. Impacts to Great Northern Diver, Slavonian Grebe and Velvet Scoter would likely be confined to winter months (october to march) when numbers are at their highest. For Red-throated Diver, impacts would be felt during the summer months (April – September), although some birds may still be present during winter months. The described impacts are likely to be fairly localised to the proposed works (ZoI estimated to be 435ha) and thus affecting a small proportion of the designated site which is 21,173 ha. Due to the temporary nature of the Impacts, it is considered that any resulting reduction in numbers of birds utilising the site, alterations in their distribution or reduction/alternation of available prey would also be temporary, with populations recovering through future recruitment.

Impacts during the construction phase will be temporary and are considered to be **moderate to low in magnitude**. The IEF is considered to have a **low sensitivity** as the SPA is large in comparison to the predicted ZoI and the designated features are mobile and have the ability to move into alternative suitable habitat. The confidence level for the assessment is considered to be high.

5.6.1.2 Operational Impacts

Impacts during the operational phase are considered to be minimal as the site is already an operational port. It is anticipated that the proposed development could result in, up to an additional 668 vessel movements per annum, which averages out to up to 13 per week. This is against a baseline estimate of over 150 vessel movements per week[62]. It is considered that any birds utilising the waters around the existing port will be habituated to some level of marine traffic as well as onshore activity, disturbance or displacement is therefore considered unlikely. Observations of bird/boat interactions were made during the vantage point surveys with the majority of vessel movements eliciting no discernable changes in bird behaviour.

No additional port activities likely to result in underwater noise above that already experienced by species present in the locale are anticipated. A slight increase in above ground noise is anticipated within the vicinity of the site but this is not considered to be significant (Chapter 9, section 9.2: Noise Impact Assessment) and so is unlikely to result in further disturbance to, or displacement of designated site features.

Additional vessel movements and onshore activities could increase the risk of a pollution incidents occurring, causing death or injury to individuals and/or their prey. Effects from such an incident would be temporary and likely only to affect a small proportion of individuals and their supporting habitat.

The operational impacts are considered to be of **low magnitude**, with the IEF having **low sensitivity** with regards to the predicted impacts. The confidence level for the assessment is considered to be high.

5.6.2 Orkney Mainland Moors SPA/ West Mainland Moors SSSI

5.6.2.1 Construction Impacts

There are no predicted impacts from construction activities including dredging, blasting and piling to Red-throated divers or habitat which support them within the SPA/SSSI as it is outside the predicted ZoI. Red-throated divers breeding within the designated site, however, feed almost exclusively in the marine environment, within 10km of their nesting site. They have been included as a feature of the North Orkney and Scapa Flow SPAs, for this reason. It is anticipated that predicted impacts described in section 5.6.1.1 above would also be relevant for the Red-throated Diver feature of the Orkney Mainland Moors SPA.

With regards to the SPA conservation objectives, the impacts could temporarily affect the viability of the Red-throated Diver population if there is reduced breeding effort as a result of injury, mortalities or additional energy expenditure as a result of displacement from feeding grounds. Impacts would be temporary and would affect a small proportion of the population.

Impacts during the construction phase are considered to be **moderate to low in magnitude**. The IEF is considered to have a **low sensitivity** as individuals could adapt by utilise alternative habitat and any reduction in

[62] Figure based on AIS Shipping Traffic 2012-2017 average weekly density of all vessel types. Data available at: https://marinescotland.atkinsgeospatial.com/nmpi/ (Accessed 1/04/2023).

population would likely recover within a short timeframe. The confidence level for the assessment is considered to be high.

5.6.2.2 Operational Impacts

Operational impacts would be as described for Red-throated Diver within the North Orkney SPA (section 5.6.1.1) and impacts are considered to be of **low magnitude**, with the IEF having **low sensitivity** with regards to the predicted impacts. The confidence level for the assessment is considered to be high.

5.6.3 Sites Designated for Grey and Harbour Seals

The following SACs and SSSIs have been grouped together for assessment to avoid repetition as it is considered that the impacts will largely be similar:

- Faray and Holm of Faray SAC/SSSI
- Sanday SAC/SSSI
- Eynhallow SSSI
- The Muckle and Little Green Holm SSSI

5.6.3.1 Construction Impacts

The designated sites for seal are between 16 and 30km from the proposed construction site. It is not anticipated that there will be any disturbance to seals or their habitats within the designated sites themselves. Grey seals are known to travel distances up to 100km from their regular haul outs and harbour seal up to 50 km, to travel to alternative haul outs and feed and so could be present within waters surrounding the development site. Details of the predicted impacts to seals as a result of construction activities is provided in section 5.6.3.1.

In relation to the conservation objectives of the designated sites, the impacts will be temporary and only affect individuals and/or prey within a relatively small area of supporting habitat outside of the sites. Grey seal density maps (Figure 2-34 in Technical Appendix 5.2: Marine Mammal and Fish Baseline) indicate that waters to the north of the Orkney Mainland, where impacts will be experienced, are less well used than areas of more open waters, to the north of Shapinsay as well as south and east of South Ronaldsay (10 - <50 vs >100 individuals per 5km^2). The estimated at sea density for harbour seals to the north of the Orkney Mainland is also 10 - <50 individuals per 5km^2. The density is similar to other coastal areas throughout the Orkney Isles. It is therefore considered that whilst the area to be impacted may support SAC/SSSI populations, it is unlikely to be critical habitat.

The impacts are considered to be of **negligible magnitude** and the IEF considered to be of **negligible sensitivity** as it is considered that due to their mobility seals will easily able to adapt by utilising alternative habitats if necessary. The confidence level for the assessment is high.

5.6.3.2 Operational Impacts

It is not considered that there will be any operational impacts to seal or seal habitats within the SACs/SSSIs. There may be some impacts to seal utilising habitat outside of the designated sites as described in section 5.6.1.2. The impacts associated with disturbance from increased vessel movements will be permanent, but the increase is relatively small and it is considered that seals utilising waters around the existing pier and shipping lanes will be somewhat habituated to vessel activity. If there is some displacement from areas of high activity, it is considered that there is sufficient alternative habitat for foraging and commuting and so there is unlikely to be an effect on the conservation status of populations within the designated sites.

Similarly, temporary impacts arising from any pollution events or vessel strike will be localised and unlikely to cause a reduction in the overall population.

The operational impacts are of **low magnitude** and the SACs/SSSIs are considered to be of **negligible sensitivity**. The confidence level for the assessment is high.

5.6.4 Burns and Canal

The construction and operational impacts to the water environment, including the Burn of Hatston is described in Chapter 4; Section 4.7. All impacts to the burn are assessed in Table 4.7 as negligible both prior to and post mitigation. As there are no significant impacts to the water environment within the Burn, it is considered that there will be no impacts to any flora or fauna which may be present within the Burn of Hatston and its conservation status as a local priority habitat will be maintained. The impacts are considered to be of **negligible magnitude** with the feature being of **negligible sensitivity**. Confidence in the assessment is high.

5.6.5 Kelp and seaweed communities on sublittoral sediment

5.6.5.1 Construction Impacts

An area of this habitat will be permanently lost under the footprint of the development. The full extent of the area which will be lost is not known as it is likely to extend out from the mapped transects. It is relatively small in comparison to the other areas of this habitat mapped during the survey though. The other areas located to the north east and north west of the proposed pier extension are over 100m away from works and are unlikely to be affected directly. There may be some indirect effects arising from sediment suspension and re-deposition as a result of dredging in the area adjacent to the pier and/or during blasting and pilling works. Due to the weak tidal action in the area, it is considered that the majority of sediments which become suspended during these activities will be deposited within or very near to the works area. A pollution incident could result in the death of component species within the habitat. It is considered that effects from such an event would be temporary, with species being able to re-establish within time, although the timescale will be dependent on the scale and nature of the pollution incident. Increased plant and vessel movements during construction could spread marine non-native species already present within the area or introduce new species which may outcompete native marine flora and fauna, resulting in permanent degradation of the habitat.

The construction impacts are considered to be of **low magnitude** and the habitat is considered to be of **low sensitivity**. The confidence level for the assessment is high.

5.6.5.2 Operational Impacts

During the operational phase of works, the potential impacts to the habitat are considered to be minimal. Although there will be an increase in vessel movements, it is not considered likely that this increase will directly impact the habitats which are already present in an area of relatively high vessel activity. Increased activity at the port may be associated with an increased risk of a pollution incident and introduction of marine non-native and invasive species as described in section 5.6.5.1.

The operational impacts are considered to be of **low magnitude** and the habitat is considered to be of **low sensitivity**. The confidence level for the assessment is high.

5.6.6 Seapens and burrowing megafauna in circalittoral fine mud

5.6.6.1 Construction Impacts

No habitat will be directly lost as a result of the development, however indirect impacts such as those described in section 5.6.5.1 may occur. These impacts could result in the loss of characteristic species. Given the apparent patchy distribution of this habitat within the Orkney Isles, re-establishment of characteristic species such as *V. mirabilis* following any losses or damage as a result of these impacts may be limited, and impacts more permanent.

The construction impacts are considered to be of a **moderate magnitude** and the habitat is considered to be of **medium sensitivity**. The confidence in the assessment is high.

5.6.6.2 Operational Impacts

Operational impacts will be as described for the sub-tidal habitat in section 5.6.5.2 and are mainly associated with increased risk of pollution and spread/introduction of marine non-native and invasive species. The associated effects would be loss of characteristic species and potentially long term degradation of the habitat.

The magnitude of the operational impact phases are considered to be of **moderate magnitude** and the habitat is considered to be of **medium sensitivity**. The confidence in the assessment is high.

5.6.7 Otter

5.6.7.1 Construction Impacts

Construction activities including movement of rock armour, blasting, piling and dredging could result in death or injury of individuals through collision with plant, vehicles or vessels both onshore or within the water. Underwater noise generated by these activities also has potential to cause injury via Permanent Threshold Shift (PTS) or Temporary Threshold Shift (TTS) in hearing. The predicted range for PTS arising for any of the activities is less than 50m from the activity location. For TTS the range is up to 225m for detonation 6 blasts in close succession, but 50m or less for other anticipated noises (Technical appendix 5.7; Hatston Pier Underwater Noise Modelling Table 7).

The most likely response to construction activities, however, is avoidance. It is anticipated that alterations to normal site activities would result in visual and noise disturbance, causing otter who may utilise the site for commuting and foraging to avoid it. This may reduce the overall foraging area available to otter in the locale, but it is considered that there would be sufficient alternative foraging areas and commuting routes to sustain the population. The risk of injury or death occurring is also greatly reduced if they avoid the area.

Death or injury to otter could also occur as a result of a pollution incident, either through direct contact with a contaminant or indirectly through consumption of affected prey items. Prey populations in the locale could also be temporarily reduced in the short term if they are affected by a pollution incident.

All the construction impacts are considered to be temporary and are only expected to affect a small area of habitat which is not considered to be used for breeding or sheltering. It is not expected that they will affect the favourable conservation status of the otter population in the locale. As such the impacts are considered to be of **low magnitude** and the IEF to be of **low sensitivity**. The confidence level for the assessment is high.

5.6.7.2 Operational Impacts

During operation there will be increased activity within the site in terms of vessel movements to and from the pier as well as onshore activities within the laydown area and access road. It is considered likely that any otter utilising the site at present will be used to some level of human activity and that the anticipated increase would not result in longer term avoidance due to disturbance. No lighting assessment has been completed and so it is not known how the post-development lighting will compare to current levels although it is expected to be consistent with current lighting arrangements. Increased artificial lighting could result in the permanent or temporary avoidance of lit areas, reducing available foraging and commuting habitat. It is unlikely that the area affected would be significant in terms of otter territory though. Additional vehicle movements may increase the risk of a road traffic accident occurring but individual losses are unlikely to affect the population viability.

Additional vessel movements at the site may increase the risk of a pollution event which could result in death or injury of individuals or their prey. Any impacts arising from such an event would be temporary and not considered likely to impact the conservation status of the otter population in the longer term.

Operational impacts are therefore considered to be of **low magnitude** and the IEF having **low sensitivity**. The confidence level for the assessment is high.

5.6.8 Seals

5.6.8.1 Construction Impacts

Construction activities including blasting, piling and dredging will result in underwater noise which can cause injuries and result in a PTS or TTS in hearing. Prolonged exposure to underwater noise below the PTS and TTS thresholds can reduce individual fitness as it interferes with individuals' ability to communicate with others, feed and navigate in an effect known as masking. Behavioural responses to underwater noise also include avoidance behaviours either by hauling out or moving away from the underwater noise source. These may result in reduced foraging time and/or increased energy expenditure. In extreme cases, exposure to high levels of underwater noise can result in death.

Underwater noise modelling suggest that blasting is the activity which may affect seals over the largest range, with the TTS range being 1.8km and PTS 250m for 6 blasts within quick succession (Technical appendix 5.7; Hatston Pier Underwater Noise Modelling Table 7). It is estimated that there will be c.500 boreholes to be blasted at a rate of 4-6 holes a day. Blasts will be staggered but close in time (eg within 1 min). Seals may therefore be exposed to short periods of this noise daily for a period of 100 days.

For dredging and vibro piling the PTS range is 50m or less for 1 hour exposure and it is considered likely that any individual within the area would move away from the sound source fairly quickly once commenced. The effects of this will most likely be temporary displacement of individuals from the waters surrounding the site. It is not considered that the habitat is important for breeding, mating or resting and that there are sufficient alternative foraging areas for them to utilise.

Impacts to seals may also arise through pollution events resulting in death or injury to individuals either directly or indirectly through consumption of contaminated prey. Prey populations may also be reduced in the short term.

Due to the temporary nature of the construction impacts, the relatively small area in which individuals could be exposed, and the lack of impacts to known breeding and mating sites, it is not considered that these would have a longer term affect on the population viability within the Orkney and North Coast SMU.

Impacts are considered to be of **low magnitude** with the IEF having **low sensitivity**. There is a high confidence in the assessment.

5.6.8.2 Operational Impacts

There are no ongoing maintenance activities anticipated at the pier which will result in underwater noise. The main impact to seals will likely arise from the permanent increase in vessel movements, potentially resulting in disturbance and avoidance. Vessel activity is already higher within the site and approaching shipping lanes than in other areas of the Orkney Isles however, and so it is considered that any seals present will be accustomed to some level of activity. If there is some additional displacement from areas of high activity, it is considered that there is sufficient alternative habitat for foraging and commuting and would not detrimentally affect the population of either species.

Increased vessel movements will also increase the risk of pollution events and vessel strike, a. Although vessel strikes are generally more associated with larger and less agile marine mammals, and so the numbers affected will likely be minimal. The effects of these impacts will be highly localised and unlikely to affect the conservation status of either species.

The operational impacts are of **low magnitude** and IEFs are considered to be of **negligible sensitivity**. The confidence level for the assessment is high.

5.6.9 Harbour Porpoise

5.6.9.1 Construction Impacts

The main impact which will arise during construction are related to underwater noise. Blasting is predicted to generate noise above the PTS threshold over a range of 725m and above the TTS threshold over 3.8km. Due to the nature of the impulsive noise generation, individuals present within the range will not have time to move away and so temporary or permanent injury is possible.

Estimated threshold ranges for TTS and PTS for 1 hour exposure to dredging noise are 950m and 200m respectively. The ranges for vibro piling are much less, with a PTS range of 50m. For dredging and vibro piling it is expected that individuals would move away from the sound source quickly and injuries are unlikely to occur. The effect of noise generation associated with these activities is more likely to be displacement from a relatively small area of foraging habitat.

Impacts from pollution events may also occur, affecting individuals directly or indirectly through ingested prey items. Such an event is likely to be localised and temporary in nature.

Although there is no current population estimate for the UK it is considered that due to the relatively small area likely to be impacted and the fact that harbour porpoise are very mobile and wide ranging, there is unlikely to be an effect on the overall population viability or functioning of its supporting habitat.

The impact is considered to be of **low magnitude** with the IEF having **low sensitivity**. Confidence in the assessment is intermediate due to lack of available data on the baseline population.

5.6.9.2 Operational Impacts

Operational impacts predicted to be experienced by harbour porpoise are similar to those described for seals in section 5.6.6.2 (increased vessel movements, risk of pollution and vessel strike). As with seal, harbour porpoise are regularly found in waters with relatively high levels of marine traffic and are agile swimmers and so disturbance and vessel strike effects will be minimal.

These impacts are not considered likely to impact on the conservation status of porpoise at the UK or on a local level.

The operational impacts are of **low magnitude** and IEFs are considered to be of **negligible sensitivity**. The confidence level for the assessment is intermediate due to lack of available data on the baseline population.

5.6.10 Minke Whale

5.6.10.1 Construction Impacts

The most substantial impact to minke whale is via underwater noise generation from blasting. Blasting is predicted to generate noise above the PTS threshold over a range of 725m and above the TTS threshold over 3.8km. This may result in permanent or temporary injury to a small number of individuals over the period of blasting (c.100 days).

As with other marine mammals discussed, dredging and vibro piling activities have considerably shorter PTS ranges (100m and 50m for 1 hour exposure respectively), and will primarily result in a temporary avoidance effect.

Pollution impacts will be as described for previous marine mammals.

Although there are gaps in the data regarding minke whale populations, given the infrequent records within the area and localised nature of the impacts it is unlikely that there will be an effect on the local conservation status or wider population.

It is considered that impacts will be of **negligible magnitude** and the IEF is of **negligible sensitivity**. The confidence level for the assessment is intermediate due to lack of available data on the baseline population.

5.6.10.2 Operational Impacts

Operational impacts predicted for minke whale will be similar to those described for seals and harbour porpoise. Minke whale may experience greater negative effects as a result of increased vessel movements, in part as the low frequency noise generated may interfere with their communication. Unlike some other species, minke whale are less able to adapt their vocalisations to adapt to increased background noise[63]. They are also less able to manoeuvre away from vessels to avoid vessel strike. Existing records suggest they are not regularly present within the likely impacted area however and so effects on the conservation status are not predicted.

It is considered that impacts will be of **negligible magnitude** and the IEF is of **negligible sensitivity**. The confidence level for the assessment is intermediate due to lack of available data on the baseline population.

5.6.11 Dolphins

5.6.11.1 Construction Impacts

As with other marine mammals, the greatest impact to dolphins (including Risso's dolphin, white-beaked dolphin, long-finned pilot whale and killer whale) is underwater noise generation. The range over which this hearing group is expected to be impacted is much lower than other groups however with a PTS threshold range of just 50m and TTS threshold range of 225m for blasting. For dredging and vibro piling the PTS distances are 50m or less. Impacts from pollution events are also a possibility for this group.

The construction impacts are temporary in nature and due to the infrequent sightings of these species and relatively small area of habitat they utilise, minimal numbers of individuals are likely to be impacted. No effects on the favourable conservation status of the species are considered likely.

It is considered that impacts will be of **negligible magnitude** and the IEF is of **negligible sensitivity**. The confidence level for the assessment is intermediate due to lack of available data on the baseline population.

5.6.11.2 Operational Impacts

Operational impacts for dolphin species will be as described for other marine mammals.

Due to the limited number of individuals and small size of habitat likely to be affected, no effects on the conservation status of any of the species is considered likely.

It is considered that impacts will be of **negligible magnitude** and the IEF is of **negligible sensitivity**. The confidence level for the assessment is intermediate due to lack of available data on the baseline population.

5.6.12 Basking Shark

5.6.12.1 Construction Impacts

The effects of underwater noise on fish are less well understood as they are in marine mammals, however there is potential for permanent or temporary injury or in extreme circumstances, death in basking shark. The terminology for fish has a slightly different meaning with PTS thresholds meaning thresholds above which mortality and

[63] Helble, T.A., Guazza R.A., Martin, C.R., Durbach, Alongi, G.C., Martin, S.W., Boyle, J.K. and Henderson, E.E (2020) Lombard effect: Minke whale boing call source levels vary with natural variations in ocean noise. The Journal of Acoustical Society of America Vol 147 (2).

potential mortal injury or permanent injury. The meaning of TTS (temporary hearing shift) is the same. Underwater noise modelling predicts that the PTS range for basking shark (fish with no swim bladder) is less than 50m for blasting, dredging and vibro piling. The highest TTS range is for blasting at 850m, this is reduced to 325m and 350m for dredging and vibro piling respectively.

Construction impacts may also arise from pollution events which could cause injury or mortality to individuals.

The construction impacts will be temporary, across a small area of possible habitat and so the number of individuals which may be affected it expected to be minimal and have no effect on the wider population.

The impacts will be of **negligible magnitude** with the IEF being of **negligible sensitivity**. Due to uncertainties within the underwater noise modelling as well as poor data on basking shark confidence is intermediate.

5.6.12.2 Operational Impacts

Operational impacts are related to higher numbers of vessels within an established port and shipping lanes. Vessel strikes are of particular concern in basking shark as they move slowly are often found near the surface of the water where they are more likely to come in to contact with propellors. It is unknown how sensitive they are to disturbance from vessel movements.

The increase in vessel numbers will be permanent, however, as basking shark appear to be infrequent visitors to the area which will be impacted, it is unlikely that there will be any effect on the wider population.

The operational impacts are considered to be of **low magnitude** with the IEF having a **low sensitivity**. There is intermediate confidence in the assessment due to a lack of data on basking shark populations and behavioural responses.

5.6.13 Marine Fish

5.6.13.1 Construction Impacts

The main impacts to marine fish species are likely to arise from underwater noise and/or pollution. These impacts could result in injury or mortality of individual fish. Pollution events could also have an indirect effect by reducing the quality of the habitat for spawning, nursing or feeding. Underwater noise could result in temporary avoidance as a result of disturbance. The majority of the species being considered have a swim bladder, although spiny dogfish do not. The underwater noise thresholds for PTS and TTS for the two hearing groups are similar though with only minor differences relating to slightly increased PTS thresholds for the species with swim bladders (100m for 6 blasts in close succession, 150m for dredging and 150m for piling). For most activities generating underwater noise, it is considered that fish would be able to move away from the noise source before injury or death would occur. Due to the nature of blasting activities this would not always be the case.

Whilst exact population estimates for the site are not known, it is considered that the habitat and number of individuals present within the site is a small proportion of the total population and habitat within the wider range and that overall conservation status is unlikely to be affected.

The construction impacts are considered to be of a **negligible magnitude** with the IEF having a **negligible sensitivity**. The confidence in the assessment is high.

5.6.13.2 Operational impacts

Impacts to marine fish during the operational phase will most likely be as a result of a pollution event, with the effects as described in section 5.6.13.1 above.

The operational impacts are considered to be of a **negligible magnitude** with the IEF having a **negligible sensitivity**. The confidence in the assessment is high.

5.6.14 Commercial Fisheries

5.6.14.1 Construction Impacts

The main impact on salmon present within the commercial fishery would be underwater noise generated by blasting, vibro piling and dredging. For fish with swim bladders not involved in hearing, the PTS ranges are less than 50m for all activities and therefore will have no effect on the commercial fishery. The estimated TTS threshold for blasting however is 850m, within the range of the fish farm. There is therefore potential for fish within the cages to suffer temporary hearing loss or alternation due to damaged sensory hair cells and/or auditory nerves. The temporary loss of hearing may affect the overall fitness of fish, through impairing their ability to assess their environment and find food. Fish have the capacity to replace hair cells over time and so a single exposure to noise above the TTS threshold would have limited affects on an individual. Within the fish farm context, the fish are unable to swim away and have potential to be exposed to noise above the TTS threshold daily over a 100 day period. This could increase the severity of the effects and reduce ability from individuals to recover. There is no research available to determine what the likely impact to fish would be from this level and duration of noise exposure. A precautionary approach should therefore be taken and mitigation employed to avoid possible negative impacts on the fishes welfare.

It is considered unlikely that any pollution or sedimentation arising from the works area would reach the fish farm in sufficient amounts to cause harm.

The impact is of **moderate to low magnitude** and the IEF is considered to have a **low sensitivity**. Due to unknown effects of repeated short term exposure to sounds above the TTS threshold, confidence in the assessment is intermediate.

5.6.14.2 Operational Impacts

No operational impacts to the commercial fishery are considered likely.

5.7 Cumulative Impact Assessment

The projects considered within the cumulative impact assessment are detailed in section 3.7.4. The two on land projects would likely have no cumulative impacts with the Hatston project. The Kirkwall Pier Development is no longer going ahead and will not result in cumulative impacts. The OICHA Harbour Masterplan also included a proposal for development of a new Deep Water Quay within Scapa Flow (SDWQ). At the time of writing, this project is being taken forward for planning submission. Many of the impacts to the marine environment are expected to be similar during the construction and operational phases. If the construction phases occur concurrently then additive cumulative effects may occur. If the construction phases are sequential then the period receptors are exposed to impacts may be prolonged. During the operational phase both projects are expected to result in increased vessel movements and therefore cumulative effects associated with impacts resulting from vessel movements are predicted.

5.8 Mitigation and Monitoring

5.8.1 Mitigation

5.8.1.1 Construction Phase

The following good practice mitigation measures will be implemented in order to avoid and minimise the negative impacts highlighted in section 2:

- Prior to works commencing on site (including any site clearance or preparatory works) a Construction Environment Management Plan (CEMP) detailing site specific mitigation and monitoring will be agreed with planning authority and implemented to avoided and reduce negative impacts.

- An Environmental Advisor/Manager will be employed to design and implement on site mitigation strategies as they are required.
- An independent Ecological/Environmental Clerk of Works (ECoW) will be employed to audit and report on adherence to the CEMP as well as any other relevant planning consents, environmental permits, legislation and mitigation.
- A silt boom to contain fine sediments will be used whilst land reclamation activities are undertaken.
- Inert stone material free from fine clays or organic materials will be utilised to form the outer bunds for land reclamation.
- The following good practice guidelines shall be adhered to and incorporated into the CEMP:
    - GGP 5: Works and maintenance in or near water;
    - PPG 6: Working at construction and demolition sites;
    - PPG 7: Safe Storage – The safe operation of refuelling facilities;
    - GPP 21: Pollution and incident response planning; and
    - PPG 22: Incident response – dealing with spills.
- All personal on the site should be made aware of the environmental sensitivities of the site (proximity to designated sites and presence of protected species including otter, marine mammals and fish) via the site induction and additional task specific toolbox talks as required.
- A pre-works check for otter should be conducted within a week prior to works commencing on the site and regularly throughout works. If otter are observed on site at any point during construction, works should be halted and advice sought from the environmental advisor. If a resting site is identified either during the pre-works check or during works, a species protection plan will be required and the need for a disturbance licence will be assessed.
- Where possible construction activities will be confined to daylight hours to reduce disturbance to commuting and foraging otter within the locale.
- Any artificial light required during construction will be fitted with shades and directed at the required work area only.
- A Marine Mammal Protection Plan as detailed in Technical Appendix 5.7 will be implemented to reduce the risk of underwater noise causing injury to marine mammals (and basking shark). This will involve the use of MMOs, Passive Acoustic Monitoring (PAM) devises and soft-start techniques for noise generating activities. The MMPP also details protocols to be implemented to reduce collision risk.
- The MMO or ECoW should also check for the presence of rafting birds on the water prior to blasting and no blasting should take place until birds have moved off. Bird scaring strategies may be required to encourage them to move away from the blast zone.
- The ECoW should monitor any fish deaths as a result activities such as blasting and report these to NatureScot and Marine Scotland (number of fish and species). Consideration should be given to mitigation strategies to reduce fish mortality if it becomes an issue. This can be difficult to do however with some strategies such as the use of netting or bubble curtains sometimes having the effect of preventing fish from moving away from noisy activities.
- If the fish farm is still operational during construction, the timing of the blasting phase should be co-ordinated as far as possible to fall within the fisheries fallow period when stocks are absent. If this is not possible, measures to dampen the transmission of sound will be considered such as the use of bubble curtains.
- The principal contractor will produce and implement a biosecurity plan throughout the duration of works. This will include the cleaning of equipment and plant machinery prior to deployment and at regular intervals throughout to reduce risk of transmitting non-native and invasive species. The plan will be submitted to the planning authority and other relevant consultees for approval prior to works commencing and implementation would be audited by the ECoW.

[64] Available at: https://www.gov.uk/guidance/control-and-management-of-ballast-water (Accessed 10/04/2023)
[65] Information available at: https://www.wisescheme.org/ (accessed 02/03/2023)

- A strict speed limit for both onshore and marine traffic will be implemented to reduce risk of collision with protected species (15mph on shore and 4 knots within the water).

5.8.1.2 Operation Phase

During the operational phase of the development, the following mitigation measures will be undertaken to avoid and minimise the predicted negative impacts:

- Implementation of Ballast Water Management Plan and industry standard ballast water management practices[64].
- Implementation of a vessel management plan including agreed routes and speed limits.
- Safe vessel operation to minimise risk of collision with marine mammals and basking shark to be promoted to users. Training courses such as those provided by the WiSe scheme[65] could be offered at regular intervals.
- Onshore speed limits will be kept at 15mph to reduce otter collision risk.
- Continuation of the Harbour Authorities biosecurity monitoring programme as detailed in the existing Ballast Water Management Policy[66]..
- Permanent lighting design will be kept to the minimum required for health and safety and security purposes. All lighting will be fitted with shades and directed and the required areas. The shoreline and surrounding waters will be avoided as far as possible to reduce disturbance to wildlife.

5.8.2 Licensing

Whilst mitigation will reduce the likelihood of impacts from underwater noise, and lessen the severity of the predicted effects, it won't be possible to completely avoid some level of disturbance to marine mammals and basking shark which may be present in the area. It is illegal to intentionally or recklessly disturb cetaceans in Scottish waters, which are all EPS. Basking shark are also protected from disturbance under the WCA. A derogation licence to permit disturbance of harbour porpoise, minke whale, Risso's dolphin, white-beaked dolphin, long-finned pilot whale, killer whale and basking shark, will be required for imperative reasons of overriding public interest.

5.8.3 Biodiversity Enhancements

In order to enhance the site for biodiversity, in accordance with NPF4, a Biodiversity Action Plan (BAP) will be developed for the onshore and intertidal habitats within the site and adjacent Orkney Islands Council Harbour Authority (OICHA) land holdings. This will include specific, measurable objectives for habitat creation and management and cover a period of 30 years, with management to be reviewed regularly and informed by monitoring data. It is anticipated that the following actions will be included:

- Creation of native scrub and species rich coastal grassland habitats within the current areas of poor semi-improved grassland and ruderal tall herb communities. Greenspaces such as these are a priority within the LBAP. As well as increasing diversity of floral species it is anticipated that this action would enhance habitat for a range of LBAP priority species including small passerines, terrestrial insects and mammals which may be present within the locale such as bats and pygmy shrews.
- Creation of habitat features within the rock armour to maximise ecological niches to support a diverse range of intertidal flora and faunal species. This can be achieved passively through careful selection and

[66] Available at: https://www.orkneyharbours.com/documents/ballast-water-management-policy (Accessed 10/01/2023)

placement of boulders to create ledges and pools or actively through introduction of features such as ridged concrete tiles which are designed to mimic natural rock features[67,68].

- Nest box installation upon suitable OICHA buildings and the pier structure. Tunnel type nest boxes could be mounted on/under the pier, c.2m above the water to attract Black Guillemots. Nest boxes on buildings could be used to encourage birds such as swifts, sparrows and other small passerines.
- Creation of insect habitat in the form of rock piles, deadwood piles and/or 'bug hotels' which contain a range of features for sheltering and nesting insects. These could be self-standing or attached to buildings or other infrastructure.

5.8.4 Monitoring

Monitoring is required to determine the success of mitigation and enhancement measures and provide data on which to base adaptive management when objectives are not being achieved. It is anticipated that the following monitoring will be required during and/or post-construction:

- Regular winter and breeding bird surveys will be conducted throughout the construction period and during the operation of the port to determine if there are changes to bird use, particularly with regards to species which are features of the North Orkney SPA.
- Water quality monitoring will be conducted, as outlined in Chapter 4 Section 4.8.3..
- Underwater noise monitoring will be carried out during high-risk activities such as blasting to confirm results of the underwater noise modelling and add confidence in mitigation strategies.
- OICHA has an existing monitoring programme for marine non-native species. Hatston is already included in this and monitoring at the site should continue.
- Monitoring of created habitats will form part of the BAP. It is anticipated that the onshore habitats will require annual monitoring for the first three years, as they become established and then at three year intervals for the duration of the management plan. The method will follow a site adapted version of the relevant Joint Nature Conservancy Council (JNCC) Common Standards Monitoring guidance[69]. The intertidal habitats should also be monitored annually for the first three years and then can be included into the existing OICHA intertidal habitats monitoring plan. Methodology should follow that of the existing monitoring programme. Nest and insect boxes should be checked annually for damage and be replaced as necessary.

5.9 Residual Effects

The significance of residual effects considered to be likely, once mitigation has been taken into consideration are summarised in table 5.7 below.

[67] MacArthur, M., Naylor, L.A., Hansom, J.D. and Burrows, M.T. (2020) Ecological enhancement of coastal engineering structures: Passive enhancement techniques. Science of the Total Environment Vol 740. Available at: https://www.sciencedirect.com/science/article/pii/S0048969720335014#f0005 (Accessed 23/02/2023)
[68] Vozzo, M.L., Mayer-Pinto, M., Bishop, M.J., Cumbo, V.R., Bugnot, A.B., Dafforn, K.A., Johnston, E.L., Steinberg, P. D. and Strain, E.M.A. (2021) Making seawalls multi-functional: The Positive effects of seeded bivalves and habitat structure on species diversity and filtration rates. Marine Environmnetal Research Vol 165. Available at: https://www.sciencedirect.com/science/article/abs/pii/S0141113620310102 (Accessed 23/02/2023).
[69] Available at: https://jncc.gov.uk/our-work/common-standards-monitoring-guidance/ (accessed 01/03/2023)

Table 5-7: Summary of Impacts on Important Ecological Features

IEF	Importance of IEF	Type of impact	Nature	Source	Duration	Magnitude	Sensitivity	Significance of effect	Confidence	Success of mitigation
North Orkney SPA	International	Construction negative	Death, injury or disturbance to birds. Habitat displacement	Dredging, blasting, piling, pollution	Temporary	Moderate/Low	Low	Not significant at any geographic level	High	Near certain
North Orkney SPA	International	Operational negative	Death or injury to birds	Pollution	Temporary	Low	Low	Not significant at any geographic level	High	Near certain
Orkney Mainland Moors SPA/West Mainland Moors SSSI	International	Construction negative	Death, injury or disturbance of birds. Habitat displacement	Dredging, blasting, piling, pollution	Temporary	Moderate/Low	Low	Not significant at any geographic level	High	Near certain
Orkney Mainland Moors SPA/West Mainland Moors SSSI	International	Operational negative	Death or injury to birds which are designated site features.	Pollution	Temporary	Low	Low	Not significant at any geographic level	High	Near certain
Sites designated for Grey and Harbour Seal	International and National	Construction negative	Death, injury or disturbance. Habitat Displacement.	Dredging, blasting, piling, pollution	Temporary	Negligible	Negligible	Not significant at any geographic level	High	Near certain
Sites designated for Grey and Harbour Seal	International and National	Operational negative	Death, injury or disturbance. Habitat Displacement.	Increased vessel movements and pollution	Permanent	Low	Negligible	Not significant at any geographic level	High	Near certain
Burn of Hatston	County	Construction negative	Degradation of habitat	Pollution	Temporary	Negligible	Negligible	No significant effect at any geographic level	High	Near Certain
Burn of Hatston	County	Operational negative	Degradation of habitat	Pollution	Temporary	Negligible	Negligible	No significant effect at any geographic level	High	Near Certain

IEF	Importance of IEF	Type of impact	Nature	Source	Duration	Magnitude	Sensitivity	Significance of effect	Confidence	Success of mitigation
Kelp and seaweed communities on sublittoral sediment	National (Scotland)	Construction negative	Permenant loss of habitat Degradation of remaining habitat	Development footprint, pollution, mINNS	Permanent	Low	Low	Significant at the site level. The loss of a small area is not significant within a regional context or higher due to the small area of loss, relative to the local distribution.		
Kelp and seaweed communities on sublittoral sediment	National (Scotland)	Construction negative	Degradation of habitat	Pollution, mINNS	Temporary	Low	Low	Not significant at any geographic area	High	Near Certain
Kelp and seaweed communities on sublittoral sediment	National (Scotland)	Operational negative	Degradation of habitat	Pollution, mINNS	Temporary	Low	Low	Not significant at any geographic area	High	Near Certain
Seapens and burrowing megafauna in circalittoral fine mud	National (Scotland)	Construction negative	Degradation of habitat	Pollution, mINNS	Temporary	Moderate	Moderate	Not significant at any geographic area	High	Near Certain
Seapens and burrowing megafauna in circalittoral fine mud	National (Scotland)	Operational negative	Degradation of habitat	Pollution, mINNS	Temporary	Moderate	Moderate	Not significant at any geographic area	High	Near Certain

IEF	Importance of IEF	Type of impact	Nature	Source	Duration	Magnitude	Sensitivity	Significance of effect	Confidence	Success of mitigation
Otter	International	Construction negative	Death, injury or disturbance. Habitat Displacement.	Dredging, blasting, piling, pollution and lighting	Temporary	Low	Low	Not significant at any geographic level	High	Near certain
Otter	International	Operational negative	Death, injury or disturbance. Habitat Displacement.	Increased vessel movements, pollution and lighting	Permanent	Low	Low	Not significant at any geographic level	High	Near certain
Grey and Harbour Seals	National	Construction negative	Death, injury or disturbance. Habitat Displacement.	Dredging, blasting, piling, pollution	Temporary	Low	Low	Not significant at any geographic level	High	Near certain
Grey and Harbour Seals	National	Operational negative	Death, injury or disturbance. Habitat Displacement.	Increased vessel movements and pollution	Permanent	Low	Negligible	Not significant at any geographic level	High	Near certain
Harbour porpoise	International	Construction negative	Death, injury or disturbance. Habitat Displacement.	Dredging, blasting, piling, pollution	Temporary	Low	Low	Not significant at any geographic level	High	Near certain
Harbour porpoise	International	Operational negative	Death, injury or disturbance. Habitat Displacement.	Increased vessel movements and pollution	Permanent	Low	Negligible	Not significant at any geographic level	High	Near certain
Minke whale	International	Construction negative	Death, injury or disturbance. Habitat Displacement.	Dredging, blasting, piling, pollution	Temporary	Negligible	Negligible	Not significant at any geographic level	Intermediate	Near certain
Minke whale	International	Operational negative	Death, injury or disturbance. Habitat Displacement.	Increased vessel movements and pollution	Permanent	Negligible	Negligible	Not significant at any geographic level	Intermediate	Near certain
Dolphins	International	Construction negative	Death, injury or disturbance. Habitat Displacement.	Dredging, blasting, piling, pollution	Temporary	Negligible	Negligible	Not significant at any geographic level	Intermediate	Near certain

IEF	Importance of IEF	Type of impact	Nature	Source	Duration	Magnitude	Sensitivity	Significance of effect	Confidence	Success of mitigation
Dolphins	International	Operational negative	Death, injury or disturbance. Habitat Displacement.	Increased vessel movements and pollution	Permanent	Negligible	Negligible	Not significant at any geographic level	Intermediate	Near certain
Basking shark	National	Construction negative	Death, injury or disturbance. Habitat Displacement.	Dredging, blasting, piling, pollution	Temporary	Negligible	Negligible	Not significant at any geographic level	Intermediate	Near certain
Basking shark	National	Operational negative	Death, injury or disturbance. Habitat Displacement.	Increased vessel movements and pollution	Permanent	Negligible	Negligible	Not significant at any geographic level	Intermediate	Near certain
Marine fish	National (Scotland)	Construction negative	Death, injury or disturbance. Habitat Displacement.	Dredging, blasting, piling, pollution	Temporary	Negligible	Negligible	Not significant at any geographic level	High	Near certain
Marine fish	National (Scotland)	Operational negative	Death, injury or disturbance. Habitat Displacement.	Pollution	Temporary	Negligible	Negligible	Not significant at any geographic level	High	Near certain
Commercial fishery	N/A	Construction negative	Injury or disturbance	Blasting	Temporary	Moderate/ Low	Low	Not significant at any geographic level	Intermediate	Probable

5.10 Statement of Significance

Once mitigation has been taken into consideration, the only significant effect after mitigation is taken into consideration is the loss of a small area of PMF habitat. This is considered to be significant at a site level only as the PMF is relatively widespread within the Orkney Islands and the loss will not affect the overall conservation status. No significant effects on other Important Ecological Features are predicted. Whilst there are some uncertainties or limitations in the assessments and/or mitigation proposed, it is anticipated that monitoring both during construction and through operation will allow for mitigation to be adapted as necessary. There is a possibility of a small number of individual birds, otter, marine mammals or basking sharks experiencing disturbance or being displaced from a small area of their habitat but this is not considered likely to affect the favourable conservation status of populations in a local, national or international context. A derogation licence will be required for disturbance to cetaceans and basking sharks. If successfully implemented, the biodiversity enhancements should provide benefits to the local biodiversity, creating habitats suitable for a variety of floral and faunal terrestrial and intertidal species.

6 ARCHAEOLOGY AND CULTURAL HERITAGE

6.1 Introduction

This chapter of the EIA Report presents the Archaeology and Cultural Heritage receptors of relevance to the proposed development and assesses the potential impacts from the construction of the proposed development on these receptors. These effects may result from physical loss or changes in the assets' settings. Potential cumulative impacts are also considered.

The chapter details the relevant planning policy context, methodology followed, reviews the baseline conditions in the defined study area, identifies the potential effects and appropriate mitigation measures to prevent, reduce or offset effects, and the residual effects of the proposed development.

6.2 Scoping and Consultation

Relevant comments from the EIA Scoping Opinion from Historic Environment Scotland (HES) and Orkney Islands Council (OIC) are summarised in Table 6-1 below, which provides a high level view on how these comments have been addressed within the EIAR.

Table 6-1: Summary of consultation responses in the Scoping Opinion specific to the historic environment

Consultee	Comment/Issue Raised	Addressed
OIC	Potential for direct impact by the proposed development on; A) significant underwater assets B) onshore archaeological assets C) assets within areas of borrow pits/areas being dredged for material to reclaim land	A) No known aircraft wrecks or paleoenvironmental remains in site; WSI/PAD to be implemented B) Sections 6.6.1.1 and 6.6.1.2 C) Material being sourced from consented quarries; outwith scope of EIAR
OIC	Potential for indirect impacts upon the settings of designated heritage assets, including St Magnus Cathedral, Quanterness Chambered Tomb Earth Houses and Balfour Castle	Significance of potential impacts are considered in Section 6.6.2.1
HES	Potential direct construction impacts upon submerged marine paleoenvironmental remains – more information requested on paleoenvironmental potential	SI Cores assessed by Dr Scott Timpany; Section 6.5.3
HES	Potential direct construction impacts upon possible aircraft wrecks	No known aircraft wrecks or paleoenvironmental remains in site; WSI/PAD to be implemented
HES	Potential direct impact by dredging upon submerged marine paleoenvironmental remains and aircraft wrecks	No known aircraft wrecks or paleoenvironmental remains in site; WSI/PAD to be implemented
HES	Proposed impacts will not have significant effects on site or setting of any terrestrial designated heritage assets	Noted

6.3 Policy, Legislation and Guidance

The following legislation, policy and guidance are relevant to the assessment of impacts from the Proposed Development on Archaeology and Cultural Heritage.

6.3.1 Legislation

- The European Convention on the Protection of the Archaeological Heritage (revised), known as the Valletta Convention, contains provisions for the protection of archaeological heritage, preferably in situ, but with provisions for appropriate recording and recovery if disturbance is unavoidable;
- The Protection of Military Remains Act 1986 (PoMRA) has the principal concern to protect the sanctity of vessels and aircraft that are military maritime graves. Any aircraft lost while in military service is automatically protected under this Act;
- The European Landscape Convention (ratified by the UK government in 2006), promotes the protection, management and planning of landscapes, including the historical and cultural aspects of landscapes;
- The primary piece of UK legislation concerning archaeology is the Ancient Monuments and Archaeological Areas Act 1979 (AMAAA), concerning sites or areas that warrant statutory protection due to being of national importance and are Scheduled under the provisions of the Act. It is an offence to carry out, without the prior written consent of the Scottish Ministers (Scheduled Monument Consent), any works which would have the effect of demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or covering up the monument;
- The Town and Country Planning (Scotland) Act (1997) and amendments, Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 and amendments, and The Planning etc. (Scotland) Act 2006 and the Planning (Scotland) 2019 Act are the primary legislation which govern onshore development planning and development management in Scotland in relation to the historic environment. Planning authorities, prior to granting planning permission, consult with Historic Environment Scotland as a statutory consultee on any development proposals that may affect the site or setting of a Scheduled Monument, an A-Listed building, an Inventoried Garden or Designed Landscape, or an Inventoried Historic Battlefield. This means that the presence of such sites within the area of a proposed development and the protection of its setting are material considerations in the planning process.

6.3.2 Policy

- Scottish Planning Policy includes policies to ‘protect archaeological sites and monuments as an important, finite and non-renewable resource and preserve them in situ wherever possible. Where in situ preservation is not possible, planning authorities should, through the use of conditions or a legal obligation, ensure that developers undertake appropriate excavation, recording, analysis, publication and archiving before and/or during development’ (SPP para 150). ‘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.’ (SPP para 145);
- The Historic Environment Policy Statement for Scotland (HEPS) 2019 includes policies that decisions affecting any part of the historic environment require understanding of its significance, its wider context and setting, and consideration of avoiding or reducing detrimental impacts; and
- The Pentland Firth and Orkney Waters Marine Spatial Plan (PFOW MSP, 2016) and the Orkney Local Development Plan (2017) policies concerning the protection of and approaches to the historic environment.

6.3.3 Guidance

- Historic Environment Scotland Designation Policy and Selection Guidance 2019 stands alongside HEPS 2019 and outlines the principles and criteria that underpin the designation of HMPAs;
- Historic Environment Scotland Managing Change in the Historic Environment Guidance Series: Setting (revised in 2020), states that "Setting can be important to the way in which historic structures or places are understood, appreciated and experienced. It can often be integral to a historic asset's cultural significance." The setting of historic assets or places should be taken into account when considering environmental assessments / statements, and when making decisions on applications.
- Historic Environment Scotland and Scottish Natural Heritage's [now NatureScot] Environmental Impact Assessment Handbook: Guidance for competent authorities, consultation bodies, and others involved in the Environmental Impact Assessment process in Scotland. 2018, v5; and
- The Chartered Institute for Archaeologists (CIfA) Codes, Standards and Guidelines (CIfA regulations, standards and guidance | Chartered Institute for Archaeologists).

6.4 Methodology

6.4.1 Impact Assessment Methodology

6.4.1.1 Impacts Requiring Assessment

This assessment covers all potential impacts identified through the scoping process, as well as any further potential impacts that have been highlighted as the EIA has progressed. It should be noted that impacts are not necessarily relevant to all stages of the proposed development.

Table 6-2 below indicates all the potential direct and indirect impacts assessed with regards to Archaeology and Cultural Heritage and indicates the development stages to which they relate. Cumulative impacts are discussed in Section 6.6.3.

Table 6-2: Impacts Requiring Assessment

Impact	Description
Construction	
Loss of or damage to known onshore historic environment assets;	During construction any activities that include ground-breaking works have the potential to result in the damage to/loss of known assets within the onshore site boundary. The potential for this impact is considered in Section 6.6.1.1
Loss of or damage to unknown onshore historic environment assets;	During construction any activities that include ground-breaking or reclamation works have the potential to result in the damage to/loss of unknown assets within the onshore site boundary. An assessment of this impact is provided in Section 6.6.1.2
Loss of or damage to known marine and intertidal historic environment assets;	During construction any activities that affect the seabed and intertidal zone have the potential to result in the damage to/loss of known cultural material lying on the seabed. The potential for this impact is considered in Section 6.6.1.3
Loss of or damage to unknown marine and intertidal historic environment assets;	During construction, any activities that affect the seabed and intertidal zone have the potential to result in the damage to / loss of unknown cultural material lying on the seabed. An assessment of this impact is provided in Section 6.6.1.4.
Loss of or damage to submerged prehistoric landscapes;	During construction, any activities that affect the seabed and intertidal zone have the potential to result in the damage to / loss of any submerged prehistoric and paleoenvironmental deposits lying on or below the seabed. An assessment of this impact is provided in Section 6.6.1.5.
Operation	
Long-term changes to the setting of historic environment assets that reduces their value	There is a possibility that the Onshore site could have long-term effects on the setting of an onshore historic environment asset, affecting the way in which the asset is understood, appreciated and experienced, and thus the significance/ importance of the historic asset. An assessment of this impact is provided in Section 6.6.2.1. There may also be cumulative effects on setting with other projects. An assessment of this cumulative impact is provided in Section 6.6.3

The assessment of direct impacts on the historic environment and on historic assets potentially indirectly affected by the proposed development affecting their setting was a desk-based exercise making use of project specific desk-based research, site visits, Zone of Theoretical Visibility (ZTV), assessment of regular sidescan sonar surveys undertaken on behalf of OICHA and assessment of stratigraphic records of core samples collected during geotechnical survey work.

6.4.1.2 Impacts Scoped Out of the Assessment

It was agreed in the scoping responses (Section3.7) that direct impacts in the operational phase could be scoped out of the EIAR.

6.4.1.3 Assessment Methodology

The assessment for Archaeology and Cultural Heritage is undertaken following the principles set out in Chapter 3: EIA methodology and scope. The sensitivity of the receptor is combined with the magnitude of impact to determine the consequence and impact significance. Topic-specific criteria have been developed for the value of the importance, sensitivity and vulnerability of historic environment receptors as outlined in Tables 6-3 and 6-4.

The sensitivity or value of the receptor is combined with the magnitude of impact, supported by expert judgement to arrive at a consequence for each impact under consideration. Example criteria for assessing magnitude of impact on historic environment receptors are presented in Table 6-5. The consequence and significance of effect is then determined using the matrix provided in Table 6-6.

The example criteria presented in the tables below are used to inform the assessment, but the tables and matrices are tools and not mechanical systems. Professional judgement is also required to input into the assessment, which may result in heritage values and significance of effect being moved higher or lower than the matrix result. This may also result in a significant material effect that does not reduce the integrity or heritage value of the receptor being identified as potentially acceptable by the statutory authorities. This reasoning is stated in the individual assessment wherever this is the case.

"Setting can often be integral to a historic asset's cultural significance....'Setting' is the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced. Monuments, buildings, gardens and settlements were almost always placed and orientated deliberately, normally with reference to the surrounding topography, resources, landscape and other structures. Over time, these relationships change, although aspects of earlier settings can be retained." [70]. To assess setting impacts, a ZTV relating to permanent structures within the site was established for the proposed development. A 5km radius around the boundary of the site was used to identify any designated heritage assets (World Heritage Sites, Scheduled Monuments, Listed Buildings, Inventoried Gardens and Designed Landscapes, Conservation Areas and Historic Battlefields) from which the development will be partially or fully visible (Figure 6-2). Designated cultural heritage assets within the 5

[70] Historic Environment Scotland, 2020, Managing Change in the Historic Environment: Setting

km radius that were not within the ZTV were afforded an initial consideration in case they could be affected, after which they were not considered further within the assessment.

Table 6-3: Example Importance Criteria for Historic Environment Receptors

Importance of asset	Cultural heritage value
High (H)	• World Heritage Sites • Scheduled Monuments and sites proposed for scheduling • Category A Listed Buildings • Inventoried Gardens and Designed Landscapes • Interconnected groups of B-Listed buildings • Outstanding Conservation Areas • Historic Battlefields • Historic Marine Protected Areas and Designated Wrecks • Aircraft lost on military service • Undesignated wrecks, archaeological sites, areas and buildings of national and international importance (identified in the HER) due to association, rarity, intrinsic value, loss of life and/or retaining archaeological, structural, architectural, decorative or other physical remains to the extent that it makes a significant contribution to our understanding or appreciation of the past • Marine Geophysical Anomaly which appears anthropogenic (atypical in its context); or there is identifiable cultural material; or it is in the area of a known archaeological site, or another contact/anomaly identified to be of high potential
Medium (M)	• Category B and Category C(S) Listed Buildings • Burial Grounds • Protected heritage landscapes • Conservation Areas • Undesignated archaeological sites, areas, buildings, wrecks and cargos of equivalent regional importance (identified in the HER), or of high local significance, due to association, rarity, intrinsic value, loss of life, and/or retaining archaeological, structural, architectural, decorative or other physical remains to the extent that it makes a significant contribution to our understanding or appreciation of the past.
Low (L)	• Cultural heritage assets the physical remains of which contribute little to our understanding or appreciation of the past. • Cultural heritage assets of local value or interest for education or cultural appreciation • Undesignated archaeological sites, areas, buildings, wrecks and cargos of equivalent local importance (identified in the HER) due to limited intrinsic, contextual or associative characteristics, or that are still common. • Unlisted historic buildings and settlements with local characteristics. • Marine Geophysical Anomaly which is likely to be a natural formation such as a sand dune, boulder or bedrock formation. It could also be a processing error of the geophysical data.
Negligible (N)	• Sites of former archaeological features, lifted or salvaged wrecks • Unlisted buildings of little historic or architectural interest • Sites or features the physical remains of which make a negligible contribution to our understanding or appreciation of the past. • Single findspots • Sites of little or no known heritage importance

Table 6-4: Example Importance Criteria for Setting and Sensitivity to change

Sensitivity to change	Importance of Setting
High (H)	A setting that makes a critical contribution to the understanding and/or appreciation of the siting and/or historical / archaeological / architectural context of a receptor. (Examples of this include: prominent topographic locations; surroundings that include related monuments in close association; surroundings that are believed to be unchanged, or little changed, from those when the receptor was created)
Medium (M)	A setting that makes a positive contribution to the understanding and/or appreciation of the siting and/or historical / archaeological / architectural context of a receptor. (Examples of this include: surroundings that complement the siting and appearance of a receptor, such as the presence of a feature of the rural past within a more recent farming landscape containing little or no urban or industrial development)
Low (L)	A setting that makes little positive contribution to the understanding and/or appreciation of the siting and/or historical / archaeological / architectural context of a receptor. (Examples of this include: surroundings that only partially complement the siting and appearance of a receptor, such as the presence of a feature of the rural past within a partly urbanized or industrialized landscape)
Negligible (N)	A setting that does not contribute positively to the understanding and/or appreciation of the siting and/or historical / archaeological / architectural context of a receptor. (Examples of this include: immediate surroundings, such as commercial coniferous woodland or an industrial development, that are not relevant to the understanding of the context of the receptor)

Table 6-5: Example criteria for the assessment of impacts on historic environment assets

Magnitude of Effect	Direct Impacts: Onshore	Indirect Impacts: Onshore
High	Works would result in the complete loss of the site, or the loss of an area, features or evidence fundamental to the historic character and integrity of the site, which would result in the complete loss of physical integrity.	The removal of, or a fundamental and irreversible change to, the relationship between a heritage asset and its relevant setting. Major change that removes or prevents appreciation, understanding or experience of a heritage asset and its key characteristics, or permanent change to or removal of surroundings of a less sensitive asset. A noticeable change to a key relationship between a heritage asset and a highly sensitive, valued or historically relevant setting over a wide area or an intensive change to a less sensitive or valued asset or setting over a limited area.
Medium	Works would result in the loss of an important part of the site or some important features and evidence, but not areas or features fundamental to its historic character and integrity. The integrity of the site would be affected, but key physical relationships would not be lost.	Noticeable change to a non-key relationship between a heritage asset and its relevant setting. A heritage asset and setting that is tolerant of moderate levels of change. Small changes to the relationship between a heritage asset and its setting over a wide area or noticeable change over a limited area.
Low	Works would not affect the main features of the site. The historic integrity of the site would not be significantly affected.	Minor changes to the relationship between a heritage asset and its setting over a wide area or minor changes over a limited area. A heritage asset and setting that is considered tolerant of change.
Negligible	Works would be confined to a relatively small, peripheral and/or unimportant part of the site. The integrity of the site, or the quality of	Changes to that cannot be discerned or perceived in relation to the heritage asset or environment.

Magnitude of Effect	Direct Impacts: Onshore	Indirect Impacts: Onshore
	the surviving evidence would not be affected.	
Positive	An enhancement to the baseline condition of the asset.	
Magnitude of Effect	**Direct Impacts: Marine**	**Indirect Impacts: Marine**
High	Works would result in the complete loss of an asset, or the loss of an area, features or evidence fundamental to the historic character and integrity of the site, which would result in the complete loss of physical integrity.	The removal of, or a fundamental and irreversible change to, the relationship between a marine heritage asset or environment and a historically relevant seabed context. Major change that removes or prevents appreciation of characteristics key to a heritage asset, or permanent change to or removal of surroundings of a less sensitive asset or seabed context. A noticeable change to a key relationship between a marine heritage asset or environment and a highly sensitive, valued or historically relevant seabed context over a wide area or an intensive change to a less sensitive or valued asset or seabed context over a limited area.
Medium	Works would result in the loss of an important part of the site or some important features and evidence, but not areas or features fundamental to its historic character and integrity. The integrity of the site would be affected, but key physical relationships would not be lost.	Noticeable change to a non-key relationship between a marine heritage asset or environment and a historically relevant seabed context. A heritage asset and setting that is tolerant of moderate levels of change. Small changes to the relationship between a heritage asset and a historically relevant seabed context over a wide area or noticeable change over a limited area.
Low	Works would not affect the main features of the site. The historic integrity of the site would not be significantly affected.	Minor changes to the relationship between a heritage asset or environment and a historically relevant seabed context over a wide area or minor changes over a limited area. A heritage asset and setting that is considered tolerant of change.
Negligible	Works would be confined to a relatively small, peripheral and/or unimportant part of the site. The integrity of the site, or the quality of the surviving evidence would not be affected.	Changes to a historically relevant seabed context that cannot be discerned or perceived in relation to the heritage asset or environment.
Unknown	Groundbreaking works over features that have not been fully interpreted would reduce the chance of interpretation in the future. In the event of significant features this would constitute impact of high magnitude; for sites of lesser significance it is less problematical. Nevertheless, it remains an issue where features have not been or could not be interpreted.	Changes to a seabed context, where it is uncertain how these contribute to our understanding of the site because the feature or asset itself could not or has not been understood or interpreted.
Positive	An enhancement to the baseline condition of the asset.	An enhancement to the seabed context of a heritage asset or environment. An enhancement to preservation conditions of a heritage asset or environment.

Table 6-6: Assessment of Impact Significance

Asset Importance or Sensitivity	Magnitude of Effect					
	High	Medium	Low	Negligible	Uncertain	Positive
High	Major	Major	Moderate	Minor	Uncertain/ Major	Positive
Medium	Major	Moderate	Minor	Minor	Uncertain/ Moderate	Positive
Low	Moderate	Minor	Minor	Negligible	Uncertain/ Minor	Positive
Negligible	Minor	Negligible	Negligible	Negligible	Uncertain/ Negligible	Positive
Uncertain	Uncertain/ Major	Uncertain/ Moderate	Uncertain/ Minor	Uncertain/ Negligible	Uncertain/ Negligible	Positive

Table 6-7: Definitions for Significance of Impact

Consequence	Significance	
Positive	Positive – to be encouraged	Positive
Major	Highly significant and requires immediate action. May be intolerable risk or significance	Significant impact under EIA Regulations
Moderate	Significant – requires additional control measures and/or management	
Minor	Not significant – however may require some management to ensure remains within acceptable levels	Insignificant impact under EIA Regulations
Negligible	Not Significant	

6.5 Baseline

6.5.1 Baseline Characterisation

This section comprises a characterisation of known historic environment assets within the site, as well as the potential for unidentified assets to be present. This characterisation is based on desk-based studies, walkover survey data collected as part of the current study, the results of geotechnical coring and marine geophysical surveys conducted for OICHA around Hatston (Hazards to Navigation).

This section also includes a baseline summary of the onshore historic environment assets and their setting that may be affected by the proposed development, based on desk-based studies and site visit.

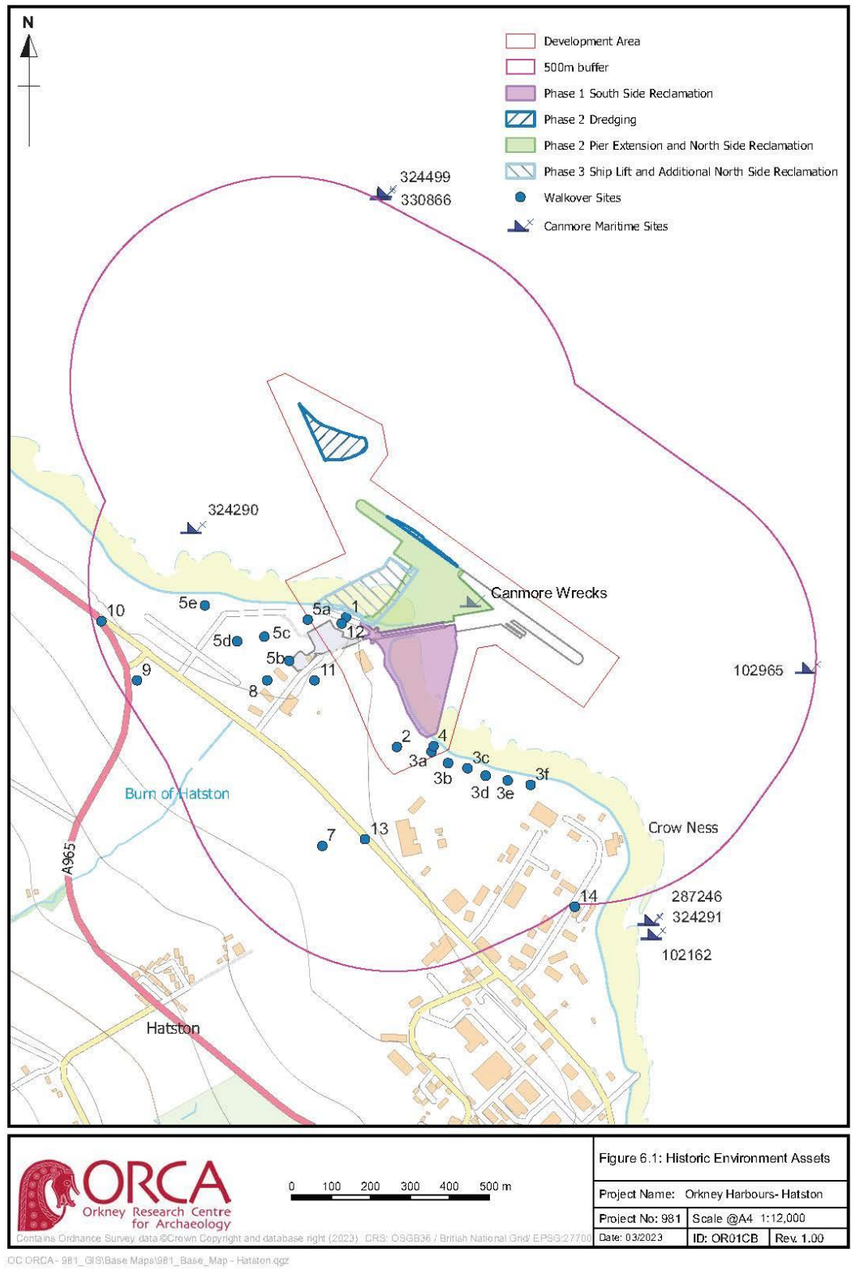

Figure 6-1: Historic Environment Assets

6.5.1.1 Study Areas

The following areas are referred to in the impact assessment:

- The site (see Figure 6-1), which comprises the proposed onshore infrastructure area, reclaimed land, the new quay and areas of dredging.
- The Study Area – The area for identifying the historic environment baseline and potential direct impacts upon it comprises the site plus a buffer of 500m to provide context.
- The Setting Study Area – The area assessed for potential impacts from the proposed development on the setting of historic assets (and thus potentially affecting their heritage significance), comprises an area of 5km from the site (see Figure 6-2).

6.5.1.2 Sources of Information

A review was undertaken of the key literature and data relevant to this assessment relating to historic environment assets and was used to produce the overview of the existing historic environment. The main data sources used in the preparation of this chapter are listed below in Table 6-8. Any other sources used are referenced in the text.

Table 6-8: Summary of key datasets and reports

Title	Source	Year	Author
British Geological Survey Bedrock and Superficial Geology map	Geology of Britain viewer – British Geological Survey (bgs.ac.uk)	Ongoing	BGS
The National Record of the Historic Environment (NRHE) of Scotland	Canmore (https://canmore.org.uk) and Pastmap database (http://pastmap.org.uk)	Ongoing	HES
Statutory lists, registers and designated areas, including Lists of Scheduled Monuments, Listed Buildings, Gardens & Designed Landscapes, Designated Wrecks and Historic Marine Protected Areas	The Historic Environment Scotland Data Portal https://portal.historicenvironment.scot/	Ongoing	HES
Orkney Historic Environment Record	Digital data – Pastmap database (http://pastmap.org.uk); physical records held at Orkney College	Ongoing	OIC
Historic Land-use Assessment	HLA (hlamap.org.uk)	Ongoing	HES
UKHO wreck register & nautical charts	https://www.admiralty.co.uk/digital-services/data-solutions/admiralty-marine-data-portal	Ongoing	UKHO
The Ship Wreck Index of Great Britain & Ireland Vol. 4 Scotland	London: Lloyd's Register of Shipping	1998	Larn, R & Larn, B
Shipwrecks of Orkney & Shetland	Newton Abbot: David & Charles	1988	Ferguson, D
Ferguson/Heath Collection	Private collection, continuing to update Ferguson's database	Ongoing	Ferguson, D & Heath, K
Wreck Site EU	http://www.wrecksite.eu	Ongoing	N/A
The British Newspaper Archives	https://www.britishnewspaperarchive.co.uk/	Ongoing	N/A
Lloyds Shipping Register	https://hec.lrfoundation.org.uk/archive-library/lloyds-register-of-ships-online/lloyds-register-of-ships-online	Ongoing	Lloyds of London
Bi-monthly Minesweeping Reports	National Archives, Kew	N/A	N/A
Lost in Waters Deep	https://lostinwatersdeep.co.uk/index.html	Ongoing	Heath, K & Sadler, W
Aviation Research Group Orkney & Shetland	https://crashsiteorkney.com/index.html	Ongoing	A.R.G.O.S
The scope of Strategic Environmental Assessment of Continental Shelf Area SEA 4 in regard to prehistoric archaeological remains	https://assets.publishing.service.gov.uk/government	2003	Flemming, N.C
Submerged Landscapes of the European Continental Shelf	Chichester: John Wiley & Sons Ltd	2017	Flemming, N.C et al (eds)
Off Scotland: a comprehensive record of maritime and aviation losses in Scottish waters	Edinburgh – C-Anne Publishing	1998	Whittaker I.G.
Sky over Scapa 1939-1945	Kirkwall: Bellavista Publications	2007	Lamb, G.

6.5.2 Onshore Baseline Conditions

6.5.2.1 Geology and Land Use

The bedrock geology of the onshore development consists of Upper Stromness Flagstone Formation formed in the Mid Devonian epoch, overlain by Diamicton[71] .

Whilst the majority of the site is occupied by industrial buildings or those associated with the pier, the Historic Landuse Assessment[72], describes the area to the SE as rectilinear fields boundaries, agricultural buildings and farmsteads, this type of defined landscape is indicative of agricultural improvements in the 19th century. The former use of the area as an airfield in WWII is also noted.

6.5.2.2 Mesolithic: c. 9000BC to c. 4000BC

The Mesolithic period extends from the end of the last glaciation period, c. 9000 BC to the arrival of farming, c. 4000BC. In Scotland, the period is largely characterised by settlement traces in the form of cave and rock-shelters,

[71] British Geological Survey 2022: BGS Geology of Britain Map Viewer Geology of Britain viewer – British Geological Survey, bgs.ac.uk

[72] hlamap.org.uk

shell middens and lithic scatters. The presence of Mesolithic communities in Orkney is now well-established, though the evidence is still considered inconclusive when trying to ascertain if the earliest human activity in Orkney was the result of seasonal movements of regional populations or infrequent visits based on resource exploitation.

There are no known Mesolithic sites within the site or within the Study Area.

6.5.2.3 Neolithic: c. 4000BC to c. 2000BC

The Neolithic period in Orkney spans around 2000 years, from c. 4000 BC to c. 2000 BC and the importance of the monumental sites of the Neolithic period in Orkney is well-known. A wide range of settlement forms characterise the Neolithic period in Orkney with the use of local tabular flagstone a defining feature in the construction of Orcadian Neolithic houses. The Neolithic tombs of Orkney display huge variety of setting and form. Many of the tombs survive as amorphous mounds with little detail of internal arrangement. Standing stones, occurring usually as individual stones, are found across many of the islands. The stones were usually erected in conspicuous locations, intimately tied into the local landscape, and some remain prominent markers in the landscape.

There are no known Neolithic sites within the site or Study Area. ORCA Site 11 (Canmore 306645), to the south-west of the site, was identified during road improvements. The remains recovered included 'buildings, corbelled with straight walls and rounded corners; Skaill knives etc. – typical of Skara Brae'. On this basis it is probable that this represents a settlement dating to this period, but there is insufficient data to characterise it definitively.

6.5.2.4 Bronze Age c.2000BC to 800BC

The Orcadian Bronze Age has often been characterised as a period of impoverishment, in comparison to the rich archaeological record of the Neolithic and Iron Ages. However, the Bronze Age in Orkney was a period of great social and environmental change and archaeological work undertaken across Orkney has demonstrated that there is a significant resource for examining Bronze Age life. Burial sites are the most common monument type for Bronze Age Orkney. The most definitive burial monument is the barrow mound, found individually and in groups, generally comprising stone-built cists (containing a burial or cremated bone), surmounted by an earthen mound. During the Late Neolithic/Early Bronze Age period, the dead were also buried in large subterranean box-cists with no apparent covering mound.

Burnt mounds are another ubiquitous Bronze Age site-type in the islands, but their purpose and role are still debated. These monuments comprise large mounds of burnt stones, usually arranged in a crescentic form around a complex of stone cells and features. Treb-dykes are large earthen banks and are a distinctive feature of Orkney, particularly in the North Isles. The appearance of these large-scale boundaries is presumed to be a Bronze Age phenomenon, but this is yet to be proven through excavation.

There are no known Bronze age sites within the site. There is one Bronze Age site within Study Area – Saverock burnt mound (ORCA Site 8; Canmore 2574) which lies c. 175m south-west of the site and which was the subject of an archaeological evaluation in 2008 (ORCA 2008)[73].

6.5.2.5 Iron Age c. 800BC to c. AD 600

Conventionally, the Iron Age of northern Scotland spans the early first millennium BC to the eighth century AD, with Early, Middle and Late Iron Age phases (the latter often referred to as the 'Pictish' period). In northern and western Scotland, the Iron Age takes the form of distinct architectural and material culture forms, notably the use of complex roundhouse architecture.

Traditionally, studies of the northern Iron Age have been dominated by the broch and these substantial drystone buildings have drawn the most attention in archaeological work. Contemporary villages around brochs, are generally enclosed by substantial curvilinear earthen banks and ditches of huge proportions. The majority of broch sites across Orkney survive as grassed-over substantial mounds in predominantly coastal or lochside locations.

There is often a close correlation between the locations of brochs and later ecclesiastical structures across Orkney.

There is one Iron Age site within the site. The remains of a souterrain (site 1; Canmore 2563) are located in the northern part of the site, visible as a rough tussocky area with a small section of coursed walling exposed in the coastal section below. Although the site was excavated in 1848, recent survey work has demonstrated the presence of shell and prehistoric pottery close to the surface at the site and a detailed examination of the coastal section suggested that substantial structural remains may still be present[74] .

A second souterrain (site 7; Canmore 2541), discovered during the construction of Hatston Airfield, lies 250m south-west of the site.

6.5.2.6 The Medieval Period (c. AD 800 to c.1614)

In order to reflect the particular political circumstances of the North of Scotland, the medieval period can be usefully sub-divided into the 'Viking Period', with a focus on initial Viking contact and activity, followed by the initial Norse settlement, and the 'Late Norse Period', marked by close political ties with Scandinavia. In Orkney, the Viking and early Norse Period is archaeologically defined as c.AD 800 to c.1050 and the Late Norse Period covers c.1050 to 1468 (the date when Orkney was transferred from Norwegian to Scottish rule). The remainder of the medieval period, c.1468 – c.1614, is historically defined as the period of Scottish Rule.

Viking sites are generally found close to the shore and usually take the form of lengths of exposed middens with some structural remains. They are a rich source of information with great potential to inform on the past (particularly diet and economy). Norse settlements tend to take the form of a longhouse, which provided accommodation for people and a byre for animals under one roof. One of the most distinctive types of Norse site across Orkney is the 'farm mound'. In general, these mounds are thought to be largely Norse in origin, and it has been suggested that the farm-names can tell us whether farm-mounds were primary Norse settlements, or if they were extant features of the landscape early in the Norse occupation. Generally associated with areas of good soil, the mounds then became a focus for settlement and a number contain buried structural elements.

There are no known Medieval sites within the site or Study Area.

6.5.2.7 The Post-Medieval Period (c.1614 to c.1900)

The post-medieval period in Orkney is traditionally regarded as commencing with the execution, in 1614, of Earl Patrick Stewart and his son for inciting rebellion. The life of the islanders during the period was dominated by the slow-downs and upturns in the wider British economy. The late eighteenth and nineteenth centuries saw the development of three key industries across Orkney; kelp processing, herring fishing and linen production. All of these developed as secondary occupations for farm labourers and their family, but at times came to almost dominate the islands' economy.

The heritage resource for the period across Orkney is largely characterised by farmsteads, including small farmsteads, crofts and larger farms with associated features, such as enclosures, dykes and cultivation remains. Remains dating from this period can be significant in a local context as they may represent the transition from the final vestiges of Norse practice through later farming traditions to the agricultural improvements, begun in earnest during the mid-nineteenth century.

Along with the remains of the industries mentioned above, the remains of maritime infrastructure are also visible, important to Orkney's maritime society. Such remains include nousts, or boat shelters, built or hollowed out above the high water mark. Their style and form did not greatly change through time (Viking-Modern), however, and it is difficult to establish dates for particular examples.

The area occupied by the onshore development area would once have been divided into fields dating to this period as can be seen on the Ordnance Survey First Edition, although much of the post-medieval landscape was

[73] ORCA 2008, *Hatston, Kirkwall, Archaeological Evaluation* – unpublished report – Site Code HK08

[74] Carruthers 2003, *Souterrains of Orkney, Survey and Trial Trenching*, unpublished report (held in Orkney SMR)

lost to the later construction of Hatston airfield. There are two sites from the post-medieval period within the site; site 4 is a sub-rectangular depression just above the coastal section which may represent a noust. A farmstead (site 12) is marked at Lower Saverock on the Ordnance Survey First Edition.

Within the Study Area, the Ordnance Survey First Edition also shows a quarry (site 13) and a flagstaff, butt and target (site 14) but it is likely that these have been destroyed.

6.5.2.8 The Modern Period (after c.1900)

This period is dominated by the presence of the Royal Navy and the use of Orkney, in particular Scapa Flow, as its wartime base. Orkney was an active battlefield during the blockade of Germany in both the First World War and the Second World War, and wartime sites are present throughout the islands, varying in form and state of preservation. There are also a number of Victorian and Edwardian military structures built by landowners for local volunteer units.

It is to this period that most of the identified sites within the onshore development area boundary belong. The onshore development area itself is part of the former airfield HMS Sparrowhawk/ RNAS Hatston (site 6; Canmore 81649), which was occupied by a number of Fleet Air Arm units serving the strategically important naval base of Scapa Flow in WWII. Whilst the majority of structures associated with the airfield have now been demolished, some have been incorporated into the modern industrial estate and recent development which exposed parts of the tarmac trackway associated with airfield shows that remains also survive below the surface (ORCA 2015[75]). On the south-west boundary of the site, lies the site of one of the dispersed aircraft hangars associated with the airfield (site 5), although it is no longer extant. The airfield bomb store, visible as a line of six concrete blast walls and concrete chambers within earthen mounds aligned along the coast at Crows Ness, also lies partly within the development area, with the north-westernmost one lying just inside the site boundary (site 3a; Canmore 269622). An additional building, close to the bomb stores and now in use as a barn, may also originally have had a military function (site 2).

Further sites associated with the airfield lie within the Study Area. These comprise further aircraft hangars just outside the site boundary to the west, part of a group of five together with site 5a (sites 5b-5e; Canmore 269623), however only one of these is now upstanding (5d), two lie beneath modern infrastructure associated with the pier (5b and 5e) and the final one is not upstanding but crop marks visible on Google earth suggest some remain may survive (5c). The remaining five bomb stores and dispersal bays which form the airfield bomb store together with site 3a also lie within 500m of the development area (sites 3b- 3f; Canmore 269622).

The watching brief undertaken in 2014-15 (ORCA 2015) also demonstrated that remains of the tarmac track associated with the airfield survive below the modern topsoil. There are also the sites of two pill boxes just west of Grainshore Road which are visible on WW II RAF vertical air photographs however these are no longer extant (sites 9 and 10.)

6.5.2.9 Previous Archaeological Investigations

Three archaeological investigations have been undertaken within the site (ORCA 2015, 2017[76], 2018[77]) and one within the Study Area (ORCA 2008).

A watching brief associated with the Hatston Enterprise development recorded parts of the tarmac trackway associated with Haston airfield below the modern airfield together with numerous post-medieval field drains (ORCA 2015). It also observed the removal of an aircraft hangar (site 5a). Two further watching briefs carried out for the creation of a laydown area observed the removal of the remainder of the same hangar but uncovered no further features of archaeological interest (ORCA 2017, , ORCA 2018).

An evaluation was carried out for a development adjacent to the burnt mound (site 8) , c. 175m south-west of the site. It demonstrated that the mound was much larger than thought and that the surrounding surface is composed of modern makeup with the old ground surface surviving 1.7m below ground level (ORCA 2008).

6.5.2.10 Sites Within the Development Area

There are no Scheduled Monuments (SMs), Listed Buildings (LBs), Garden and Designed Landscapes, Historic Battlefields or World Heritage Sites within the site or Study Area.

6.5.2.10.1 Sites of High Importance

There are no sites of high importance located within the site or Study Area.

6.5.2.10.2 Sites of Medium Importance

There are three sites of medium importance within the site. Site 6 is the overall number for the Hatston airfield the extents of which contains the majority of the onshore component of site, and there is also an upstanding component part of, a bomb store (site 3a). The remains of a previously excavated Iron Age souterrain (site 1), are also located within the site.

6.5.2.10.3 Sites of Low Importance

There are no sites of low importance located within the site or Study Area.

6.5.2.10.4 Sites of Negligible Importance

There are three sites of negligible importance within the site; a possible noust (site 4), a former farmstead (site 12) and the site of a recently removed aircraft hangar (site 5a).

6.5.2.10.5 Sites of Uncertain Importance

The structure currently in use as a barn (site 2) may be associated with the airfield in which case it will probably be of medium importance but further research or investigation would be required to characterise it fully.

6.5.2.11 Historic Environment Assets and their setting

The landscape of Orkney has a predominantly low and gentle relief, the smooth contours of which are emphasised by the scarcity of trees and woodland cover. This landscape, though windswept, supports large areas of productive pastures and some arable farming. The sea is important to the physical and cultural landscapes of Orkney. The meeting of land and sea at the coast, and the features that are formed, are key elements in the landscape. The most dramatic topography is found around Orkney's coastline where spectacular cliffs have been sculpted into arches, stacks, geos (coastal clefts) and gloups (blowholes). These renowned features are essential contributors to Orkney's identity and perception. Along the western coast in particular, the land meets the sea in a cliff rampart up to 300 metres high which has been shaped by the relentless action of Atlantic waves. In contrast, many of the lowest areas appear drowned by shallow lochs and bays. Here, the lower-lying coastal features such as tilted flags, sand dunes and sandy bays present an entirely different character.

There are 5 Scheduled Monuments (SMs), 219 Listed Buildings, and 1 Garden and Designed Landscapes, within or close to the 0 to 5 km Zone of Theoretical Visibility (ZTV) relating to permanent structures associated with the proposed development, the setting of which could potentially be indirectly impacted by the development (Figure 6-2).

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[75] ORCA 2015, *Hatston Enterprise Area, Kirkwall, Orkney, Watching Brief Data Structure Report.* Unpublished report, Project No. 531

[76] ORCA 2017, *Hatston Lay-Down Area, Galt View, Hatston, Kirkwall, Watching Brief Data Structure Report.* Unpublished report. Project No. 734

[77] ORCA 2018 *Hatston Laydown Area, Kirkwall, Orkney Watching Brief Data Structure Report.* Unpublished report. Project No. 751

6.5.2.11.1 Grain Earth House and Grainbank, two souterrains, Hatston SM90154

This Scheduled Monument comprises the remains of two adjacent earth houses, or souterrains,. Souterrains are semi-subterranean structures, usually dated to the Iron Age. Grain Earth House, which is well-preserved, was discovered and excavated in 1827 and again in 1857. A modern entranceway gives access to the interior, which is in two parts. A slightly curved, drystone-lined passage 5m long, 0.8m wide and 0.9m high gives access to an oval chamber 3m long by 1.6m wide and 0.6m high, the lintelled roof of which is supported by 4 slender orthostats.

The second souterrain, sometimes referred to as Grainbank, lies immediately to the west, and is apparently of similar dimensions, although it lies slightly higher in the earth and apparently had a slightly taller entrance passage. It was revealed in 1982 during works to create a carpark, although excavation took place only deep enough to confirm the nature of the monument. The entire structure had been filled in antiquity with earth and rubble, within which were numerous bone artefacts, including a fine weaving comb. The area has now been resurfaced and grassed over.

The souterrains are located within the Hatston Industrial Estate and their setting is entirely confined to their immediate surroundings; consequently they are considered to have a negligible sensitivity to change.

6.5.2.11.2 Quanterness, Chambered Cairn and Prehistoric House SM1365

The monument consists of a chambered tomb of Neolithic date, into which a roundhouse was set in the early Iron Age. The chambered tomb, as a slightly elongated mound concealing a rectangular chamber with six side-chambers. The main chamber was entered by a passage running from the E. Considerable quantities of human and animal bone were recovered, together with pottery and artefacts of bone and stone. At the outer end of the entrance passage, embedded in the mound of the cairn, was a circular structure which was shown after excavation to be a roundhouse of mid first millennium BC date. Although partly excavated, the large bulk of the site has not been examined, and it retains the potential to provide very important information about the known structures. It is partially covered by, and entirely surrounded by, a dense planting of trees; consequently its setting is confined to its immediate surroundings, and it has a low sensitivity to change.

6.5.2.11.3 St Magnus Cathedral, LB36668 Grade A, Kirkwall Conservation Area and associated LBs and SMs

One of the most important cathedrals in Scotland, the impetus to build a cathedral began circa 1117 when Magnus, the man to whom it is dedicated, was murdered on Egilsay by his cousin Hakon, with whom he shared the earldom of Orkney. An extensive period of construction started in 1137 and, as work continued over many years, architectural fashion shifted and styles changed. The tower dates from the early 14th century and the original spire was replaced at first by a timber pyramidal roof and then, in 1916, by the present copper-covered spire. The height of the tower makes it a notable landmark around much of Kirkwall Bay and the surrounding area and it is considered to have a medium sensitivity to change. The Cathedral is located within Kirkwall Conservation Area which contains a number of Listed Buildings and Scheduled Monument; due to the built-up nature of Kirkwall, the sensitivity to change of these remaining features, in terms of their views across to Hatston, is considered to be low.

6.5.2.11.4 Car Ness Battery, Car Ness SM3249

The World War I and II Carness Battery is situated at the head of Car Ness. The battery is in a relatively complete condition and includes two 12-pounder gun-emplacements, Battery observation Post, magazine, searchlight platform, store and crew shelter buildings, engine house, and the remains of a First World War gun-emplacement All that remains of the crew accommodation camp immediately to the S are several concrete hut bases.

The battery faces north-east and was built to provide artillery and anti motor torpedo defence in addition to Wellington Battery over the approaches to the Bay of Kirkwall. Wellington Battery comprised three 6-inch gun emplacements, magazines, shelters, observation post, engine room and searchlight platforms.

The battery was designed predominantly to protect the sea lanes to the north and west; its setting relates predominantly to these views and it has a high sensitivity to change in these directions and a medium sensitivity to change for views in other directions.

6.5.2.11.5 BALFOUR CASTLE GDL00038; BALFOUR CASTLE (WITH GARDEN GATEWAY) SOUND LB18615 Grade A

A large and ambitious mid-19th century designed landscape comprised of formal gardens and Orkney's largest woodland which together form the integral setting of Balfour Castle. One of the architect David Bryce's (1803-76) first large commissions, who also remodelled the grounds incorporating earlier features, in collaboration with garden designer Craigie Inglis Halett. The designed landscape occupies gentle south facing slopes, with views across to mainland Orkney . It has a high sensitivity to change.

6.5.3 Offshore Baseline Conditions

There are no marine cultural heritage statutory designations within the study area, although there are plane wrecks that would fall under PoMRA. There are two UKHO charted wrecks (including a plane wreck) within the study area.

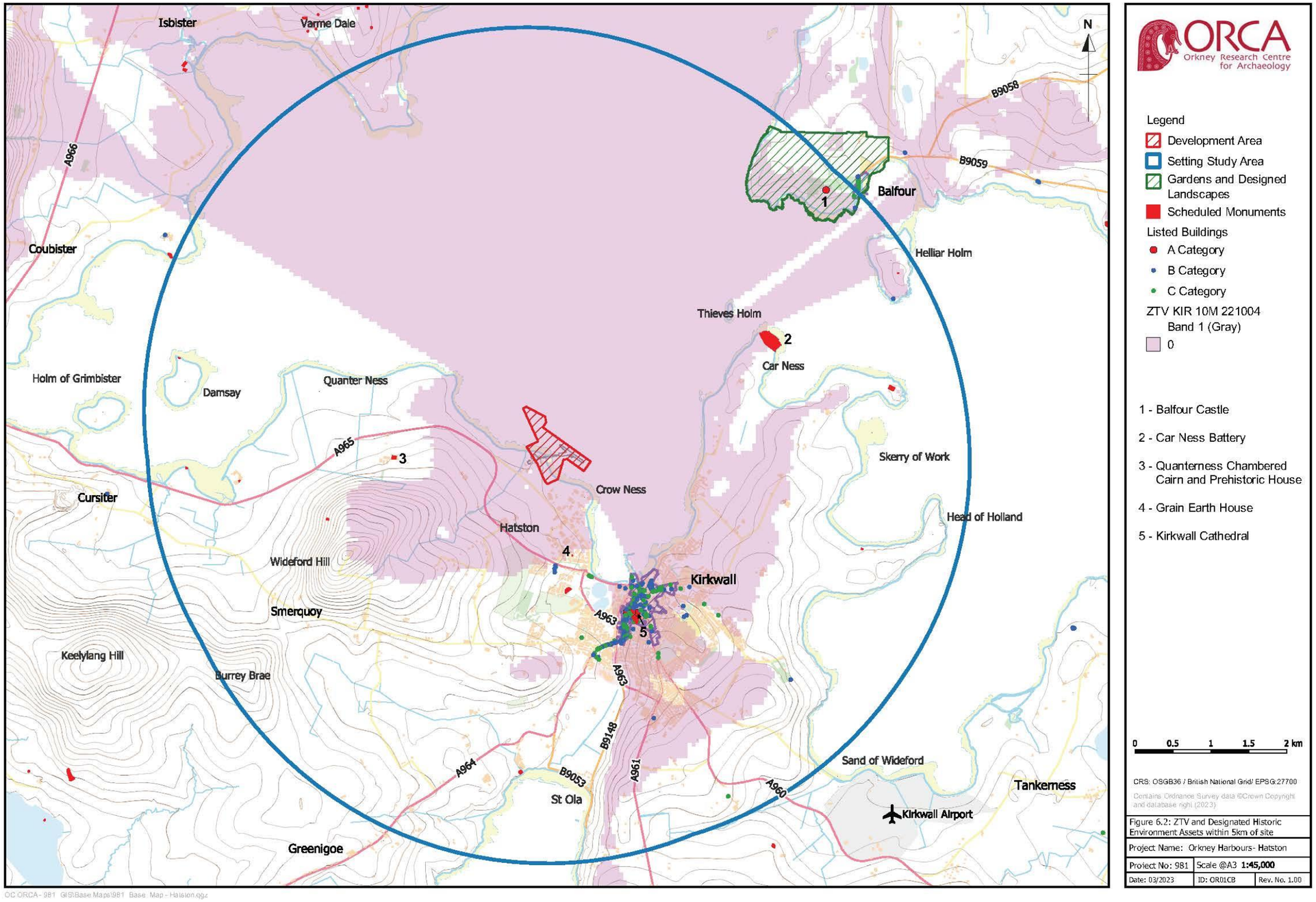

Figure 6-2: ZTV and Designated Historic Environment Assets within 5km of site

Hominids and humans have occupied the UK continental shelf (UKCS) at various times for more than 700,000 years but finds showing this are incredibly rare. Submerged landscapes are where human beings and early hominids previously lived or hunted on terrain which was at that time dry land, or where they exploited fish and shellfish on the coast which is now submerged.

Some 12,000 years ago, at the end of the last Ice Age, relative sea levels around Orkney may have been 30-40m lower than present only reaching current levels approximately 2,000 BC[78][79]. There are no known submerged paleoenvironmental remains in the shallow margins of this part of Kirkwall Bay, and assessment of stratigraphic records of core samples collected during preliminary geotechnical survey work has confirmed there are no sediments of interest for any palaeoecological study (Timpany pers comm). The sediments encountered appear to be likely glacial till (clay, sands and sub-angular to angular gravels) with overlying marine sands that have likely formed since the last glacial period and indicate that this area has never been terrestrial land where organic soils have formed.

Canmore has fourteen losses listed at the location of 'Canmore Wrecks' on Figure 6.1, in Volume 3 Technical Appendix 6-2, because the location of almost all of these wrecks is not known, so they have been placed at the southwest corner of a 1km grid square that contains the name 'Bay of Kirkwall' in 1:25000 OS mapping, even though it is recorded that some were saved and towed away. These are listed in full in , in Volume 3 Technical Appendix 6-2. There is negligible likelihood that these vessels are in the proposed development footprint, because they would have been discovered during the construction of the current Hatston Pier and Ferry Terminal. However, it is possible that the remains of some wrecks survive in the wider area.

Military aircraft went missing in and around Kirkwall Bay, partly due to Hatson being a wartime airfield, and there is a moderate possibility of finding one in the general area (see Table 6-1). Any aircraft would automatically fall under PoMRA. Two of the three aircraft originally listed by Canmore at the Canmore Wrecks location on Figure 6.1, , in Volume 3 Technical Appendix 6-1 have been found (Grumman Wildcat and Grumman Avenger). The Grumman Avenger is located some 4km to the northwest in Wide Firth.

Spitfire BL253 is recorded as having crashed into the sea some 500 yards north of Haston, killing the pilot. Although his body was recovered, the aircraft has not yet been located[80]. The aircraft is of high importance, and falls under PoMRA, meaning that it is an offence to disturb the aircraft without a licence.

The marine historic environment assets with known locations or of high importance are listed in Table 6-9 and shown on Figure 6.1 , in Volume 3 Technical Appendix 6.1.

Table 6-9: Overview of identified marine historic environment assets

Name	Canmore ID	UKHO No	Description	Date lost	Source	Importance
Unknown 3	324290	69750	Sailing vessel. Barque? Shoreline wreckage	Unknown	3,4,5	Low
Grumman Avenger:	270117, 286838, 324221	69279	Grumman Avenger: FN899 832 Sqn.	16/11/1943	1,3,4,5,8,9	High
Grumman Wildcat	324499, 330866	74628	Grumman Wildcat JV526	17/05/1944	1,3,4,5,8,9	High
Supermarine Spitfire	270118	-	Vickers Spitfire BL253 899 Sqn. Crashed into sea 500yds north of Hatston	20/01/1943	1,5,8,9	High
Canmore Wrecks	various	-	See Volume 3 Technical Appendix 6.2	various	5	Negligible-Moderate

Source (see Table 6-X): 1 = Whittaker (1998[5]); 3 = UKHO; 4 = Wrecksite.eu[6]; 5 = Canmore Maritime (Project Adair); 8 = A.R.G.O.S.; 9 = Lamb (2007)[7]

SULA Diving, specialists in interpreting marine geophysical survey data for archaeological remains, undertake regular sidescan sonar surveys on behalf of OICHA which they use to form Hazard to Navigation reports[81]. Their most recent survey was undertaken in 2022 and confirmed that there do not appear to be the remains of any of the wrecks identified in the desk-based assessment, or any other significant wreck remains lying on the seabed present within the site.

6.6 Impact Assessment

6.6.1 Impacts during construction

6.6.1.1 Loss of or damage to known onshore historic environment assets

During construction any activities that include ground-breaking works have the potential to result in the damage to or loss of the seven known assets within the site boundary.

Within the onshore area, potential below ground impact from the proposed development is limited to the construction of short lengths of road, drainage works along the edge of the South Side Reclamation area (a French drain along the boundary line), and a service trench, routed in the existing southern road verge, to the south of the additional North Side Reclamation area. Consequently only one known asset, the previously excavated souterrain, Site 1, actually has the potential to be damaged by the service trench, with the remaining assets within the site located outwith areas of proposed intrusive development. It should be noted that the infilling of the North Side Reclamation Area will prevent any further coastal erosion of the remains of the souterrain.

The souterrain is of medium importance, and the impact from the service trench is considered to be of low magnitude, as at the very worst it would result in the removal of a limited section of any existing remains. This would result in a **minor consequence of impact**, which is not a significant impact under EIA Regulations.

6.6.1.2 Loss of or damage to unknown onshore historic environment assets

During construction any activities that include ground-breaking or reclamation works have the potential to result in the damage to/loss of unknown assets within the onshore site boundary. However, the risk of unknown historic environment assets being present in the site has been heavily reduced because of the desk-based and walkover surveys conducted. In addition, the archaeological watching briefs (Section 6.5.2.9) that have been conducted nearby have not identified any previously unknown features of archaeological interest. Consequently, the site is considered unlikely to contain any unknown archaeological assets of higher than Low importance.

[78] Dawson, S., Wickham-Jones, C.R. (2007). 'Sea level change and the prehistory of Orkney.' In: Antiquity 81, 312
[79] Dawson, S., Bates, R., Wickham-Jones, C. & Dawson, A. (2017). 'Northern North Sea and Atlantic Northwest Approaches. In Flemming, N.C., Harff, J., Moura, D., Burgess, A. & Bailey, G.N. (eds.) *Submerged Landscapes of the European Continental Shelf: Quaternary Paleoenvironments. Chichester*: John Wiley & Sons Ltd. 187-209

[80] http://crashsiteorkney.com/kirkwall-spitfire-bl253.html16
[81] SULA Diving, 2022, *Side scan survey of piers and anchorages.* Confidential report for Orkney Islands Council (Department of Marine services)

Within the onshore area, potential below ground impact from the proposed development is limited to the construction of short lengths of road, drainage works along the edge of the South Side Reclamation area (a French drain along the boundary line), and a service trench, routed in the existing southern road verge, to the south of the additional North Side Reclamation area.

There remains the potential for previously unknown archaeological assets, of low importance, to be subject of an impact of **medium magnitude** of effect, which would result in a minor **consequence of impact**, which is not a significant impact under EIA Regulations.

6.6.1.3 Loss of or damage to known marine and intertidal historic environment assets

During construction, any activities that affect the seabed and intertidal zone have the potential to result in the damage to/loss of known cultural material lying on the seabed. Desk-based assessment identified no wrecks within, or immediately adjacent to the site. Heritage assets with known locations or of high importance are listed in Table 6-9 and shown on Figure 6-1 , in Volume 3 Technical Appendix 6.1. There is a theoretical potential that those assets without a confirmed location might be within the site. However, the risk of loss or damage to these wrecks has been reduced because of the ongoing marine geophysical surveys conducted (SULA 2022), which did not encounter evidence of any identified wrecks on the seabed. It is never possible to eliminate this risk entirely because smaller artefacts/wreckage of stone, non-ferrous materials such as aluminium and wood might not be picked up by such surveys.

The sensitivity of such items could vary anywhere from negligible to high, however due to the surveys conducted to reduce the risk and the localised construction/installation activities, the likelihood of **impact is considered low**. The mitigation (Section 6.7) of the preparation and implementation of a PAD to avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest means that the magnitude of direct impact is **negligible**.

Therefore, the consequence of effect is minor and the resulting **significance of effect minor** and therefore not significant.

6.6.1.4 Loss of or damage to unknown marine and intertidal historic environment assets

During construction, any activities that affect the seabed and intertidal zone have the potential to result in the damage to / loss of unknown cultural material lying on the seabed.

The risk of unknown marine and intertidal historic environment assets being in the Offshore Project Area has been reduced because of the ongoing marine geophysical surveys conducted and reviewed. It is never possible to eliminate the risk entirely, because smaller artefacts/wreckage of stone, non-ferrous materials such as aluminium and wood might not be picked up by such surveys.

The sensitivity of such items could vary anywhere from negligible to high, however due to the surveys conducted to reduce the risk and the localised construction/installation activities, the likelihood of impact is considered low. The mitigation (Section 6.7) of the preparation and implementation of a PAD to avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest means that the **magnitude of direct impact is negligible**.

Therefore, the consequence of effect is minor and the resulting **significance of effect minor** and therefore not significant.

6.6.1.5 Loss of or damage to submerged prehistoric landscapes;

During construction, any activities that affect the seabed and intertidal zone have the potential to result in the damage to / loss of any submerged prehistoric and paleoenvironmental deposits lying on or below the seabed

Submerged prehistoric and palaeoenvironmental deposits are generally considered to have moderate or high sensitivity. However, no submerged palaeoenvironmental deposits have been identified within the site following specialist review of the initial geotechnical investigations, and none is known from other studies.

The surveys conducted and the localised construction/installation activities compared to the potential extent of such deposits means that the likelihood of impact is considered low. The mitigation (Section 6.7) of the preparations and implementation of a PAD to avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest means that the **magnitude of direct impact is negligible**.

Therefore, the consequence of effect is minor and the resulting **significance of effect is minor** and therefore not significant.

6.6.2 Impacts during operation

6.6.2.1 Long-term changes to the setting of historic environment assets that reduces their value

There is a possibility that the site could have long-term effects on the setting of an onshore historic environment asset, affecting the way in which the asset is understood, appreciated and experienced, and thus the significance/ importance of the historic asset.

The following assets have been identified, the setting of which could potentially be indirectly impacted by the development.

6.6.2.1.1 Grain Earth House and Grainbank, two souterrains, Hatston SM90154

These have a negligible sensitivity to change, are not located within the ZTV and therefore would be subjected to a **negligible magnitude** of effect by the construction of the proposed development; which would result in a **negligible consequence** of impact, which is not a significant impact under EIA Regulations.

6.6.2.1.2 Quanterness, Chambered Cairn and Prehistoric House SM1365

This asset has a low sensitivity to change, is not located within the ZTV, and would be subjected to a **negligible magnitude** of effect by the construction of the proposed development, which would result in a **negligible consequence of impact**, which is not a significant impact under EIA Regulations.

6.6.2.1.3 St Magnus Cathedral, LB36668 Grade A, Kirkwall Conservation Area and associated LBs and SMs

St Magnus Cathedral has a medium sensitivity to change, whilst the remaining assets within Kirkwall Conservation area have a low sensitivity to change on the site. They would be subjected to a **negligible magnitude** of effect by the construction of the proposed development, which would result in **a minor consequence of impact**, which is not a significant impact under EIA Regulations.

6.6.2.1.4 Car Ness Battery,Car Ness SM3249

This asset has a high sensitivity to change and would be subjected to a **negligible magnitude** of effect by the construction of the proposed development, which would result in a **minor consequence of impact**, which is not a significant impact under EIA Regulations.

6.6.2.1.5 BALFOUR CASTLE GDL00038; BALFOUR CASTLE (WITH GARDEN GATEWAY) SOUND LB18615 Grade A

This asset has a high sensitivity to change and would be subjected to a **negligible magnitude** of effect by the construction of the proposed development, which would result in a **minor consequence of impact**, which is not a significant impact under EIA Regulations.

6.6.3 Cumulative Impacts

The potential for cumulative effects and cumulative impact has been assessed for the proposed development and three further cumulative schemes (Table 3-2).

The nature of archaeological remains is such that there is no potential for any direct cumulative impacts between the schemes, as there is no pathway for them to impact upon any historic environment assets in common.

The limited visual impact of the proposed development precludes any significant indirect cumulative impact upon the setting of any historic environment asset.

6.7 Mitigation and Monitoring

A Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) to avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest will be compiled and submitted for approval to OIC and MS-LOT and fully implemented during the construction phase of the project.

An Archaeological Watching Brief undertaken during any ground breaking works in the vicinity of the known souterrain (site 1) would mitigate any direct impacts through preservation by record; this could be written into the WSI/PAD.

6.8 Residual Effects

Table 6-10 summarises the effects for all impacts assessed. In summary, no significant residual effects on historic environment assets have been identified.

Table 6:10 Summary of Residual Effects for Archaeology and Cultural Heritage receptors

Predicted Impact	Receptor	Assessment Consequences	Significance	Mitigation Identified	Significance of Residual Effect
Construction					
Loss of or damage to known onshore historic environment assets;	Souterrain – ORCA Site 1	Minor	Not significant	Watching Brief	Not significant
Loss of or damage to unknown onshore historic environment assets;	Unlocated archaeology surviving within the onshore part of proposed development	Minor	Not significant	No additional measures identified	Not significant
Loss of or damage to known marine and intertidal historic environment assets;	None definitively located within site	Minor	Not significant	WSI/PAD	Not significant
Loss of or damage to unknown marine and intertidal historic environment assets;	Unlocated shipwrecks, aircraft and other unknown assets	Minor	Not significant	WSI/PAD	Not significant
Loss of or damage to submerged prehistoric landscapes;	Submerged prehistoric sites & paleoenvironmental deposits	Minor	Not significant	WSI/PAD	Not significant
Operation					
Long-term changes to the setting of historic environment assets that reduces their value	Grain Earth House and Grainbank	Negligible	Not significant	Due to the lack of significant effects, no mitigation measures are proposed	Not significant
	Quanterness, Chambered Cairn	Negligible	Not significant		Not significant
	St Magnus Cathedral, Kirkwall Conservation Area and associated designated assets	Minor	Not significant		Not significant
	Car Ness Battery	Minor	Not significant		Not significant
	Balfour Castle	Minor	Not significant		Not significant

6.9 Statement of Significance

This chapter has considered the likely effects of the proposed development on archaeological assets (both onshore and marine), historic buildings, and other aspects of the historic environment.

Baseline conditions were established through a desk-based assessment of existing archaeological and documentary evidence, a site walk-over survey, assessment of regular sidescan sonar surveys undertaken on behalf of OICHA and assessment of stratigraphic records of core samples collected during geotechnical survey work.

These studies have established that there are no designated heritage assets within the site or in close proximity to the site and that the proposed development will not have a significant impact on the significance or setting of any designated heritage assets in the surrounding area. No marine heritage assets or sediments of interest for palaeoecological study have been identified within the site.

The baseline studies identified a single heritage asset within the area which could be impacted by the proposed development; a souterrain. The level of survival of this asset is unknown, but it has been previously excavated and has been assessed as being of medium value. The potential impact from the proposed development is considered

to be of low magnitude, which would result in a minor consequence of impact, which is not a significant impact under EIA Regulations. This minor impact could be mitigated by implementing a limited watching brief during any intrusive works in the vicinity of the souterrain.

7 SEASCAPE, LANDSCAPE AND VISUAL IMPACT ASSESSMENT

7.1 Introduction

This chapter of the EIAR presents the findings of the seascape, landscape and visual impact assessment (SLVIA) of the proposed development. Potential significant effects, proposed mitigation measures and any anticipated residual effects are identified for both the construction and operational phases of the proposed development.

The location of the proposed development requires that the landscape assessment pay due regard to coastal character. For the purposes of this assessment, the terms 'coastal' and 'coastal character' (as defined and considered within published documents) are considered to fall within the 'seascape' aspect of the SLVIA. In relation to this, this assessment does not consider 'seascape' as a separate and additional topic but as the coastal counterpart to 'landscape' informed by published coastal character assessments. Herein, references to seascape assessment can be considered as referring to the assessment of effect on coastal character and vice versa.

Detail regarding the site and the proposed development is located within Chapter 1 (Introduction) and Chapter 2 (Proposed Development).

7.2 Scoping and Consultation

7.2.1 Scoping report

A scoping report was submitted by Envirocentre on behalf of Orkney Islands Council Harbour Authority for the expansion of Hatston Pier and Harbour to both Orkney Islands Council (OIC) and Marine Scotland in March 2021.

Section 7 of the scoping report considered potential landscape and visual effects. This landscape and visual scoping was based on a preliminary appraisal including a site visit. It sought to consider:

- The landscape/seascape character of the site and surrounding area;
- The coverage of any landscape designations across the site and surrounding area;
- Important views and viewpoints towards the site from the surrounding area;
- Any potentially significant landscape and visual effects during construction and post-completion; and
- Recommendations for mitigating any potentially significant adverse effects.

Neither a ZTV for the proposed development nor a schedule of proposed representative viewpoints was provided at scoping stage.

7.2.2 Scoping opinions

Scoping opinions were received from both:

- Orkney Islands Council (May 2021); and
- Marine Scotland (October 2021)

Both scoping opinions however draw on some of the same consultation responses from statutory consultees and OIC Development Management. The key seascape, landscape and visual matters raised in the scoping opinion of OIC was supported in full by Marine Scotland with no materially additional matters raised.

7.2.3 OIC Scoping Opinion

OIC included a requirement for a Seascape, Landscape and Visual Impact Assessment (SLVIA) within the ES. Section 6.3 of their scoping opinion provides additional detail. It includes the following:

- The response came principally from OIC Development and Marine Planning
- The opinion mentions that 'historic environment assets are considered likely receptors'
- Includes a request to consider cumulative effects
- States that a 'full SLVIA will be required'
- Suggests that viewpoints and receptors should be agreed with the council.

The OIC scoping opinion does not contain any other specific requests.

Individual consultee responses are provided in Appendix 1 of the OIC scoping opinion, in Volume 3 Technical Appendix 3.2. The following contain relevant information.

Development Management (OIC Policy Officer)

This response states that the effects on landscape, seascape and coastal character are likely to be significant as a result of the scale of the proposed development and a full SLVIA should be required as part of the EIAR. This should include an assessment of cumulative effects. It adds:

'In the absence of an identified zone of theoretical visibility (ZTV) it is not possible to comment at this stage on the identification of seascape, landscape and visual receptors. Due to the proposed nature and scale of the development it is likely that landscape and visual impacts will be experienced across the local area. It is therefore considered premature to conclude in the scoping report at para. 7.4.3 that 'it is very unlikely that any significant effects would be experienced', as this will depend on the outcome of the SLVIA and potential mitigation. It is recommended that the developer should identify the ZTV and consult the planning authority to identify viewpoints and key receptors. This is likely to include historic environment assets.'

NatureScot

The scoping consultation response from NatureScot stated that:

'We are not able to comment on the landscape and visual impacts of this proposal. We are currently providing detailed landscape and visual advice in only the highest priority circumstances, where the effects of proposals approach or surpass levels that raise issues of national interest. Our advice is that from the information provided this proposal does not raise landscape issues of national interest.'

Marine Scotland Scoping Opinion

Marine Scotland / The Scottish Ministers agreed with comments made by OIC in their Scoping Opinion. No additional issues were raised. The same OIC Development Management and NatureScot consultation responses were appended.

7.2.4 Further consultations during the assessment

Following receipt of the scoping opinions, further consultations were undertaken during the early stages of the assessment with both OIC and NatureScot. These post-scoping consultations with OIC and NatureScot focused on the following topics:

- The required extent of the study area
- The assessment methodology and criteria
- The selection of representative viewpoints for the visual assessment

- The possible inclusion of heritage locations as visual receptors
- The treatment of seascape and whether this is covered under the heading of coastal character

Consultations with OIC comprised:

- A ZTV and proposed representative viewpoints were issued to OIC on 15 October 2022 prior to undertaking a site visit (no response was received prior to the site visit being undertaken)
- Captured viewpoint locations were shared with OIC on 20 October 2022 following a site visit (no response was received)
- A telephone conversation took place on 28.11.22 between Phillip Black of Sweco and Jamie Macvie of OIC during which viewpoint locations, visual receptors, the National Scenic Area (NSA) and seascape matters were discussed. A number of locations were mentioned for possible consideration including heritage sites where visitors might also be present. Jamie Macvie also suggested that views from ferries might be included.
- A detailed method statement was later issued to OIC on 02.12.22 (no response was received).

Consultations with NatureScot comprised:

- A ZTV and proposed representative viewpoints were issued to NatureScot on 15 October 2022 prior to undertaking a site visit
- Captured viewpoint locations were shared with NatureScot on 20 October 2022 following a site visit
- Sian Haddon from NatureScot responded on 28 October 2022 stating that 'given the information provided in the ZTV, we have nothing to add in relation to the development at Hatston'
- A final email was received from Sian Haddon at NatureScot on 01.12.22. Consideration of seascape was confirmed as requiring reference to the relevant NatureScot guidance document (Guidance Note on Coastal Character Assessment published as Scottish Natural Heritage in July 2018), and to the Orkney and North Caithness Coastal Character Assessment (published as Scottish Natural Heritage in August 2016).

7.2.5 Extent of the study area

No proposed study area was suggested within the scoping report. An initial study area of 15 km radius around the extent of the site was adopted to run preliminary ZTVs. ZTVs showing a 15 km radius study area were issued to both OIC and NatureScot as part of the process of agreeing representative viewpoints. Neither body commented on the extent of the study area. Following completion of the ZTV and preliminary site work a study area of 10 km radius around the site was judged to be adequate. This extent captured most of the area of potential visibility. The adoption of a 10 km radius study area was included in the detailed method statement issued to OIC and NatureScot on 02.12.22.

7.2.6 Representative viewpoints for the visual assessment

No proposed representative viewpoints were included in the scoping report. Following production of a preliminary ZTV, consultations took place in September and October 2022 to agree the representative viewpoints for the visual assessment with OIC and NatureScot. Six representative viewpoints were suggested.

NatureScot stated that they did not have any further comment adding 'given the information provided in the ZTV, we have nothing to add in relation to the development at Hatston.'

No written response was received from OIC. A telephone conversation took place on 28.11.22 between Phillip Black of Sweco and Jamie Macvie of OIC during which viewpoint locations were discussed. Jamie Macvie requested that consideration be given to a view from approaching ferries. Such a view has been included in the assessment.

7.2.7 National Scenic Area (NSA)

It was agreed with both consultees that the proposed development at Hatston posed no issues in relation to potential effects on the Hoy and West Mainland NSA.NSA The designation lies beyond 10 km and outside of the potential ZTV.

7.2.8 Seascape

It was agreed with NatureScot that seascape and coastal character are effectively the same thing and that reference to the Orkney Coastal Character Assessment covered off seascape issues.

OIC deferred to NatureScot on the matter. OIC simply sought (during the call on 28.11.22) that views from the sea be considered. It was suggested that views from the ferries approaching Hatston be considered. Such a viewpoint has been included in the assessment.

7.3 Policy, Legislation and Guidance

7.3.1 National Policy

Scottish Planning Policy (The Scottish Government, June 2014)

Scottish Planning Policy (SPP, 2014) is the Scottish Government's statement on land use planning policy. The following components of SPP relate to the potential landscape and visual effects of the proposed development. In relation to Landscape and Natural Heritage, the government recognises that landscape is subject to change and aims to *"facilitate positive change while maintaining and enhancing distinctive landscape character".* SPP also recognises that different landscapes will have different capacities to accommodate new development, and therefore "the siting and design of development should take account of local landscape character". The following paragraphs are of relevance:

Paragraph 41: Qualities of successful place. This paragraph encourages development that complements local features, for example landscapes, topography, ecology, skylines, spaces and scales, street and building forms, and materials to create places with a sense of identity.

Paragraph 77: Promoting rural development. This paragraph states that in remote and fragile areas and island areas outwith defined small towns, the emphasis should be on maintaining and growing communities by encouraging development that provides suitable sustainable economic activity, while preserving important environmental assets such as landscape and wildlife habitats that underpin continuing tourism visits and quality of place.

Paragraph 194: Policy Principles (valuing the natural environment). This paragraph states that the planning system should facilitate positive change while maintaining and enhancing distinctive landscape character. It also seeks to promote the protection and improvement of the water environment, including rivers, lochs, estuaries, wetlands, coastal waters and groundwater, in a sustainable and co-ordinated way.

Paragraph 202: Development Management (valuing the natural environment). This paragraph states that the siting and design of development should take account of local landscape character. Development management decisions should take account of potential effects on landscapes and the natural and water environment, including cumulative effects. Developers should seek to minimise adverse impacts through careful planning and design, considering the services that the natural environment is providing and maximising the potential for enhancement.

Paragraph 203: Development Management (valuing the natural environment). This paragraph states that planning permission should be refused where the nature or scale of proposed development would have an unacceptable impact on the natural environment. Direct or indirect effects on statutorily protected sites will be an important consideration, but designation does not impose an automatic prohibition on development.

7.3.2 Regional planning policy

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

Statutory Regional Marine Plans are due to be prepared for all Scottish waters. The pilot Pentland Firth and Orkney Waters (PFOW) Marine Spatial Plan is the outcome of a pilot process for setting up planning policy framework for future statutory Regional Marine Plans. Paragraph 12.1 of the Orkney Local Development Plan, 2017, states that the PFOW *"supports an integrated approach to terrestrial and marine planning and the Pentland Firth and Orkney Waters Pilot Marine Spatial Plan, and any subsequent Regional Marine Plan, which will form part of the statutory marine planning regime under the Marine (Scotland) Act 2010, will be adopted as Planning Policy Advice."*

7.3.3 Local planning policy

Orkney Islands Council (OIC) is the local planning authority for Orkney. The Development and Marine Planning Team at OIC cover a range of responsibilities associated with strategic and local policy development for the use, development and protection of land and sea in Orkney. The core responsibility of the team is the preparation and review of the Orkney Local Development Plan and the Orkney Regional Marine Plan.

Orkney Local Development Plan 2017 - 2022

The Orkney Local Development Plan (OLDP), adopted in April 2017, contains the land use planning polices which OIC use for determining applications and OIC development proposals for town, villages and rural settlements within the local authority area. The main document is supported by appendices, Supplementary Guidance, Planning Policy Advice and Development Management Guidance.

The local plan contains the following policies relevant to the seascape, landscape and visual assessment of the proposed development. Policies with a spatial component are included on Figure 7.1, in Volume 2 to this EIAR.

Policies

Policy 1 – Criteria for all development. This policy sets out the general requirements for all development. Of relevance to landscape and coastal character, the policy text states that development will be supported where:

i. It is sited and designed taking into consideration the location and the wider townscape, landscape and coastal character; …

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; …

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 2 – Design. This policy seeks to deliver good design. "Where relevant, proposals must demonstrate, through consideration of scale, massing, form, proportions, plot size/density, materials, layout and landscaping, that it complies with the following fundamental principles:

i. it reinforces the distinctive identity of Orkney's built environment and is sympathetic to the character of its local area;

ii. it has a positive or neutral effect on the appearance and amenity of the area; … and

vi. all external lighting is designed to minimise light pollution."

Policy 9 – Natural heritage and landscape. The remit of this policy is ecology, trees and landscape. The explanatory text states that: *"During the lifetime of the Plan, the Council will investigate and identify Local Landscape Areas. Development within a Local Landscape Area should pay due regard to any supporting information on the areas that is produced by the Council as planning policy advice.'*

Specifically in relation to landscape and coastal character, Policy 9 states that:

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".

Policy 10 – Green infrastructure. This policy deals with green infrastructure including core paths, access and open spaces in settlements. In terms of development, *'Where a proposal will affect access rights, a core path, a right of way or other public paths it will be necessary to … maintain or enhance the amenity value of the current route'.*

Policy 12 – Coastal development. The role of this policy is to manage costal development. The policy is split into several parts listed from A to E. Parts A and E contain relevant policy context information and extracts from each part are included below.

"A - Criteria for all Coastal Development" states *"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;… 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.'

"E - Ports & Harbours" states *"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

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."

Orkney Local Development Plan Supplementary Guidance

Six Supplementary Guidance (SG) documents have been produced to support the OLDP. The SG documents have statutory status, meaning they form part of the Plan and have the same weight when deciding planning applications. The following SG documents contain relevant supplementary planning guidance

- Settlement Statements.
- Historic Environment and Cultural Heritage.

Supplementary Guidance: Settlement Statements (April 2017)

Settlement statements, produced for all the settlements on Mainland and the linked isles, set out the key information for each settlement to complement the policies of the Orkney Local Development Plan. They are intended to be a useful guide to the main issues and requirements which development within that settlement would need to address. The proposed development falls within the Kirkwall settlement area, within allocation area K-19 and immediately adjacent to allocation area K-20 (to the east).

- K-19 Hatston Marine Park is allocated for business and industrial development. It is included in the Crowness Business Park development brief published in October 2012.
- K-20 Orkney Auction Mart is allocated for business and industrial development connected to the operational use of the Orkney Auction Mart (animal grazing and fodder).

Design guidance for the settlement of Kirkwall includes the following of relevance to the proposed development:

"The environment and character of Hatston should be enhanced by development in the following ways:

- *Opportunities for improving landscaping and creating woodlands and open spaces are incorporated wherever possible.*
- *The historic layout of the airfield is used as the framework for new development."*

The "Kirkwall Urban Design Framework" adopted in 2009 is referenced within the Design Guidance section of the Settlement Statement. It is stated that *"an Urban Design Framework for Kirkwall has been produced and was adopted in 2009; it will be reviewed and updated throughout the lifetime of this Plan. The most up-to-date version is a material consideration for planning applications."*. Further information about the Kirkwall Urban Design Framework document is provided in the section below.

Supplementary Guidance Historic Environment and Cultural Heritage (March 2017)

This SG document sets out the required approach to assessing the effects of development on cultural heritage. This matter is considered Chapter 6 (Archaeology and Cultural Heritage). However, consultations with OIC highlighted the need for the visual assessment to consider visitors to heritage sites. No such heritage sites attracting significant numbers of visitors were identified within the study area or ZTV.

Other relevant planning documents

Kirkwall Urban Design Framework (August 2009)

The Kirkwall Urban Design Framework (Kirkwall UDF) is a strategic planning and urban design document for the future development of Kirkwall. The Kirkwall UDF strategic objectives are to be delivered by following 12 planning and design principles. The following 6 planning and design principles are relevant to landscape and coastal character considerations:

"2. To reinforce Kirkwall's distinctiveness and unique sense of place through its new development, and protect and enhance its historic environment;…

4. To ensure new developments respond to the landscape setting and capacity;…

7. To create a greenspace network for Kirkwall;…

9. To redefine the fragmented urban edge through development and improve gateways into Kirkwall;…

10. To improve Kirkwall's streetscape and public realm on a hierarchical basis; and

11. To create a robust landscape framework for the future development of Hatston Industrial area."

The document contains further detailed information for each of the design principles and criteria that *"planning applications must demonstrate"* . The criteria are specific to each of the principles but share common themes such as contributing to the creation of high quality public realm, respecting the local area and conservation and enhancement of landscape setting.

Crowness Business Park (Incorporating Hatston Enterprise Area) Development Brief (October 2012)

This Development Brief, approved in 2012, covers the OLDP 2017 Kirkwall allocation of K-19. The development brief is due to be reviewed and updated to consider the adjoining Kirkwall allocation of K-18 and is a material consideration for the determination of relevant planning applications. The purpose of the development brief document is to provide more detail on the planning and design considerations at Crowness Business Park. The Development vision (pg. 8) states

'the development of the Hatston Pier for use by ferries, cruise ships and cargo vessels determines that the Hatston area will be the first and last land-based experience of Orkney for some visitors, it is therefore important that this creates a positive impression.

The vision for the site is a high quality business and industrial development area to support the renewables industry in Orkney. Development will be able to take advantage of the site's key gateway location to Kirkwall and the outstanding views towards the coast of the west mainland.

Development should contribute positively to redefining a gateway to this fragmented urban edge of Kirkwall, and provide visual and physical connections back towards the Town Centre.

High quality architecture and a positive response to Grainshore Road will assist this, as has been demonstrated to date with the HIE development on site KB-2. A landscape and planting strategy will also be fundamental to the successful integration of this area with the surrounding countryside, and it is also important to consider the view of the development from the sea.

Part of the industrial areas identified may be appropriate for a training facility for Orkney Construction Training Group.'

The Development Brief includes a section on Design Criteria. Design criterion 2: *Boundaries, edges and landscaping* suggest that *"native tree species of local provenance and other trees and shrubs that already grow successfully in the town, such as sycamores, should be used to establish the landscape treatment in the Development Brief area, in particular to assist in screening the industrial areas from the inward sea views and to contribute to this gateway into Kirkwall. Details and specifications should be agreed with the Environmental Policy Planner."*

7.3.4 Key issues emerging from policy context

The key seascape, landscape and visual issues associated with the proposed development have been identified as follows:

- The site is located within the settlement limits of Kirkwall within an area allocated for business and industrial uses
- The Crowness Business Park Development Brief means that the area is subject to further industrial and commercial development
- The scale, location, siting and design of development must nevertheless not have a significant adverse effect, either individually or cumulatively, on the landscape/coastal character or townscape

7.3.5 Guidance

The overall method of assessment is based on the principles established in best practice guidance Guidelines for Landscape and Visual Impact Assessment, Third Edition (2013) (GLVIA3) (Landscape Institute and the Institute of Environmental Management and Assessment). GLVIA3 states that any assessment of effects and the assessment criteria used should be tailored to the specific nature and likely potential effects of the development proposed.

Consideration of costal character has been informed by Nature Scot's "Guidance Note Coastal Character Assessment" (version 1a, July 2018)" Paragraph 1.7 of this guidance explains that 'Coastal character is made up of the often-narrow margin of the coastal edge, its immediate hinterland and areas of sea. These three key components of coastal character include what is commonly known as 'seascape.'

Within the context of SLVIA, this assessment considers 'seascape' as the coastal counterpart to 'landscape'. As such, the method of assessment of effects applied to coastal character receptors has been the same as the approach applied to the assessment of effects on terrestrial landscape character receptors.

7.4 Methodology

7.4.1 Introduction

This text provides the methodology for the assessment of the seascape, landscape and visual impacts (SLVIA) of the proposed Orkney Logistics Hub development at Hatston north west of Kirkwall on the north coast of Mainland in Orkney. The proposed methodology has been developed in response to OIC's scoping opinion dated 13 October 2021 within which paragraph 6.1 requires that seascape, landscape and visual impacts should be addressed in the EIA report. Paragraphs 6.3.1 to 6.3.4 of the Council's scoping opinion provide further guidance on what should be considered by the SLVIA.

7.4.2 Scope of the assessment

The assessment considers effects on landscape and coastal character (the effect on the landscape and seascape resource) and on visual amenity (the effect on people's visual amenity in specific locations).

The assessment will consider both the construction and operational phase effects of the proposed development. It will consider the operational phase effects in year 1 immediately after completion of construction. Separate consideration of effects over the longer term (typically residual effects in year 15 after any mitigation planting has begun to mature) will not be undertaken for this proposed development because, due to the location and specific landscape and coastal character context, mitigation of potential effects is unlikely to include areas of proposed new tree planting to screen the proposed development.

Cumulative effects will also be considered (further information is provided below).

7.4.3 Study area

The proposed development principally comprises the following permanent infrastructure:

- An extension to the existing quay, at approximately 5m AOD, which would include additional light columns;
- New reclaimed laydown areas between the quay and the current coastline, at approximately 5m AOD, coinciding with the length of an existing pier which currently links the two; and
- a ship lift, likely to extent to approximately 26m AOD.

Whilst the permanent infrastructure is likely to be either low-lying or low in height, development of the site would facilitate and introduce activities which, although temporary in nature, would be taller and potentially more widely visible. These could include shipping, cranage, buildings and other associated temporary activities and features.

The following study areas have therefore been adopted for the assessment of effects:

- A general study area of 10km radius around the proposed development for consideration of coastal and landscape character effects; the production of ZTVs; and the selection of representative viewpoints for the visual assessment.
- A focused study area of 2km radius around the proposed development for more detailed consideration of individual visual receptors within the immediate locality including residential locations near to the site.

7.4.4 Zone of Theoretical Visibility (ZTV)

The ZTV, which informed the study areas, was based on a nominal point in the vicinity of the proposed quay extension and run at three AOD elevations:

- 10m AOD as proxy for ground level activity at the proposed extended quay;
- 50m AOD as proxy for larger ships, cargo and operations likely to be occurring in the vicinity of the quay, laydown area and landside areas; and
- 100m AOD to capture a likely upper limit for the height of any larger temporary structures that might in due course be associated with the operation of the quay e.g. the potential temporary presence of taller cranes and cargo. In this respect the ZTV captures a worst case outcome for larger temporary uses of the extended quay.

7.4.5 Determining baseline conditions

Baseline assessments of coastal character, landscape character and visual context have been informed by a combination of desk and field-based techniques.

<u>Desktop assessment</u>

The desk-based review involved the interrogation of the following information sources:

- NatureScot national landscape character assessments – identification of landscape character types (LCT) in the vicinity of the site and across the development ZTV;
- Ordnance Survey mapping and aerial photography relating to existing landform, vegetation, settlement patterns, promoted viewpoints and drainage regimes; and
- Plans containing information relating to landscape designations and landscape related policies at the local and national level.

Field assessment

Field surveys were undertaken in October 2022 and January 2023 from public highways and publicly accessible areas and involved:

- A corroboration of the findings of the desktop review;
- Collection of additional information on landscape elements, landscape and coastal character, views and localised screening; and
- Baseline viewpoint photography from agreed representative viewpoints.

7.4.6 Representative viewpoints, photography and visualisations

The visual assessment is based on eight selected representative viewpoints. The location of the representative viewpoints was informed by the ZTVs and agreed with OIC and with NatureScot. Although photography was in any case obtained in the winter, due to the absence of tree cover and open nature of the Orkney landscape, seasonal differences in the levels of visibility and the visual effect of the proposed development would be very limited.

Photomontage visualisations of the proposed development have not been created or included within this report. The permanent infrastructure of the quay and laydown area would be very low lying and the taller elements, likely to be associated with the quay, would be mobile and temporary features such as visiting shipping. Any photomontage image featuring temporary elements would be highly conjectural.

7.4.7 Assessment criteria

In accordance with GLVIA3, the assessments will use experienced professional judgement to assess the sensitivity of the baseline coastal, landscape and visual environment and to consider the magnitude of potential change that the proposed development would cause. These are then combined to consider the level of effect and its significance. Major and moderate levels of effect are generally regarded to be significant.

Landscape and Coastal Character Areas

The sensitivity of a landscape or coastal character area will be assessed by combining the susceptibility of their key characteristics to the type of changes likely to be associated with the proposed development with the value or importance understood to be attached to the area. Key characteristics can include matters such as scale; enclosure; openness, landform; landcover; landscape pattern; and manmade influences. The sensitivity of the landscape or costal character area will be assessed as High, Medium, or Low using professional judgement.

Assessment of the magnitude of change may take account of all the following factors and professional judgement is used to determine the relevance and appropriate weighting to be attributed to each:

- The degree of change that takes place;
- The geographical extent of the character area that will be changed;
- The likely duration of the change to the character area; and
- Whether the change to the character area would be reversible if the development were decommissioned.

The degree of likely change will be assessed as High, Medium, Low or Negligible. A judgement of a High change is typically defined as the development forming a prominent element or will result in a substantial alteration to key characteristics. A judgement of a Negligible magnitude of change is typically defined as the development will be a barely perceptible or will not change the key characteristics.

A final judgement on the overall level of effect on the landscape or coastal character area will then been made by combining the sensitivity of the receiving environment with the magnitude of change to it. The level of effect will be described using a four-point scale of Major, Moderate, Minor or Negligible and the nature of effect will be judged as Adverse or Beneficial. Reasoned professional judgement will be used to combine considerations and assess the overall level of effect.

Visual

The sensitivity of visual receptors and representative viewpoints will be assessed by combining consideration of their visual susceptibility with the value, or importance, that they are likely to attribute to their available views. The sensitivity of the receptors will be assessed as High, Medium, or Low using professional judgement. Typically, high sensitivity receptors are people with a particular interest in their available view or with prolonged viewing opportunities such as residential locations; tourist destinations providing a specific important and highly valued view; recreational hilltops; ornamental parks/designed landscapes; and core paths. Typically, low sensitivity receptors are people with a passing interest in their surroundings such as places of employment; major highways (excluding those likely to attract high levels of tourist traffic); commercial buildings; and commuters.

Assessment of the magnitude of visual change may take account of all the following elements and professional judgement will be used to determine the relevance and appropriate weighting to be attributed to each:

- The degree of visual change that takes place;
- The geographical extent of the area from which the change will be visible;
- The likely duration of the visual change; and
- Whether the visual change is likely to be reversible if the infrastructure were decommissioned.

The degree of likely visual change will be assessed as High, Medium, Low or Negligible. A judgement of a High magnitude of change is typically defined as the visual changes associated with the development will form a prominent element within the view, resulting in a prominent change to the quality and character of the view. A judgement of a Negligible magnitude of change is typically defined as the visual changes associated with the development will result in a barely perceptible change in the view or will cause no change to the existing view.

A final judgement will be made on the overall level of effect on the visual receptors by combing their sensitivity with the magnitude of visual change that they would likely experience. Overall effects will be described using a four-point scale of Major, Moderate, Minor or Negligible and the nature of effect will be judged as Adverse or Beneficial. Reasoned professional judgement will be used to combine considerations and assess the overall level of visual effect.

7.5 Baseline

7.5.1 Site description

The proposed development site is located to the north west of Kirkwall at a section of north east facing coastline on the western flank of the Bay of Kirkwall. The site area is predominantly open water surrounding the existing Hatston Pier and access road which extends from the coastline. Land reclamation will occur to both sides of this access road, with the north side fully infilled, whilst the south side will have approximately 50% of the area infilled, with the balance retained to create a sheltered harbour space behind the existing main pier.

Behind the coastline adjacent to the site, the land rises gently to the west and continues to gain elevation until reaching the summit of Wideford Hill at 225m, some 3km distant from the site boundary.

Whilst the site at present is predominantly open water, it also encompasses an area of the immediate coastline and adjacent land. The coastline to the south of the pier access road consists of exposed bedrock and large shingle at water level and up to the high spring tide line. Beyond this is a steep grass and ruderal vegetated bank varying between 2 and 10m in height and with an agricultural stock fence line at the boundary of some pasture grazing fields. A second fenceline and embankment of similar grass and ruderal vegetation lie a few metres further back which takes up the level difference to the existing road level of the pier and adjacent existing industrial units. Further south lie open pasture fields rising gently to the west and the site boundary.

To the north of the pier, the coastline within the site boundary comprises of short a section of rock armour adjacent to where the pier extends from the coastline. This extends as to where a short section of bedrock escarpment rises from the water line (at all but low tide). This bedrock takes the form of a small cliff face up to 5m, with very steep loose gravel and stone slopes above taking the coastal edge to a level some 10-15m in height above the varying water level.

Behind this initial coastline lies a short section of scrub grassland and a new access road which ties into the road extending out onto the pier. The rest of the site inland from here rises gently to the west and consists of various light industrial and commercial land uses, with vehicle loading / waiting / parking areas, roads infrastructure as well as an industrial unit and storage tanks. This area is named on the Ordnance Survey maps as Warness Park, but is to be renamed as part of this development and is referred to within this study as Hatston Enterprise Area.

Figure 7.2 View of Hatston Quay

Figure 7.3 View from Hatston Quay towards Wideford Hill

Figure 7.4 View from the Shapinsay Ferry towards Hatston Quay and Wideford Hill

Figure 7.5 View from Blackhill Road towards Hatston Quay and Kirkwall

7.5.2 Landscape character context

Landscape Character Assessment: Orkney Landscape Evolution and Influences (2019)

This document describes the evolution of the Orkney landscape and complements the information contained within the 2019 NatureScot Landscape Character Types (LCT) dataset. The introductory text includes the following:

- *"The islands have predominantly low and gentle relief, the smooth contours of which are emphasised by the scarcity of trees and woodland cover. This landscape, though windswept, supports large areas of productive pastures and some arable farming. The landform is generally lower than 270 metres, except on Hoy, the second largest island, where hills reach 480 metres above sea level. They are characterised by heather moorland cover which contrasts with the pastoral greens of the lower ground;*
- *"The sea is important to the physical and cultural landscapes of Orkney… The most dramatic topography is found around Orkney's coastline where spectacular cliffs have been sculpted into arches, stacks, geos (coastal clefts) and gloups (blowholes). These renowned features are essential contributors to Orkney's identity and perception… In contrast, many of the lowest areas appear drowned by shallow lochs and bays. Here, the lower-lying coastal features such as tilted flags, sand dunes and sandy bays present an entirely different character;*
- *"The legacy of past generations is evident in the rich archaeology of the Orkney landscape…This subtly influences the shape of the landscape, especially through field patterns and hints of building clusters clearly visible from arriving by air"*

NatureScot Scottish Landscape Character Types (2019)

The Scotland-wide digital map-based landscape character assessment (LCA) Landscape Character Type (LCT) boundaries demarcate areas of consistent and recognisable landscape character and is applicable at the local landscape level. The proposed development is located within LCT 301 – Coastal Basin (See Figure 7.6, Volume 2)

LCT 301 Coastal Basin LCT

On Orkney, this LCT is described as having *"a smooth relief falling gently from adjoining higher ground to the concave curve of the coastline, and contains many of the archipelago's lowland burns and wetlands. The basins occur on six islands: Eday, Rousay, Burray, South Ronaldsay, with the largest basins found on West and East"*

The key characteristics of LCT 301 Coastal Basin are:

- *"Wide, basin-shaped landform open to the sea, with smooth relief falling from surrounding hills and cliffs to a concave, curved coastline;*
- *Wetland and small lochs on lower ground and along watercourses and 'ouse' waterbodies behind the coastline, with associated semi-natural vegetation;*
- *Productive agriculture with improved grazing, cultivated grass and arable crops in rectilinear, stone-walled fields;*
- *Woodlands and tree groups are very small scale, scarce but prominent features, associated with buildings;*
- *Many estate farms, resettled crofts and a few small settlements;*
- *Kirkwall is Orkney's main settlement, its townscape around the harbour and historic St Magnus' Cathedral forming a dominant feature in Eastern Mainland and in views from nearby bays;*
- *Mature trees within the urban area of Kirkwall;*
- *Minor and major roads which follow mid-level ground and provide good access to lower ground and beaches;*
- *Rich in archaeology and built heritage including mills, estate farms and Word War II defence sites;* and
- *Views subtly focused by the landform onto the coastline, and skylines form the visual containment when viewed from low level."*

7.5.3 Coastal character context

Orkney and North Caithness Coastal Character Assessment (August 2016)

The Orkney and North Caithness Coastal Character Assessment structure is based on Regional Coastal Character Areas (RCCAs), some of which are further subdivided into Local Coastal Character Areas (LCCAs). The proposed development is located within LCCA 17a The Pier to Craigfield which is part of RCCA 17 Kirkwall (Figure 7.6, Volume 2).

LCCA 17a The Pier to Craigfield

LCCA 17a The Pier to Craigfield is described as follows:

- ***Location and extent:*** *This coast extends from The Pier in the west (north of Hatston) to Craigiefield in the east and includes the Bay of Weyland;*
- ***Maritime influence:*** *This moderately small, semi-enclosed, extent of tidal water from Hatston to Kirkwall, is known as the Bay of Kirkwall and has framed views north across Wide Firth towards the Mainland, Gairsay and Shapinsay. It is animated by wind action and is seldom completely calm. A strong maritime influence exists from the frequent passage of boats and ferries to and from the numerous piers and slipways around the harbour plus associated navigational aids. The smells and sounds of the sea, harbour and fishing trade are prevalent around the bay and experienced at close range often by members of the public and tourists;*
- ***Character of coastal edge:*** *The low lying, generally north facing, subtly indented coastline comprises fragmented rock platforms and skerries, stretches of rock, shingle and sand, and man-made edges such as piers, slipways and retaining walls;*
- ***Character of immediate hinterland:*** *Rolling pasture and arable land rises to the west, beyond the urban edge, and backed by steeply rising moorland hills. To the east pasture and arable landforms a low-lying horizon line beyond the urban edge. There is a degree of shelter and semi containment provided by the built urban edge of Kirkwall and the rising agricultural land to the east and west including moorland hills to the west and distant west;*
- ***Extent of human influence:*** *Settlement is concentrated at Kirkwall and has a typical urban character consisting of hard surfaces, highway elements, street lighting and commercial and light industrial development. Settlement is dispersed thereafter along roads and scattered throughout the urban fringe areas of the hinterland to the west, south and east. Access to the coast is readily available from Kirkwall and surrounding coastal roads; and*
- ***Views:*** *Views are largely focused on harbour activity and the passage of boats and ferries from both the shoreline and from the sea. Sea users experience views focused on Kirkwall.*

7.5.4 Landscape designations

The location and extent of landscape designations are included on Figure 7.1, in Volume 2 to this EIAR.

National Scenic Areas (NSA)

The Hoy and West Mainland NSA lies approximately 10km to the west of the site at its closest point. The ZTVs (Figure 7.8, Volume 2) demonstrate that there would be no potential for visibility of the proposed development from areas within the designation. Therefore the NSA has not been included in this assessment.

Local Landscape Designation

The local authority are in the process of identifying Local Landscape Areas and producing supporting Planning Policy Advice on this matter. At the time of writing, there are no known identified Local Landscape Areas that could

potentially be affected by the proposed development.

7.5.5 Visual context

Topography (Figure 7.7, Volume 2) is the main influence on visibility of the proposed development. The area around the site is visually open. A degree of screening is provided in some close range views by intervening built form located within the vicinity of the proposed development. Landcover, in general, is limited and there are very few trees. The visual context of the coastline in this area is influenced by industrial context of the port. Beyond the site, there are open views over the sea to the north and distant views to the south are limited by the enclosing hills located south of the site.

The ZTV (see section 7.4.4 for details and Figure 7.8, Volume 2) indicated that:

- Potential visibility would principally be limited to areas within approximately 10km of the site
- Areas of potential visibility over shorter distances were primarily associated with the environs of Kirkwall around Kirkwall Bay on Mainland
- Elevated ground to the west of Kirkwall around Wideford Hill prevents potential visibility further to the south and west
- There is no potential visibility from the Hoy and West Mainland NSA
- Longer potential views would occur across Wide Firth from the north west, north and north east

7.6 Impact Assessment

The following landscape and visual receptors have been identified as having potential to be affected by the proposed development:

7.6.1 Coastal and landscape receptors

The receptors for the assessment of coastal and landscape effects of the proposed development are as follows:

LCT 301 Coastal Basin LCT

The landscape is considered to be of medium value. Due to the limited scale of the proposed development, the existing quay and area of industry, susceptibility to the proposed development is considered to be low. Overall this landscape is considered to be **medium sensitivity**.

LCCA 17a The Pier to Craigfield

The coastal character area is considered to be of medium value. Due to the limited scale of the proposed development, the existing quay and area of industry, susceptibility to the proposed development is considered to be low. Overall this landscape is considered to be **medium sensitivity**.

7.6.2 Visual receptors and selected representative viewpoints

Nearby visual receptors are largely restricted to workers of the terminal and industrial estate. Within the wider area the following categories of visual receptors with have been identified as having potential to be affected by the proposed development. Representative viewpoints will be used in the assessment of visual effects. This section provides information about the types of receptors represented by the viewpoints and the sensitivity of each type of receptor to the proposed development

Residential locations

There is potential for residents within residential locations within approximately 1km to 2km of the site to be affected by the proposed development. Residential locations include isolated properties, clusters of residential properties and the settlement of Kirkwall. Residents take an active interest in the visual environment around them and they have prolonged viewing experiences of the landscapes around homes and along streets. Residents are considered to be of **high sensitivity** to changes in the visual environment**.**

This section provides brief descriptions of the typical site-facing views experienced from each of the residential locations identified as having potential to be affected by the proposed development. Whilst there is variation between the visual experiences from each of the identified residential locations, there are also the following common visual elements and experiences:

- With the exception of garden vegetation there is typically no notable vegetation within views from the residential locations;
- Where there are views of the Bay there is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries. During the summer months larger, international cruise ships are visible within the Bay;
- The impression of a ‘flattened’ landscape created by gentle drops in elevation towards the coastline and the low-lying, low-level built form which rarely breaks above the adjacent coastline; and
- The single wind turbine within Hatston Enterprise Area is a notable vertical feature within views where the majority of visual elements combine to create a view with a strong horizonal emphasis.

Quanterness

Figure 7.9 View in the direction of Hatston from the Quanterness access Road

Quanterness residential receptors experience panoramic, open views with some ground level screening provided by garden vegetation. A shallow ridge dropping down from Wideford Hill creates an intermediate horizon within the midground and screens the Hatston Enterprise Area (including the single turbine) from ground level views. The distant horizon becomes visible where the shallow ridge drops away near the coastline. The foreground views are visually simple and typically of open agricultural fields. Visual detail and interest is minimal.

Saverock Cottages

Figure 7.10 View towards Hatston from a local road near the Saverock properties
Saverock residential receptors experience elevated, panoramic, open views with some ground floor level screening provided by garden vegetation. The Bay of Kirkwall extends across north-facing views and the nearby headlands and islands are visible on the horizon. The foreground of open agricultural fields is visually simple. Visual detail is found within the middle distance and beyond where Hatston Enterprise Area is visible on the coast.

Hatston Park and Farm

Figure 7.11 View from the northern edge of Hatston Park towards Hatston Farm and Hatston beyond
Hatston Park residential receptors experience elevated, panoramic, open views from upper floors with ground floor level screening provided by surrounding built form and garden vegetation. The degree of openness at ground level depends on the position of the viewer. From within the cluster of houses, views are fragmented and framed by garden vegetation and neighbouring properties. Views from the northern and eastern boundaries are open and feature Hatston Farm the foreground and Hatston Enterprise Area in the mid-ground. The Bay of Kirkwall extends across the view and headlands and island feature on the distant horizon.

Hatston Cottages

Figure 7.12 View from Hatston Cottages towards Hatston Park and Hatston Farm and Hatston beyond
Hatston Cottages residential receptors experience elevated, panoramic, open views from ground level and upper floors. Views towards the site are open and feature open fields, the lower-lying Hatston Park properties and Hatston Farm. The rooftops of the industrial units within Hatston Enterprise Area are visible over the intervening built forms. Bay of Kirkwall extends across the view and Shapinsay and outlying islands visible on the horizon.

Sunnybank Road

Figure 7.13 View from Sunnybank Road towards Hatston
Sunnybank Road residential receptors experience elevated, panoramic open views from ground level and upper floors. Garden vegetation provides a degree of ground level screening. The Bay of Kirkwall extends across the view and within it there is a horizontal interplay of headlands and islands within the seascape up to the horizon. The single wind turbine within the Hatston Enterprise Area draws a connecting line across the bay and the existing Hatston Quay appears to jut out into the bay.

Blackhill

Figure 7.14 View from Blackhill Road towards Hatston
Blackhill Road residential receptors experience elevated, panoramic open views. The Bay of Kirkwall extends across the view and within it there is a horizontal interplay of headlands and islands within the seascape up to the horizon. The foreground features open field, Sunnybank Road properties feature with the mid-ground. An interesting visual interplay is created where the single wind turbine within the Hatston Enterprise Area draws a connecting line across the bay.

Grainbank

Figure 7.15 View from Grainbank towards Hatston
Grainbank residential receptors visual experience varies from west to east. The greatest degree of openness is experienced at the western end and further east, changes in elevation and the Hatston Enterprise Area built form increase screening in the midground and close in the view. The Bay of Kirkwall though partially screened by the mid-ground features, is visible across the view and the headlines are visible on the horizon.

Kirkwall (north eastern extent)

Figure 7.16 View towards the north-eastern settlement edge of Kirkwall and Hatston beyond

Kirkwall residential receptors include those located on the north-eastern settlement edge where the rise in elevation affords views over intervening built form. The majority of views are framed by adjacent built form. Open views are experienced where properties are located next to open fields. The Bay of Kirkwall extends across the northern extent of the view Wideford Hill is a notable feature within the background. The background topographical context of the Orkney Mainland creates the impression of an open yet contained view.

Castlegreen

Figure 7.17: View from Castlegreen towards Hatston

Castlegreen residential receptors experience open, near sea-level views within some screening provided by garden vegetation and garden outbuildings. The Bay of Kirkwall appears to be 'sandwiched' between the adjacent coastline and the rolling hills of the Orkney Mainland on the horizon. Wideford Hill is a notable background feature. Hatston Enterprise Area is set against this elevated backdrop and the existing Hatston quay is visible amongst the industrial context of the Hatston Enterprise Area.

Core Paths

Consideration of Core Path network users also acknowledges the general rights of access for recreational purposes in Orkney. Figure 7.1 (Volume 2) shows the location of core paths. Core Path users take an active interest in the visual environment around them as they journey along Core Paths through the landscape, They are considered to be of **high sensitivity** to changes in the visual environment.

There is potential visibility of the proposed development from the following Core Path locations within approximately 1km to 2km of the site:

- K4 - Muddisdale and Wideford Hill
- K10 - Seatter Bridleway
- WM - Bay of Puldrite to Hall of Rendall

Roads

The A965 passes within 1km to the south of the site. Locations with potential for visibility of the proposed development include a relatively elevated section of the A965 west of Kirkwall, near Hatston.

Road users are typically of low sensitivity to changes in the visual environment. This is due to the focus of attention on the road and the passing nature of the view. However, in recognition of the scenic nature of the views along this section of the A965 towards Kirkwall road users are considered to be of **medium sensitivity** to changes in the view from the road.

Ferry routes and cruise ships

Several ferry routes head northward from the terminals at Hatston and Kirkwall. Services from Hatston include the NorthLink Ferries services sailing to and from Aberdeen and Lerwick (Shetland). Services from the terminals in Kirkwall include services sailing and from Shapinsay, Rpaness, Papa Westray, Hollandstoun, Edy, Sanday and Stronsay. National and international passenger cruise ships ranging from 4500 capacity ships to 450 capacity ships dock at the anchorages in Hatston and Kirkwall. There is potential for visibility of the proposed development from boats operating on these services as the ferries and cruise ships sails into and out of the terminals at Hatston and Kirkwall.

Ferry and cruise ship passengers would take an active interest in the visual environment around them as they travel into and out of the terminals. They are considered to be of **high sensitivity** to changes in the visual environment.

Recreational locations

There is potential for recreational location visitors within approximately 1km to 2km of the site to be affected by the proposed development. Paragraph 6.3.4 of OIC's scoping opinion identified historic assets as potential visual receptors in recognition that heritage assets on Orkney attract visitors. Visitors to historic assets were considered for inclusion within this assessment but due to the screening effects of topography and built form and lack of public access no historic asset visitor locations have been included in this assessment. For further information about historic assets in relation to the development, please refer Chapter 6 (Archaeology and Cultural Heritage).

There is potential for visibility of the proposed development from locations within Orkney Golf Course. In sporting activities where the focus of the participant is generally on the sporting activity, participants are typically of low sensitivity to changes in the visual environment. However, in recognition of the scenic nature of the landscape within which the gold course is located, visitors to the golf course are considered to be of **medium sensitivity** to changes in the view from the golf course.

Representative viewpoints

The following eight representative viewpoints were identified for detailed assessment. The location of the selected viewpoints is shown by Figure 7.18, Volume 2 Baseline photography is provided on Figures 7.19 to 7.26 (in Volume 2 of this EIAR).

Viewpoint 1, Wideford Hill. Figure 7.19 An elevated long range view from the top of Wideford Hill at an elevation of approximately 209m AOD, approximately 2.7km south-west of the site. The viewpoint is representative of the panoramic views available from this location including those across Wide Firth and the Bay of Kirkwall. The viewpoint is representative of the views experienced by visitors to Wideford Hill including Core Path Users (K4 - Muddisdale and Wideford Hill).

Viewpoint 2, A965 at Quanterness. Figure 7.20 A low level close range view from the closest point of the A965 main road to the site at an elevation of approximately 14m AOD approximately 0.9km west of the site. The viewpoint is representative of the open, expansive views experienced from this slightly elevated section of road within proximity of the site and the coastline. This viewpoint is representative of the views experienced by A965 road users travelling east towards Kirkwall.

Viewpoint 3, A965 at Saverock. Figure 7.21. A low level close range view at an elevation of approximately 32m AOD approximately 1.0km south-west of the site. The viewpoint is representative of the open, expansive views experienced from the this slightly elevated section of road and nearby residential properties. The viewpoint is representative of the views experienced by A965 road users travelling west away from Kirkwall and residential locations west and south-west of Hatston.

Viewpoint 4, Sunnybank Road. Figure 7.22 A slightly elevated medium range view from Sunnybank Road at an elevation of approximately 61m AOD, approximately 1.2 km south-west of the site. The viewpoint is representative of the open north-facing views experienced from the hillside south of Hatston. The viewpoint is representative of views experienced by residents within residential locations on the north-facing hillside south of the site and visitors to Orkney Golf course.

Viewpoint 5, Castlegreen. Figure 7.23 A low level long range view from the headland to the north of Kirkwall, at an elevation of approximately 8m AOD, approximately 2.1km north-east of the site. The viewpoint is representative of the coastal level open west-facing views experienced from the headland north of Kirkwall, norh-east of Hatston. The viewpoint is representative of views experienced by residents within residential locations along the shoreline north-east of Kirkwall.

Viewpoint 6, Puldrite. Figure 7.24 A low level long range view from Puldrite across Wide Firth at an elevation of approximately 15m AOD, approximately 5.9km north-west of the site. The viewpoint is representative of the open, large scale south facing views across Wide Firth towards Kirkwall and Hatston. The viewpoint is representative of the views experienced by visitors to the Puldrite coastline, including those following Core Path WM16 (Bay of Puldrite to Hall of Rendall).

Viewpoint 7, Work Road, Kirkwall. Figure 7.25 A slightly elevated long range view from the eastern side of the town of Kirkwall at an elevation of approximately 39m AOD, approximately 2.7 km south-east of the site. The view is representative of the expansive west facing views available from the landscape east of Kirkwall. The viewpoint is representative of the views experienced by residents within residential locations on the hillside north-east of Kirkwall and users of Users of Core Path WM16 (Bay of Puldrite to Hall of Rendall).

Viewpoint 8, Shapinsay Ferry route. Figure 7.26 A sea level long range view from the Bay of Kirkwall at an elevation of approximately 0 m AOD, approximately 1.5 km north-east of the site. The view is representative of the panoramic open views experienced from open areas of the sea-going vessels within the Bay of Kirkwall, including those towards the Orkney Mainland. The viewpoint is representative of the views experienced by ferry and cruise ship passengers.

7.7 Mitigation and Monitoring

7.7.1 Mitigation measures

Construction mitigation measures and operation phase mitigation measures are adequately addressed by the scheme design. No additional landscape or visual mitigation measures are proposed.

7.7.2 Enhancement opportunities

The Crowness Business Park (Incorporating Hatston Enterprise Area) Development Brief (October 2012) states that "*the development of the Hatston Pier for use by ferries, cruise ships and cargo vessels determines that the Hatston area will be the first and last land-based experience of Orkney for some visitors, it is therefore important that this creates a positive impression"*. The possibility of planting along the coastal frontage is also specifically mooted in the Brief.

The following landscape and visual enhancement opportunities will be delivered as part of the proposed development. Their implementation would assist with integrating the proposed development into the Orkney coastal landscape and they would help create a welcoming environment when pier users transit through Hatston. The extended quay would not be secured and fenced off and would therefore be open to pier users when required, and incorporation of these measures would help safely manage this user access, which includes passengers from cruise liners and passengers accessing and egressing the lifeline ferry service; this would include delineating different areas; and help to steer pedestrians away from the principal operational quayside areas. These proposed measures constitute environmental enhancements and do not form required mitigation upon which the assessments of residual seascape, landscape and visual effects have been assessed:

- Enhanced soft landscape areas would be incorporated into the layout of the proposed development and along the coastal frontage at the back of the new extended quayside. This planting would possibly incorporate some occasional trees in more sheltered positions that would favour their establishment. The principal purpose of such planting would be to soften and integrate the development, and help define different spaces, rather than provide visual screening which would be neither feasible nor necessary. Planting would be used to help delineate different parts of the site and steer pier user (pedestrian) activity away from the main operational areas. Planting areas would also be used to help define the coastal footpath which adjoin the site and delineate and enhance the start/end of the proposed foreshore coastal path (a desired route linking through to Kirkwall and beyond to Carness).
- Measures to accommodate and delineate enhanced future pier user access would be incorporated into the layout and design of the development. This would likely include clearly defined visitor parking provision, occasional lengths of sensitively designed fencing, incidental coastal seating (including the provision of rest seating between parking areas and the quayside for pedestrian users of the ferries), signage, visitor information and interpretation. Although the whole area would be open to pier user (public) access these elements would be used to help manage people's presence and circulation.

7.8 Residual Effects

The potential residual effects of the proposed development have been considered for both the construction phase and the operational phase of the proposed development. Effects would potentially arise as a consequence of permanent structures which would include the extension to the existing pier, the shiplift and the areas of reclaimed land. During operation effects would also potentially arise as a consequence of the activities that would be facilitated by the proposed development for example cargo storage, cranage and movement of maritime vessels.

7.8.1 Coastal and Landscape Character Effects

Construction

There is an existing industrial context which influences the coastal and landscape character along this section of the coastline and construction activities would share similar characteristics, e.g. industrial machinery and laydown areas with industrial materials. However, activities and infrastructure associated construction of the pier and the shiplift and the reclamation the new laydown areas would be of a larger scale and intensity than the baseline industrial activities.

LCT 301 Coastal Basin LCT

The landscape impacts would be direct but contained to a relatively small area of the wider landscape character area. The magnitude of change to the LCT 301 Coastal Basin LCT would be **Low**. During construction the level of effect would be locally **Minor Adverse (not significant)** for the duration of the works, visually contained and temporary.

LCCA 17a The Pier to Craigfield

The coastal impacts would be direct but contained to a relatively small area of the wider coastal character area. The magnitude of change to LCCA 17a The Pier to Craigfield would be **Low**. During construction the level of effect would be locally **Minor Adverse (not significant)** for the duration of the works, visually contained and temporary.

Operation

At operation, the proposed development would result in direct permanent changes along this section of the coastline. The permanent changes can be summarised as the extension to the existing quay which would include additional light columns (approximately 30m AOD); the new reclaimed laydown areas between the quay and the current coastline coinciding with the length of an existing pier which currently links the two; and the new a ship lift (approximately 26m AOD).

Whilst the permanent infrastructure is likely to be either low-lying or low in height, development of the site would facilitate and introduce activities which, although temporary in nature, would be taller and potentially more widely visible. These could include shipping, cranage, buildings and other associated activities.

LCT 301 Coastal Basin LCT

The landscape impacts would be direct but contained to a relatively small area of the wider landscape character area. The magnitude of change to the LCT 301 Coastal Basin LCT would be **Low**. During operation the level of effect would be locally **Minor Adverse (not significant)**

LCCA 17a The Pier to Craigfield

The coastal impacts would be direct but contained to a relatively small area of the wider coastal character area. The magnitude of change to LLCA 17a The Pier to Craigfield would be **Low**. During operation the level of effect would be locally **Minor Adverse (not significant)**.

7.8.2 Visual Effects

The following tables identify the residual visual effects of the proposed development from the eight identified representative viewpoints. Representative viewpoint locations are identified on Figure 7.18, Volume 2. Baseline views from each representative viewpoint area provided within Figures 7.19 to 7.26, Volume 2.

At completion the visual impact of the permanent infrastructure will vary depending on the position of the representative viewpoint and the effects of intervening built form and topography and this is described within the following tables. However, the dynamic visual impacts that would result as a result of the proposed development would be common to the majority of the viewpoints (viewpoint 6, Puldrite is the exception) and would be as follows:

- The pier extension would increase the flow of vessel traffic through the terminal at Hatston and there would be views of the increased the number of ships permitted to berth at Hatston at the same time.
- Views of the activity taking place within the laydown areas and which may include temporary storage and the movement of large structures such as cranes and cargo.

Table 7-1: Viewpoint 1 assessment table

Viewpoint 1, Wideford Hill	
Approximate Distance	2.7 km
Location	E341369, N1011725, 209m AOD
Direction of view	North-east
Receptors	Visitors to Wideford Hill and Core Path Users (K4 - Muddisdale and Wideford Hill)
Sensitivity	**HIGH**
Baseline view	Views from the top of Wideford Hill are panoramic and expansive. The elevated location affords long distance views out over the Bay of Kirkwall and the Wide Firth. The complex horizonal interplay between areas of open water and the headlands and islands creates a visually interesting background to the view. The horizon between the sea and the sky simple and linear. Other than a small area of woodland near Quanterness there is little in the way of notable vegetation. Development is limited. The existing quay at Hatston and the adjacent industrial units within the Hatston Enterprise Area are clearly visible from this elevated location within the landscape. The single wind turbine is visible but set against a backdrop of land and sea. There is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries.
Construction Phase Magnitude of Change	**LOW** There would be long-range open views of the proposed development during construction from the top of Wideford Hill. The construction activities would take place within a section of the coastline where the baseline visual context is influenced by adjacent industrial areas. Construction activities would be centred around the existing Hatston Quay.
Construction Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** During the construction phase the magnitude of visual change would be low and temporary
Operational Phase Magnitude of Change	**LOW** Whilst there would be clear and uninterrupted views of the extended quay, the shiplift and the new reclaimed laydown areas between the quay and the current coastline, and the shiplift, the development would be centred around the existing infrastructure. The eastern reclaimed laydown area would be contained within the extent of the existing eastern arm of the quay. The pier extension west would result in a noticeable extension beyond the current western extent but the change would be relatively small within the wider context of the view.
Operational Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** Based on the existing context and the integration and relationship of the proposed developments to the existing landscape elements.

Table 7-2: Viewpoint 2 assessment table

Viewpoint 2, A965 at Quanterness	
Approximate Distance	0.9km
Location	E342910, N1013072, 14m AOD
Direction of view	East
Receptors	A965 road users travelling east towards Kirkwall
Sensitivity	**MEDIUM**
Baseline view	The view is open and expansive with long range views across the Bay of Kirkwall The viewpoint is located on the section of road where the view opens up as road users travel east round the flank of Wideford Hill. The low-lying position of the Bay of Kirkwall within the northern extent of the view contrasts with the sweeping slopes of Wideford Hill within the southern extent of the view. The existing quay at Hatston is a notable feature that juts out from the coastline. The adjacent industrial units at Hatston Enterprise Area are visible across intervening landscape of open fields but set against the rising landscape north-east of Kirkwall. The northern settlement edge of Kirkwall is visible within the background. The single wind turbine extends into the skyline and is a notable vertical element within the view. There are various pockets of development within the view which include the small clusters of properties north-east of Kirkwall. There is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries.
Construction Phase Magnitude of Change	**LOW** There would be medium-range open views of the proposed development during construction as road users travel towards Kirkwall along the elevated sections of the A965. The construction activities would take place within a section of the coastline where the baseline visual context is influenced by adjacent industrial areas. Construction activities would be centred around the existing Hatston Quay.

Viewpoint 2, A965 at Quanterness	
Construction Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** During the construction phase the magnitude of visual change would be low and temporary.
Operational Phase Magnitude of Change	**LOW** Whilst there would be clear and uninterrupted views of the extended quay, the new shiplift, and the western reclaimed laydown area between the quay and the current coastline, the development would be centred around the existing infrastructure. The eastern reclaimed laydown area would be screened from view by the existing quay. The pier extension west would result in a noticeable extension toward the viewpoint but the change would be relatively small within the wider context of the view
Operational Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** Based on the existing context and the integration and relationship of the proposed developments to the existing landscape elements

Table 7-3: Viewpoint 3 assessment table

Viewpoint 3, A965 at Saverock	
Approximate Distance	1.0km
Location	E342998, N1012448, 32m AOD
Direction of view	North-east
Receptors	Residential locations south west of Hatston which include Quanterness and Saverock Cottages. A965 road users travelling west away from Kirkwall
Sensitivity	**HIGH**
Baseline view	The views is open and panoramic to the north and north east over the Bay of Kirkwall with a strong horizontal emphasis and pattern to the view created by the complex interplay of open water, islands and headlands within the extents of the bay. The cluster of industrial buildings within the Hatston Enterprise Area is clearly visible over the intervening landscape of open fields. The existing Hatston quay is only partially visible due to its location beyond the industrial sheds, The single wind turbine extends into the skyline above the horizon and is a notable vertical element within a view. There is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries.
Construction Phase Magnitude of Change	**LOW** There would be medium-range open views of the proposed development during construction from residential locations south-west of Hatston. The construction activities would take place within a section of the coastline where the baseline visual context is influenced by adjacent industrial areas. Construction activities would be centred around the existing Hatston Quay.
Construction Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** During the construction phase the magnitude of visual change would be low and temporary. The level of effect would be minor and not significant
Operational Phase Magnitude of Change	**LOW** The proposed development would be largely screened by the existing built form within the Hatston Enterprise area. Visible parts of the proposed development would be seen as an extension of the existing land use. Change brought about by the proposed development would be relatively small within the wider context of the view.
Operational Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** Based on the existing context, integration and relationship of the proposed developments to the existing landscape elements of the same type.

Table 7-4: Viewpoint 4 assessment table

Viewpoint 4, Sunnybank Road	
Approximate Distance	1.2km
Location	E 342974, N1011843, 61m AOD
Direction of view	North
Sensitivity	**HIGH**
Receptors	Residential locations on the hillside south of Hatston which include Sunnybank Road, Blackhill, Hatston Park and Farm, Hatston Cottages and Grainbank. Visitors to and users of Orkney Golf course

Baseline view	The view is wide and panoramic across the Bay of Kirkwall. The foreground of open fields affords views of the cluster of residential properties at Hatston Park and beyond this the industrial buildings within Hatston Enterprise Area. Due to the slightly elevated position within the landscape, there is a clear line of sight to the existing Hatston quay over the intervening built forms. The single wind turbine, a notable feature within the view, is less visually prominent from this location where the hub and blades appear set against the background formed by the sea and islands beyond. There is little to no vegetation present in the view. The horizontal character of the view is enhanced by the interplay of strips of land and open water up to the horizon. There is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries.
Construction Phase Magnitude of Change	**LOW** There would be medium-range open views of the proposed development during construction from residential locations located on the hillside south of Hatston and from the golf course. The construction activities would take place within a section of the coastline where the baseline visual context is influenced by adjacent industrial areas. Construction activities would be centred around the existing Hatston Quay.
Construction Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** During the construction phase the magnitude of visual change would be low and temporary. The level of effect would be minor and not significant
Operational Phase Magnitude of Change	**LOW** Whilst there would be clear and uninterrupted views of the extended quay, and the eastern reclaimed laydown area between the quay and the current coastline, and the shiplift, the development would be centred around the existing infrastructure. The majority of the western reclaimed laydown area would be screened from view by the existing built form within Hatston Enterprise Area. The pier extension west would result in a noticeable westward extension but the change would be relatively small within the wider context of the view.
Operational Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** Based on the existing context, integration and relationship of the proposed developments to the existing landscape elements of the same type.

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Table 7-5: Viewpoint 5 assessment table

Viewpoint 5, Castlegreen	
Approximate Distance	2.1km
Location	E346096, N1013258, 8m AOD
Direction of view	West
Receptors	Residential locations located near or along the shoreline north-east of Kirkwall.
Sensitivity	**HIGH**
Baseline view	The coastal level, west-facing view is open and long ranging. The foreground of open fields affords views out over the Bay of Kirkwall and there is a clear line of sight towards the existing Hatston quay and the nearby industrial units. The bay appears to be ‘sandwiched’ between the land within the foreground and the elevated landscape of the Orkney Mainland of which Wideford Hill is a notable topographic feature. Although the view is open the backdrop of hills creates a sense of containment compared to views which look northwards out over the Wide Firth. There is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries.
Construction Phase Magnitude of Change	**LOW** There would be medium to long-range open views of the proposed development during construction from residential locations north-east of Kirkwall. The construction activities would take place within a section of the coastline where the baseline visual context is influenced by adjacent industrial areas. Construction activities would be centred around the existing Hatston Quay.
Construction Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** During the construction phase the magnitude of visual change would be low and temporary. The level of effect would be minor and not significant
Operational Phase Magnitude of Change	**LOW** The pier extension will be visible but the land reclamation will be screened by the existing pier and the western pier extension. The proposed development would result in a noticeable extension to the built form within this area but the change would be connected to the exiting pier and relatively small within the wider context of the views from this location.
Operational Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** Based on the existing context, integration and relationship of the proposed developments to the existing landscape elements of the same type.

Table 7-6: Viewpoint 6 assessment table

Viewpoint 6, Puldrite	
Approximate Distance	5.9km
Location	E342135, N1018890, 15m AOD
Direction of view	South-east
Receptors	Users of Core Path WM16 (Bay of Puldrite to Hall of Rendall)
Sensitivity	**HIGH**
Baseline view	An expansive west facing views from the slightly elevated landscape east of Kirkwall The foreground of open fields affords open views out across the water and to the Orkney Mainland landscape beyond. Built development associated with Kirkwall and Hatston Enterprise Area is set against a slightly elevated backdrop which notably rises up to the east where Wideford Hill is a notable topographic feature within the view. The water appears 'sandwiched' between the coast edge of the headland and the distant coastal edge across the Bay. There is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries.
Construction Phase Magnitude of Change	**NEGLIGIBLE** There would be long-range open views in the direction of the proposed development. Users of Core Path WM16 are unlikely to notice the construction activities taking place at Hatston Quay during construction due to the long-range nature of the view. If construction activities were perceptible, they would occupy a very small extent of the panoramic view from this location and would occur within a section of the coastline where the baseline visual context is influenced by adjacent industrial areas.
Construction Phase Level of effect and significance	**NEGLIGIBLE (NOT SIGNIFICANT)**
Operational Phase Magnitude of Change	**NEGLIGIBLE** Whilst there would be clear and uninterrupted views in the direction of the proposed development, alterations to the view brought about by the proposed development would be barely perceptible due to the distance between the site and the viewpoint.
Operational Phase Level of effect and significance	**NEGLIGIBLE (NOT SIGNIFICANT)]**

Table 7-7: Viewpoint 7 assessment table

Viewpoint 7, Work Road, Kirkwall	
Approximate Distance	2.7km
Location	E346195, N1011479, 39m AOD
Direction of view	North-west
Receptors	Users of Core Path K10 (Seatter Bridleway) and residential locations on the hillside north-east of Kirkwall.
Sensitivity	**HIGH**
Baseline view	As viewed from Work Road, the foreground of open fields affords open views towards the settlement edge of Kirkwall and the due to the relatively lower level position of the built form, the view continues out into the bay and onwards to the Orkney Mainland hills which occupy the back ground of the view. Views from the upper floors of properties within the view would be similar but framed by the adjacent properties. Hatston Enterprise Area buildings, quay and single wind turbine are clearly visible this position as are the properties west of Kirkwall which appear to be set into the slope of Wideford Hill. There is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries.
Construction Phase Magnitude of Change	**LOW** There would be long-range open views of the proposed development during construction from residential locations on the hillside north-east of Kirkwall and from Core Path K10. The construction activities would take place within a section of the coastline where the baseline visual context is influenced by adjacent industrial areas. Construction activities would be centred around the existing Hatston Quay.
Construction Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** During the construction phase the magnitude of visual change would be low and temporary. The level of effect would be minor and not significant

Operational Phase Magnitude of Change	**LOW** The pier extension and western land reclamation area would not be visible from this viewpoint due to the screening effects of the existing pier structure. There would be direct open views of the eastern parcel of reclaimed land but it would be low lying and contained within the extent of development already established by the existing pier. The shiplift would be visible. The proposed development would result in a noticeable alteration to the view but the change would be relative small within the wider context of the views from this location.
Operational Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** Based on the existing context, integration and relationship of the proposed developments to the existing landscape elements of the same type.

Table 7-8: Viewpoint 8 assessment table

Viewpoint 8, Shapinsay Ferry route	
Approximate Distance	1.5km
Location	E345450, N1013591, 0m AOD
Direction of view	South-west
Receptors	Ferry and cruise ship passengers
Sensitivity	**HIGH**
Baseline view	This panoramic open view is representative of those experienced from the open, elevated areas of the ferry as it sails towards the Orkney Mainland. Note that other views from the ferry would be contained and influenced by the elements of the boat such as the parked vehicles and the 'ro-ro' ramp positioned at the front of the ferry. From this particular vantage point, there is a direct line of sight out over the water towards Hatston and the elevated landscape beyond which include the notable topographic feature of Wideford Hill. The existing quay at Hatston is clearly visible along with the industrial units and single wind turbine within Hatston Enterprise Area. The single large wind turbine is also notable although backclothed by the topography of Wideford Hill. Although the view is open, there is a sense of containment created by the elevated topography on the mainland. There is continual movement of maritime vessels ranging in size from small private yachts and trawlers up to large ferries.
Construction Phase Magnitude of Change	**LOW** There would be medium to long-range open views of the proposed development during construction from the Shapinsay Ferry Route. The construction activities would take place within a section of the coastline where the baseline visual context is influenced by adjacent industrial areas. Construction activities would be centred around the existing Hatston Quay.
Construction Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** During the construction phase the magnitude of visual change would be low and temporary. The level of effect would be minor and not significant.
Operational Phase Magnitude of Change	**LOW** There would be direct open views of the pier extension and shiplift from this location within the bay. The areas of reclaimed land would be located behind the existing and extended pier and would not be visible from this location due the screening effects of the existing and extended pier structures. The proposed development would result in a noticeable alteration to the extent of pier within the view but the change would occur within a relatively thin horizonal strip of the coastline and would be relative small within the wider context of the views from this location.
Operational Phase Level of effect and significance	**MINOR ADVERSE (NOT SIGNIFICANT)** Based on the existing context, integration and relationship of the proposed developments to the existing landscape elements of the same type.

7.9 Statement of Significance

Potential effects of the proposed development have been considered for both the construction phase and the operational phase of the proposed development. Effects would potentially arise as a consequence of permanent alterations which would include the extension to the existing pier, the shiplift and the areas of reclaimed land. During operation effects would also potentially arise as a consequence of the activities that would be facilitated by the proposed development for example cargo storage, cranage and movement of maritime vessels.

7.9.1 Coastal and Landscape Character Effects Statement of Significance

One coastal character area and one landscape character area were identified as likely to experience effects as a result of the proposed development. Both the coastal character area and landscape character area have been assessed as likely to experience Minor Adverse effects as a result of the proposed development. No significant landscape or coastal character effects have been identified.

7.9.2 Visual Effects Statement of Significance

Visual effects have been assessed against eight representative viewpoints. Seven of the eight viewpoints were assessed as likely to experience Minor Adverse effects as a result of the proposed development and one has been assessed as likely to experience negligible effects. No significant visual effects have been identified.

8 SOCIO-ECONOMICS

8.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) will identify the likely potential socio-economic effects during the short-term (construction) and long-term (operation) of the proposed development.

The assessment considers the potential direct and indirect economic and demographic impacts from the proposed development on identified key sensitive receptors within the local area.

A baseline has been established through relevant social and economic indicators with national comparisons for context where possible. The magnitude of potential impacts from the proposed development are considered in terms of scale and length of time as a reasonable worst-case. The assessment will seek to mitigate adverse effects and enhance the design, construction and operation of the proposed development to improve the outcomes of the residual effects.

8.2 Scoping and Consultation

8.2.1 Statutory Consultation

An EIA Scoping Report was submitted in March 2021 and is detailed in Volume 3 Technical Appendix 3.2.

The Scoping Report was submitted to both Orkney Islands Council and Marine Scotland as statutory consultees in the EIA process. The proposed development contains elements which are both above and below Mean High Water Springs (MHWS), which constitutes the dividing line between terrestrial and marine planning, therefore both Orkney Islands Council and Marine Scotland were required to be consulted.

An EIA Scoping Opinion was received from Orkney Islands Council in May 2021 and from Marine Scotland-Licensing Operations Team in October 2021. The Scoping Opinions are included within Appendix 3.2.

Both Scoping Opinions agreed that Population and Human Health should be scoped out of the EIA process but that social and economic impacts could potentially arise from the Proposed Works and that these should be fully assessed in the EIA Report.

In response, a methodology for a Socio-economic EIAR chapter was submitted to the statutory consultees on 5th January 2023 for their review and consideration. At time of writing (February 2023), no response has been received from the statutory consultees.

8.2.2 Stakeholder Engagement

Stakeholder engagement has been ongoing throughout the design process including Statutory Public Exhibitions, 1-2-1 meetings with stakeholders, informal drop-in events, workshops, presentations to a variety of participants (including Community Councils), and the issue of newsletters and media releases. This allows for local residents and businesses to access information regarding the proposed development and provide input, feedback and raise any concerns. These inputs have been used to shape the detailed design for the project. A Stakeholder Engagement Plan was produced in September 2022 and is routinely updated once new information becomes available. Stakeholder engagement activities are collated through a central database and relevant actions / suggestions logged with the project team.

Key topics of discussion and concern in relation to socio-economics collated include:

- Project benefits
- Timing of the project
- Potential impacts on traffic
- Finance and how the project will be funded
- Concerns around housing constraints (for construction and operational staff)
- Opportunities for added value, e.g. community benefits, biodiversity enhancements, distribution of benefits across the community
- Desire for projects to proceed to secure maritime activity and jobs for Orkney into the future

The responses within the Stakeholder Engagement Plan informed the assessment and potential impacts anticipated.

8.3 Policy, Legislation and Guidance

8.3.1 National Policy

National Planning Framework 4 (2023)[82]

The NPF4 sets out how future development must support a just transition, highlighting that opportunities for development and regeneration that are designed to tackle social, economic and health inequalities and specifically mentions Orkney and the surrounding waters

The OLB at Hatston in Annex B as a development contributing to *"energy innovation development on the islands".* NPF4 supports development which are for *"renewable energy generation, renewable hydrogen production, infrastructure and shipping, and associated opportunities in the supply chain for fabrication, research and development. Any strategy for deployment of these technologies must enable decarbonisation at pace and cannot be used to justify unsustainable levels of fossil fuel extraction or impede Scotland's just transition to net zero."*

The policy recognises that *"the use of low and zero emission fuels will play a crucial role in decarbonising island and mainland energy use, shipping, strengthening energy security overall and creating a low carbon energy economy for the islands and islanders. The developments will add value where they link into national and international energy expertise, learning and research and development networks."*

The NPF4 also states that: "*It is essential, and a statutory requirement, that people with protected characteristics, including disability, race, age, sex and sexual orientation, and including people from a range of socio-economic backgrounds, are given particular support to express their views on plans and decisions, with consultations designed to meet the communication needs of people*."

When applying the spatial principles in practice, the NPF4 outlines how Scottish Government wants future places to work for everyone and achieve sustainable development.

Scotland's National Marine Plan (2015)[83]

[82] Scottish Government (2023) *National Planning Framework 4*. Available at: https://www.gov.scot/publications/national-planning-framework-4/

[83] Marine Scotland. (2015). Scotland's National Marine Plan. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2015/03/scotlands-national-marine-plan/documents/00475466-pdf/00475466-pdf/govscot%3Adocument/00475466.pdf

Scotland's National Marine Plan (NMP) sets out guidance specifically for regional planners and includes basic legislative requirements. Within these requirements is:

- Keeping under review the physical, environmental, **social**, cultural and **economic** characteristics of the region; the purposes for which it is used; its communication, energy and transport systems; and the living resources which it supports; and
- Setting **economic**, **social**, marine ecosystem and climate change objectives

The NMP states that it "*should be applied proportionately, taking account of the potential scale of impact of any proposal as well as the sensitivity of the environment and/or any potential social or economic effect under consideration*."

The NMP also sets out that "*The Marine (Scotland) Act 2010 requires marine plans to set economic, social and marine ecosystem objectives and objectives relating to the mitigation of, and adaptation to, climate change. Plans must also state policies for, and in connection with, the sustainable development of the area to which this Plan applies*."

The NMP includes the following general policies related to Socioeconomics:

- **GEN 2 Economic benefit**: Sustainable development and use which provides economic benefit to Scottish communities is encouraged when consistent with the objectives and policies of this Plan.

  "*The economic benefit of proposed development and use should be considered carefully and taken into account, appropriately and proportionately, in marine decision making. Particular consideration should be given to opportunities that aim to provide benefit to communities, including local job creation and local training either directly or through supply chain projects*."

- **GEN 3 Social benefit**: Sustainable development and use which provides social benefits is encouraged when consistent with the objectives and policies of this Plan.

  "*The social benefit of proposed developments and increasing use should be considered carefully and taken into account, appropriately and proportionately, in marine decision making. Consideration should be given where industries and developers assist in supporting the development of onshore infrastructure, helping to achieve community cohesion and reducing social disparity. The impact of proposed development on existing activities, including those which promote health and wellbeing, should also be taken into account in decision making*."

- **GEN 4 Co-existence:** Proposals which enable coexistence with other development sectors and activities within the Scottish marine areas are encouraged in planning and decision making processes, when consistent with policies and objectives of this Plan.

  "As development and use of the marine environment continues to increase, there is likely to be increased competition for space. One approach to managing this is to encourage development proposals which bring together activities which are compatible or synergistic in one location, to make good use of space, i.e. those which involve or allow co-existence, taking account of temporal and spatial issues. This applies to a wide range of scenarios, including using existing infrastructure as a basis for a new activity, or taking advantage of opportunities now and in the future as technology advances, or for inshore activities to locate further offshore in tandem with other industries.

  Opportunities for coexistence and synergies may be identified through existing examples, by sectors as new practices and technologies emerge or by data collection at a national or regional level. Where possible, marine planners and decision makers should encourage development or use which does not result in areas being unsuitable for future use by others"

Scotland's National Strategy for Economic Transformation: Delivering Economic Prosperity (2022)[84]

Scotland's National Strategy for Economic Transformation (SNSET) sets out the priorities for Scotland's economy as well as actions needed to maximise opportunities over the next decade to achieve a wellbeing economy. The SNSET sets out five policy programmes of action:

- *"establish Scotland as a world-class entrepreneurial nation founded on a culture that encourages, promotes and celebrates entrepreneurial activity in every sector of our economy*
- *strengthen Scotland's position in new markets and industries, generating new, well-paid jobs from a just transition to net zero*
- *make Scotland's businesses, industries, regions, communities and public services more productive and innovative*
- *ensure that people have the skills they need at every stage of life to have rewarding careers and meet the demands of an ever-changing economy and society, and that employers invest in the skilled employees they need to grow their businesses*
- *reorient our economy towards wellbeing and fair work, to deliver higher rates of employment and wage growth, to significantly reduce structural poverty, particularly child poverty, and improve health, cultural and social outcomes for disadvantaged families and communities"*

These five policy programmes outline how Scotland will tackle long-term structural challenges, build on economic strengths, and position Scotland to maximise economic opportunities of the next ten years.

8.3.2 Regional and Local Policy

The Pilot Pentland Firth and Orkney Waters Marine Spatial Plan[85]

The Pilot Pentland Firth and Orkney Waters Marine Spatial Plan (OWMSP) seeks to: "*support the cultural and social wellbeing of local communities including the maintenance and enhancement of quality of life, and visual amenity in coastal areas*"

General Policy 1B of the OWMSP refers to "*Supporting sustainable social and economic benefits*" which outlines how the renewable energy sector has the potential to have a transformational effect on the local economy. Existing marine industries already make a vital social and economic contribution towards both productivity and employment; the OWMSP aims to support the growth of the renewable energy sector to "*bring forward social, economic and environmental benefits in a way that co-exists with existing economic activities".*

General Policy 1B sets out that developments that are supported by the OWMSP must demonstrate:

- sustainable employment benefits

[84] The Scottish Government (2022) Scotland's National Strategy for Economic Transformation: Delivering Economic Prosperity [online] Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/strategy-plan/2022/03/scotlands-national-strategy-economic-transformation/documents/delivering-economic-prosperity/delivering-economic-prosperity/govscot%3Adocument/delivering-economic-prosperity.pdf

85 The Scottish Government (2016) Pilot Pentland Firth and Orkney Waters Marine Spatial Plan. Available at: https://www.gov.scot/binaries/content/documents/govscot/publications/factsheet/2016/03/pilot-pentland-firth-orkney-waters-marine-spatial-plan/documents/00497299-pdf/00497299-pdf/govscot%3Adocument/00497299.pdf

- that opportunities to support local supply chains and create skilled employment in local communities have been maximised
- that any adverse social, economic and operational effects on existing activities have been avoided, or where avoidance is not possible, adverse effects have been appropriately mitigated
- that opportunities to support synergistic benefits between development and activities have been maximised

It is also emphasised in General Policy 1B that early engagement should be undertaken with the local authority or other relevant bodies if there are likely to be significant impacts on local infrastructure or services.

Orkney Local Development Plan 2017- 2022[86]

The Local Development Plan (LDP) for Orkney outlines planning policies that seek to strengthen and support Orkney's communities by enabling developments which have a positive and sustainable socioeconomic impact on the community. With this, it seeks to utilise locally available resources, whilst striving to preserve and enhance the natural and cultural heritage assets upon which Orkney's economy and society depends.

The LDP seeks to "*support the growth of Orkney's communities in a sustainable manner, ensuring that development is directed in the first instance to places with sufficient infrastructure and facilities to support sustainable social and economic development; the towns, villages and rural settlements of the Plan [LDP].*"

The following policies relate to Socioeconomics:

- **Policy 12: Coastal Development**: Ports & Harbours: "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."

In support of this policy a Masterplan setting out the vision for the physical transformation of harbours across five locations, including Hatston, on the mainland and has been adopted by Orkney Islands Council as supplementary planning guidance.

Orkney Child Poverty Strategy 2022-2026[87]
The Orkney Child Poverty Strategy (OCPS) describes "the impact of poverty on children and shows how the experience of Orkney's children and families compares with Scotland". It sets out five themes to drive the strategy (pockets, prospects, places, prevention and priorities) and includes an action plan which will be taken to meet immediate need and to address long-term prevention of child poverty in Orkney. The outline action plan includes short, medium and long-term target outcomes; those outcomes specific to this socio-economic chapter include:

- Places (Every family has a sustainable home):
  - Extend more employment opportunities to the isles
  - Explore options to apply the benefits from wind power development to reduce home energy costs
- Prevention (Future generations can escape poverty):
  - Promote good employment practice, flexibility and fair pay, and their benefits to employers

8.3.3 Guidance & Industry Standards

There is no published specific methodological guidance and technical significance criteria to assess socioeconomic effects within EIA. Professional judgement based on experience, relevant industry guidance and reports, has informed this assessment. Relevant industry guidance and reports included:

- Institute of Environmental Management and Assessment (IEMA)
- His Majesty's (HM) Treasury's Green Book (2022)
- The Blue Economy in the Highlands and Islands Report (2023)
- Orkney Economic Review (2020)
- Outline Business Case (OBC) for Orkney Harbours Masterplan Phase 1 Projects (2022)

8.4 Methodology

8.4.1 Assumptions & Limitations

The following assumptions and limitations have influenced the data collection and assessment of this chapter:

- There is no technical significance criteria relating to the assessment of socio-economic effects. The assessment approach is to take a 'benchmark' of relevant socio-economic baseline conditions for the identified study area. The baseline of the site and surrounding area has been qualitatively considered where relevant in the context of the proposed development not being delivered. The degree of change is assessed against the sensitivity of the receptor to determine the significance of effect. The degree of uncertainty influences the conclusions on the significance of effects and reflects a conservative outcome i.e. beneficial outcomes are reduced in significance and negative outcomes increased, which is likely to change as more detailed information is made available
- As with any dataset, baseline data will change over time. While the most recent published data sources have been used in this assessment it should be noted that in some instances this data may not be up-to-date
- Based on the information available, the context of the location and the scale and type of the project, it has been assumed that all identified receptors in the assessment are of a **high** sensitivity
- The assessment has been undertaken using information from the OBC for the proposed development such as construction and operational employment numbers, Gross Value Added (GVA) and Net Present Value (NPV) impacts
- The construction timeline and operational dates of the proposed development is 3 years, starting 2024 but this is assumed to be indicative. For the purposes of this assessment it has been assumed that the duration of the construction timeline will be less than 5 years
- The development will be procured on a design and build contract so therefore, it is not possible to determine the exact location from which the construction workforce will be employed (local, regional or at a national level). However, assumptions can be made that this will consist of a mix of local, regional and national workers, due to the scale of the project and that there will be certain requirements placed upon the contractor to utilise local workers and engage the local supply chain
- The specific nature of operational jobs is not known at this stage in the design. It has been assumed for the purposes of this assessment that the development will present the opportunity for an increase in higher paid, more secure permanent employment

[86] Orkney Islands Council (2017) Orkney Local Development Plan [online]. Available at: https://www.orkney.gov.uk/Service-Directory/O/Orkney-Local-Development-Plan.htm

[87] Orkney Islands Council (2022) Orkney Child Poverty Strategy 2022 to 2026 [online]. Available at: https://www.orkney.gov.uk/Files/OHAC/Orkney%20Child%20Poverty%20Strategy%202022-2026.pdf

- The specific operational uses of the proposed development was not known at the time of assessment beyond facilities for multiple industrial activities that require both deep-water berthing and large laydown area. It is assumed that the activities would not adversely affect the commercial viability or efficient working of the harbour or pier for commercial marine / tourism related uses
- The Contractor will facilitate reasonable continued access for the existing users during the construction phase at the Site.
- During operation, there will be increased capacity available. The introduction of provision for the renewables industry to operate during operation of the proposed development is known at the time of the assessment
- Operational activities of shipping traffic will continue to use existing routes and the Navigational Risk Assessment concluded that there is little significant new navigational risk associated with either the construction or operation of the proposed Hatston Pier redevelopment; AND
- The specific impacts on businesses is based on the responses within the Stakeholder Engagement Plan (2022), the Public Consultation Q&A and the OBC.

8.4.2 Study Area

The study area for the assessment differs based on the best information available and receptors identified to inform the design. This includes:

- Site Level - the site (where data is available at this spatial level)
- Local Area – Orkney Islands Council
- National - Scotland / UK (where data is available at this spatial level)

8.4.3 Baseline Conditions

Data has been gathered and summarised in quantitative and/or qualitative terms depending on the availability, relevance and completeness of data at the time of undertaking the assessment. For the purpose of this assessment, the socio-economic baseline comprises the following indicators:

- Population size
- Scottish Indices of Multiple Deprivation
- Employment and economic activity
- Unemployment
- Job Seeker's Allowance
- Workforce qualifications
- Occupation category of residents
- Key business sectors
- Household income
- Tourism volume and value

8.4.4 Cumulative

There are a related projects based in and around Orkney that have the potential to have socio-economic impacts within the local area.

Local future projects included in the assessment are based on the findings within OBC, which include Hatston, Scapa and Lyness. It is assumed that the construction phases of all projects are in parallel. A brief overview of the other projects is provided:

Scapa

Scapa Deep Water Quay comprises new harbour infrastructure on the Scapa Flow coastline of Mainland Orkney between Kirkwall and Holm within the natural deep water harbour of Scapa Flow. Scapa Deep Water Quay and Scapa Flow offer the optimal location for a major assembly hub for fixed and floating wind substructures and turbine integration, as well as small scale manufacturing[88] .

Lyness

Lyness is an existing facility located on the island of Hoy, which had particular prominence as a former wartime Royal Navy base. Investment is required to create a hard standing laydown area behind the quay. There is one site in close proximity to the quayside comprising 3.76 hectares which will be developed provide a suitable laydown area for these activities[89].

Other Developments

In addition to the above schemes, the OIC planning portal was searched for development type relevant to the proposed development that could give rise to cumulative effects:

- 4a Business and industry – Major
- 4a Business and industry – Local (with EIA)
- 5c Waster Management – Local (with EIA)
- 7c Freshwater Fish Farming – Local EIA
- 8c Marine Finfish Farming – Local (with EIA)
- 10a Other developments – Major
- 10c Other Developments – Local (with EIA)
- Pre-App Query

No project was identified within the last 2 years on the planning portal. It is reasonable to assume that projects with the potential to have significant environmental effects, including socio-economic impacts, would be required to have an EIA Scoping Report and that would be available on the planning portal. In the absence of other projects with overlapping construction period and / or any EIA Scoping Reports, no further cumulative effects are considered. For future projects that trigger an EIA, these will need to consider the proposed development as part of their assessment where there is overlap in programme and potential significant effects to meet the EIA regulations.

8.4.5 Key Receptors

As set out in the methodology shared with the statutory consultees prior to preparing this EIAR chapter, the following key receptors have been identified based on the likely relevant impacts of the proposed development and the established study area:

- The existing local communities
- Local businesses
- Marine users
- Other local community assets (including public and other services in housing, education and health)

[88] Orkney Harbours Masterplan Phase 1. (2022). Outline business case.

[89] Orkney Harbours Masterplan Phase 1. (2022). Outline business case.

8.4.6 Magnitude Criteria

Impacts will be categorised according to the following magnitudes:

Major

Total or major change to key receptors of the baseline conditions resulting in fundamental differences. Examples would include major, long term (5+ years) changes to the Site profile, such as operational employment impacts and changes to local Gross Domestic Product (GDP).

Moderate

Loss or change of one or more key receptors of the baseline conditions resulting in material changes. Examples would include short term (<5 years) changes to the Site profile, such as construction employment effects.

Minor

Minor change to key receptor conditions, with limited differences to the baseline. Examples would include minor, short-term changes to the Site profile such as increased traffic congestion during construction.

Negligible

A very minor loss or detrimental alteration to socioeconomic resource, one or more characteristics, features, or elements; or a very minor benefit or positive addition to socioeconomic resource, one or more characteristics, features or elements.

8.4.7 Mitigation and Enhancement

Identifying ways of mitigating potential negative impacts and maximising positive opportunities have been included as part of the assessment. This approach is inherent to a successful EIA process that will inform and improve the design and residual outcomes for the community.

8.4.8 Significant Effects

The assessment of likely significant effects is based on the EIA significance criteria terminology, as set out in table 5.1. An effect of Moderate or above is considered significant.

Table 8-1: significance matrix – significant effects highlighted in bold

	Impact Magnitude			
Receptor Sensitivity / Value	**Negligible**	**Minor**	**Moderate**	**Major**
Low	Negligible	Negligible	Negligible	Slight
Medium	Negligible	Negligible	Slight	**Moderate**
High	Negligible	Slight	**Moderate**	**Substantial**
Very High	Slight	**Moderate**	**Substantial**	**Substantial**

8.4.9 Assessment Methodology

A qualitative analysis has been undertaken using established methodologies, including the Additionality Guide by English Partnerships (2014). The Additionality Guide sets out an approach to measuring the extent to which a proposed development (and associated outputs, outcomes and impacts) is larger in scale, at a higher quality, takes place quicker, takes place at a different location, or takes place at all as a result of intervention. Additionality measures the net result, taking account of deadweight, leakage, displacement, substitution and economic multipliers.

The OBC for the proposed development provides the key outputs and forecast on employment and economic impacts.

To establish the likely potential operational impacts of the proposed development on key receptors, the assessment considers the following for both the construction and operational phases:

- **Impact on employment**; assessed using predicted construction and operational employment
- **Impact on local businesses;** including access and operational activities of existing local businesses, including marine users and tourism
- **Impact on local community**; including capacity of local community services

The results of the socio-economic assessment will benchmark the overall project aims against a variety of additional socio-economic components, and how these meet established social and economic policy objectives at the national level.

8.5 Baseline

8.5.1 Population

The site of the proposed development is located within the ward of Kirkwall West and Orphir. Table 5.2 presents the demographic profile for Orkney Islands and Scotland.

Table 8.2 indicates that in 2021, the life expectancy and fertility rate of the Orkney Islands population was higher than in Scotland. Good or very good general health was also higher and bad or very bad general health lower in Orkney Islands than in the rest of Scotland.

Table 8-2: Population and demographics for Orkney Islands

Indicator	Orkney Islands[90]	Scotland[91]
Population (2021)	22,540	5,479,900
Female population (2021)	11,336	2,807,338
Male population (2021)	11,204	2,672,338
Life expectancy (males) (2019-2021)	80.4	76.6[92]
Life expectancy (females) (2019-2021)	83.8	80.8[8]

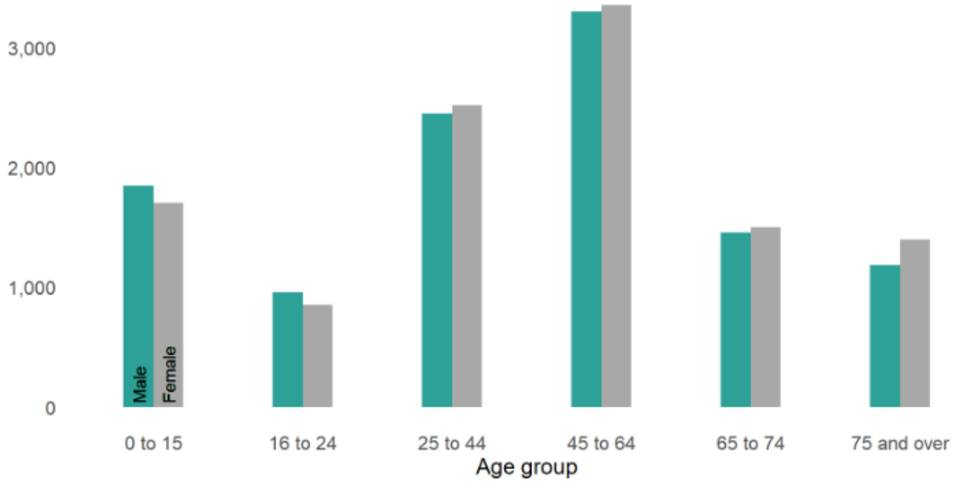
[90] National Records of Scotland (2021) Orkney Islands Council Area Profile. Available at: https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/orkney-islands-council-profile.html#table_pop_est
[91] National Records of Scotland (2022) Mid-2021 Population Estimates Scotland. Available at: https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates/mid-2021#:~:text=Key%20Findings%3A,around%2023%2C100%20people%20(0.43%25).

[92] National Records of Scotland (2022) Life Expectancy in Scotland 2019-2021. Available at: https://www.nrscotland.gov.uk/files//statistics/life-expectancy-in-scotland/19-21/life-expectancy-19-21-report.pdf

Approximated total fertility rate (2021)	1.42	1.31 (2021)[93]
General Health[94]		
General health (bad or very bad %)	2.4%	8.1%
General health (good or very good %)	80.4%	73%

* data in table 5.2 is not available at the 'Site level' study area
* General health is presented as a percentage of the population
* the data source for table 5.2 is included as a footnote reference in the indicator heading. Where a different data source has been used due to data availability, the footnote reference has been included next to the value.

Figure 8-2 shows that in 2021, the 45 to 64 age group was the largest and the 16 to 24 age group was the smallest. Orkney has a higher older population than the Scotland average. The Fraser of Allander Institute identified that the 'natural change' in the population of Orkney population will be negative. With this, the population projections show that Orkney's working age is forecast to decline by 8% between 2018 and 2043 and 'pensioners' are forecast to grow by 28%. Figure 8-3 shows the projected population profile for Orkney between 2018 and 2028.



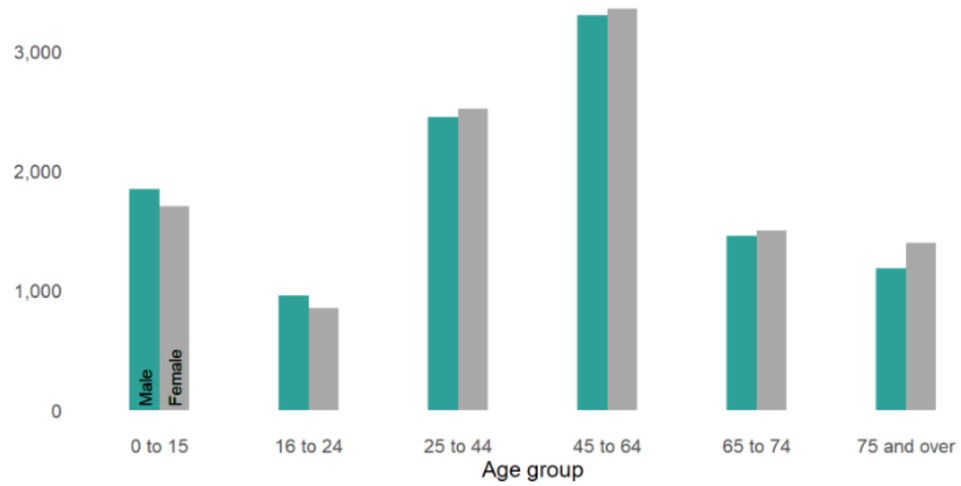
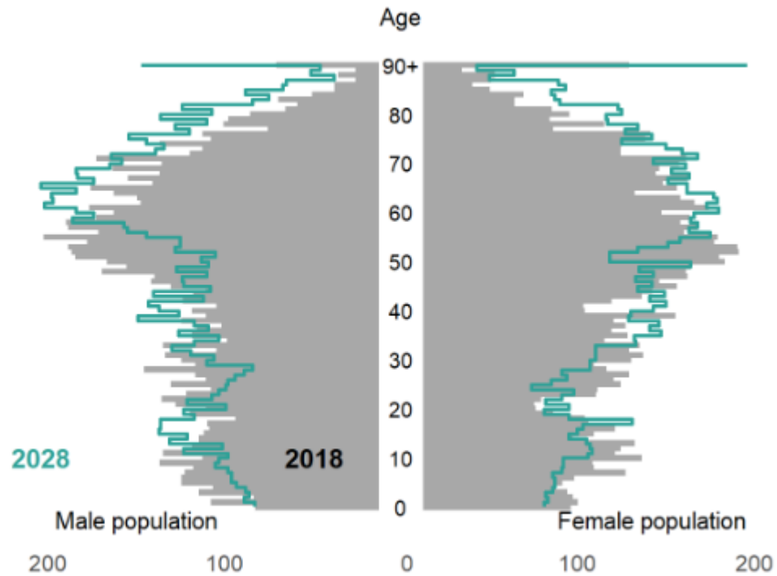


Figure 8-3: Population of Orkney Islands by age and gender (2021)[95].



[93] National Records of Scotland (2022) Birth date the second lowest since records began. Available at: https://www.nrscotland.gov.uk/news/2022/birth-rate-the-second-lowest-since-records-began
[94] Scottish Government (n.d) General Health – Scottish Survey Core Questions. Available at: https://statistics.gov.scot/resource?uri=http%3A%2F%2Fstatistics.gov.scot%2Fdata%2Fgeneral-health-sscq

[95] National Records of Scotland (n.d) Orkney Islands Council Area Profile. Available at: https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/orkney-islands-council-profile.html#population_projections

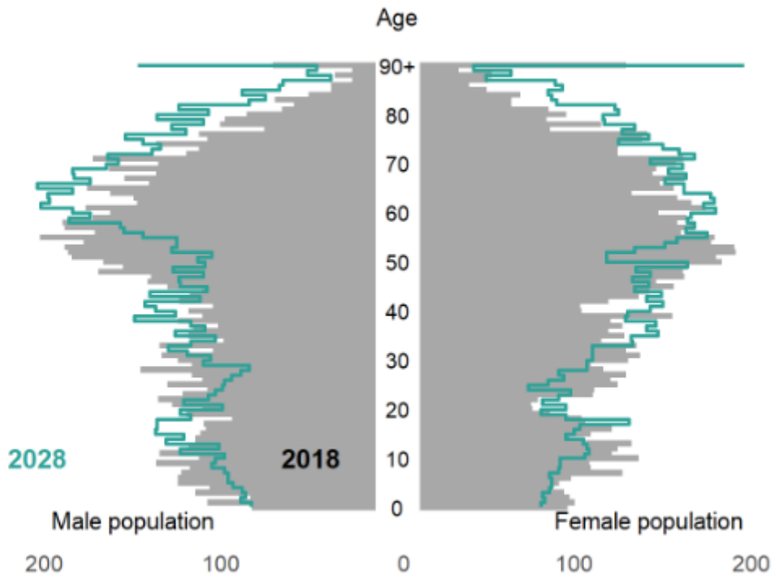


Figure 8-3: Projected population profile for 2018 and 2028 – Orkney Islands[96].

8.5.2 Scottish Indices of Multiple Deprivation

The Scottish Index of Multiple Deprivation (SIMD) is a relative measure of deprivation across 6,976 small areas (data zones) within Scotland. There is an overall index of multiple deprivation rank for each area, which is made up of seven 'domains', which consist of the topics shown in Figure 8-1. The indices of deprivation rank all data zones from 1 to 6,976 (total data zones in Scotland) with 1 representing the most deprived area in Scotland.

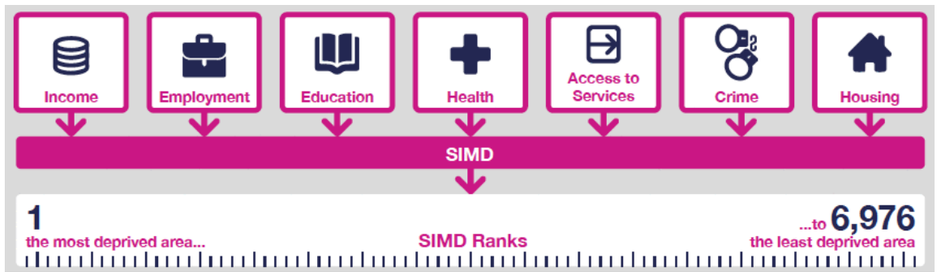


Figure 8-1: Scottish Index of Multiple Deprivation Ranks

The site of the proposed development is located within the "East Mainland" data zone (S01011817). Overall, East Mainland S01011817 is within the 40% least deprived areas in Scotland. Table 5.3 also presents the data for each of the individual domains. East Mainland S01011817 is within at least 40% of the least deprived neighbourhoods for most domains, except for 'crime' and 'geographic access' in which it is within 50% of the least deprived and within 20% of the most deprived respectively.

In the local study area, data zones in the outskirts Kirkwall (east of the site) and out to Finstown (west of the site), score poorly for geographic access, which is expected for rural and likely cumulative with the nature of the island geography. In more central areas of Kirkwall (S01011821 and S01011822) show an inverse trend with low scores in housing and crime and high scores in geographic access. Areas on the edge of Kirkwall to the east and south (S01011818, S01011819 and S01011826) do have improved scores for geographic access but this is not typical of the Orkney Islands (most data zones are within the least 10% for this domain).

Table 8-3 presents the SIMD scores for East Mainland S01011817, which the proposed development is located.

Table 8-3: Scottish Index of Multiple Deprivation Scores

Indices	Data Zone: S01011817 – East Mainland[97] (2020)
Overall rank in Scottish Index of Multiple Deprivation	4,836
	Within 40% least deprived
Income domain rank	4,468
	Within 40% least deprived
Employment domain rank	5,083
	Within 30% least deprived
Education / skills domain rank	5,466
	Within 30% least deprived
Health domain rank	5,175
	Within 30% least deprived
Crime rank	3,578
	Within 50% least deprived
Housing domain rank	5,842
	Within 20% least deprived
Geographic access domain rank	1,187
	Within 20% **most** deprived

The Orkney Child Poverty Strategy 2022-2026[98] describes the impact of poverty on children and shows how the experience of Orkney's children and families compares against Scotland statistics. The strategy outlined the following findings:

- *The percentage of children in working families in Orkney fell sharply from 80% in 2019 to 58% in 2020, dipping below Scotland at 63%*
- *8% of Orkney adults have no savings*
- *12% of Orkney households with children contained an adult with a long term health problem*
- *66% of Orkney households are managing well financially (34% are not)*
- *3% of Orkney households are single parent families and 5% have 3+ children*
- *Of all family households in Orkney, 17% are single parent families and 26% have 3+ children*
- *14.7% of first-time mothers in Orkney are under 25*
- *The End Child Poverty Coalition estimate for child poverty in Orkney after housing costs are deducted from household income is 23%, reflecting the relatively high cost of housing in Orkney*

[96] National Records of Scotland (n.d) Orkney Islands Council Area Profile. Available at: https://www.nrscotland.gov.uk/files/statistics/council-area-data-sheets/orkney-islands-council-profile.html#population_projections
[97] Scottish Government (2020) Scottish Index of Multiple Deprivation 2020. Available at: https://simd.scot/#/simd2020/BTTTFTT/9/-4.0000/55.9000/
[98] The Orkney Partnership (2022) Orkney Child Poverty Strategy 2022-2026. Available at: https://www.orkney.gov.uk/Files/OHAC/Orkney%20Child%20Poverty%20Strategy%202022-2026.pdf

8.5.3 Employment, Unemployment and Economic Activity

Table 8-4 presents employment, unemployment and economic activity statistics for Orkney Islands and Scotland. The data indicates that more people are in employment as a percentage of the total population in Orkney Islands than in Scotland overall. The majority of people are employees in Orkney Islands as opposed to self-employed, and both being employed and self-employment are higher in Orkney Islands than in Scotland as a percentage of the population. Less people are unemployed in Orkney Islands than in Scotland as a percentage of the population.

Table 8-4: Employment and unemployment levels

Economic status[99]	Orkney Islands (Oct 2021-Sep 2022)	Scotland (Oct 2021-Sep 2022)
In employment	81.7%	74.5%
Employees	72.7%	66.4%
Self employed	10.5% (2020)[100]	7.7%
Unemployed	2.7%	3.5%

* Economic status is presented as a percentage of the population
* The data source for Table 8-4is included as a footnote reference in the indicator heading. Where a different data source has been used due to data availability, the footnote reference has been included next to the value.
* Data in Table 8-4 is not available at the 'Site level' study area

8.5.4 Job Seekers Allowance

Table 8-5 presents the Job Seekers Allowance and Universal Credit claimants in Orkney Islands compared with Scotland. The data indicates that the majority of claimants in Orkney Islands are between the ages of 16 and 24, which is also the case for Scotland. The least number of claimants for Orkney Islands are aged 50 or over, which again is also the case for Scotland.

Table 8-5: Job Seeker Allowance and Universal Credit claimants for Orkney Islands and Scotland

Job Seeker Allowance and Universal Credit claimants (2022)[101]		
	Orkney Islands	Scotland
All claimants (aged 16+)	1.6%	3.2%
Aged 16-24	4.5%	4.7%
Aged 25-49	1.5%	3.7%
Aged 50 and over	1.1%	2.3%

*% is number of claimants as a proportion of resident population of the same age
* data in Table 8-5 is not available at the 'Site level' study area

8.5.5 Occupation category of residents

Table 8-6 presents the employment in Orkney Islands compared with Scotland by employment sector. Table 8-6 indicates that 22.8% of the Orkney Islands population are employed within 'skilled trade occupations' which is significantly higher than the national average of 12.5%. The most recent census data available for Orkney is 2011.

Table 8-6: Employment by employment sector (2011)

Employment Sector[102]	Orkney Islands (%)	Scotland (%)
1 Managers, Directors And Senior Officials	8.1	8.4
2 Professional Occupations	12.7	16.8
3 Associate Professional and Technical Occupations	9.4	12.6
4 Administrative & Secretarial Occupations	8.7	11.4
5 Skilled Trades Occupations	22.4	12.5
6 Caring, Leisure And Other Service Occupations	10.8	9.7
7 Sales And Customer Service Occs	6.8	9.3
8 Process Plant & Machine Operatives	7.9	7.7
9 Elementary Occupations	13.2	11.6

* data in Table 8-6 is not available at the 'Site level' study area
* % is as a proportion of all persons in employment (16+)

Table 8-7 presents the employment by industry in Orkney Islands compared with Scotland. Table 8-7 indicates that largest employment sectors within Orkney are: agriculture, forestry and fishing, wholesale and retail trade and human health and social work activities (10.4%, 14.6% and 16.7% respectively). These industries have higher employment in Orkney than Scotland, with agriculture, forestry and fishing, in particular, being significantly higher.

Table 8-7: Employment by industry (2021)[103]

Industry	Orkney Islands (%)	Scotland (%)
A : Agriculture, forestry and fishing	10.4	1.8
B : Mining and quarrying	0.6	1.0
C : Manufacturing	3.8	7.0
D : Electricity, gas, steam and air conditioning supply	0.6	0.7
E : Water supply; sewerage, waste management and remediation activities	0.4	0.8
F : Construction	6.7	6.0
G : Wholesale and retail trade; repair of motor vehicles and motorcycles	14.6	14.2
H : Transportation and storage	7.5	4.1
I : Accommodation and food service activities	5.8	7.5
J : Information and communication	1.7	3.1
K : Financial and insurance activities	0.4	3.1
L : Real estate activities	0.8	1.5
M : Professional, scientific and technical activities	4.2	6.4
N : Administrative and support service activities	2.5	7.9
O : Public administration and defence; compulsory social security	8.3	6.5
P : Education	7.5	8.6
Q : Human health and social work activities	16.7	15.7
R : Arts, entertainment and recreation	3.3	2.4
S : Other service activities	1.5	1.7
T : Activities of households as employers;undifferentiated goods-and services-producing activities of households for own use	0.0	0.0
U : Activities of extraterritorial organisations and bodies	0.0	0.0

[99] NOMIS (2021) Labour Market Profile – Orkney Islands. Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157427/printable.aspx
100 Orkney Islands Council (2020) Orkney Economic Review. Available at: https://www.orkney.gov.uk/Files/Business-and-Trade/Economic_Review/Orkney%20Economic%20Review%202020.pdf
[101] NOMIS (2022) Labour Market profile- Orkney Islands. Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157427/printable.aspx
[102] Orkney Islands Council (2019) Orkney Economic Review 2019. Available at: https://www.orkney.gov.uk/Files/Business-and-Trade/Economic_Review/Orkney%20Economic%20Review%202019.pdf
[103] NOMIS (n.d) Business Register and Employment Survey. Available at: https://www.nomisweb.co.uk/query/construct/submit.asp?forward=yes&menuopt=201&subcomp=

8.5.6 Workforce Qualifications

Table 8.7 presents the level of qualification held by the population of Orkney Islands and Scotland. The data indicates that the majority of the population in Orkney Islands hold an NVQ1 and above qualification, which is cognisant with the data for Scotland overall. NVQ 4 and above is the least held qualification by both those in Orkney Islands and in Scotland overall.

Table 8-7: Qualifications for Orkney Islands and Scotland

Number of people with the following qualifications (all persons aged 16 and over) (2021)[104]:		
	Orkney Islands	**Scotland**
No qualifications	No available data	7.8%
NVQ1* and above	89.5%	86.4%
NVQ2* and above	78.8%	79.6%
NVQ3* and above	58.8%	64.8%
NVQ4* and above	40.6%	50%

NVQ1 - SVQ/NVQ level 1, Level 1 vocational awards, IVQ certificate, Level 1 International Introductory Awards (Academic: GCSE grades D - G, 3/Foundations S Grade, Foundation GNVQ).
NVQ2 - SVQ/NVQ level 2, Level 2 vocational awards, IVQ Technician certificate, IVQ Diploma, Level 2 International awards(Academic: GCSE grades A* - C).
NVQ3 - SVQ/NVQ level 3, Level 3 vocational awards, IVQ Technician Diploma, IVQ Advanced Diploma, Level 3 International Awards (Academic: A- Level)
*NVQ4 - Licentiateship (LCGI), Higher Professional Diploma, SVQ/NVQ level 4, Level 4 vocational awards (Academic: Undergraduate)
* % is as a proportion of resident population of area aged 16-64

The Fraser of Allander Institute reported that in 2018, a higher proportion of those aged 16-64 had level 4 qualifications and above in Scotland (44.2%) than in Orkney (42.5%), although a higher proportion of those aged 16-64 in Scotland had no qualifications (9.7%) than in Orkney (2.7%)[92].

8.5.7 Key business sectors

The structure of the Orkney economy (2018), by sector, is shown in table 8-8. The Orkney Islands Economic Review (Fraser of Allander Institute, 2020) highlighted that tourism is an important source of income for Orkney. The tourism industry "cuts across a number of different sectors, including accommodation and food services, manufacturing and transport, depending on the goods and services that tourists consume when they visit." This report also found that it is estimated that the visitor economy in Orkney is worth over £67m per annum – with average spend per visit at £350.

Table 8-8: GVA share by sector 2018[105]

Sector	**Orkney**	**Scotland**
Agriculture, fishing, mining, electricity, gas, water and waste	14%	7%
Manufacturing	4%	10%
Construction	7%	6%
Wholesale and retail trade; repair of motor vehicles	7%	10%
Transportation and storage	5%	4%
Accommodation and food service activities	2%	3%
Information and communication	1%	4%
Financial and insurance activities	2%	7%
Real estate activities	10%	11%
Professional, scientific and technical activities	6%	7%
Administrative and support service activities	1%	4%
Public administration and defence	12%	7%
Education	5%	6%
Human health and social work activities	24%	10%
Arts, entertainment and recreation	1%	2%
Other service activities	0%	2%

8.5.8 Gross Disposable Household Income

Table 8.9 shows that residents in Orkney Islands have slightly less Gross Domestic Household Income (GDHI) than those in Scotland, which can be explained by a lower rate of income than the national average. The median hourly pay in Orkney Islands is lower than the national average.

Table 8-9: GDHI for Orkney Islands and Scotland

Gross Disposable Household Income (2020)[106]		
	Orkney Islands	**Scotland**
GDHI per head	£19,159	£19,706
Median Hourly Pay (excluding overtime) for all employees (2021)[107]		
	Orkney Islands	**Scotland**
Median Hourly Pay	£13.66	£14.29

8.5.9 Tourism Volume and Value

Table 8.10 presents the tourism profile for Orkney Islands in 2019 and 2020. In 2019 the Transport sector had the largest share of tourism- related income in Orkney, and accommodation benefitted second-highest. Recreation benefitted least from tourism- related income. These trends are similar in 2020, however the tourism-related income is significantly lower: this is attributed to the Covid-19 pandemic in that year.

Table 8-10: Tourism sector statistics for Orkney Islands

Tourism sector[108]	**Orkney Islands (2019)**	**Orkney Islands (2020)****
All staying visitors (000s)*	219.56	77.05
Estimated economic impact from tourism**		
Total (£) (in millions)	95.40	35.48
Distribution of economic impact by sector		
Sector	**£ (in millions)**	**£ (in millions)******
Transport	22.38 (23.5%)	8.049 (22.7%)
Accommodation	20.68 (21.7%)	8.095 (22.8%)
Shopping	18.47 (19.4%)	6.461 (18.2%)
Indirect	17.2 (18.0%)	6.352 (17.9%)
Food and drink	10.89 (11.4%)	4.434 (12.5%)

[104] NOMIS (n.d) Labour Market Profile – Orkney Islands. Available at: https://www.nomisweb.co.uk/reports/lmp/la/1946157427/report.aspx?town=orkney
[105] Fraser of Allander Institute (2020) Orkney Islands Economic Review [online] Available at: https://strathprints.strath.ac.uk/75705/1/FAI_2020_Orkney_Islands_Economic_Review.pdf
[106] Office for National Statistics (2022). Regional gross disposable household income, UK: 1997 to 2020. Available at: https://www.ons.gov.uk/economy/regionalaccounts/grossdisposablehouseholdincome/bulletins/regionalgrossdisposablehouseholdincomegdhi/1997to2020
[107] The Scottish Parliament (2021) Earnings in Scotland. Available at: https://digitalpublications.parliament.scot/ResearchBriefings/Report/2022/3/9/ce765259-d82e-4db7-8ecf-802683f7e56b#43d4dae3-ac86-444b-8354-9a6dea331e3d.dita
[108] Orkney Islands Council (2020) Orkney Economic Review. Available at: https://www.orkney.gov.uk/Files/Business-and-Trade/Economic_Review/Orkney%20Economic%20Review%202020.pdf

Recreation	5.768 (6.0%)	2.092 (5.9%)
Total	**95.4**	**35.48**
Visitor attractions		
St Magnus Cathedral (free admission)	198,521	8,334
Skara Brae (paid admission)	115,136	6,642
Italian Chapel (free admission)	Unknown	Unknown
Skaill House (paid admission)	80,731	1,712
Pier Arts Centre (paid admission)	48,937	Unknown
Orkney Museum (free admission)	44,337	3,387
Visiting Cruise Vessels		
Number of port calls	158	1
Total passengers	132,388	681

*Staying visitors are defined as 'Visitors who are staying overnight for one or more nights away from home for holidays'
**Note: Values may be impacted by the Covid-19 global pandemic.
***Estimated economic impact refers to the economic value / income of the tourism sector in Orkney Islands.
**** % is of total distribution

8.5.10 Future Baseline

The OBC identifies that without the Masterplan proposals, there would be almost no change in current activity at the Orkney Logistics Base.

8.5.11 Design Interventions and Controls

Design interventions and/ or controls have not been proposed prior to this stage in the design as a result of EIA socio-economic assessment.

8.6 Impact Assessment

It is anticipated that the following potential impacts would arise during the construction and operational phase of the proposed development:

8.6.1 Construction Phase

A summary of construction phase impacts is provided in Table 8-13.

Employment opportunities

Construction of the proposed development will require the temporary employment of construction workers throughout each of the construction phases. Construction is anticipated to take place in 3 phases over less than 5 years. The OBC estimates this to be phase 1 in 2024 and phases 2 and 3 in 2027 and 2028 respectively.

Based on the indicative estimates within the OBC, across the five year construction period there are 542 job-years of employment in the Orkney economy from the three projects (including Hatston). This estimate is a potentially significant increase in employment opportunities locally but the detail at this stage of the development is limited. As a result, the assessment adopts a low probability as a worst case scenario. The certainty is likely to increase as the proposed development progresses and the positive impacts potentially increase in magnitude.

Construction of the proposed development is considered likely provide beneficial employment impacts for the local study area of a minor magnitude. This is based on the current lack of detail of the value of the jobs, the amount of employment, the opportunities and training for locals, and as construction jobs will be temporary in nature.

Due to the scale of the proposed development (estimated overall project cost of £77,612,773.60 [109]) the design team anticipate it is likely that a construction contractor will be sourced outside of the local study area. It is likely that the construction workforce will comprise a mix of local, mainland Scotland and international workers. Therefore there is likely to be leakage in terms of additionality, whereas the temporary recruitment of construction workers outside of Orkney will likely have a direct minor benefit the wider economy of mainland Scotland and to a lesser extent the UK and EU (likely negligible).

Table 8-11: Construction impacts: employment impacts by year (full time job years)

Project	2024	2025	2026	2027	2028	2029	2030	Total
Direct	43	0	0	178	202	0	0	**423**
Indirect & Induced	12	0	0	48	59	0	0	**119**
Total	**55**	**0**	**0**	**226**	**261**			**542**

Table 8-12: Construction impacts: employment impacts by year (full time job years) – total employment

Project	2024	2025	2026	2027	2028	2029	2030	Total
Orkney Logistics Base	56	0	0	226	261	0	0	543
Scapa Deep Water Quay	253	505	505	0	0	0	0	1263
Lyness	0	0	0	0	0	15	26	41
Total	309	505	505	226	261	15	26	1846

Local spend

Construction impacts associated with Orkney Logistics Base will generate £26.9m GVA between 2022 and 2030; of this up to £8m will be attributable to the Orkney supply chain over the same period.

It is likely that the construction workforce will comprise a mix of local, mainland Scotland and international workers. Therefore there is likely to be leakage in terms of additionality, whereas the temporary recruitment of construction workers outside of Orkney will likely have a direct minor benefit the wider economy of mainland Scotland and to a lesser extent the UK and EU (likely negligible).

This is considered an indirect minor benefit to local businesses, as the impact would be temporary and there is a degree of uncertainty around the extent of the impact.

Access / operation of local businesses

The proposed development has the potential to impact access and operational activities of local businesses, including marine users, during the construction phase. It is anticipated that the contractor appointed will ensure reasonable access is maintained throughout the construction phase. The magnitude of disruption is considered to be no greater than a minor impact.

Capacity / availability of local businesses

As part of the consultation engagement, local residents raised concerns regarding an increase in construction personnel in the local study area and the impact on capacity of local hotels and other available accommodation.

Magnitude and nature of the impact is dependent on the timing and scale of the workforce required from outside Orkney:

- a moderate adverse impact is likely should a large workforce require accommodation during peak tourist season (summer) and / or during key local events (e.g. Orkney International Island Games 2025) and thereby reducing availability for visitors / attendees / event organisers
- a minor beneficial impact is likely should the workforce require accommodation during the off-peak tourist season, with no major overlap with key local events and thereby increasing income for local businesses in traditionally quieter periods
- a negligible impact is likely should the required workforce sourced from outside the local area be minimal and over a short period

Table 8-13: summary of the identified likely construction impacts

Identified Construction Impacts	Magnitude
Likely temporary increase in employment / jobs for local workers	Minor beneficial
Likely temporary increase in employment / jobs for national / international workers	Negligible beneficial
Likely economic impacts to the local businesses as a result of construction workers temporarily residing in Orkney and associated spend	Minor beneficial
Potential impact on access and operational activities of local businesses and marine users currently using the existing pier.	Minor adverse
Potential impact on capacity of local accommodation during peak season and / or during key events and reducing availability of visitors / attendees / organisers outwith Orkney Islands Council area.	Moderate adverse
Potential impact on the tourist offseason in relation to additional income.	Minor beneficial

[110] Orkney Harbours Masterplan Phase 1. (2022). OBC

8.6.2 Operation phase

A summary of operational phase impacts is provided in 8.14.

Employment opportunities

There are several areas of business identified in the OBC, attracted as a result of the proposed development, including:

- Offshore wind operations and maintenance
- Oil and gas
- Boat repair
- Freight and cargo
- Tidal stream and wave energy
- Aquaculture
- New harbour tenants

There will be likely new jobs opportunities for the operational phase of the proposed development, with requirements for a mix in sector and skills. These opportunities are likely to be higher value added jobs requiring specific skills.

During operation of the proposed development, the OBC predicts that there would be an increase of approximately 94 FTE jobs per annum from 2032 onwards[110] . This is considered to be the base case and includes: direct, indirect and induced employment.

An increase of full time employment is likely to have a positive impact for the local economy. The detail at this stage of the development is limited. As a result, the assessment adopts a low probability as a worst case scenario. The certainty is likely to increase as the proposed development progresses and the positive impacts potentially increase in magnitude. On this basis, the impact is considered to be limited to minor in magnitude.

Local Economy

The OBC states that the proposed development will generate a GVA over a 30 year period of £128M, with an annual average of £5M, above the baseline to the Orkney economy. This includes indirect and induced GVA and attributed largely to offshore wind and operations and maintenance. The scale of the benefit is dependent on the capacity available in the local economy and the procurement practices of various externally based contractors.

This is likely to have a beneficial impact to the local economy but it is unknown if the capacity in the local economy would facilitate a material change for key receptors. It is therefore considered at a minimum a minor impact.

Access / operation of local businesses

The operational phase of the proposed development is likely to increase access and capability for local businesses using the infrastructure. As the level of detail at this stage on the extent and degree of benefits is limited, the magnitude of the impact is limited to a minor beneficial. This is likely to improve as the design and engagement develops.

Local Community Capacity

During the stakeholder engagement activities, concerns were raised by some attendees regarding housing availability due to their perception of a potential ‘influx’ of workers.

The economic assessment as part of the OBC identifies the cumulative number of FTE jobs for Hatston, Scapa and Lyness overall as 'significant but not unachievable or of such a magnitude that it will have substantial negative impacts on Council services: at the same time, consideration in advance will need to be given across a number of areas such as housing, education and health. These forecasts are already being considered within the housing needs assessment currently being undertaken with the Council.' To reflect the level of detail known at this stage, and as part of a wort case scenario approach to te impact assessment, it is considered that the council services and capacity of facilities of the local community would be limited to a minor adverse impact for the proposed development.

The OBC outlined that there are numerous smaller piers and harbours throughout the North and South Isles of Orkney, as well as around the Orkney Mainland: many of which accommodate lifeline island ferry services, aquaculture, fishing and marine leisure activities. These piers are critical in ensuring the viability of small island communities. The proposed development has the potential to facilitate benefits that can be disseminated across the ferry-connected islands in Orkney (for example, by creating accessible job opportunities that are available for people living on the ferry-linked isles). There is potential for the proposed development to added additional infrastructure capacity and increased opportunities for the community but the level of detail and certainty is not available at this stage in the design and therefore not considered as part of the conclusions of this assessment as a worst case scenario approach.

Table 8-14: summary of the identified likely operational impacts

Identified Operational Impacts	Magnitude
New, permanent jobs for local workers and wider opportunities	Minor beneficial
Increase in GVA for the Orkney economy	Minor beneficial
Local community capacity and council services	Minor adverse
Continued access and operations for existing local businesses	Minor adverse

8.7 Mitigation and Monitoring

8.7.1 Construction

During the construction phase, the following mitigation and enhancement measures would reduce adverse impacts and enhance opportunities:

- Requirements upon the contractor to provide local job creation and local training either directly or through supply chain for the construction of the development to provide greater and longer lasting benefit to communities
- Continue to consult with local businesses, including local tourists groups such as Orkney Tourism Group, throughout the proposed development design and construction programme to avoid significant inflow of workers during peak tourist season and large scale events, projects and activities
- Engage with local businesses, including marine users, to understand their access and operational requirements. Contractor and design team should ensure that current operations at the harbour can reasonably continue during construction of the proposed development and effectively communicate when there are any changes to access (including short term changes)
- Engage with local public services such as, the local authority, NHS Orkney, member organisations of the local emergency planning group, and the Community Planning Partnership to ensure there is sufficient capacity in local services and infrastructure to accommodate additional workers
- Community benefits and social value should be maximised during the construction period, such as the provision of apprenticeships, training and work experience opportunities. The baseline indicates that the age group 16 – 24 has the highest proportion on the island of being unemployed; targeting this group would maximise benefits and this would represent a significant opportunity to provide long term employment and development of key green skills locally

8.7.2 Operation

During the operational phase, the following mitigation and enhancement measures would reduce adverse impacts and enhance opportunities:

- New permanent employment opportunities should be made available to local residents in the first instance, in combination with appropriate training, support, development and access to higher skill / paid jobs
- Continued consultation and liaison with Orkney Islands Council and ongoing monitoring of employment forecasts to inform housing need assessments and implications for education and health
- Continue to engage with local businesses, including marine users, to understand their access and operational requirements. Design team should at a minimum ensure that current operations at the harbour can reasonably continue during operation of the proposed development and ideally improve access / capabilities of the pier

8.8 Residual Effects

8.8.1 Construction Phase

A summary of construction phase effects is provided in table 8-15.

Employment opportunities

The magnitude of the impact identified in Section 8.6, will be dependent on the degree that job creation and local training (either directly or through supply chain) is locally based.

Where jobs and opportunities are sourced locally, as per the mitigation set out in section 8.7, the result is likely to be a moderate impact on employment for the local community (a high value receptor), which is assessed as a **Moderate** residual effect.

This is considered a significant beneficial temporary effect of the development.

Local spend

The local spend is likely to have a minor positive impact on the economy of the local community (a high value receptor) and have a greater impact when the construction period is out with the peak tourist season and does not clash with key local events.

Based on the short-term nature of the impact and that the extent of local spend is unclear at this stage in the design, this is considered a Slight beneficial residual effect and therefore not assessed as significant.

Access / Operation of Local Businesses

Access and operational activities of local businesses, including marine users, is assumed to continue to a reasonable degree. Engagement between the contractor and businesses will increase the opportunities to alleviate potential issues. No impact on local community assets identified.

The residual effect is considered limited to Slight adverse and therefore not assessed as significant.

Capacity / Availability of Local Businesses and Local Community Assets

Depending on the timing and scale of the required labour force from outside of the local area, there is the potential for significant **Moderate** adverse effects on the local community and businesses alike as this may limit potential visitor access and experience during peak season/key events.

Should the contractor engage with local businesses and tourist groups (such as Orkney Tourism Group or VisitScotland) to avoid significant inflow of workers during peak tourist season and large-scale events on the island, this effect is likely to be limited to a Slight adverse residual effect and therefore not assessed as significant.

Table 8-15: summary of the identified likely construction effects

Identified Construction Impacts	Identified Effects	Residual Effects
Likely temporary increase in employment / jobs for local, regional and national workers	Slight beneficial	**Moderate beneficial**
Likely economic impacts to the local businesses as a result of construction workers temporarily residing in Orkney and associated spend	Slight beneficial	Slight beneficial
Potential impact on access and operational activities of local businesses and marine users currently using the existing pier.	Slight adverse	Slight adverse
Potential impact on capacity of local accommodation during peak season and / or during key events and reducing availability of visitors / attendees / organisers outwith Orkney Islands Council area.	**Moderate adverse**	Slight adverse
Potential impact on the tourist offseason in relation to additional income.	Slight beneficial	Slight beneficial

8.8.2 Operation phase

A summary of operational phase effects is provided in Table 8-16.

Employment opportunities

An increase of full-time employment, as per the OBC, is likely to have a positive impact for the economy of the local community (a high value receptor). The extent to which this will directly and / or indirectly effect the local area is dependent on a number of factors and capabilities locally, which makes it difficult to determine at this stage in the design.

Based on the information available, the residual effect is considered Slight beneficial and therefore not assessed as significant. This assessment would likely improve as more information is available regarding the FTE opportunities for locals as a result of the proposed development. Where jobs and opportunities are sourced locally, as per the enhancement set out in section 8.7, the result is likely to be a **Moderate** beneficial residual effect.

Local Economy

The scale of the benefit is dependent on the capacity available in the economy of eth local community and the procurement practices of various externally based contractors.

At a minimum, it is considered a Slight beneficial residual effect and therefore not assessed as significant. This assessment would likely improve as more information is available regarding the capacity within the local economy to support the supply chain for the proposed development. Where jobs and opportunities are sourced locally, as per the enhancement set out in section 8.7, the result is likely to be a **Moderate** beneficial residual effect.

Access / Operation of Local Businesses

It is anticipated that the operation of the proposed development would incorporate inclusive design to facilitate the current access requirements for local businesses, including marine users, and potentially improve access and capabilities.

The residual effect is considered limited to Slight beneficial and therefore not assessed as significant.

Local Community Capacity

The OBC identifies that the cumulative impact of three local schemes (Hatston, Scapa and Lyness) will not have substantial negative impacts on council services. There is also potential for positive impacts to the wider community.

With ongoing consultation and monitoring as outlined in the mitigation section of this report, it is considered that the residual effect would be limited to Slight adverse and therefore not assessed as significant.

Table 8-16: summary of the identified likely operation effects

Identified Operation Impacts	Identified Effects	Residual Effects
New, permanent jobs for local workers and wider opportunities	Slight beneficial	**Moderate beneficial**
Increase in GVA for the Orkney economy	Slight beneficial	**Moderate beneficial**
Continued access and operations for existing local businesses	Slight adverse	Slight beneficial
Local community capacity and council services	Slight adverse	Slight adverse

8.9 Statement of Significance

This chapter has identified the likely potential socio-economic effects during the short term (construction) and long term (operation) of the proposed development. Key sensitive receptors include:

- The existing local communities
- Local businesses
- Marine users
- Other local community assets

Potential impacts during both construction and operational phases included:

- Employment opportunities
- Local spend opportunities
- Access and operational impacts for existing local businesses
- Capacity of the local community and businesses

Many of the benefits from the proposed development are dependent on the capacity and skill set of the local supply chain and workforce, and local employment opportunities both directly and indirectly attributed to the proposed development. This is difficult to assess at this stage in the design. The design team and Contractor will need to support local jobs and opportunities to ensure benefits to the local area. The assessment concluded residual significant beneficial effects for the employment and the economy of the local community should mitigation and enhancement measures be adopted.

Access and operational activities of existing businesses are assumed to be maintained to a reasonable degree and therefore no significant effect identified.

The scale of employment opportunities is assessed within the OBC and concludes that is would be of a magnitude that would not have substantial negative impacts on Council services. The report also highlights that consideration in advance will need to be given across a number of areas such as housing, education and health. These forecasts

are already being considered as part of the Council's housing needs assessment and continued monitoring / updates is recommended.

There is a potential significant adverse effect during the construction phase should a large workforce from outside of the local area be required and as a result limits potential visitor access and experience during peak season / local key events. The design team and contractor will need to continue to consult with local businesses, including local tourist groups throughout the proposed development design and construction programme to reduce this impact and potentially have a positive effect on businesses during low season.

9 SUPPORTING ASSESSMENTS

9.1 Accidents and Natural Disasters

9.1.1 Introduction

Major accidents and/or disasters is a topic introduced by the 2014/52/EU EIA Directive and subsequent national legislation. Major accidents and/or disasters should be considered where the development has the potential to cause loss of life, permanent injury and or temporary or permanent destruction of an environmental receptor. This section considered the potential for such eventualities in the context of the new quay and laydown area at Hatston as describe in Chapter 2.

9.1.2 Assessment Scope and Methodology

The Scoping document supplied to OIC and MSLOT suggested that Accidents and Disasters could be scoped out of the EIAR. However, within the Scoping Responses (MSLOT) the following was requested:

'The EIA Report must include a description and assessment of the likely significant effects deriving from the vulnerability of the Proposed Works to major accidents and disasters. The Applicant should make use of appropriate guidance, including the recent Institute of Environmental Management and Assessment ("IEMA") 'Major Accidents and Disasters in EIA: A Primer', to better understand the likelihood of an occurrence and the Proposed Works susceptibility to potential major accidents and hazards.'

The Institute of Environmental Management and Assessment ("IEMA") 'Major Accidents and Disasters in EIA: A Primer (September 2020), hereafter referred to as 'The Primer' was reviewed and informed the assessment below where the following was carried out (as suggested by The Primer):

- The development itself was considered in regard to being a source of major accidents or vulnerability to disasters;
- Interactions with external hazards or associated activity were also considered; and
- If a major accident or disaster occurred would the existence of the development increase risk of significant effects to environmental receptors.

9.1.3 Baseline Conditions

As described in Chapter 2 Hatston is currently an operating port with associated vessel movements and the development will primarily include laydown areas and a quay extension resulting in a modest increase in vessel movements. The existing pier has a licence granted by HSE under the Dangerous Goods in Harbour Regulations 2016, this means that, depending on class, the movement of explosive materials is strictly controlled. The storage of materials contained within this regulation are not permitted on site. With regard to any other materials that are contained within the International Maritime Dangerous Goods (IMDG) code are covered by relevant regulations. The proposed development is not located within an area of significant seismic activity, nor are climatic factors prone to creating natural disasters such as tsunamis, hurricanes or catastrophic fluvial flooding. Coastal flooding and sea level rise is considered within Chapter 4 – Water Environment and is not considered further here.

In terms of general safety protocols and procedures it should also be noted that:

- Orkney Islands Council Harbour Authority have an existing Safety Management System, which aims to enhance safety within the Harbour Authority area by ensuring that all marine navigation hazards are identified, control measures are in place, and levels of risks are acceptable
- The Harbour Authority are compliant with the Department for Transport Port Marine Safety Code; and
- The OIC Marine Services division of OICHA ensures that all operations under their jurisdiction are done in such a manner so as to keep safe its users, the public, the harbour area and the surrounding environment.

9.1.4 Potential Impacts

There are three tests suggested by The Primer. These are described and assessed below:

1. *Is the development a source of hazard that could result in a major accident and/or disaster?*

In our view, no. The quay itself and associated laydown area do not present a source of such hazard.

2. *Does the development interact with any external sources of hazard?*

Yes. The creation of additional quay will result in additional vessel movements. Vessel operations are a source of hazard. This is assessed further below.

3. *If an external man-made or natural hazard occurred would the presence of the development increase the risk of significant environmental effect to an environmental receptor occurring?*

In our view no. The development will not increase the risk of significant effects due to other hazards occurring.

With regard to Test 2 above, an updated Navigation Risk Assessment (NRA) was undertaken to take into account the proposed OLBH development to explore the risks associated with increased vessel movements at Hatston and its approaches. This is contained in full in Technical Appendix 2.2 (Volume 3 of this EIAR). The NRA key findings can be summarised as follows:

- The NRA was undertaken following the collation of detailed input data including information about the project methodology, current vessel traffic densities, historic incident rates in the project area and, importantly, comprehensive stakeholder input;
- It was established that both existing and anticipated future traffic levels will be relatively low, and that conflicts between different harbour users are also likely to be low. Historic incident rates are low and indicated that the likelihood of hazards occurring in the future would also be low;
- Nevertheless, 50 potential hazards were identified during the project construction phase, and 38 during operation. All of these were assessed in accordance with the International Maritime Organization Formal Safety Assessment methodology for risk assessments;
- No hazards were assessed to be in the High Risk or Significant Risk band for either the construction or operation phase of the project.
- The assessment concluded that there is little significant new navigational risk associated with either the construction or operation of the proposed Hatston Pier redevelopment;
- The project site is located in an area of relatively low present day traffic density (albeit with significant seasonal variations), and which is already subject to numerous effective risk control measures (a fully approved operational Vessel Traffic Service, Pilotage, Towage, etc). As a result of both of these factors, incident frequency is also low; and
- There will be an inevitable increase in navigation risk through the introduction of a new structure, generating an increased volume of traffic. However, the increase in risk is low, on top of an already low baseline.

On the basis of the NRA carried out for the Hatston development the risk of major accident and/or disaster from shipping associated with the development is not considered significant.

9.1.5 Mitigation Measures

On the basis of the assessment carried out and the supporting NRA, the only mitigation considered necessary is the ongoing updating and review of existing protocols described above, either in response to legislation changes, if port operations are modified in the future, or as part of normal OICHA periodic review.

9.2 Airborne Noise

9.2.1 Introduction

This chapter summarises the findings of the noise impact assessment (NIA) which was carried out for the proposed development. The noise assessment considers the airborne construction and operational noise impacts at existing sensitive receptors surrounding the site. The full NIA is presented in Technical Appendix 9.2.

The effects of construction noise on marine life is considered as part of the Underwater Noise Assessment presented in Technical Appendix 5.6, and Chapter 5 - Biodiversity of the EIAR.

9.2.2 Assessment Scope and Methodology

Scoping Responses

A summary of the relevant responses regarding noise impact to the Scoping Report submitted by EnviroCentre, is shown in Table 9-1.

Table 9-1: Summary of Consultation Responses

Organisation	Consultation Response	How and where addressed
Orkney Islands Council (OIC)	The EIA should define the source of infill material and if this is not known at the time of submission, should outline the potential options ensuring assessment of the potential impacts associated with the worst case scenario through providing information of likely Heavy Goods Vehicle (HGV) movements associated with that option and appropriate mitigation, including a Framework CEMP/Dust Mitigation Strategy. With appropriate mitigation of the worst case scenario outlined in the introductory sections of the EIA, noise and air quality during the construction phase of the proposed development can be scoped out of the EIA.	The source of infill and associated worst case assumptions adopted in the NIA are described in Section 0 of this EIAR.
	It is agreed that operational noise can be scoped out of the assessment for the reasons set out in the Scoping Report.	Assessment of operational noise has been included in the EIAR to address Marine Scotland requirements.
Marine Scotland	The Scottish Ministers advise that airborne noise is scoped in for both construction and operation phases and a construction noise impact assessment must be included in the EIA Report. If construction methodologies have not been confirmed then the worst case scenario must be assessed.	Assessment of construction and operational airborne noise have been included in the EIAR. Both assessments assume worst case scenarios.

Methodology

The noise assessment was undertaken to establish the impact of construction and operational activities on noise sensitive receptors surrounding the Site. The assessment involved the following stages;

- Consultation with OIC Environmental Health Department to agree assessment methodology and noise criteria;
- Measurement of existing baseline noise environment at a sample of 3 areas representative of the most exposed noise sensitive receptors surrounding the proposed development; the monitoring locations are shown in Figure No. 674795-GIS081, in Volume 2 Appendix 9.2.
- Measurement of existing baseline road traffic noise at two locations along routes to / from Heddle and Cursiter Quarries. The monitoring locations are shown in Figure No. 674795-GIS082, in Volume 2 Appendix 9.2.
- Review of construction activities, locations and noise data;
- Calculation and assessment of construction noise at the most exposed sensitive receptors, following guidance provided in BS5228-1:2009+A1:2-014; Code of Practice for Noise and Vibration on Construction and Open Sites[111]. 3D computer noise modelling using CadnaA software has been used in the calculation of construction noise at sensitive receptors;
- Review of existing and proposed operational activities, locations and noise data;
- Prediction of operational noise using CadnaA software at location of most exposed sensitive receptors; and
- PAN 1/2011[112] assessment of operational noise, using principles defined in BS4142:2014[113].

9.2.3 Baseline Conditions

A background noise survey was carried out in the area surrounding the proposed development site during day and night-time periods between 28th and 30th November 2022. The purpose of the survey was to establish day and night-time background noise levels at areas representative of the most exposed properties surrounding the development site. The noise monitoring locations and methodology were agreed with OIC Environmental Health department through consultation.

[111] British Standards Institution (2014), *BS 5228-1:2009+A1:2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1: Noise.*

[112] The Scottish Government (2011), *PAN 1/2011 Planning and Noise*.
[113] British Standards Institution (2019), *BS 4142:2014+A1:2019 – Methods for Rating and Assessing Industrial and Commercial Sound*.

The noise monitoring locations are described in Table 9-2, and shown in Figure No. 674795-GIS081, in Volume 2 Appendix 9.2.

Table 9-2: Noise Monitoring Locations

ID	Grid Reference	Location
01	342756 1012636	On the grounds of Saverock farmhouse. The monitoring position was located adjacent to the access road which runs north east from Saverock farmhouse in order to represent the closest property on this track to Hatston Pier.
02	343425 1012133	At the end of the farm track accessed via Hatston Park. The monitoring position was located to the north east of the barn with direct line of sight to Hatston Pier.
03	345718 1012302	Located approximately 15 metres west of Carness Road with a direct view across the Bay of Weyland to Hatston Pier.

The baseline road traffic measurement positions are described in Table 9-3 and shown in Figure No. 674795-GIS082, in Volume 2 Appendix 9.2.

Table 9-3: Baseline Calculation of Road Traffic Noise (CRTN) Noise Monitoring Location

ID	Grid Reference	Location
CRTN 1	335822 1013392	Adjacent to Heddle Road in the front garden of a residential property
CRTN 2	338891 1012493	Adjacent to A965, on drive of Ingashowe House

Full details and results of the baseline noise survey are presented in Section 4 of Technical Appendix 9.2. in Volume 3.

9.2.4 Potential Impacts and Modelled Scenarios

Construction Schedule and Modelled Scenarios

Details of the proposed construction schedule at the Site have been supplied by Arch Henderson. A summary of the proposed construction schedule is shown in Table 9-4.

Table 9-4: East Quay, Proposed Construction Schedule

Phase	Stage	Description
1	**1**	Formation of reclamation bund. Existing armour stone uplifted and used as outer slope protection to Stage 2.
	2	Continuation of reclamation bund, with section of sheet pile retaining wall installed using vibro hammer.
	3 & 4	Drainage and infill behind reclamation bund progressed to create reclaimed area.
2	5	Forming works access approach parallel to existing causeway.
	6	Forming reclamation access to commence steel sheet piling using vibro hammer adjacent existing suspended deck pier.
	7	Sheet piling at commencement of new 320m quay. Rotary drill located on spud leg barge to pre-treat sea bed. Crane on further barge used for lifting and progressing piling using vibro piling methods.
	8	Pre-treatment of hard strata and then vibro piling to form quay wall. Infill and install of tie rods. Install of main concrete cope and deck works.
1	**1**	Formation of reclamation bund. Existing armour stone uplifted and used as outer slope protection to Stage 2.
	2	Continuation of reclamation bund, with section of sheet pile retaining wall installed using vibro hammer.
	3 & 4	Drainage and infill behind reclamation bund progressed to create reclaimed area.
3	9	Dredging of outside berth and north west navigational approach to -10m CD. Either cutter suction or backhoe dredging technique used to removed dredge spoil into split hopper barge.

At this stage exact construction timings for the Phases in Table 9-4 are not know, however, it is understood that Phase 1 reclamation, armour and drainage works are programmed to be carried out circa 6 months ahead of Phase 2 and 3 works commencing.

As can be seen in Table 9-4, in many cases more than one type of construction activity will occur during the same months. Noise modelling scenarios have been set up to account for the cumulative impact of the concurrent activities. The scenarios have been set up to model the worst-case potential combination of construction activities for the construction phases. A summary of the combined construction activities and relevant assessment periods for each of the modelled scenarios is shown in Table 9-5. A full breakdown of the individual items of plant and activities for each set of construction activities and scenarios are shown in Appendix C of Technical Appendix 9.2. in Volume 3. It should be noted that while the modelling has predicted all operations within a scenario to be concurrent, this is a conservative assumption and some activities will in fact be contiguous.

Table 9-5: Modelled Scenarios; Construction Noise

Modelled Scenario	Phases	Modelled Combination of Construction Stages (Worst Case)	Relevant Assessment Periods
1	1 & 2	HGV deliveries and tipping	Day, Weekend
		Rock armour revetment	
		Drainage, infill and compaction	
		Pile sea bed pre-treatment	
		Install sheet pile wall	
2	3	HGV deliveries and tipping	Day, Weekend
		Rock armour revetment	
		Drainage, infill and compaction	
		Install sheet pile wall	
		Pile sea bed pre-treatment	
		Tie rod / anchor walls	
		Surfacing	
3	4	Dredging	Day, Evening, Night, Weekend

Evening and Night-time Construction Noise

With reference to the assessment periods included in Table 9-5, only in the case of dredging are works scheduled to be carried out over a 24-hour period. All other activities are expected to have finished by 7 pm on a daily basis.

Weekend Construction Noise

The proposed construction schedule includes working during daytime hours during the week days and the weekends. The implication of this is that works associated with higher noise levels are likely to potentially also take

place during weekend hours (Saturday 07:00 – 19:00 and Sunday 09:00 – 13:00), which are subject to more stringent noise limits than during the weekdays.

Infill and Associated HGV movements

Import of the fill material will be carried out over a circa 10 month period using up to 6 to 7 trucks per hour. The material will come from the existing Cursiter and Heddle quarries 7.5km to 9km away from the site. The HGV routes between both quarries and Hatston Pier are shown in Drawing No. 202043/FS-04 titled *Hatston Pier, Kirkwall, Feasibility Study, Existing Commercial Quarries Location Plan* by Arch Henderson, Appendix A. The split of materials coming from each quarry is anticipated to be circa 50 / 50.

Arch Henderson have confirmed that up to 6 to 7 HGVs are expected per hour during the infill stages. HGV movements have been modelled using a worst case of 8 HGVs per hour, with a 50% split of HGVs travelling from Heddle and Cursiter Quarries respectively.

Sea Bed Pre-Treatment and Piling

Piling will be carried out between the hours of 08:00 and 19:00 Monday to Friday, and Saturday 08:00 – 19:00 and Sunday 09:00 – 13:00.

Steel sheets will be installed at specified locations using vibro hammering technique, which typically generates less noise than impact hammering techniques. The installation of sheet piling for construction of the new 320m quay will involve pre-treatment of the seabed. Drilling will be undertaken using a rotary percussive 'Down the Hole' (DTH) hammer with a Symmetrix N131 casing or equivalent. Hole size will generally be 110mm diameter. Drilling patterns will be reviewed following trial pile installation to ensure the required depth is being achieved. Underwater blasting will be carried out in the drilled spaces to prepare the seabed for sheet piling. The impact of blasting on underwater noise is assessed in Technical Appendix 9.2. in Volume 3, and Chapter 5 - Biodiversity of the EIAR.

Water to airborne sound transmission from underwater blasting for piling preparation will not be significant. The prediction of underwater to airborne sound transmission form blasting is beyond the scope of BS5228, and has not been included in this NIA as any potential impacts would be on the marine ecological environment only.

Dredging

A short dredging campaign of 650m^3 volume will commence following completion of all quay works. The dredging will be carried out by either cutter suction or back hoe dredging technique. The dredged material will be used on the Site as infill material. Backhoe dredging generates higher airborne noise levels than the cutter suction method, therefore this NIA assumes use of the backhoe method as a worst-case scenario. Should cutter suction method be employed the levels shall be less than those presented in this report.

The dredging has the potential to be carried out over a 24 hour period and is anticipated to run for up to a 2 week period.

Construction Noise Model Data and Assumptions

3D computer noise modelling of the various stages of construction activity at the site has been carried out using CadnaA software. Details on worst case construction activities, operating times, and associated items of noise generating plant for each stage of construction used within the noise models have been supplied by Arch Henderson. Full details of the construction noise modelling data and assumptions are provided in Technical Appendix 9.2. in Volume 3.

Change in Road Traffic during Construction Phase

For each NSR the aspects of road traffic noise subject to change has been calculated. A full 3D propagation model has not been conducted, as the only aspects of interest are those that change due to development generated traffic. Full details of the traffic data and input parameters are provided in Technical Appendix 9.2. in Volume 3.

Operational Phase: Increased Vessel Movements

During the operational phase, there will be an increase in vessel movements and associated harbour activity over that of the existing baseline which was established in 2016. Current baseline vessel movements comprise circa 2292 total movements per year, which comprise predominantly ferries (42%), cruise ships (11%), pilot boats (31%) and cargo vessels (8%). There are also a smaller percentage of oil supply (2%), renewables (3%), tugs (2%) and other vessels (2%).

The proposed development shall increase the number of oil supply vessels by circa 120 movements per year initially, rising to 400 per year (circa 1 extra vessel per week, rising to 3 to 4). It is estimated that there would be 4 additional HGV movements associated with each extra supply vessel, which equates to circa 2 extra HGVs arriving/departing per week, rising to 6 to 8.

The use of Hatston as a base for operations and maintenance activities associated with offshore wind farm development is anticipated to commence from 2028 onwards. There shall be an increase of circa 24 vessel movements initially, rising to 48 by 2032. There is not anticipated to be a significant increase in HGV movements associated with operations and maintenance of offshore wind farms, with the majority of supplies arriving to / from the harbour via vessels.

There shall also be an increase in other types of vessel, such as boat repair, renewables and cargo, the numbers of which will increase based on demand, with exact numbers not known at this stage. The number of associated HGVs will depend on the type of vessel, however, it is anticipated that most materials will arrive to / from the port via vessels so significant increases are unlikely.

Proposed Operational Activities

During the operational stage, there is the potential for noise from ships berthing, loading / unloading activities, and transfer to / from materials to the laydown area to impact upon existing residents. In summary, the potentially significant noise generating operational activities as a result of the proposed quay extension and laydown are anticipated to comprise of;

- Ship berthing (including on-board generators) and cargo loading / unloading activities;
- Use of boat lift and movement of boats within site for storage or maintenance;
- Laydown and storage of renewables components such as those for offshore wind farms. This is typically carried out using Self Propelled Modular Transporters (SPMTs);
- Movement of cargo to / from laydown area; and
- HGV loading / unloading and movements.

Operational Noise Data

3D computer noise modelling of operational activity at the proposed development has been carried out using CadnaA software.

Calculations were carried out using plant manufacturer's noise data, and published data in BS5228:2009+A1:2014, to derive predicted noise levels at noise sensitive receptors. Full details of the items of modelled operational plant, noise data (including data source), operating times, durations, source heights and assumptions for the modelled operations are shown in Appendix D of Technical Appendix 9.2. in Volume 3.

9.2.5 Construction Noise Assessment Results

The greatest weekday and weekend predicted noise levels are associated with construction Phases 1 & 2, in which activities including land reclamation and piling will be carried out.

There is the potential that dredging may be carried out over a 24 hour period, therefore evening and night-time noise levels have been predicted for this scenario.

During the day and night-time periods noise levels are not predicted to increase at surrounding residential receptors. The outcome of the assessment is that **Neutral impacts** are predicted during all construction phases including dredging. There are no significant adverse impacts in EIA terms.

The change in road traffic noise levels along routes which HGVs carrying infill material to / from the local quarries which will supply the site has been predicted. The maximum change in noise level as a result of construction HGVs is predicted to be less than 1dB along the routes. The maximum significance of effects as a result of the construction traffic is Slight, which is not significant in EIA terms.

Full details of the construction assessment results are provided in Section 6 of Technical Appendix 9.2. in Volume 3.

9.2.6 Operational Noise Assessment Results

During the day and night-time periods noise levels are predicted to increase by up to 1dB at surrounding residential receptors as a result of the increased operational activities at Hatston. The maximum significance of the changes in noise levels is **Neutral / Slight**, which is not significant in EIA terms.

Full details of the operational assessment results are provided in Section 7 of Technical Appendix 9.2. in Volume 3.

9.2.7 Mitigation Measures

No significant adverse impacts are predicted during the construction phase.

Noise during the construction phase will be carried out during the specified working hours and will follow best practice noise management techniques. No additional mitigation measures are proposed.

No significance adverse impacts are predicted during the operational phase. No mitigation measures are therefore proposed.

9.3 Air Quality

9.3.1 Introduction

A detailed review of the Proposed Development was undertaken by Envirocentre to support the EIA Scoping Report and the potential change in air quality as a result of it. This considered the baseline air quality, the construction phase emissions and the operational phase emissions. Based upon the predicted change in vehicle movements associated with both phases air quality was scoped out. Both Marine Scotland and OIC agreed that air quality could be scoped out.

9.3.2 Assessment Scope and Methodology

A review of the traffic flow data associated with the operational phase of the Proposed Development formed part of the Transport section, full details can be found in section 9.5. This identified that the operational traffic flows were low and did not require to be considered further and only the construction phase movements were considered.

This chapter's main focus is the construction phase.

It was agreed from feedback from the scoping report that in order to inform the construction and environmental management plan (CEMP) a construction dust risk assessment should be completed to allow for the appropriate level of mitigation measures to be identified. The full construction site risk assessment can be found in Volume 3, Technical Appendix 9.3.

9.3.3 Baseline Conditions

The island has a predominantly rural nature with no large-scale industrial processes therefore, the main source of air pollution is road traffic emissions. The key pollutants of concern that are associated with road transport emissions are nitrogen dioxide (NO_2) and particulates (PM_{10} and $PM_{2.5}$).

The main traffic routes in Orkney are a series of 'A' roads that link the west mainland to the east, through Kirkwall and southwards across the barriers to South Ronaldsay. However, on the main A965, recent traffic counts indicate traffic flows of approximately 5,000 Annual Average Daily Traffic (AADT) (in 2022) in line with Orkney's small population. Full details of the baseline traffic can be found in Section 9.5. The greatest number of traffic movements can be found within Kirkwall, with much lower levels of traffic found across the mainland and the Outer Isles.

The islands are linked to mainland Scotland via its airport situated 2 miles outside Kirkwall, and via ferry services across three routes. Other smaller air and ferry links serve the outer isles and link to 'The Mainland'.

Air quality in Orkney is considered very good and there are no areas where there is a risk of exceeding the air quality objectives.

9.3.4 Potential Impacts

9.3.4.1 Pollutant emissions

The numbers of HGV movements associated with the construction phase fall below the assessment criteria, in accordance with the relevant guidance[114]. This guidance advises that where the change is less than 100 AADT (HGV), detailed assessment, i.e. dispersion modelling, is not required. However, it is noted that the construction phase traffic flows will be in the region of 66/67 per day spread over 10 hours for a duration of two years.

Large ships generally burn high sulphur content oils in their main engines (bunker oils). For large ports, these may give rise to elevated short-term SO_2 concentrations, which might lead to exceedances of the 15-minute or 1-hour mean objectives. NOx and PM emissions may also lead to elevated concentrations at sensitive receptors around ports.

It is over one kilometre to the nearest residential properties from the Proposed Development. Therefore, in line with Defra's local air quality management technical guidance document (2022; LAQM.TG(22)), the assessment criteria for shipping movements has been reviewed:

- are there more than 5000 large ship movements per year for receptors within 250m.

[114] air-quality-planning-guidance.pdf (iaqm.co.uk)

- are there more than 15,000 large ship movements per year with relevant exposure within 1km

A large ship is defined as cross-channel ferries, roll on-roll off ships, bulk cargo, container ships, cruise liners, etc – one ship generating two movements (arrival and departure). On the basis of the above criteria, no further assessment was required as the number of movements associated with Hatston is less than 15,000 and they are not all large ship movements. Given the low number of large ship movements per annum, the Proposed Development is not considered likely to have an adverse impact on the North Orkney SPA.

To further reduce any potential emissions to air it is recommended that renewable energy sources are considered as part of the detailed design process (wind power, battery storage, tidal and hydrogen fuel) that could be used when to power ships at berth (i.e. shoreside power supply).

9.3.4.2 Dust impacts

There is the potential for impacts upon local residents during the construction phase from fugitive dust emissions and in accordance with the Scoping Opinions received, a full construction dust risk assessment has been carried out and is provided in Volume 3, Technical Appendix 9.3.

This assessment concluded that there was a **low risk of dust impacts from earthworks and construction activities**, due to the distances of sensitive receptors from the activities. However, there was a **medium risk of dust impact from Trackout activities**. The recommended mitigation measures specific to trackout activities are summarised in Figure 9-1, with a comprehensive list of appropriate mitigation measures presented in Volume 3, Technical Appendix 9.3.

Measures specific to trackout

Mitigation measure	Low Risk	Medium Risk	High Risk
43. Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	D	H	H
44. Avoid dry sweeping of large areas.	D	H	H
45. Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D	H	H
46. Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	N	H	H
47. Record all inspections of haul routes and any subsequent action in a site log book.	D	H	H
48. Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	N	H	H
49. Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D	H	H
50. Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	N	H	H
51. Access gates to be located at least 10 m from receptors where possible.	N	H	H

Figure 9-1: Mitigation measures specific to trackout (From IAQM (2016))

9.3.5 Mitigation Measures

These mitigation measures should reduce any impacts from dust emissions associated with trackout upon the local environment. These measures will be included within the Construction Environmental Management Plan, which will be produced by the contractor prior to construction and signed off by OIC.

9.4 Carbon, Climate Change and Greenhouse Gas Emissions Assessment

9.4.1 Introduction

This report details the carbon assessment conducted for the redevelopment at Hatston Quay, hereafter referred to as “the development”. The development includes the proposal of:

- Initial phase of reclamation – creation of land to the east of the existing causeway;
- Construction of 320m of new quay west of the existing quay;
- Dredging of areas adjacent to the new length of quay; and
- Further reclamation phases – creation of land to the west of the existing causeway.

The purpose of this assessment is to establish the capital carbon emissions associated with the construction and maintenance of the development, as detailed above. This involved identifying emissions associated with use of the materials across the lifecycle modules within PAS 2080 – Carbon Management in Infrastructure (A1- 5, B2 and B3).

PAS 2080

PAS 2080 - Carbon Management in Infrastructure is a specification for whole life carbon management within the infrastructure sector (transport, energy, water, waste and communications) and sets out the general principles of a carbon management process, to promote carbon and cost reduction in infrastructure delivery on a whole life carbon basis. The framework looks at the whole value chain, aiming to reduce carbon and reduce cost through more intelligent design, construction and use.

Effective carbon management in infrastructure will make an important contribution to tackling climate change and leave a positive legacy for future generations.

Regulatory Guidance

International

The Paris Agreement is a legally binding international treaty on climate change. The treaty was adopted by 196 parties at COP21 (Conference of the Parties) in Paris, in 2015. The Paris Agreement and subsequent scientific reports, including Intergovernmental Panel on Climate Change (IPCC) reports, all point to clear conclusions:

- Global warming is likely to reach 1.5°C between 2030 and 2035 at current trends.
- Global ‘rebalancing’ must be pursued at pace and requires interim emission cuts of around 50% by 2030, for any prospect of staying close to 1.5°C of warming.

To achieve this long-term climate change mitigation goal, countries aim to reach global peaking of GHG emissions as soon as possible to achieve a climate neutral world by 2050. Each signatory to the Paris Agreement has a duty to produce a Nationally Determined Contribution (NDC), indicating how state-level transformations will contribute to climate action.

National

The Climate Change Act (2008) is central to the UK Government’s plan to reduce carbon emissions. The Act is a legally binding target to reduce the UK's GHG emissions by a reduction of 80% against 1990 levels by 2050. In May 2019, the UK Government declared a climate emergency, leading to updating the commitments in the 2008 Act to target net zero carbon emissions by 2050 under the Climate Change Act (2050 Target Amendment) Order 2019.

Following the UK publication of The Climate Change Act, the Scottish Government produced the Climate Change (Scotland) Act 2009 which sets the statutory framework for GHG emission reductions in Scotland. However, this was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, which increased the ambition of Scotland's emissions reduction targets to net zero by 2045 and revised interim and annual emissions reduction targets to the following;

- 2030 is at least 75% lower than the 1990/1995 baseline; and
- 2040 is at least 90% lower than the 1990/1995 baseline.

The Climate Change Plan 2018-2032: Securing a Green Recovery on a Path to Net Zero and Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme 2019-2024 set out key steps for achieving a reduction in greenhouse gas emissions across Scotland.

Within the Draft Energy and Just Transition Plan it states that the "*Scottish Government is clear that unlimited extraction of fossil fuels is not consistent with our climate obligations".*

Regional

The Orkney Local Development Plan (LDP) 2017 sets out a vision and spatial strategy for the development of land in Orkney over the next 10-20 years. If a proposal is contrary to any single policy within the LDP, then it does not accord with the Plan.

One key and relevant policy is *POLICY 1 - Criteria for All Development*, where it was stated that development will be supported where *"**it is resource efficient and utilises sustainable construction technologies, techniques and materials and, where practicable, low and zero carbon generating technologies are installed**".*

9.4.2 Assessment Scope and Methodology

PAS 2080

The assessment methodology aligns with the modular framework set out in PAS 2080 Carbon Management in Infrastructure (Figure 9-2).

From previous project experience and industry guidance, such as RICS Professional Statement Whole Life Carbon Assessment for the Built Environment (2017), it is known that the majority of embodied carbon falls within the A1-A5 (before use). Therefore, the assessment boundary and therefore emission sources considered within the assessment include the pre-construction and construction emissions (A1 – A5), with the additional reporting of Use (specifically B2 and B3 – maintenance and repair). Pre-construction and construction phases comprise the physical assets associated with the development and are hereafter referred to as the "**capital carbon**" of the development. This includes emissions associated with sourcing of materials and construction activities and are defined in terms of lifecycle stages, detailed in PAS 2080 and RICS (2017), as follows:

- Products and materials (A1-3) - use of materials for temporary and permanent construction activities.
- Transport to the Project site (A4) – the transportation of materials to the Project site, e.g., by heavy good vehicles (HGV); and
- Construction and installation processes (A5) - construction plant use.

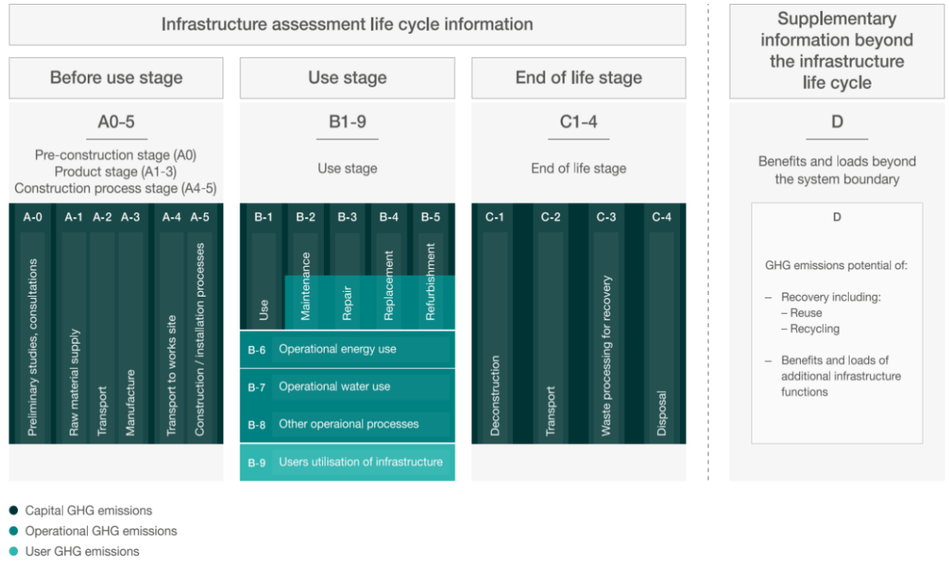


Figure 9-2: PAS 2080 Life Cycle Modules

For the assessment of the development's emissions, a calculation method is used following data collection. The calculation of GHG emission that is used in this assessment follows that provided within the GHG Protocol and is defined as:

Activity Data x Emission Factor = GHG Emission ($kgCO_2e$)

The material quantities were sourced from the 'Feasibility Study - High Level Cost Estimates' document produced by Arch Henderson (dated 29/04/2021). Various industry standards and databases were used to source the carbon emission factors to calculate the construction and plant emissions. Table 9-6 details the emission factor sources according to the life cycle stage of the Project.

Table 9-6: Embodied carbon emissions considered in the assessment

Life Cycle Stage	Guidance	Industry Standard / Source of Carbon Factors
A1 – A3	Product	CESSM4
A4	Transport to project site	RICS 2017
A5	Construction and installation processes	CESSM4

Sweco's carbon estimating tool was used to calculate emissions associated with the development. Emission factors deriving from industry leading guidance, such as those from CESSM4 and the Inventory of Carbon and Energy (ICE) databases, are embedded within the tool. The tool also uses RICS (2017) guidance and associated emission factors to inform A4 emissions. The emission factor ($kgCO_2e/kg$) associated with each distance category (Local, National or European) is used depending on the distance from the source location of materials to the construction site.

For some specific items (service road, dredging and rock armour), additional sources of information were identified and the emission factors within these reports were used. These were:

- Road: Engineering and Physical Sciences Research Council and DecarboN8, 'Measuring Road Infrastructure Carbon: A 'critical' in transport's journey to net-zero,' 2022.
- Dredging: The Crown Estate, 'Marine Estate Research Report: Carbon Footprint of Marine Aggregate Extraction', 2010.
- Rock Armour: HR Wallingford, 'Quantifying the carbon footprint of coastal construction - a new tool HRCAT,' 2011

Assumptions

The following assumptions have been made in this carbon assessment:

- The project lifetime, also known as the Reference Study Period (RSP) has been assumed to be 60 years. This is in line with industry standards; RICS (2017) guidance.
- Although maintenance and repair have been accounted for, replacement (B4) or refurbishment (B5) of materials have not been considered as it has been assumed the lifetime of assets would be as the RSP.
- For the assessment of A4 emissions, it is assumed that materials are locally sourced (50km radius) materials unless informed otherwise.
- Although a 60-year RSP has been used in this assessment, the end of life emissions are not estimated as the development will be built in perpetuity.

Climate Change Projections

The latest UK Climate Projections (UKCP18, published November 2018) are used to assess the future climate scenario in the location of the proposed development. UKCP18 uses Representative Concentration Pathways (RCPs) which are named according to the concentration of GHG modelled to occur in the atmosphere in 2100. There are 4 RCPs available in the UKCP18 climate projections: 2.6, 4.5, 6.0 and 8.5. RCP8.5 is the most conservative, highest-impact (worst case) scenario.

9.4.3 Assessment Outcomes

Total Carbon

The total carbon emission for the project is **84,641** tCO_2e. Table 9-7 highlights the carbon associated with lifecycle stages A and B.

Table 9-7: Total emissions of proposed development (tCO_2e)

Life cycle stage	Activity	Emissions (tCO_2e)
A	**Before use stage**	**83,590**
B	**Use stage**	**1,051**
	Total Embodied Emissions (tCO_2e)	**84,641**

Capital Carbon

Emissions from the construction phase, which covers the capital carbon of the development, are summarised in Table 9-8.

Table 9-8: Emissions arising from the construction phase

Life cycle stage	Activity	Emissions (tCO_2e)
A1 – A3	**Materials used in construction**	**38,848**
A4	**Transportation of materials to site**	**23,124**
A5	**Construction site emissions**	**21,618**
	Total Capital Carbon Emissions (tCO_2e)	**83,590**

Embodied carbon emissions from construction materials are the main contributor to climate change during this period, with additional emissions arising from the direct use of plant and transport of materials to site. The total capital carbon of the project was **83,590 tCO_2e.**

Emissions associated with core fill and quay work are the most carbon intensive elements of the proposed development, as Figure 9.3 shows.

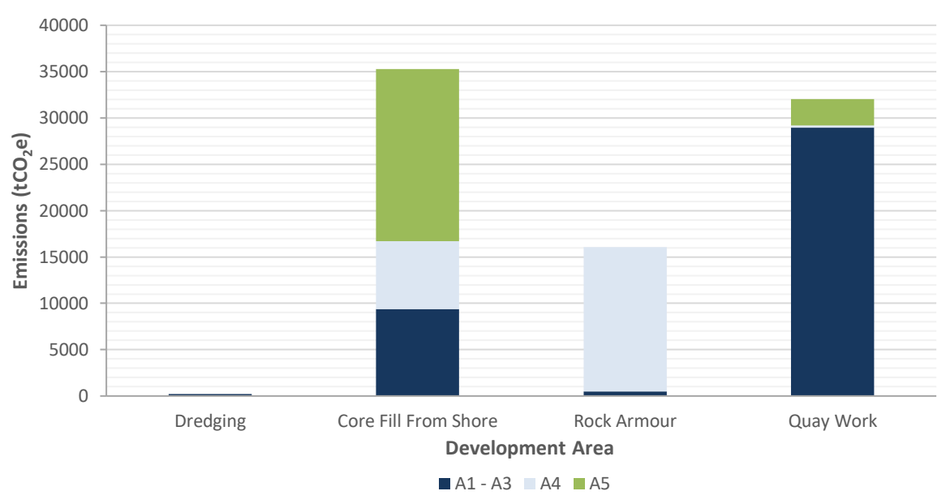


Figure 9-3: Emissions associated with lifecycle stage A across all activities

Use Stage Carbon

Total carbon emissions associated with the use stage (B2 and B3 emissions) are estimated to be **1,051 tCO_2e**. Core fill had the highest emission total associated with the B lifecycle stage (Figure 9-4). At 441 tCO_2e, this was only 32 tCO_2e more than B stage emissions of Quay Work. Dredging has no emissions associated with lifecycle stage B as it is a one-time activity that occurs in construction phase.

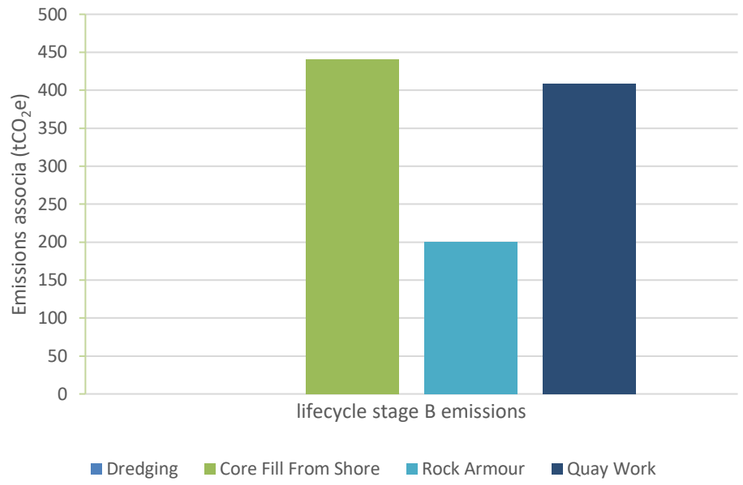


Figure 9-4: Emissions associated with lifecycle stage B across all activities

Climate Change Projections

The UK Climate Projections provide regional climate projection information for the North Scotland Administrative Region (where the proposed development is located).

The general trend for the region is warmer, drier summers and milder, wetter winters. These changes are predicted to occur under all emissions scenarios (low, medium and high levels of carbon emissions), which are incorporated into the climate change models used by the IPCC.

Under the highest emissions scenario (RCP8.5) for the 2080s (2080-2099), estimated changes in climatic conditions are outlined in Table 9-9.

Table 9-9: Future Climate Projections for North of Scotland (2080s; RCP8.5)

Climate Variables	Climate Observations
Temperature	The average annual temperature modelled to occur within 2080s, under the RCP8.5 scenario at the 50th percentile, is an increase of approximately 2°C. Summer temperature is projected to increase by 3-4°C under the central estimate, which represents 'as likely as not' probability of change (50th percentile). Average winter temperature is estimated to increase by 2-3°C (50th percentile).
Rainfall	The average annual rainfall rate predicted to occur between 2080 and 2099, under the RCP8.5 scenario at the 50th percentile, is an increase in precipitation anomaly between 0% and 10%. The average summer rainfall rate is projected to decrease by 10%-20%, whereas the average winter rainfall rate is estimated to increase by 10%-20% (in the 50th percentile or central estimate for both).
Wind	Climate projections for wind are more uncertain than those for temperature and precipitation, due to inherent difficulty in modelling future wind conditions. However, an increase in extreme weather including wind is projected (Committee on Climate Change, 2017).

9.4.4 Mitigation Measures

Carbon Reduction Opportunities

PAS 2080 promotes the carbon reduction hierarchy (Figure 9-5 and Figure 9-6) which helps value chain members to identify potential opportunities to reduce carbon.

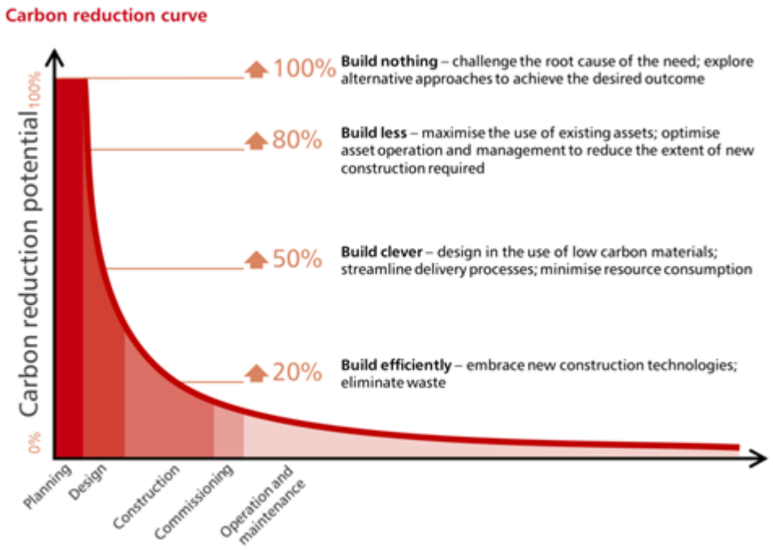


Figure 9-5: PAS 2080 Carbon Reduction Hierarchy

The carbon reduction hierarchy highlights the importance of implementing measures of carbon reduction at the early stages, where the potential of carbon reduction is greatest. This is also reiterated in Figure 9-5; the scope for reducing whole life cycle carbon emissions is greater during the initial working stages than in the later working stages.

The '**build nothing, build less, build clever, build efficiently**' strategy shows that measures to optimise the design should always be prioritised before methods such as use of alternative materials.

The earlier in a project carbon mitigation is considered, the more opportunities there are to make emissions reductions and energy efficiencies

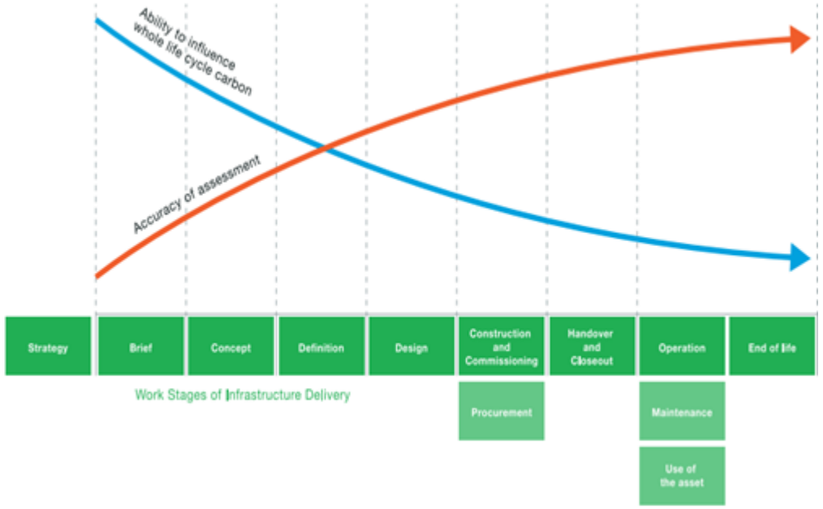


Figure 9-6: Diagram Showing Ability to Influence Carbon Reduction

Opportunities for areas of carbon reduction in the construction phase include:

1. **Materials:** The use of materials with a lower embodied carbon impact (for example, low carbon concrete or recycled steel) would significantly reduce the emissions.

   Examples of low carbon materials include low carbon concrete (75% cement replacement is achievable using GGBS or fly ash substitution), use of recycled steel, or electric arc furnace (EAF) steel with high recycled content, fibre reinforcement for concrete and concrete mix optimisation.

   The development at Hatston will aim to use material sourced from nearby local commercial quarries. Doing so will minimise emissions associated with A4 lifecycle stage and therefore capital carbon.

2. **Material efficiency:** A design optimisation process is needed to ensure only the necessary quantity and type of materials are used. Assessing options to build efficiently and optimising the use of materials needs to occur through design, procurement, and construction phases.
3. **Construction site management:** Sourcing energy efficient plant, regular vehicle maintenance and putting in good practice site procedures (for example, reducing vehicle/plant idling) to make operations more efficient.
4. **Site Waste Management Plan:** Promoting the reduction and effective management of waste during construction, following the waste mitigation hierarchy and relevant national waste reduction policies.

   This will fall within the Construction Environmental Management Plan that will be produced.

Once the proposed development becomes operational, consideration to measures of emission reduction during the operational phase can follow the Energy Hierarchy. The 'Energy Hierarchy' is a widely adopted method to identify opportunities to reduce energy demand and therefore decrease the related carbon emissions. This hierarchy suggests the use of a four-tiered approach to reducing operational energy consumption, **Be Lean, Be Clean, Be Green and Be Seen** stages (Figure 7-7).

A brief explanation of each stage of the energy hierarchy is given below:

- **Be Lean**: This stage focuses on being energy efficient. This involves reassessing any architectural layouts of the development based on internal parameters (i.e., daylighting requirement, function of the space, thermal characteristics of the space) and external factors such as surrounding buildings, site morphology, and local weather data.
- **Be Clean**: The second step on the optimisation process entails an analysis of the site's available energy sources and the evaluation of alternative technologies to deliver the required energy in the most sustainable way.
  - This will be necessary to meet the national requirements of net zero by 2045
- **Be Green:** The strategy will seek to maximise the provision of low and zero carbon energy capture and generation to meet the remaining demands of the development.
  - As stated in the project description, it is intended that the design of the development will accommodate provision and storage of alternative (less polluting/carbon-free) fuels and provision of shore power to smaller vessels where viable. The proposals for shore power will allow the development to generate renewable energy for onsite use. However, additional consideration of other methods of renewably sourced energy generation is needed for the development to achieve net zero in operations.
- **Be Seen:** The final stage of the process would aim to optimise the performance of the development and verify performance against the design intent through monitoring of consumption. This stage would seek to close any performance gaps and reporting on actual energy performance and lessons learned.

Figure 9-7: The Energy Hierarchy

Climate Change Resilience

Climate change projections suggest a general trend of warmer, drier summers and milder, wetter winters. With the development in close proximity to the coastline, it is likely that sea level rise and storm surges, as an indirect impact to the projected changes in climate, will become more of a threat to the development in Orkney.

However, the proposed development at Hatston has been designed at a height that sustains current high tide and projected sea level rise height. More specifically, the architects informed that the "*quay cope height has been chosen as +5.0m OD (+6.4m CD) which* ***is at a level above highest recorded tide for Kirkwall (taken at Stromness) and the addition of 0.51m for worldwide local sea level projections at mid-range sea-level projection*** *(50th percentile))."*

It is therefore assumed that the development will be resilient to projected climate change and associated impacts over the assessed 60-year period.

9.5 Transport

9.5.1 Introduction

In line with the scoping responses issued, there is no requirement to provide a detailed EIA traffic chapter for the proposed development.

9.5.2 Assessment Scope and Methodology

Based on information supplied on the operation of the proposed development, it is considered that the construction phase will generate a higher level of traffic than the operational phase. On this basis, the construction phase has been considered within this section.

9.5.3 Baseline Conditions

Several data sources were reviewed to obtain baseline data. The following data was reviewed:

9.5.3.1 Finstown Traffic Management Study

Finstown Traffic Management study was undertaken by Systra and reported on in 2022. As part of this study, Automatic Traffic Counters (ATC) data counters were used at 5 locations surrounding Finstown (west of Hatston). With data at Site 4 and Site 5 used to calculate flows along the A965.

9.5.3.2 Department For Transport (DFT) counters

Existing traffic levels were taken from ATC data counters installed by the Department for Transport (DFT). Although no data has been collected in recent year, only historic data. The DFT traffic counters provide bi-directional average daily flows for each link.

9.5.3.3 Kirkwall Housing TA

Additional information was gathered from a Transport Assessment for a residential development (19/04/PPMAJ) near to the proposed development site in Kirkwall. Traffic data was collected in 2018 for peak hour periods. No 24-hour data was available however it provides an indication of traffic levels.

Some of the counters were used to provide base data and others used for comparison to ensure reliable data.

The location of counters is shown in Figure 9-8.

Figure 9-8: Location of traffic counters

DFT traffic counters located on Orkney have historic manual count data that will require factoring to bring to a common future base year. For two of the points, the DFT estimated 2021 (most recent) flows were lower than the manual historic counts, however, to present the worst-case scenario, the flows have been factored up using NRTF low growth to bring the historic 2009 DFT data on the A965 East up to a 2022 base level. The low growth factor used is 1.133.

The base traffic flows for Hatston are shown in Figure 9-9. The average % HGV on the routes considered is 5%.

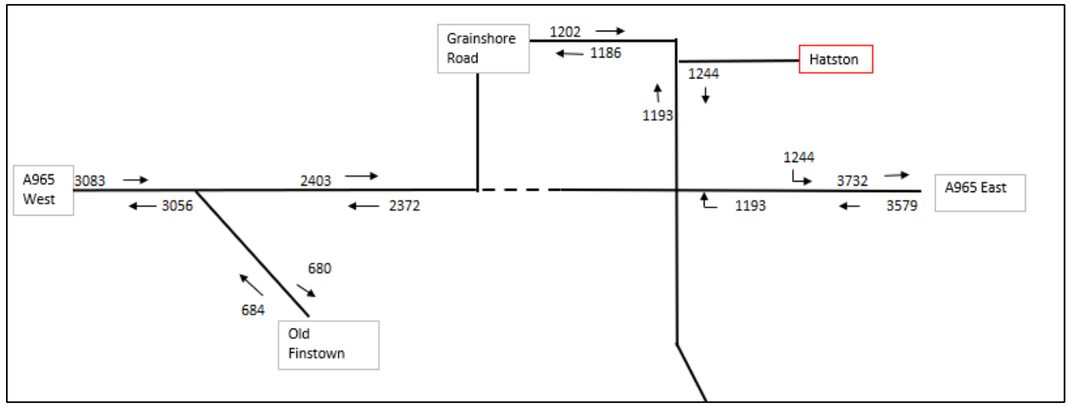


Figure 9-9: AADT Base traffic flows for Hatston

No traffic data is available on Grainshore Road for which Hatston is accessed. In the absence of traffic data, traffic is estimated using the ATC counts. It has been assumed that 50% of traffic on the A965 west will divert along Grainshore Road 33% of traffic from A965 East.

9.5.4 Potential Impacts

9.5.4.1 Construction traffic

An estimate of HGV numbers for Hatston were provided within the feasibility study. These are presented in Table 9-10 below.

Table 9-10: Hatston HGV numbers

Proposed Hatston Works	Area m2	Type 1 (m3)	Crusher Run (m3)	General Fill (m3)	Est. Total (Tonnes)	Est. Duration (months)	HGV / day	HGV/hour/ 10 hour day
Works 1 South Reclamation	29,600	8,800	30,000	159,000	394,000	10 months	66	6 to 7
Works 2 North Reclamation & Quay Works	34,000	10,500	34,000	396,000	880,000	22 months	67	6 to 7
Works 3 Boat lift & storage area	13,300	4,000	13,500	83,500	183,000	10 months	31	3 to 4
	7.7 Hectares	23,300 m3	77,500 m3	638,500 m3	**1.46M Tonnes**			

The construction period is expected to last for 3 years. 'Works 1 – South Reclamation' will be undertaken as Phase One over 10 months, followed by 'Works 2 – North Reclamation & Quay Works' and 'Works 3 – Boat lift & storage area', which will form Phase two with a 26-month construction period. It has been assumed that all HGVs will arrive from the west, where the quarries are located.

It is estimated that there will be approximately 75 staff working on each site during the construction stage. To estimate the number of vehicles generated by staff attending the site, the Scottish Household Survey (SHS) data was used to obtain the travel to work mode share for OIC. The data shows that 60% of employees commute by car. Based on this data, it is assumed that 45 cars will access each site per day associated with staff.

Confirmation is needed for the living arrangement of staff accessing the site and the potential provision of shuttle buses to minimise any impacts on the road network.

The predicted construction Phase One and Phase Two traffic flows for Hatston are shown in Figure 9-10 and Figure 9-11 respectively. These are construction vehicles and staff related trips.

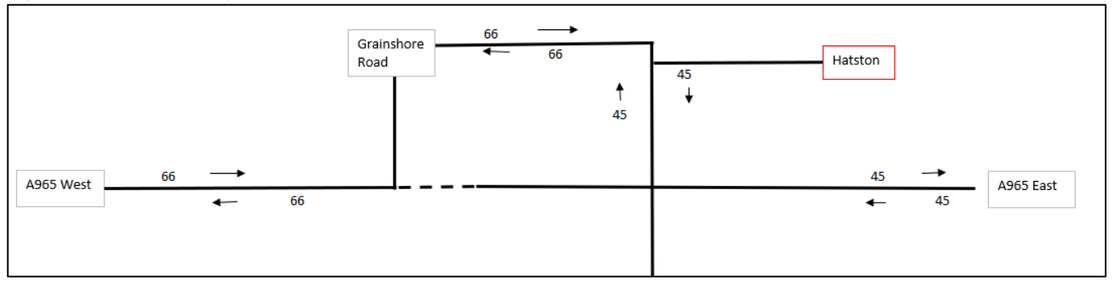


Figure 9-10: Hatston Phase One construction related traffic flows

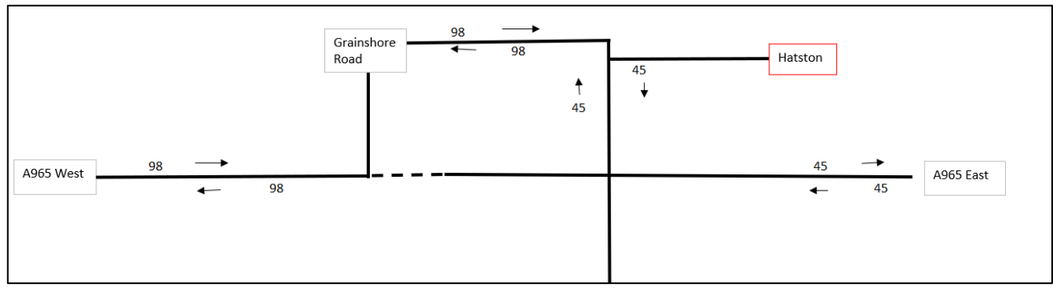


Figure 9-11: Hatston Phase Two construction related traffic flows

For evaluation purposes, the significance of the environmental effects associated with the development generated traffic are categorised as outlined within Table 9-11, extracted from the Institution of Environmental Management and Assessment's (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic'.

Table 9-11: Traffic Assessment Significance Criteria

Significance Rating	Description of Significance
Major	Where the impact leads to serious and lasting disruption (e.g., a 90% increase in baseline traffic) and permanent mitigation measures are required.
Moderate	Where the impact is of a temporary nature, leading to disruption (e.g., a 60% increase in baseline traffic) and short-term mitigation measures are required.
Slight	Where the impact exceeds industry standard design thresholds, or a traffic increase of above 30%, but does not lead to disruption. No mitigation measures are required.
Insignificant	No perceivable impact. No mitigation measures are required.
Positive	Where the proposals result in an improvement to current conditions.

Early indications suggest that the traffic impact of the proposed development is insignificant with the threshold showing a lower than 30% percentage increase. The threshold results for Hatston Phase One, and Phase Two are shown in Figure 9-12 and Figure 9-13 respectively.

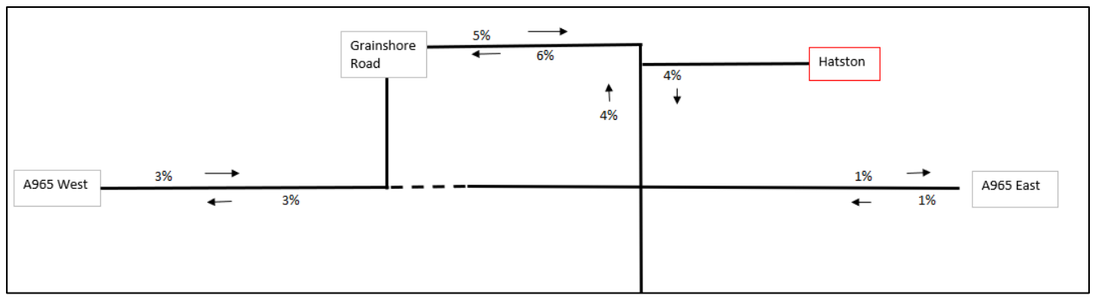


Figure 9-12: Hatston Phase One Threshold Assessment

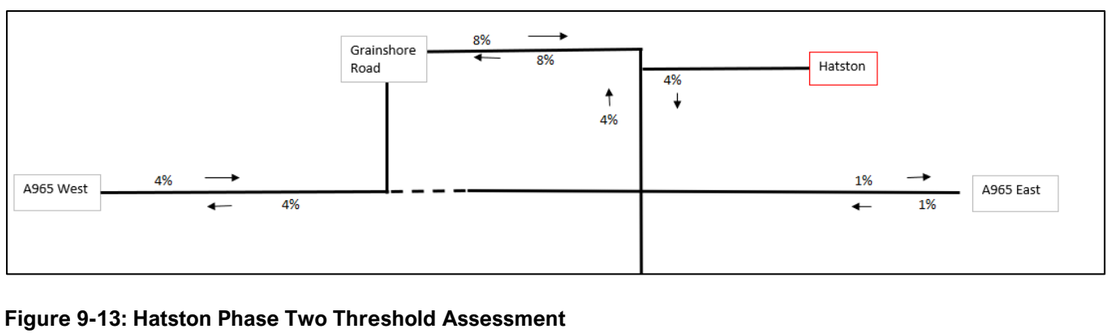


Figure 9-13: Hatston Phase Two Threshold Assessment

The threshold assessments show there is a 8% or less increase on all arms for each phase of the proposed development. Therefore it is predicted there will be a **negligible impact** on the surrounding road network.

9.5.4.2 Operational traffic

The proposed development aims to improve the space at the existing dock and allow for less constricted ferry timetabling. Currently no other boat is able to dock when the cruise liner is in port. It is understood that there will be no additional boats as a result of this work. There will be no increase in parking provision on site. The operational traffic will include additional staff however all traffic will be lower than that of the construction phase.

This section demonstrates that the likely land-based traffic impacts resulting from the construction phases of the Hatston are insignificant, and therefore no detailed assessment has been provided. The traffic generated during the operation phases for both units is lower than that in the construction phase and will therefore also have an **insignificant impact** on the surrounding road network.

The impact of any water-based traffic has not been assessed.

10 SCHEDULE OF MITIGATION

10.1 Introduction

This Chapter presents a summary of the mitigation and enhancement measures identified by the specialist environmental studies throughout the EIA process. It indicates how these mitigation measures have or would be implemented. In addition to summarising mitigation, enhancement measures identified in the topic specific Chapters of this EIAR are also highlighted.

The mitigation and enhancement measures included in this EIAR would be implemented during one or more of the following three broad phases of the proposed development:

- Measures incorporated during the design process;
- Measures required through the construction phase; and
- Measures likely to be required during post-construction.

Table 10-1 below provides a summary of the mitigation measures proposed for each issue identified by the EIA process. The measures are divided into the categories outlined above. It should be noted that the table presents a summary only; further details on the mitigation and enhancement measures are included within each Chapter of this EIAR.

The Schedule is designed to provide a comprehensive summary of all construction or physical mitigation measures that would require to be carried through into the construction and operation of the proposed development, to ensure that the environmental assessment outcomes discussed throughout this EIAR are reached, e.g. to ensure that significant adverse effects are avoided where applicable and possible.

10.2 Mitigation Measures

Mitigation detailed in each technical chapter has been summarised below.

Table 10-1: Schedule of Mitigation

Feature / Topic	Mitigation	Timing
General		
Construction Environmental Management Plan	A Construction Environmental Management Plan (CEMP) will be developed to ensure that the mitigation measures outlined in the EIA are followed during the proposed construction works. The CEMP will include surface water management and pollution prevention measures (e.g. Pollution Prevention Plan), and will be in place during construction and operation. The CEMP will remain a live document and will be continually updated as the work progresses. The CEMP will be developed as a practical tool to facilitate the management of environmental mitigation measures and to provide a clear roadmap of the key roles and responsibilities during construction. All mitigation measures will be incorporated into the CEMP, which will include detailed Construction Method Statements (CMS). An Environmental Clerk of Works (EnvCoW) will monitor the construction works to ensure that the CEMP and associated mitigation measures are being implemented effectively.	Construction
Best Practice	Best practice will be adopted throughout all phases of development, following current guidance as listed in Chapter 5 of this EIAR. The programme of works, including timings and methods, will be planned, monitored and managed to minimise the potential negative environmental impacts.	Construction
Pollution Incident Response Plan	A Pollution Incident Response Plan will be set out in the CEMP relating to the construction of the proposed development, statutory requirements and identification of areas of highest sensitivity. This will provide site spill response procedures, emergency contact details and equipment inventories and their location. All staff will be made aware of this document and its content during site induction. A copy will be available in the site office at all times.	Construction
Chapter 4: Water Environment		
Construction Environmental Management Plan	A Construction Environmental Management Plan (CEMP) will be developed to ensure that the mitigation measures outlined in the EIAR are followed during the proposed construction works. The CEMP includes surface water management and pollution prevention measures (e.g. Pollution Prevention Plan), and will be in place before construction commences . The CEMP will remain a live document and will be continually updated as the work progresses. The CEMP is a practical tool to facilitate the management of environmental mitigation measures and to provide a clear roadmap of the key roles and responsibilities during construction.	Construction
	A suitably qualified Environmental Clerk of Works (EnvCoW) will monitor the construction works to ensure that the CEMP and associated mitigation measures are being implemented effectively.	Construction
	Best practice will be adopted throughout all phases of development, following current guidance. The programme of works, including timing, direction and method of capital dredge, will be planned, monitored and managed to minimise the potential negative environmental impacts.	Construction
	A Pollution Incident Response Plan will be developed relating to the construction of the proposed development, statutory requirements and identification of areas of highest sensitivity. This will provide site spill response procedures, emergency contact details and equipment inventories and their location. All staff will be made aware of this document and its content during site induction. A copy will be available in the site office at all times.	Construction
	All activities above Mean High Water Springs (MHWS) with potential to affect the water environment require to be authorised under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR). The level of authorisation required is dependent on the anticipated environmental risk posed by the activity to be carried out. These activities could include construction drainage. Construction activities below MHWS with potential to affect the water environment require to be authorised under a Marine Licence.	Construction
Dredged Material	Mitigation measures will be delivered by the principal contractor through detailed Construction Environment Management Plans (CEMPs) that will be produced following appointment. The contractor will be responsible for producing a site specific Pollution Prevention Plan (PPP) that will apply the principles of the agreed mitigation to show how the mitigation is implemented effectively down to the specific site.	Construction
Surface Water Management	The surface water drainage will be designed to ensure that there are no untreated surface water discharges directly to surrounding coastal waters. It is proposed to replicate natural drainage around construction areas and to use source control to deal with rainwater in proximity to where it hits the ground in line with current Sustainable Drainage Systems (SuDS) guidance. Suitable prevention measures will be in place at all times to prevent the release of pollutants to the water environment, including adjacent coastal waters. These will be regularly inspected and maintained to ensure optimal performance.	Construction
Site Compounds	Run-off from compounds will be captured and passed through construction drainage features prior to discharge. Foul drainage will either be contained in a closed system and disposed of at a suitable off-site facility with private treatment and discharge or, where possible, directed via a connection to the local drainage network.	Construction
Concrete	In the case that concrete batching was to be undertaken on-site the following mitigation measures would be implemented to minimise the potential impact of concrete batching on the water environment in line with PPG6: • Concrete batching will take place on an impermeable designated area and at least 10m from any waterbody. • Equipment and vehicles will be washed out in a designated area that has been specifically designed to contain wet concrete/ wash water. • A closed loop system will be used for wash waters. Wash waters will be stored in a contained lined pond for settlement before being reused (e.g. for mixing and washing). • No discharge of wash waters will occur on-site. All excess wash water that cannot be reused will be disposed of off-site. The following mitigation is proposed for concrete handling and placement: - Pouring of concrete will take place within well shuttered pours to prevent egress of concrete from the pour area. - Pouring of concrete during adverse weather conditions will be avoided.	Construction

Feature / Topic	Mitigation	Timing
	- The CEMP will include a Pollution Incident Response Plan, and drivers of vehicles carrying concrete will be informed so as to raise awareness of potential effects of concrete and of the procedures for clean-up of any accidental spills. - Concrete acidity (pH) will be as close to neutral (or site-specific pH) as practicable as a further precaution against spills or leakage.	
Oil, Fuel, Site Vehicle Use and Storage	The risk of oil contamination will be minimised by good site working practice (further described below) but should a higher risk of oil contamination be identified then installation of an oil separator will be considered. The storage of oil is considered a Controlled Activity which will be deemed to be authorised if it complies with the Regulations. The mitigation measures to minimise any risk of contaminant release are in line with SEPA PPG and GPP documents and include the following: • Storage: o Storage for oil and fuels on site will be designed to be compliant with GPP2 and GPP8. o The storage and use of loose drums of fuel on site will not be permitted. o Bunded tanks will provide storage of at least 110% of the tank's maximum capacity. • Refuelling and maintenance: o Fuelling and maintenance of vehicles and machinery, and cleaning of tools, will be carried out in a designated area where possible in line with PPG7. o Multiple spill kits will be kept on site. o Drip trays will be used while refuelling. o Regular inspection and maintenance of vehicles, tanks and bunds will be undertaken. Emergency procedure: The Pollution Incident Response Plan will include measures to deal with accidental spillages.	Construction
Operational Environmental Management Document (OEMD)	An Operational Environmental Management Document (OEMD) will be in place throughout the operational phase. Best practice will be followed throughout the operational phase, with reference to the SEPA Guidance for Pollution Prevention (GPPs), and best practice guidance.	Operational
Surface Water Management	It is proposed that drainage of surface water will adopt SuDS principles and be by means of infiltration through a permeable surface, and the underlying permeable reclamation fill, providing treatment. Details of the operational surface water management proposals and methodology will be included within the OEMD and will be submitted to SEPA's operations team for agreement consent. Plans of the surface water management system will be located within the Site office, with foul water systems clearly marked. Where a site use or development proposal is such that it will require a Pollution Prevention and Control (PPC) authorisation from SEPA, then specific processes, techniques and technologies will be included within the surface water management system in that location in order to meet the requirements of the PPC authorisation. Such measures would be in line with best practice guidance.	Operational
Oil, Fuel, Site Vehicle Use and Storage	The proposed development's Pollution Incident Response Plan will be updated for the operational phase of the development, taking full consideration of best practice, statutory requirements and identification of areas of highest sensitivity. It will provide site spill response procedures, emergency contact details and equipment inventories and their location. All operation staff will be made aware of this document, and its contents, and it will be available in the port office. Appropriate spill kits and absorbent materials will be stored in a suitable location which is easy to access. Staff/contractors will be trained in the use of spill kits and other pollution control equipment and the operation of pollution control devices.	Operational
Monitoring and Enhancement	The Developer shall undertake a planned programme of compliance monitoring to verify the effectiveness of the project's environmental management. Monitoring plans will be established and implemented with the agreement of SEPA, SNH and Marine Scotland. Specific auditing and monitoring plans will be developed by the contractor and will cover the following: • The contractor's own Environmental Management System; • The CEMD, schedule of mitigation register, relevant legislation and industry good practice; • All project activity; • Roles and responsibilities for those undertaking audits and monitoring; • Frequency of inspection activities (i.e. daily, weekly, monthly); • Process to deal with corrective actions/non-compliance; and Reporting procedures (including non-compliance).	Construction/Operation
Chapter 5: Biodiversity		

Feature / Topic	Mitigation	Timing
General	Prior to works commencing on site (including any site clearance or preparatory works) a Construction Environment Management Plan (CEMP) detailing site specific mitigation and monitoring will be agreed with planning authority and implemented to avoided and reduce negative impacts. An Environmental Advisor/Manager will be employed to design and implement on site mitigation strategies as they are required. An independent Ecological/Environmental Clerk of Works (ECoW) will be employed to audit and report on adherence to the CEMP as well as any other relevant planning consents, environmental permits, legislation and mitigation. A silt boom to contain fine sediments will be used whilst land reclamation activities are undertaken. Inert stone material free from fine clays or organic materials will be utilised to form the outer bunds for land reclamation. The following good practice guidelines shall be adhered to and incorporated into the CEMP: • GGP 5: Works and maintenance in or near water; • PPG 6: Working at construction and demolition sites; • PPG 7: Safe Storage – The safe operation of refuelling facilities; • GPP 21: Pollution and incident response planning; and • PPG 22: Incident response – dealing with spills.	Construction
Wildlife Protection	All personal on the site should be made aware of the environmental sensitivities of the site (proximity to designated sites and presence of protected species including otter, marine mammals and fish) via the site induction and additional task specific toolbox talks as required. A pre-works check for otter should be conducted within a week prior to works commencing on the site and regularly throughout works. If otter are observed on site at any point during construction, works should be halted and advice sought from the environmental advisor. If a resting site is identified either during the pre-works check or during works, a species protection plan will be required and the need for a disturbance licence will be assessed. Where possible construction activities will be confined to daylight hours to reduce disturbance to commuting and foraging otter within the locale. Any artificial light required during construction will be fitted with shades and directed at the required work area only. A Marine Mammal Protection Plan as detailed in Technical Appendix 5.8will be implemented to reduce the risk of underwater noise causing injury to marine mammals (and basking shark). This will involve the use of MMOs, Passive Acoustic Monitoring (PAM) devises and soft-start techniques for noise generating activities. The MMPP also details protocols to be implemented to reduce collision risk. The MMO or ECoW should also check for the presence of rafting birds on the water prior to blasting and no blasting should take place until birds have moved off. Bird scaring strategies may be required to encourage them to move away from the blast zone. The ECoW should monitor any fish deaths as a result activities such as blasting and report these to NatureScot and Marine Scotland (number of fish and species). Consideration should be given to mitigation strategies to reduce fish mortality if it becomes an issue. This can be difficult to do however with some strategies such as the use of netting or bubble curtains sometimes having the effect of preventing fish from moving away from noisy activities. If the fish farm is still operational during construction, the timing of the blasting phase should be co-ordinated as far as possible to fall within the fisheries fallow period when stocks are absent. If this is not possible, measures to dampen the transmission of sound will be considered such as the use of bubble curtains. The principal contractor will produce and implement a biosecurity plan throughout the duration of works. This will include the cleaning of equipment and plant machinery prior to deployment and at regular intervals throughout to reduce risk of transmitting non-native and invasive species. The plan will be submitted to the planning authority and other relevant consultees for approval prior to works commencing and implementation would be audited by the ECoW. A strict speed limit for both onshore and marine traffic will be implemented to reduce risk of collision with protected species (15mph on shore and 4 knots within the water).	Construction
	Implementation of Ballast Water Management Plan and industry standard ballast water management practices	Operation
	Implementation of a vessel management plan including agreed routes and speed limits.	Operation

Feature / Topic	Mitigation	Timing
	Safe vessel operation to minimise risk of collision with marine mammals and basking shark to be promoted to users. Training courses such as those provided by the WiSe scheme could be offered at regular intervals.	Operation
	Onshore speed limits will be kept at 15mph to reduce otter collision risk.	Operation
	Continuation of the Harbour Authorities biosecurity monitoring programme as detailed in the existing Ballast Water Management Policy	Operation
	Permanent lighting design will be kept to the minimum required for health and safety and security purposes. All lighting will be fitted with shades and directed and the required areas. The shoreline and surrounding waters will be avoided as far as possible to reduce disturbance to wildlife.	Operation
Chapter 6: Archaeology and Cultural Heritage		
WSI/PAD	A Written Scheme of Investigation (WSI) and Protocol for Archaeological Discoveries (PAD) to avoid or mitigate accidental impacts and manage any accidental discoveries of archaeological interest will be compiled and submitted for approval to OIC and fully implemented during the construction phase of the project.	Construction
Watching Brief	An Archaeological Watching Brief undertaken during any ground breaking works in the vicinity of the known souterrain (site 1) would mitigate any direct impacts through preservation by record; this could be written into the WSI/PAD.	Construction
Chapter 7: Seascape, Landscape and Visual Impact		
None	The assessment of seascape, landscape and visual effects does not identify a requirement for mitigation other than already embedded within the siting and design of the proposed development. This reflects the consistency between the nature of the proposed development and the baseline conditions at the site, and that no potentially significant seascape, landscape or visual effects have been identified.	NA
Chapter 8: Socioeconomics		
Employment opportunities	Requirements upon the contractor to provide local job creation and local training either directly or through supply chain for the construction and operational phases of the development to provide greater and longer lasting benefit to communities.	Construction
Local Businesses	Continue to consult with local businesses, including local tourist board throughout the proposed development design and construction programme to avoid significant inflow of workers during peak tourist season and large scale events on the island.	Construction
Local Businesses	Engage with local businesses, including marine users, to understand their access and operational requirements. Contractor and design team should ensure that current operations at the harbour can reasonably continue during construction of the proposed development and effectively communicate when there are any changes to access (including short term changes).	Construction
Local Community Capacity	Engage with local authority to ensure there is sufficient capacity in council services and infrastructure to accommodate influx in workers.	Construction
Community Benefits	Community benefits and social value should be maximised during the construction period, such as the provision of apprenticeships, training and work experience opportunities. The baseline indicates that the age group 18 – 24 has the highest proportion on the island of being unemployed; targeting this group would maximise benefits and this would represent a significant opportunity to provide long term employment and development of key green skills locally.	Construction
Employment opportunities	New permanent employment opportunities should be made available to local residents in the first instance in combination with appropriate training, support and access to higher skill / paid jobs.	Operation
Local Community Capacity	Continued consultation with Orkney Islands Council and ongoing monitoring of employment forecasts to inform housing need assessments and implications for education and health.	Operation
Local Businesses	Engage with local businesses, including marine users, to understand their access and operational requirements. Design team should at a minimum ensure that current operations at the harbour can reasonably continue during operation of the proposed development and ideally improve access / capabilities of the pier.	Operation
Chapter 9.1: Accidents and Natural Disasters		
Marine Safety	Orkney Islands Council Harbour Authority existing Safety Management System, should be updated periodically as harbour operations change or new legislation arises	Construction and Operation
Chapter 9.2: Airborne Noise		
Construction Noise	Noise during the construction phase will be carried out during the specified working hours and will follow best practice noise management techniques. No additional mitigation measures are proposed.	Construction
Operational Noise	No significance adverse impacts are predicted during the operational phase. No mitigation measures are therefore proposed.	Operation
Chapter 9.3: Air Quality		
Trackout	Recommended mitigation measures for track out are as follow:	Construction

Feature / Topic	Mitigation	Timing
	▪ Use water assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use. ▪ Avoid dry sweeping of large areas ▪ Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport ▪ Inspect on-site haul routes for integrity and instigate necessary repairs to surfaces as soon as reasonably possible ▪ Record all inspections of haul routes and any subsequent action in a site log book ▪ Install hard surface haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water browsers and regularly cleaned. ▪ Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably predictable) ▪ Ensure there is an adequate area of hard surfaced road between the wheel and wash facility and the site exit, wherever site size and layout permits. ▪ Access gates to be located at least 10 m from receptors where possible These measures will be included within the Construction Environmental Management Plan which will be produced by the contractor prior to construction and signed off by Orkney Islands Council.	
Chapter 9.4: Carbon Climate Change and Greenhouse Gas Emissions		
Construction	Opportunities of carbon reduction in the construction phase can be achieved through consideration of alternative/recycled materials, design optimisation, construction site management (e.g., sourcing energy efficient plant) and construction waste management. These examples are discussed in more detail in *Section 9.4.5* of the Carbon, Climate Change and Greenhouse Gas Emissions Assessment	Construction
Operation	Consideration to measures of emission reduction during the operational phase can follow the Energy Hierarchy. This hierarchy suggests the use of a four-tiered approach to reducing operational energy consumption via *Be Lean, Be Clean, Be Green* and *Be Seen*. Examples of mitigation measures at each stage of the hierarchy are discussed in detail within *Section 9.4.5* of the Carbon, Climate Change and Greenhouse Gas Emissions Assessment.	Operation

10.3 Construction Environmental Management Document

The Schedule of Mitigation will form the basis of the subsequent Construction Environmental Management Document (CEMD).

The CEMD will be a working document which would be updated throughout the construction phase of the project. It will also provide a clear roadmap of the key roles and responsibilities during construction works. An Environmental Manager will be identified who would be responsible for the implementation of the CEMD ensuring that all measures identified within the Schedule of Mitigation are applied and adhered to.

11 SUMMARY OF SIGNIFICANCE OF EFFECTS

11.1 Introduction

The predicted environmental effects related to the construction and operation of the proposed Orkney Logistics Base (Hatston) have been considered throughout the design and subsequent assessment of the development layout. The views of statutory consultees have been taken into account as presented in Chapter 3: EIA Methodology and Consultation.

The final design of the proposed development has been subject to a detailed EIA and design iteration process which has sought to minimise the effects resulting from the proposed development whilst ensuring the maximum benefits to the environment, nearby communities, and future generations. Where appropriate, additional mitigation measures have been proposed as well as opportunities for enhancement. Both mitigation and enhancement measures are detailed within their respective specific chapters and summarised within Chapter 9: Schedule of Mitigation of this EIAR.

The conclusions of each chapter are provided below.

11.2 Water Environment

Assessment of the impacts of the proposed development on the Water Environment in the study area was undertaken and detailed within Chapter 4 of the EIAR. The assessment considered the potential for significant impacts on hydrology, hydrogeology, water quality and coastal processes comprising tides, waves and sediment transport. The assessment concluded that the magnitude of effects of the proposed development were deemed to be negligible (and therefore not significant) prior to mitigation apart from:-

- Water and Sediment during the construction phase within the immediate area which was assessed as being low in magnitude;
- Pollution incidences during the construction phase were assessed as having a low to high magnitude of impact depending on the scale and nature of the incident; and
- Water Quality during the operational phase were assessed as having a low to high magnitude of impact depending on the scale and nature of the incident.

With suitable mitigation measures identified and in place, the residual effects are subsequently reduced to negligible in their magnitude and therefore not significant for both the construction and operational phases. A monitoring programme to verify the effectiveness of the mitigation measures proposed is provided in the Chapter.

Overall, the effects of the proposed development on the Water Environment are considered **not significant**.

Chapter 5 Biodiversity considered the impacts of the development on the ecology of both the terrestrial and marine environments. A number of specialist ecological studies were undertaken, which includes a Habitats Regulations Appraisal (HRA), to inform the impact assessment. A number of Important Ecological Feature's (IEF's) considered in the Chapter were assessed as having a negligible magnitude prior to mitigation measures being implement apart from:-

- North Orkney SPA and Orkney Mainland Moors SPA/West Mainland Moors SSSI were deemed to have a moderate to low magnitude of impact during the construction phase and a low magnitude of impact during the operational phase. For both phases the IEF's were considered to have a low sensitivity;
- Sites Designated for Grey and Harbour Seals are assessed has having a low magnitude of impact with the SACs/SSSIs considered to be of negligible sensitivity during the operational phase;
- Impacts on Kelp and Seaweed during the construction and operational phases are considered to be of low magnitude with the habitat having a low sensitivity;
- Seapens and burrowing megafauna in circalittoral fine mud were assigned a moderate magnitude of impact and a medium sensitivity during both the construction and operational phases of the development;
- The impact on Otters during both phases of development were assessed has having a low magnitude with the IEF to be of low sensitivity.
- Seals, harbour porpoise were all deemed to have a low magnitude of impact with the IEF's considered to be of low or negligible sensitivity during both phases of development;
- The impacts on basking sharks are considered to be of low magnitude with the IEF having a low sensitivity during the operational phase only;
- The commercial fishery during the construction phase only is assessed as having a moderate to low magnitude of impact with the IEF considered to have a low sensitivity.

11.3 Biodiversity

Cumulative impacts on Biodiversity were identified during the construction phase of this development and the new Deep Water Quay within Scapa Flow (SDWQ) should these phases occur concurrently or sequentially. Both developments are predicted to have cumulative impacts during the operational phases.

With suitable mitigation measures identified and in place, the residual effects for the IEF's are subsequently reduced to negligible in their magnitude and therefore not significant for both the construction and operational phases apart from a small area identified as being a Priority Marine Feature (PMF). The PMF is considered to be significant at a site level only. A derogation licence will be required for disturbance to cetaceans and basking sharks during the construction phase.

Biodiversity enhancements are also identified which should provide benefits to the local biodiversity, creating habitats suitable for a variety of floral and faunal terrestrial and intertidal species. A monitoring programme to verify the effectiveness of the mitigation measures proposed is provided in the Chapter.

Overall, the effects of the proposed development on Biodiversity are considered **not significant**.

11.4 Archaeology and Cultural Heritage

Archaeology and Cultural Heritage of the study area is presented in Chapter 6 of the EIAR. The construction assessment concluded that there was only the souterrain which has the potential to be damaged as a result of ground-breaking works. However, with suitable mitigation measures in place the potential for loss of or damage to known and unknown onshore historic environment assets would result in a minor consequence of impact, which is not a significant impact under EIA Regulations.

In relation to the loss of or damage to known and unknown marine and intertidal historic environment assets through construction activities, review of marine surveys has identified no features of interest, therefore the likelihood of impact is considered low. No submerged palaeoenvironmental deposits have been identified within the study area.

The Archaeology and Cultural Assessment of the operational phase of the development identified no significant impacts under the EIA Regulations.

Mitigation and monitoring proposed in the Chapter takes the form of a Written Scheme of Investigation (WSI), a Protocol for Archaeological Discoveries (PAD) and an Archaeological Watching Brief during any ground breaking works in the vicinity of the souterrain.

Overall, the effects of the proposed development on Archaeology and Cultural Heritage are considered **not significant**.

11.5 Seascape, Landscape and Visual

The findings of the Seascape, Landscape and Visual Impact Assessment (SLVIA) are presented in Chapter 7 of the EIAR. The Zone of Theoretical Visibility (ZTV) was used to identify viewpoints and key receptors to be considered in the SLVIA including historic environment assets and views from ferries approaching the development site. Construction and operation phase mitigation are considered to be adequately addressed by the scheme design and as such no additional measures are proposed, however, enhancement opportunities have been identified in the chapter.

In relation to the impact assessment, the SLVIA assigns a low magnitude of impact resulting in a locally Minor Adverse level of effects on the Coastal and Landscape character during both phases of development. In respect to visual impacts, the assessment predicts a Minor Adverse effects for the majority of the viewpoints considered.

Overall, the effects of the proposed development on the Seascape, Landscape and Visually are considered **not significant**.

11.6 Socio-Economics

The potential for socio-economic effects during the short-term (construction) and long-term (operation) of the development were considered in Chapter 8 of the EIAR. The assessment took account of the cumulative impacts associated with related projects based in and around Orkney that also have the potential to have socio-economic impacts within the local area during the construction phase.

The construction assessments considered the impacts associated with:-

- Temporary increase in employment / jobs for local workers;
- Temporary increase in employment / jobs for national / international workers;
- Economic impacts to local businesses as a result of construction works temporarily residing in Orkney and associated spend;
- On access and operational activities of local businesses and marine users currently using the existing pier;
- On the capacity of local accommodation during peak season and / or during key events and reducing availability of visitors / attendees / organisers out with OIC area; and
- Potential impact during the tourist off-season in relation to additional income.

The magnitude of the impact identified ranged between Moderate adverse in relation to availability of local accommodation during peak season and or during key events to Minor beneficial in relation to increase in local employment, for local businesses and during the tourist offseason.

During the operational phase, the socio-economic impact assessment identified minor beneficial magnitude of impacts associated with new permanent jobs for local workers and an increase in GVA for the Orkney economy. A minor adverse magnitude of impacts was assigned to the capacity of the local community and council services and access and operations for existing local businesses.

The outcomes of the assessment are based on the level of detail known at the time of writing and as such are reflective of the worst-case scenario. However, as the level of certainty increases as the proposed development progresses the positive impacts will potentially increase in magnitude.

Mitigation and enhancement measures were proposed for both the construction and operational phases of the development to reduce adverse impacts and enhance opportunities. With the implementation of these measures the overall effects of the proposed development on socio-economical aspects of Orkney Islands are **considered not significant.**

11.7 Other Issues

Chapter 7: Topics not Requiring Full EIA, covers topics including Accidents and Natural Disasters, Airborne Noise, Air Quality, Carbon, Climate Change and Greenhouse Gas Emissions and Transport. None of these aspects are considered significant in terms of the EIA Regulations.

GLOSSARY

AADT	Annual Average Daily Traffic
AMAAA	Ancient Monuments and Archaeological Areas Act 1979
AOD	Above Ordnance Datum
AQ	Air Quality
BGS	British Geological Survey
BPEO	Best Practicable Environmental Option
CD	Chart Datum
CEMD	Construction Environmental Management Document
CEMP	Construction Environmental Management Plan
CFB	Coastal Flood Boundary
CIfA	Chartered Institute for Archaeologists
CIEEM	Chartered Institute of Ecology and Environmental Management
COP	Conference of the Parties
CRTN	Calculation of Road Traffic Noise
dB	Decibel
DTW	Down The Hole
ECoW	Ecological Clerk of Works
EHD	Environmental Health Department
EHO	Environmental Health Officer
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIA Regulations	Town & Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017
EnvCoW	Environmental Clerk of Works
GGBS	Ground Granulated Blast-furnace Slag
GHG	Greenhouse Gas
Ha	Hectares
HES	Historic Environment Scotland
HEPS	Historic Environment Policy Statement for Scotland
HGV	Heavy Goods Vehicles
HLA	Historic Land-use Assessment
HRA	Habitats Regulations Assessment
ICE	Inventory of Carbon and Energy
IEF	Important Ecological Features
IEMA	Institute of Environmental Management and Assessment
IES	Institute of Environmental Science
IPCC	Intergovernmental Panel on Climate Change
JNCC	Joint Nature Conservation Committee
$kgCO_2e$	Kilograms of Carbon Dioxide Equivalent
LBAP	Orkney Local Biodiversity Action Plan
LCT	Landscape Character Types
LCA	Life Cycle Assessment
LPG	Liquified Petroleum Gas
mAOD	Metres Above Ordnance Datum
Marine EIA Regulations	Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
MMPP	Marine Mammal Protection Plan
MMO	Marine Mammal Observer
mNNIS	Marine Non Native Invasive Species
MS-LOT	Marine Scotland Licensing Operations Team
MWHS	Mean Water High Springs
NIA	Noise Impact Assessment
NPF	National Planning Framework
NRA	Navigation Risk Assessment
NRHE	National Record of the Historic Environment
NS	NatureScot
NSA	National Scenic Area
NTS	Non-Technical Summary
O&M	Operations & Maintenance
OIC	Orkney Islands Council
OICHA	Orkney Islands Council Harbour Authority
OLBH	Orkney Logistics Base Hatston
OLDP	Orkney Local Development Plan
OW	Orcadian Wildlife
PAC	pre-Application Consultation Report
PAD	Protocol for Archaeological Discoveries
PMF	Priority Marine Features
PoMRA	Protection of Military Remains Act 1986
PPG	Pollution Prevention Guidance
pSPA	Proposed Special Area of Protection
RAMS	Risk Assessments and Method Statements
RBMP	River Basin Management Plan
RICS	Royal Institution of Chartered Surveyors
RCP	Representative Concentration Pathways
RSP	Reference Study Period
SAC	Special Area of Conservation
SBL	Scottish Biodiversity List
SDWQ	Scapa Deep Water Quay
SEA	Strategic Environmental Assessment
SEIA	Socio-Economic Impact Assessment
SEPA	Scottish Environmental Protection Agency
SLVIA	Seascape, Landscape & Visual Impact Assessment
SPA	Special Area of Protection
SPMT	Self-Propelled Modular Transporter
SPP	Scottish Planning Policy
SSSI	Sites of Special Scientific Interest
STS	Ship-to-ship
SUDS	Sustainable Urban Draining System
SWF	Seawatch Foundation
SWMP	Site Waste Management Plan
UKCP	UK Climate Projections
WCA	Wildlife and Countryside Act 1981
WDC	Wale and Dolphin Conservation
WFD	Water Framework Directive
WSI	Written Scheme of Investigation
ZOI	Zone of Influence
ZTV	Zone of Theoretical Visibility