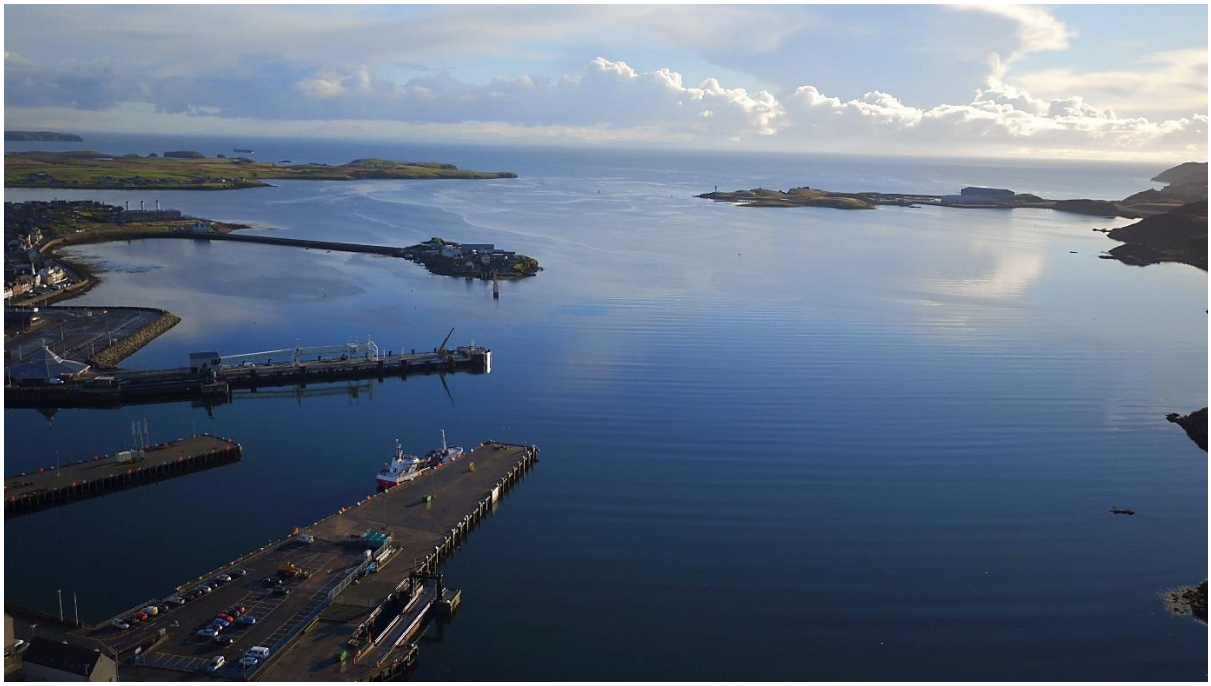
Stornoway Deep Water Port

Volume 3: Technical Appendices



October 2018

Deep Water Port

Volume 3: Contents of Technical Appendices

Technical Appendix 3.1 Scoping Reports

Technical Appendix 5.1 Preliminary Ecological Appraisal

Technical Appendix 5.2 Marine Mammal Protection Plan

Technical Appendix 5.3 Habitats Regulations Appraisal

Technical Appendix 5.4 Underwater Noise Report

Technical Appendix 5.5 Otter Report

Technical Appendix 5.6 Fisheries Baseline

Technical Appendix 6.1 Cultural Heritage Baseline and Gazetteer

Technical Appendix 6.2 Cultural Heritage Historical Maps

Technical Appendix 7.1 Noise Assessment

Technical Appendix 8.1 Hydrographic and Geophysical Survey

Technical Appendix 8.2 Addendum Hydrographic Assessment

Technical Appendix 8.2 Hydraulic Assessment

Technical Appendix 9.1 Transport Assessment

Technical Appendix 3.1

Stornoway Port Authority
Deep Water Port at Arnish EIA Scoping Report

September 2017

Stornoway Port Authority
Deep Water Port at Arnish EIA Scoping Report

Client:	Stornoway Port Authority
Document number:	7777
Project number:	169438
Status:	Final
Author:	Various
Reviewer:	George Fleming
Date of issue:	1 September 2017
Filename:	169438- Deep_Water_Port_Arnish_Scoping_Report

Glasgow	Aberdeen	Inverness	Edinburgh
Craighall Business Park 8 Eagle Street Glasgow G4 9XA 0141 341 5040 info@envirocentre.co.uk www.envirocentre.co.uk	Banchory Business Centre Burn O'Bennie Road Banchory AB31 5ZU 01330 826 596	Alder House Cradlehall Business Park Inverness IV2 5GH 01463 794 212	Suite 114 Gyleview House 3 Redheughs Rigg Edinburgh EH12 9DQ 0131 516 9530

This report has been prepared by EnviroCentre Limited with all reasonable skill and care, within the terms of the Contract with Stornoway Port Authority ("the Client"). The report is confidential to the Client, and EnviroCentre Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced or altered without the prior written approval of EnviroCentre Limited.

Contents

1 Introduction 3
1.1 Background 3
1.2 The Applicant 3
1.3 Project Team 3
1.4 Planning History and Need for the Proposed Development 4
1.5 Scoping under the EIA Regulations 2017 4
1.6 The Legislative Context 5
1.7 Consultation and Stakeholders 6
2 The Proposed Development 8
2.1 Site and the Surrounding Area 8
2.2 The Proposed Development 9
3 Approach to EIA 16
3.1 Introduction 16
3.2 General Approach to Assessment 16
3.3 Mitigation 17
4 Potentially Significant Environmental Effects 19
4.1 Introduction 19
4.2 Landscape and Visual 19
4.3 Ecology 31
4.4 Cultural Heritage and Archaeology 41
4.5 Noise 47
4.6 Air Quality 50
4.7 Water Environment 51
4.8 Traffic and Transport 54
4.9 Other Issues 59
5 Content and Structure of the Environmental Statement 61
5.1 Content and Structure 61
6 Conclusions 62

Appendices

A Drawings
B Habitat Information and Site Photography

Figures

Figure 2-1 Cutter Suction Dredger 10
Figure 2-2 Pipe Delivery System 10
Figure 2-3 Typical Backhoe Dredger and Self-Propelled Hopper Barge 11
Figure 2-4 Example Quay Wall Construction Method 12
Figure 2-5 Cathodic Protection Anodes 12
Figure 2-6 Tie Rods 13
Figure 2-7 Reclamation 14
Figure 2-8 Rock Armour 14
Figure 2-9 Quay Fendering 15
Figure 4-1 Traffic Point 56
Figure 4-2 Road Traffic Incidents 57

Tables

Table 4-1 Sensitivity Criteria 20
Table 4-2 Susceptibility Criteria 25
Table 4-3 Landscape Value 26
Table 4-4 Susceptibility to Change 27
Table 4-5 Magnitude of Change 28
Table 4-6 Scale of Effect 29
Table 4-7 Significance of Effect 30
Table 4-8 Terrestrial designated sites 32
Table 4-9 Western Isles LBAP Species 33
Table 4-10 Western Isles LBAP Habitats 33
Table 4-11 Western Isles LBAP Priority Bird Species 35
Table 4-12 Marine Designated Sites 37
Table 4-13 Marine mammal LBAP species 37
Table 4-14 Heritage Assets within the Site Boundary 41
Table 4-15 Criteria for Assessing the Importance of Heritage Assets 44
Table 4-16 Criteria for Assessing the Magnitude of Impacts on Heritage Assets 45
Table 4-17 Criteria for Assessing the Significance of Effects on Heritage Assets 46
Table 4-18 Tidal Range at Stornoway 52
Table 4-19 Traffic Flow Information (ADDF) 2015 Data 56
Table 4-20 Road Traffic Incidents 56

1 INTRODUCTION

1.1 Background

EnviroCentre Ltd has been appointed by Stornoway Port Authority (SPA) in respect of Environmental Impact Assessment (EIA) Scoping and supplementary ecological baseline collection in relation to a proposed new redevelopment at Arnish, approximately 2km south of Stornoway (as demonstrated within within Appendix A: Drawing No 169438-001). The purpose of this report is to seek a Scoping Opinion from Comhairle nan Eilean Siar under Part 4, Section 17(1) of the newly adopted Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (hereafter referred to as 'the EIA Regulations').

We refer the Council to the contents of this report which sets out an initial baseline and proposed EIA methodology. Accordingly this Report has been laid out as follows:

- Section 1 introduces the applicant, the regulatory background to which this Scoping Request is made;
- Section 2 sets out a description of the proposed development upon which to base potentially significant environmental effects upon. This development description will evolve as engineering design progresses;
- Section 3 sets out the approach to EIA based upon the legislative context introduced within section 1;
- Section 4 discusses potentially significant environmental effects on a topic by topic basis, and offers methodologies for the assessment of those environmental topics;
- Section 5 discusses the content and structure of any potential EIA, based upon the findings of section 4; and
- Section 6 concludes the findings of the Scoping Report.

1.2 The Applicant

Stornoway Port is the primary port for the Western Isles and one of the busiest ports on the west coast, north of the Clyde. The Port is central to the economy of the island, facilitating the lifeline ferry service and supporting almost all economic activities from fishing and aquaculture, to construction, retail and marine leisure.

The Port is run by Stornoway Port Authority (SPA), a Trust Port, with a Board contributing a range of skills and experience. SPA's Board is committed to supporting activities that will benefit the local community, both socially and economically.

Stornoway Port Authority take such steps as it may consider necessary or expedient for the conservancy, protection, regulation, maintenance and improvements of the harbour and the navigation thereof and for these purposes the Authority may:

- Manage, regulate, improve and maintain the harbour;
- Do all other things, which in its opinion are expedient to facilitate the proper carrying on or development of the harbour.

1.3 Project Team

This Scoping Report has been prepared by EnviroCentre Ltd with input from other organisations shown in Table 1.1.

Table 1.1: The Project Team

Topic	Specialist
EIA, Ecology, Water, Noise, Air Quality, Traffic & Transport and Other Issues	EnviroCentre Ltd.
Landscape and Visual	Doug Harman Landscape Planning
Cultural Heritage and Archaeology	Headland Archaeology
Engineering Design	Wallace Stone
Planning	Barton Wilmore

1.4 Planning History and Need for the Proposed Development

The proposed development of Deep Water Port at Arnish was identified within the SPA's Draft Masterplan for Stornoway, dated 26th November 2016. This formed a masterplan which set out proposed land use and a growth strategy in the harbour area for the next 20 years. Whilst this does not represent adopted Supplementary Planning Guidance (SPG) by Comhairle nan Eilean Siar, it represents a positive vision for the future of Stornoway and was subject to public consultation on 13th and 14th December 2016.

SPA is aware that the Port of Stornoway is crucial to the economic future of Stornoway and the Outer Hebrides. The masterplan is driven by economic opportunities for the town, and will support job creation and a sustainable community. Along with the Deep Water Port at Arnish the first phase of the Masterplan development would also include the development of Bayhead and the Newton Marina redevelopment. Given these elements will potentially be progressed along different timescales and are subject to separate consenting regimes, they are not considered further within this EIA Scoping Report.

Outer Hebrides Local Development Plan 2012

The Outer Hebrides Local Development Plan identifies Arnish as a safeguarded, first phase, site in the National Renewables Infrastructure Plan (Prop E1a Arnish, Lewis)

The core of the industrial estate is identified as the prime location for energy related development or other appropriate large scale uses that utilise its facilities and/or require a deep water harbour.

Preferred development would be in use classes 4-6:

- Use class 4: Business;
- Use class 5: General industrial; and
- Use class 6: Storage or distribution.

1.5 Scoping under the EIA Regulations 2017

As the proposed development contains elements which are above and below Mean High Water Springs (MHWS), which constitutes the dividing line between terrestrial and marine planning, consents will be required from both the Council (for any elements not covered under SPAs' permitted development rights) and Marine Scotland. Accordingly, an EIA will be prepared to cover both consents under both the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2017 (the Marine EIA Regulations).

In determining the requirement for an EIA, Schedule 1 of the 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.

In this instance, the proposed development is considered to constitute Schedule 1 development as defined by the EIA Regulations as it falls under Regulation 8 (2) "*Trading ports, piers for loading and unloading connected to land and outside ports (excluding ferry piers) which can take vessels of over 1,350 tonnes*".

By virtue of its nature, size and location, the proposed development could potentially have (if unmitigated) significant adverse effects on the environment. The proposed development has not been subject to a Screening Decision by Comhairle nan Eilean Siar, but due to the size and potential impacts generated by the proposed development EIA will be required. Schedule 4 of the EIA Regulations specifies the information that should be included in an ES, and this Scoping Report further discusses the requirements of Schedule 4.

Paragraph 85 of "Planning Circular 1 1/2017 - The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 emphasises that "*A developer may ask the planning authority for their formal opinion on the information to be supplied in the EIA Report (a 'scoping opinion'). This provision allows the developer to be clear about what the planning authority considers the significant effects of the development are likely to be and, therefore, the topics on which the EIA report should focus.*"

The purpose of EIA Scoping is to:

- *"Identify the key issues to be considered;*
- *Identify those matters which can be either be scoped out or which need not be addressed in detail; and*
- *Discuss and agree appropriate methods of impact assessment, including survey methodology, where relevant".*

In accordance with Part 4, Section 17(1) of the EIA Regulations, this Scoping Report is submitted to Comhairle nan Eilean Siar with the intention that it should form the basis of their Scoping Opinion. In addition to Comhairle nan Eilean Siar, other statutory consultees, local people and organisations and other stakeholders, are invited to comment on the potential environmental effects to be included within the EIA and the assessment methodologies to be used. As such, it should be noted that this document does not seek to assess the environmental effects of the proposed development as this is the purpose of the EIA which will be carried out once the design has been sufficiently evolved.

1.6 The Legislative Context

The continued management and development of the harbour is subject to European and national legislation of which the following is the principal legislation relevant to the current development programme:

- The Harbours Act 1964, to be determined by Transport Scotland to grant a Harbour Empowerment or Revision Order to empower Stornoway Port Authority to undertake works or vary its existing harbour powers;
- The Town and Country Planning (Scotland) Act 1997, as amended by the Planning etc. (Scotland) Act 2006 – for works on land and to the mean low water mark. An application for Planning Permission will be determined by Comhairle nan Eilean Siar;
- The Harbour Works (Environmental Impact Assessment) Regulations 1999 (as amended by The Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2011) (for works below the mean low water mark)
- The Marine (Scotland) Act 2010 (Marine Licences) – to be consented by Marine Scotland for the deposit or removal of a substance or object below the mean high water springs mark.

Each of these licensing regimes will require an EIA if the development will create any project categorised under the Environmental Impact Assessment Directive (85/337/EEC –subsequently amended by Directive 97/11/EC, 2011/92/EU and 2014/52/EU

Marine (Scotland) Act 2010.

A Marine Licence would be required for the deposit or removal of a substance or object below the mean high water springs mark. Marine Scotland stipulate that any associated dredging works taking place, that involves disposal at sea, then a Marine Licence for Sea Disposal may also be required.

Under Section 20(1) of the Marine (Scotland) Act 2010 (from 0 -12nm) and Section 65(1) of the Marine and Coastal Access Act 2009 (from 12 – 200nm)[1], a marine licence from Scottish Ministers is required if organisation intends to carry out certain acts in the Scottish marine area. These acts can include:

- The deposit of substances or objects into the sea or onto the sea bed
- The removal of substances or objects from the sea bed
- Construction, alteration and improvement works
- Dredging
- The deposit or use of explosives.

1.7 Consultation and Stakeholders

The Applicant recognises the importance of consultation and community involvement throughout the project development process in line with "PAN 3/2010 Community Engagement" (PAN 3/2010). PAN 1/2013 also reinforces the importance of public involvement in the Scoping process and makes it clear that the EIA process is intended to ensure that consultation bodies and the public have opportunity to express their opinion on both the proposed development and the ES.

The Applicant has held informal pre-application discussions with local stakeholders during consultation events in December 2016 and has sought pre-application advice from Comhairle nan Eilean Siar and Marine Scotland. This advice has been reflected in this Report and will be taken forward to design of the proposed development as appropriate.

Scoping represents the first formal consultation of the EIA process, and Comhairle nan Eliean Siar has a responsibility to distribute to relevant stakeholders and consultees in order to gather views and opinions regarding the proposed scope of the EIA. We would intend that the proposed list of stakeholders within the Scoping period is contained below:

- BT;
- Comhairle nan Eilean Siar Biodiversity Officer;
- Comhairle nan Eilean Siar Environmental Health;
- Comhairle nan Eilean Siar Flood Prevention Officer;
- Comhairle nan Eilean Siar Landscape Officer;
- Comhairle nan Eilean Siar Roads Department;
- The Crown Estate;
- Highlands and Islands Enterprise (HIE);
- Historic Environment Scotland (HES);
- Marine Scotland;
- Maritime and Coastguard Agency;
- Outer Hebrides Fisheries Trust;

[1] Circular 1/2015 The Relationship Between the Statutory Land Use Planning System and Marine Planning and Licencing - http://www.gov.scot/Publications/2015/06/5851/4

- Royal Society for the Protection of Birds (RSPB);
- Scottish Environmental Protection Agency (SEPA);
- Scotland Gas Networks (SGN);
- Scottish Natural Heritage (SNH);
- Scottish Water; and
- Western Isles Archaeology Service.

2 THE PROPOSED DEVELOPMENT

2.1 Site and the Surrounding Area

2.1.1 The Site

Arnish is located approximately 1.5 - 2km south of Stornoway, on the Isle of Lewis. The site consists of Arnish Point Industrial Estate, including a quayside, Fabrication yard and an area of coast on two sides of a peninsula. Arnish is accessed from the west via the junction at the A859.

SPA, on behalf of Highlands and Islands Enterprise, operates the deep-water pier at Arnish which is regularly used by offshore construction vessels delivering cargo to the Arnish fabrication yard. The Arnish fabrication facility, operated by BiFab, is currently used to manufacture and assemble oil and gas equipment. It is also likely to continue to be used for both onshore and offshore wind and tidal arrays. The yard is modest by industry standards with a 100 metre quay, 60,000 m² of open storage assembly halls covering 17,400 m².

There is potential for the yard to gain work in a number of sectors that have growth potential in the Western Isles, including onshore wind farms, offshore renewables, and oil and gas. However, to fully capitalise on it's potential, a deep water berth and more quayside space are required, as well as improved road access.

Stornoway is also the hub for the aquaculture sector in the Western Isles. The leading operator at the Port is The Scottish Salmon Company, who produce around 14,000 tonnes of salmon per year. Their fish are landed at the killing station at Arnish, and trucked to their Marybank facility for processing, and then sent to the mainland via the ferry.

2.1.2 The Surrounding Area

Stornoway Port Authority (SPA) is the primary port for the Western Isles and one of the busiest ports on the west coast, north of the Clyde. The Port is central to the economy of the island, facilitating the lifeline ferry service and supporting almost all economic activities from fishing and aquaculture, to construction, retail and marine leisure. The Port is run by SPA, a Trust Port, with a Board contributing a range of skills and experience. SPA's Board is committed to supporting activities that will benefit the local community, both socially and economically

There is a strong marine tourism sector in Stornoway that provides a solid foundation for future growth. Stornoway is the focus of the £53 million per year tourism sector in the Western Isles. The town and surrounding area have a good offer for marine leisure and other tourists. This includes the newly renovated Lews Castle and grounds, Harris Tweed, Callanish Standing Stones, golf, distillery, blackhouses, beaches, sailing, etc. In addition, Stornoway is an established port of call on the cruise circuit, attracting 66 scheduled calls in 2016. Stornoway attracts relatively few large cruise vessels as those over 156 metres in length cannot berth at the Port and passengers are brought ashore by tender. This is increasingly unpopular, and impractical in bad weather.

Growth in the cruise market around Scotland is strong, especially for large vessels. To maintain and grow the cruise market in Stornoway, a facility for berthing cruise ships of 300 metres or more is needed.

Stornoway Port has been used as a service base for survey vessels exploring the waters west of the Hebrides and is the natural choice for a home port for developers working in that area. The port is the closest to the Atlantic shelf, and with the close proximity of the airport with direct flights to Aberdeen, Inverness, Glasgow and Edinburgh, together with a regular thrice daily ferry service, both personnel, equipment and stores can be delivered to the island quickly and efficiently.

The Port regularly handles specialist cargos of fuel, aviation fuel, gas, coal, road salt, cement, wind turbines, transformers, fish farm equipment and feed, and a variety of other general cargo items.

2.2 The Proposed Development

2.2.1 Outline Description

A new multi-purpose Deep Water Port has been proposed on the west shore of Glumaig Bay, a few kilometres south of Stornoway Harbour. The proposed site is across the bay from Arnish Fabrication Yard and load out quay (Appendix A Drawing No. 1917/105C).

The first phase of the proposals provides 400 metres of quay with 10 metres water depth at lowest tide, a new freight ferry berth and marshalling area, a heavy lift area 50m square, and 15ha of laydown, storage and development land behind the quay. The proposals also incorporate a 40m wide access corridor around the south side of Glumaig Bay, connecting Arnish Yard to the new quay (Appendix A Drawing No. 1917/203A).

The proposals are designed to provide the following: -

- Alongside berthing for cruise liners of all sizes.
- Waiting and turning area for buses serving cruise liner passengers.
- Ferry berth, linkspan and marshalling area (freeing up the current car ferry to provide an additional daily sailing).
- Extensive laydown and storage area with 50m square heavy lift area – to service renewables and decommissioning projects.
- Berthing and unloading gantries for oil delivery vessels, with pipelines to new storage tanks nearby (moving oil storage out of Stornoway town).
- Dedicated area for leisure activities buildings and rock climbing wall.

The project also provides improvements to the current access road to Arnish Yard from the main Stornoway/Tarbert road (A859), with a direct access road to the Deep Water Port.

2.2.2 Earthworks

At the heart of the project is the excavation of 750,000 cubic metres of rock from the steep slopes behind the quay, to provide the infill material to build the reclamation, and to add in the cleared area beneath the excavation.

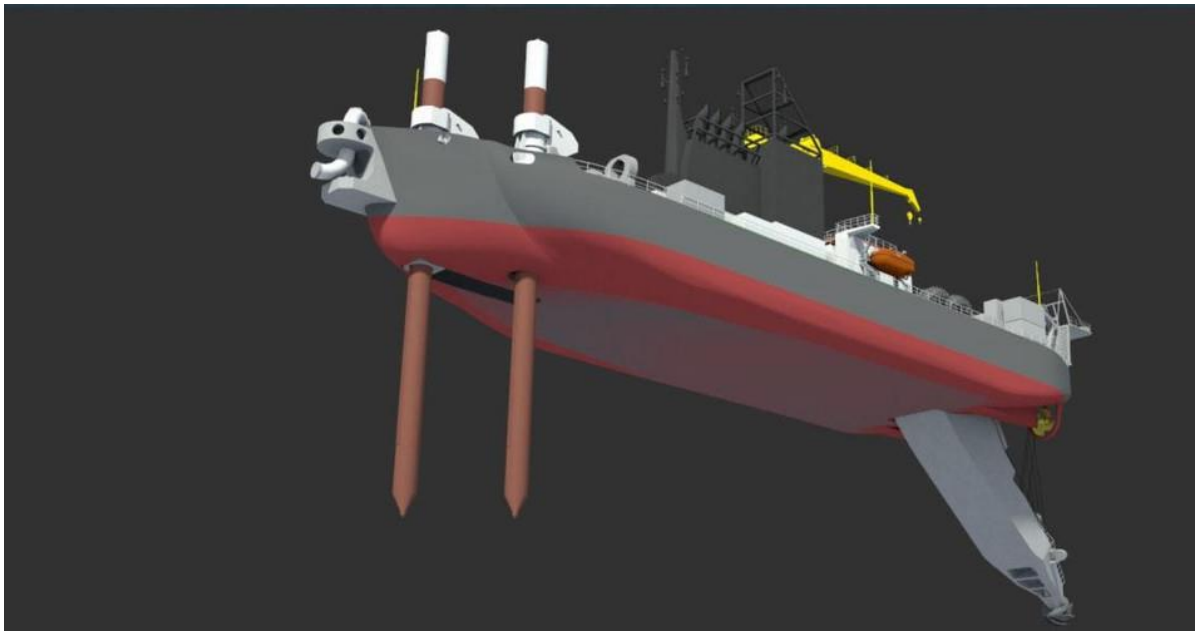
The rock would be prepared by bulk blasting, before being loaded onto a fleet of dumper trucks, moved to the adjacent reclamation area, tipped, spread and compacted. Using material produced so near at hand is very efficient, as is the freeing up of additional ground beneath the excavated rock.

2.2.3 Dredging

A large area of sea bed (some 200,000 square metres) adjacent to the new quay requires to be dredged to provide access to the quay and berthing alongside in all tides for vessels drawing up to 10 metres. The dredge volume is estimated at 440,000 cubic metres.

A recent seismic survey has confirmed that no rock will be in the dredge and the material, which is expected to consist of sediments, sands and gravels, should all be dredgable without any blasting. Tender prices are currently being sought for marine boreholes to confirm the findings of the seismic survey and provide more information on which to assess the most suitable method of dredging.

Figure 2-1 Cutter Suction Dredger



It seems likely that the bulk of the material will be suitable for incorporation in the reclamation. The material may also allow dredging by cutter suction dredger, as above (Figure 2-1), with the uprisings delivered to the reclamation site along a pipe supported on floats (Figure 2-2).

Figure 2-2 Pipe Delivery System

This method, if feasible, would lead to substantial savings in cost for the project. The dredging could also be conducted after completion of the quay wall, greatly reducing the sediment plume around the deposit site.

If the material is not suitable for cutter suction dredging and pumping ashore, the most efficient method would involve the use of a large backhoe dredger on a spud leg barge, feeding self-propelled hopper barges, which would move inshore and dump the material, through bottom opening doors, in the reclamation area.

Figure 2-3 Typical Backhoe Dredger and Self-Propelled Hopper Barge

This method would take a longer time to complete, and would be more expensive.

Whatever method was used, as much dredged material as possible would be used in construction of the reclamation. Any material that was unsuitable for use in the works would require to be disposed of at sea at a licenced disposal site.

2.2.4 Piling

The main quay wall, and the side wall at the freight ferry berth will be of steel sheet piles with a reinforced concrete capping beam, tied back with steel tie bars to buried steel sheet pile anchor walls.

The quay walls will be of the 'combi-wall' type, with large diameter (estimated at 2.2m) steel tubes at 3 metre centres grouted into sockets drilled into the sea bed strata and bedrock. The gaps between the tubes, which are equipped with standard clutches, are filled with conventional sheet piles, which are forced into the sea bed a few metres only, with a vibrating pile driver (Figure 2-4).

Figure 2-4 Example Quay Wall Construction Method

All the quay wall piles will be equipped with cathodic protection anodes, and painted with epoxy paint above mid tide (Figure 2-5).

Figure 2-5 Cathodic Protection Anodes

The tie rods will be wrapped in denso tape before burial to protect them from corrosion (Figure 2-6). There will be an estimated 4,700 tonnes of steel in the piles and 700 tonnes in the tie rods.

Figure 2-6 Tie Rods

Where bearing piles are required, at the linkspan abutment and dolphins, and at the heavy lift area, the steel tube piles will require to be driven. There are an estimated 650 tonnes of piles in these areas.

Wherever piles are driven, a marine mammal observer will be on duty, and piling will be suspended whenever sightings or acoustic monitoring indicate the presence of cetaceans in the area.

Soft-start techniques will be used, to minimise the impact on any cetaceans that are in the area and unnoticed.

2.2.5 Reclamation

The reclaimed material, from dredging uprisings and from the excavated rock to landward, will be compacted from mid-tide upwards to minimise any settlement, and the wall tie rods placed inside oversized ducts over the outer five metres, to allow for the small amount of settlement that might occur over time (Figure 2-7).

Drainage will be arranged to allow collection of all surface water, and, in areas where there is any risk of oil spillage, interceptors will be used to prevent pollution of the sea.

Services ducts will be buried to allow easy installation of pipes and cables after completion of the reclamation. At this stage it is envisaged that a substantial strip of the area behind the main quay wall will be capped with a heavy concrete slab, while the storage and development areas further back will have a well finished crushed rock surfacing.

Figure 2-7 Reclamation

2.2.6 Armouring

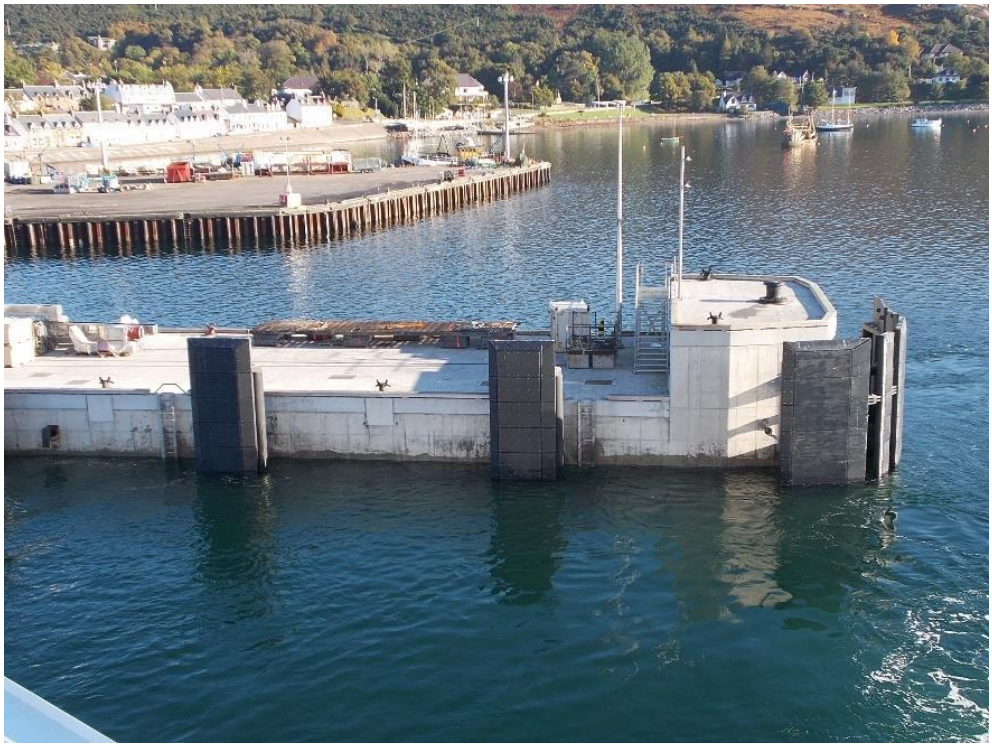
The south end of the reclamation, where it joins the future phase 2, will be graded to a suitable slope, and the face protected with rock armouring. The armouring will consist of secondary armour, small enough to prevent any loss of reclamation through its voids, and primary armour, large enough to resist the incident wave action while preventing any loss of secondary armour through its voids (Figure 2-8).

Figure 2-8 Rock Armour

2.2.7 Fendering

The main quay will be equipped with fendering suitable for all the vessel types likely to berth there. In the absence of full details of the target vessel, we have assumed panel fenders (contact panels 6m x 2.5m), each with a rubber cone fender at two levels (deck level and mid-tide level) and the necessary restraint chains (Figure 2-9).

Figure 2-9 Quay Fendering



The fenders on either corner will require to be of larger capacity, as the full mass of the vessel may impact on its centre of gravity at those locations.

The freight ferry berth will be accommodating frequent berthing manoeuvres, and the ferry will have side belting, which projects up to 300mm from the vessel's side and ensures that all berthing loads are directed into the car deck, which is extremely strong. Other areas of the vessel hull are not designed to carry any berthing loads. Due to the geometry of this berthing arrangement, hull contact with either the top or the bottom of the fender panel is likely using the two level cone design referred to above. For this reason the freight ferry berth will be equipped with parallel motion fenders (pmf), which keep the fender panel vertical at all times during berthing operations.

3 APPROACH TO EIA

3.1 Introduction

The objectives of an EIA are to:

- Establish the availability of the baseline data;
- Request that statutory consultees provide any relevant environmental information relating to the site and the surrounding area;
- Define a survey and assessment framework from which a comprehensive overall assessment can be produced; and
- Provide a focus for the consenting authorities and the consultees' considerations – in terms of:
    - Potential impacts to be assessed;
    - Assessment methodologies to be used;
    - Other areas that should be considered; and
    - Any other environmental issues of perceived concern.

The aim of the Scoping Report is to assist Comhairle nan Eilean Siar, and its consultees to form an opinion as to the likely effects of the proposed development. It describes the proposed development and provides information with regard to the environment, with the aim of providing sufficient information in line with paragraph 4.15 of Planning Advice Note 1/2013 – Environmental Impact Assessment (PAN 1/2103)

It seeks to identify potential environmental impacts of the proposed development and most importantly to reach agreement on which of the impacts could lead to significant environmental effects. The EIA will be focussed on assessing the potentially significant effects and propose mitigation measures to reduce the residual effects on the environment. The scoping process will eliminate those environmental issues which do not require further consideration.

3.2 General Approach to Assessment

The project team benefits from significant experience and technical expertise in environmental assessment and development of housing projects and will ensure that the EIA will be carried out in accordance with the EIA Regulations.

The potential environmental impacts during construction, operation and decommissioning will be identified and assessed in the ES, based upon the recommendations of the technical EIA team, consultation with statutory consultees, other interested parties and local communities. Topic assessments will be undertaken using best practice methodology, following industry guidelines whenever appropriate and carried out by specialists with relevant professional experience.

Schedule 4, Part 1 of the EIA Regulations states the "*description of the likely significant effects on the factors specified in regulation 4(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the development.*" Each assessment will consider these criteria and assess them whenever appropriate to the proposed development. This also highlights that the emphasis of the EIA process should be on assessing likely significant effects, rather than every environmental effect associated with a development.

Impartial professional consultants (as set out in Table 1.1) will assess the likely significant environmental effects identified. These specialist assessments will generally incorporate:

- Site visits;
- Collection of baseline data regarding the site and surroundings;
- Identification of the likely significant effects of the proposed development; and
- Recommendations on how these effects could be avoided or reduced.

For each topic the proposed methodology to be used within technical topics is set out within Section 4 of this Scoping Report. Cumulative effects will be assessed within each ES chapter as appropriate, at a scale appropriate to that subject and in line with best practice guidance currently available.

It is essential that the methodology used for assessing the significance of environmental effects is set out clearly and transparently within an ES and is justifiable. Significance is generally determined through a combination of the sensitivity of a receptor or resource to an effect and the magnitude of the change resulting from the proposed development, however where this differs the full methodology is explained within the relevant section as appropriate.

Significant effects are more likely to be predicted where important resources, or numerous or sensitive receptors, could be subject to impacts of considerable magnitude. Effects are unlikely to be significant where low value or non-sensitive resources, or a small number of receptors, are subject to minor impacts. The assessment of significance of an environmental effect resulting from the proposed development will have regard to the following:

- Sensitivity, importance or value of the resource or receptor;
- Extent and magnitude of the effect;
- Duration of the effect;
- Nature of the effect;
- Performance against environmental quality standards; and
- Compatibility with environmental policies.

The methods for predicting the nature and magnitude of any 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 thus qualitative assessments are used. Such assessments rely on previous experience and professional judgement. The methodologies used for assessing each topic area will be described within the individual chapters of the ES and will follow best practice guidelines where applicable.

3.3 Mitigation

Part I (7) of Schedule 4 of the EIA Regulations states that the ES must contain a "description of the measures envisaged in order to prevent, reduce and where possible, offset any significant adverse effects on the environment."

As outlined in *Planning Circular 1: The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017*, there is a widely accepted strategy for mitigation which will be followed when considering the environmental effects of the proposed development. This comprises (in order of preference): avoidance, reduction, compensation and remediation. In addition, consideration will be given to providing the opportunity for enhancement. Mitigation and, if appropriate, monitoring proposals, will be described clearly within the ES. The mitigation will be achievable and will be delivered through appropriate mechanisms.

3.4 Requirements of the EIA Regulations

The Scottish Governments *Planning Circular 1 2017: Environmental Impact Assessment regulations 2017,* states "*…Environmental Impact Assessment or 'EIA' - is a means of drawing together, in a systematic way, an assessment of a project's likely significant environmental effects. This helps to ensure that the importance of the predicted effects, and the scope for reducing any adverse effects, are properly understood by the public and the competent authority before it makes its decision*." (Paragraph 4)

In addition to those items explained above, the EIA Report will either include discussion of, or scope out via section 4 of this Scoping Report, the following items:

- A description of the development, including description of the location, its physical characteristics, land-use requirements during construction and operation, a description of characteristics of the operational phase, and an estimate of the types and quantities of expected residues and emissions;
- A description of reasonable alternatives, including development design, size, scale, and a justification of the project choices made;
- A description of the baseline environmental situation and an outline of the likely evolution thereof without implementation of the proposed development;
- An assessment of the environmental baseline for each environmental topic scoped into the EIA, with reference to those items specified within Schedule 4 (5) of the EIA Regulations;
- A description of mitigation and monitoring measures (where applicable); and
- A description of any expected adverse impacts in relation to the vulnerability of the proposed development to risks of major accidents and/or disasters which are relevant to the project.

4 POTENTIALLY SIGNIFICANT ENVIRONMENTAL EFFECTS

4.1 Introduction

This section discusses potentially significant effects. Each of the environmental topics discussed within this section could have the potential to be impacted by the proposed Deep Water Port development at Arnish, or conversely environmental features may impact upon the proposed development. By establishing the extent of potential impacts and subsequent effects, the topic can be scoped into the ES, or scoped out of the ES.

4.2 Landscape and Visual

4.2.1 Introduction

This section addresses the potential direct and indirect effects of the proposed development on landscape resources and visual receptors. These are defined respectively within paragraph 3.21 of the Guidelines for Landscape and Visual Impact Assessment (GLVIA)[2] as:

"*…the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape*"

and

"*…the people who will be affected by changes in views or visual amenity at different places*".

To help inform the scope of a Landscape and Visual Impact Assessment as part of the EIA process, an initial landscape and visual appraisal was undertaken as a desk study exercise to identify the following:

- the landscape character of the site and surrounding area;
- the 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 landscape/seascape;
- any potentially significant landscape and visual effects during construction and post-completion;
- recommendations for mitigating any potentially significant adverse effects; and
- recommendations for further study.

4.2.2 Baseline Conditions

The purpose of the baseline desk study is to record the existing landscape and visual resources, against which the potential effects of the proposed development, can be judged. To inform this, the following baseline conditions have been identified and described:

- landscape character;
- seascape character;
- landscape designations; and
- key views and visual receptors.

[2] Landscape Institute and Institute of Environmental Assessment (2013). *Guidelines for Landscape and Visual Impact Assessment.* Third edition.

Landscape character

As detailed in the *Western Isles landscape character assessment*[3], the site of the proposed development is located within the *Rocky Moor* LCT landscape character type (LCT). To the east of Stornoway, the landscape is characterised by a *Crofting* LCT and to the north of the harbour, *Boggy Moor* LCT.

The *Rocky Moor* landscape is characterised by '*smooth dip slopes which combine with rocky convexities to create a rocky and stepped landscape. Inland rocky moor tends to merge with boggy moor or mountain massif and where it extends to the shoreline, it forms a coastline of convex landforms dipping into deep water*'.

Although information on landscape character provides a useful framework in which to describe the landscape and predict effects, the information provided in the landscape character assessment is relatively broad brush. Furthermore, given the coastal location of the site, the character of the seascape is also an important factor to consider.

Seascape character

Seascape character is made up of physical characteristics of hinterland, coast and sea plus a range of perceptual responses to the seascape, as well as visual aspects. Although no detailed sescape characrer assessment has been undertaken for the study area, a regional/national coastal character assessment was undertaken in support of a study on the sensitivity and capacity of the Scottish seascape in relation to windfarms[4]. As detailed within this study, the site of the proposed development is located within the *Low Rocky Islands Coast* seascape character type (SCT) which exhibits the following key characteristics:

- low rocky coastline, cliffs and fragmented coastline in places backed by moorland;
- sparsely settled, small crofting settlements along coastline, large settlement at Stornoway with some industrial development, airport and busy port;
- views of the Minch and beyond views of distant hills on mainland particularly distinctive Assynt; and
- parts of this landscape feel remote except Stornoway area.

In assessing sensitivity to wind turbines, the study identifies the following seascape sensitivities and these provide a sound framework in which to assess the potential impacts of the proposed development.

Table 4-1 Sensitivity Criteria

Sensitivity criteria	Analysis
Scale and Openness	Fairly open and large – medium scale apart from to the north of this area where the landscape is more contained and smaller scale.
Form	Horizontal emphasis particularly to the north of Stornoway and on the Eye Peninsula, gently undulating with cliffs at coast. The form becomes more complex further south with a more fragmented and contained seascape.
Settlement	Sparse settlement in the north, major settlement including some industry around Stornoway and crofting settlements elsewhere. Some uninhabited areas.
Pattern/Foci	Foci and pattern varied. Foci include views to Assynt on clear days, important headlands and peninsulas e.g. Tolsta and the Eye peninsula.
Lighting	Stornoway is lit but the rest of the seascapes and out at sea are dark.
Movement	Busy port at Stornoway but generally the rest of the area is fairly quiet including some uninhabited areas to the north of Tolsta.

[3] Scottish Natural Heritage (1998). *Western Isles landscape character assessment*.
[4] Scottish Natural Heritage (2005). *An assessment of the sensitivity and capacity of the Scottish seascape in relation to windfarms*.

Sensitivity criteria	Analysis
Aspect	Easterly aspect across sea. From settlement, roads, ferries. There is a heritage trail from Tolsta to the North of Lewis and open sea views over to Skye are important here.
Modification/Remoteness /Sense of Naturalness	There is modification in parts, around Stornoway and some telecommunications masts etc. The crofting patterns, whilst traditional, can in places appear in contrast to the rougher, wilder and more natural surroundings. Generally though a largely natural and remote area, particularly in the hinterland of Lewis.
Exposure	Feels exposed to the north of this area where coastline becomes more linear, hinterland is flatter and sheltered areas are fewer.

Landscape designations

None of the site is covered by any landscape designations although *Lews Castle and Lady Lever Park* is a Garden and Designed Landscape (GDL) designation that covers a relatively large part of the western bank of the Bayhead River where it meets the harbour. It is located approximately 2km to the north of the site at its closest point.

As detailed in the designation citation[5], the GDL is '*a prime example of a mid-late 19th century ornamental and estate landscape, rare on Lewis, laid out with coastal and riverside carriage drives and walks. The designed landscape comprises a series of distinctive wooded parklands contrasting dramatically with the prevailing openness of the island landscape'.* It is also noted that GDL makes an '*outstanding contribution to the setting of Stornoway'*.

The closest National Scenic Area (NSA) is the *South Lewis, Harris and North Uist* NSA, which is located approximately 26 km south-west of Stornoway. Two parts of this NSA are also identified as Wild Land Areas[6].

Key views and visual receptors

Although no detailed analysis of the zone of theoretical visibility has been undertaken at this stage, it is evident that views of the site are relatively localised. In general, these are restricted by nearby containing rising ground, large areas of woodland to the west of the harbour and extensive built development across the town.

However, as the site of the proposed development is located south west of Stornoway harbour, there is a relatively large number of nearby receptors with open views towards it. This includes residents and visitors in Stornoway, and recreational users in and around the harbour. Daily ferries from Stornoway to Ullapool also pass in very close proximity to the site.

Situated on the north-west side of Stornoway Harbour overlooking the town, Lews Castle commands panoramic views and is prominent on the sea approach to Lewis. The Castle is situated mid-way on the east-facing, heavily wooded hillside and dominates views from Stornoway. Views from Lews Castle and Lady Lever Park overlook Stornoway, the inner harbour and town. Extensive views are also obtained from the summit of Cnoc Croich across to Lews Castle, the island's hinterland and the harbour. Similar views of the site are also experienced from areas of low rising moorland to the south of the harbour.

There is a dense network of Core Paths across the *Lews Castle and Lady Lever Park* GDL and several other 'wider footpaths' to the north and east of the town. The nearest National Cycle Network (NCN) route is NCN 780 which passes approximately 7.5 km to the south-west of the site at its closest point.

[5] http://portal.historicenvironment.scot/designation/GDL00263
[6] http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-policy-and-guidance/wild-land/

4.2.3 Potentially Significant Effects during Construction

As noted previously, the site benefits from a relatively contained setting whereby areas of low-rising ground and headlands, extensive woodland cover across *Lews Castle and Lady Lever Park* and built development in Stornoway is likely to restrict the extent of landscape and visual impacts to the local area.

During the construction phase, the presence and operation of plant machinery, delivery vehicles and the construction of infrastructure is likely to significantly affect the views of some nearby residents, road users and recreational boat users in the harbour. The views of recreational users from Lews Castle and Lady Lever Park (and associated Core Path Network) could also be significantly affected.

In addition to the likely localised extent of effects, the presence of nearby industrial development and activity will also help to limit the nature of landscape and seascape effects during construction. Nonetheless, it likely that some short term direct and indirect significant effects on the character of the harbour during construction would result, particularly on nearby areas of the coast that have an undeveloped and peaceful character.

In order for the potential impacts to be fully identified, further survey work is required which is likely to focus on the following:

- local landscape character;
- local seascape character;
- Lews Castle and Lady Lever Park GDL;
- views and amenity of nearby residents;
- views of and amenity nearby road users;
- views and amenity of Core Paths users; and
- views and amenity of ferry passengers and other recreational boat users.

4.2.4 Potentially Significant Effects post-Completion

At this stage, the potential for significant landscape and visual effects post-completion is somewhat dependent on the quality of design of the Deepwater Port at Arnish and associated infrastructure. During the iterative design process, it will be important to consider the landscape and seascape setting of the harbour and ensure where possible, important views are protected and enhanced through the provision of a high quality development. Until the design is finalised, it assumed that some localised significant landscape and visual impacts could result and these will be explored through further field survey on the following receptors:

- local landscape character;
- local seascape character;
- Lews Castle and Lady Lever Park GDL;
- views and amenity of nearby residents;
- views and amenity of nearby road users;
- views and amenity of Core Paths users; and
- views and amenity of ferry passengers and other recreational boat users.

4.2.5 Inclusion or Exclusion from EIA

Based on the findings of this desk-based appraisal and the potential for significant effects during construction and post-completion as detailed above, it is recommended that a full Landscape and Visual Impact Assessment (LVIA) is undertaken as part of an EIA.

4.2.6 Design and Mitigation

Where any significant landscape and visual effects are identified as part of the LVIA process, recommendations for mitigation which could be implemented in order to avoid, reduce or remedy adverse effects will be identified. As part of this, a series of landscape designs aims will be suggested to help ensure that as far as possible, the proposed development minimises its impact and integrates positively with its sensitive harbour setting.

4.2.7 EIA Assessment Methodology

As part of the EIA process, a full Landscape and Visual Impact Assessment would be undertaken in accordance with the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA), version 3 (Landscape Institute and the Institute of Environmental Management and Assessment 2013). The LVIA would be based on the following methodology.

Evaluation of the Existing Environment – the Baseline

The baseline review for the landscape and visual resource has three elements:

1. Description – a systematic review of existing information and policy relating to the existing landscape and visual resource;
2. Classification – analysis of the data to subdivide the landscape/seascape resource into discrete areas of recognisable character and identification of the visual receptors; and
3. Evaluation – Use of professional judgement to apply sensitivity criteria to a landscape/seascape or visual resource with reference to specified criteria.

The baseline review is undertaken through desk-based data review followed by a site survey to verify the findings, and then analysis of the data. This process is described in detail in the following paragraphs.

Desk Based Data Review

Existing mapping, legislation, policy documents and other written, graphic and digital data relating to the proposal and broader study area is reviewed. This includes the following documents:

- Outer Hebrides Local Development Plan (2012);
- Western Isles landscape character assessment (1998);
- Ordnance Survey maps; and
- Digital sources of mapping and aerial photography.

The desk study also establishes the main users of the area, key viewpoints and key features, thus defining the visual baseline which requires to be verified on site. The potential visual receptors are identified and classified according to their associated use (settlements, footpaths, roads etc.). The aim of the baseline review of visual resources is to ensure that an appropriate range of viewpoints is included in the visual assessment. The potential extent of visibility of the proposed development as identified in the preliminary Zone of Theoretical Visibility (ZTV) provides the basis upon which the potential visual receptors are initially identified.

The desk study informs subsequent site work, which allows the confirmation of the Landscape/Seascape Character Types (LCTs/SCTs) and Landscape/Seascape Character Areas (LCAs/SCAs) where applicable.

Site Survey

Field survey work is carried out to verify and, if required, refine the landscape/seascape character types identified within the study area, and to gain a full appreciation of the relationship between the proposed development, and the landscape.

The baseline visual resource is verified during the survey work and at this time, the validity of the list of representative viewpoints used in the LVIA. Since the ZTV is based on a 1:50,000 digital terrain model, it does not capture local landform. There are times when a viewpoint selected from analysis of the ZTV does not actually have any views to the proposed development. In some instances, this can be remedied by slight adjustments of the grid references, although the location must remain relevant to the particular receptor(s) for which the viewpoint was selected. It is also important to ensure that the viewpoints remain a representative selection of views.

Data Analysis

Analysis and reporting of the baseline resource takes place after the completion of the desk and field surveys. The baseline landscape and visual review provides a description, classification, and evaluation of the landscape and visual resource of the study area.

The baseline review provides a robust description of the landscape and visual resource from which to assess the landscape and visual effects of the proposed development and to advice, in landscape and visual terms, on the development's acceptability in principle and upon its siting, layout and design. This involves identification of all the landscape and visual receptors and analysis of the sensitivity of each of these receptors to the proposed development.

Extent of the Study Area and Viewpoint Selection

Maps of Zone of theoretical visibility (ZTVs) are prepared using digital terrain models based on a maximum height of the proposed development. These represent the 'worst case' area of theoretical visibility where the proposed development may theoretically be seen. The ZTVs are based entirely on topographic factors and do not account for any screening effects provided by vegetation, buildings or minor variations in landform or the orientation of view. Therefore, the extent of any ZTVs tends to be greater than actual visibility and does not take account of climatic factors such as light conditions.

The ZTV for the proposed development is then used as a basis for the further assessment and evaluation of the magnitude of visual impacts.

Through the initial stages of the desk study, viewpoints are selected to represent views experienced from a variety of receptors, within different landscape character types and at a variety distances from the proposed development where the view may be apparent.

A study area centred on a likely 5 km radius from the proposed development will be used for the study of landscape and visual effects. Given the relative scale of the development and the character of the landscape, significant effects are very unlikely to be experienced at distances over 5 km.

Landscape/seascape Susceptibility and Value

The GLVIA indicates that landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgements of their susceptibility to the type of proposal and the value attached to the landscape.

Landscape Susceptibility

This LVIA includes an assessment of factors affecting the susceptibility of the landscape to the changes brought about by the proposed development, in order to identify any variation at the local scale. The following table sets out attributes of landscape/seascape character that are typically considered in assessing susceptibility.

Table 4-2 Susceptibility Criteria

Susceptibility Criteria	***Lower***	***Higher***
Scale	Large-scale or vast	Intimate or small-scale
Enclosure	Open or exposed, windswept	Enclosed or confined, sheltered
Landform	Flat, smooth, regular, rolling, gently undulating, or flowing landform	Dramatic, steep, mountainous, rugged, or complex landform with prominent peaks or ridges
Diversity	Simple or uniform, e.g. Moorland or forestry plantations	Complex or diverse, variety of land cover
Landcover pattern and line	Sweeping lines, or indistinct or irregular patterns	Strong and regular linear features, geometric or rectilinear patterns, or planned landscapes
Settlement and infrastructure	Frequent masts, pylons, industrial elements, modern buildings, infrastructure, settlements or main roads	No obvious modern settlement, buildings, infrastructure or main roads
Perception of landscape change	Modern or clearly dynamic showing obvious land use changes	Little or no land use changes, or with obvious historical continuity
Tranquillity	Busy, with evidence of human activity, noise or regular movement	Remote or tranquil with strong sense of stillness or solitude
Settings and skylines	Low lying areas that do not tend to feature in views from populated areas or main transport routes	Areas with topographic features that define the setting, backdrop, outlook or skyline of populated areas or main transport routes

Landscape Value

The assessment takes as its starting point the recognised value of the landscape, for example, as identified by landscape designations.

In addition, the assessment considers the following factors, in order to identify how the relative landscape value may vary at the local scale. The factors set out in the following table are adapted from paragraphs 5.28-5.31 of the GLVIA and other guidance (Scottish Natural Heritage and Countryside Agency 2004 Figure 1b).

Table 4-3 Landscape Value

Factors affecting Landscape value	
Condition/intactness	The degree to which the landscape is unified or intact
Scenic quality	The extent to which the landscape appeals, primarily to the visual senses
Perceptual aspects	The degree to which the landscape is recognised for perceptual qualities, such as its sense of remoteness
Rarity	The presence of unusual elements or features in the landscape or the presence of an unusual LCT
Representativeness	The degree to which the landscape contains important examples of elements or features, or is of a particular character that is considered important
Conservation interests	Cultural or natural heritage interests that add to the value of the landscape and/or are of value in themselves
Recreational value	Evidence of recreational activity where experience of the landscape is important, such as recognised scenic routes
Associations	Recognised cultural or historical associations that contribute to perceptions of the natural beauty of the landscape

Sensitivity of Visual Receptors

The sensitivity of each visual receptor is assessed in terms of susceptibility to change in views or visual amenity as well as the value attached to particular views.

Susceptibility to Change

People generally have differing responses to views and visual amenity depending on the context (e.g. location, time of day, degree of exposure), and their purpose for being in a particular place (e.g. whether for recreation, travelling through the area, residence or employment). Susceptibility to change is therefore a function of:

- The occupation or activity of people experiencing the view or visual amenity; and
- The extent to which their attention or interest may be focused on the landscape around them.

The following table illustrates some examples of the relative susceptibility of some of the key visual receptors within the Study Area. Note that different individuals or groups of people at one location may have different levels of susceptibility.

Table 4-4 Susceptibility to Change

High	Medium	Low
Residents within dwellings or curtilage	People at their place of work, where views are an important part of the setting, such as a countryside ranger	People at their place of work whose attention is likely to be focused on their work or activity, not on their surroundings
Users of recognised national trails, whose attention or interest is likely to be focused on the landscape or on particular views	N/A	People engaged in active outdoor sports or recreation and less likely to focus on the view
Road users where appreciation of the landscape is an important part of the experience, such as recognised scenic routes	Road users likely to be travelling for other purposes than just the view, such as commuter routes	N/A
Visitors to heritage assets or to other attractions, such as recognised beauty spots, where views of the surroundings are an important part of the experience	N/A	N/A

Value attached to particular views

Judgments are also be made about the value attached to views, based on the following considerations:

- Recognised value – such as views from heritage assets or designated landscapes;
- Inclusion in guidebooks or on tourist maps, the facilities provided for visitors or references to the view in literature or art; and
- The relative number of people who are likely to experience the view.

People that are more susceptible to change at viewpoints of recognised value are more likely to be significantly affected by any given change.

Assessing Effects

The impact assessment aims to identify all the potential landscape and visual effects of the development taking account of any proposed mitigation measures. This is carried out by:

- Assessing the magnitude of change brought about by the proposed development on each of the receptors identified in the baseline review;
- The effect is then predicted by combining the sensitivity and importance of the receptor (as identified in the baseline review) with the magnitude of change; and
- Lastly, the significance of the predicted effect is assessed in a logical and well-reasoned analysis.

The assessment aims to describe the changes in the character and the landscape resources that are expected to result from the proposed development. It covers both landscape effects (changes in the fabric, character and key defining characteristics of the landscape); and the visual effects (changes in available views of the landscape and the significance of those changes on people).

Magnitude of Landscape Change

Each effect on landscape receptors is also assessed in terms of its size or scale, the geographical extent of the area influenced and its duration and reversibility.

Size or Scale of Effect

This is judged using the factors set out in the following table:

Table 4-5 Magnitude of Change

Rating	Criteria
Very large	Highly obvious change, affecting the majority of the key characteristics and defining the experience of the landscape
Large	Obvious change, affecting many key characteristics and the experience of the landscape
Medium	Noticeable but not obvious change, affecting some key characteristics and the experience of the landscape
Small	Minor change, affecting some characteristics and the experience of the landscape slightly
Negligible	Little perceptible change

Geographical Extent of Effect

The geographical area over which the landscape effects would be experienced (regional, local or restricted to the site) is also taken into account. This is distinct from the scale of the change. For example, a small change to the landscape over a large geographical area could be comparable to a very large change affecting a much more localised area.

Magnitude of Visual Effect

Visual effects result from the changes in the content or character of views and visual amenity, due to changes in the landscape. The assessment of visual effects takes account of both the sensitivity of the visual receptors (individuals or groups of people) and the magnitude of the change on their views and visual amenity.

The magnitude of the visual effect resulting from the Proposed Development is evaluated in terms of size or scale, geographical extent, duration and reversibility.

Size or Scale of Effect

This is based on the interpretation of a combination of a range of factors. Some of these are largely quantifiable and include:

- Distance and direction of the viewpoint from the Proposed Development;
- Extent of the Proposed Development visible from the viewpoint
- Scale of the change in the view, including the proportion of the field of view occupied by the Proposed Development;
- Degree of contrast with the existing landscape elements and characteristics in terms of background, form, pattern, scale, movement, colour, texture, mass, line or height;
- The relative amount of time during which the effect would be experienced and whether views would be full, partial or glimpses; and

- Orientation of receptors in relation to the Proposed Development, e.g. whether views are oblique or direct.

Table 4-6 Scale of Effect

Rating	Description	Appearance in field of vision
Very high	Dominant	Commanding, controlling the view Creation/removal of a dominant visual focus Highly uncharacteristic elements or pattern introduced Most of the view affected
High	Prominent	Major change to the view, striking, sharp, unmistakeable, easily seen Creation/removal of major visual focus Uncharacteristic elements or pattern introduced Large proportion of the view affected
Medium	Conspicuous	Noticeable change to the view, distinct, clearly visible, well defined Creation or removal of a visual focus that may compete Some elements of the Proposed Development fit the existing pattern Some of the view affected
Low	Apparent	Minor change to the view but still evident Little change to focus of the view Fits intrinsic visual composition Little of the view affected
Negligible	Inconspicuous	No real change to perception of the view Weak, not legible, hardly discernible

Geographical Extent

The extent over which the changes would be visible is also taken into account.

The magnitude of visual change arising from the Development is described as High, Medium, Low or Negligible based on the overall extent of visibility. For individual viewpoints it will depend upon the combination of a range of factors:

- The distance of the viewpoint from the development;
- The duration of effect;
- Extent of the development visible from the viewpoint;
- The angle of view in relation to main receptor activity;
- The proportion of the field of view occupied by the development;
- The background to the development; and
- The extent of other built development visible.

Other factors may also influence the visual effect. These relate to both human perception and to the physical environment itself. Factors which tend to reduce the apparent magnitude include the following:

- An absence of visual clues;
- A complex and varied scene; and
- Low relative elevation of view

Factors which tend to increase the apparent magnitude include the following:

- Visual clues;
- A simple scene; and
- High relative elevation of view.

Sequential Visual Effects

Sequential visual effects typically occur when moving along a linear route, as the observer moves from one point to another and gains views of other developments or a different view of the same development.

Significance of Effects on Landscape and Visual Receptors

The assessment of significance is based on professional judgement, considering both the sensitivity of the receptor and the predicted magnitude of effect resulting from the Proposed Development.

Major loss of landscape features or characteristics across an extensive area that are important to the integrity of a nationally valued landscape are likely to be of greatest significance. Short-term effects on landscape features or characteristics over a restricted part of a landscape of lower value are likely to be of least significance

The degree of significance of effects on visual receptors is determined from a combined evaluation of the sensitivity of the visual receptor and the magnitude of the visual effect.

Effects are more likely to be significant on people who are particularly sensitive to changes in views and visual amenity, or who experience effects at recognised and important viewpoints, or from recognised scenic routes. Large scale changes which introduce new, discordant or intrusive elements into the view are also more likely to be significant than small changes or changes involving features already present within the view.

The significance of any identified landscape or visual effect is assessed as Major, Moderate, Minor or Negligible effect. These categories have been determined by consideration of viewpoint or landscape sensitivity and predicted magnitude of change as described above, with the table below used as a guide to correlating sensitivity and magnitude to determine significance of effects. It should be noted that this is a guide only, and there will be times when the combination of sensitivity and magnitude yield a slightly different result from that predicted by the table. Where this discrepancy leads to prediction of significant effect, it is explained in the text.

Table 4-7 Significance of Effect

Magnitude of Change				
Sensitivity	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major to moderate	Moderate	Moderate to minor
Medium	Major to moderate	Moderate	Moderate to minor	Minor
Low	Moderate	Moderate to minor	Minor	Minor to none
Negligible	Moderate to minor	Minor	Minor to none	None

Assessment of significance of landscape and visual effects

Where overall effects are predicted to be *major* (shaded dark grey) these are considered to be equivalent to significant effects, as referred to in the *Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations* 2017. Overall effects of moderate to major (shaded light grey) may be significant if experienced over an extensive proportion of a receptor, area or route. Changes of moderate or less are not likely to result in significant effects.

4.3 Ecology

4.3.1 Introduction

The assessment of ecology will consider the geographical area potentially affected by the development of a deep water port at Arnish. Particular attention will be given to:

- Terrestrial ecology, protected habitats and species;
- Birds; and
- Marine mammals and fish.

The proposals have the potential to affect ecology in the immediate vicinity of the development footprint in terms of direct habitat losses. It is also envisaged that a range of other effects on ecology in the wider area could occur, these include but are not limited to, ecological interactions and changes in hydrodynamic regime, physical disturbance during construction and operation of the port, and underwater noise and pollution arising from construction activities. These areas will all be considered in the assessment. Impact of the development on the water environment including hydrology, hydrogeology, water quality and coastal processes will be considered in the Water section of the EIA.

Each area of ecology listed above will be considered in turn.

4.3.2 Baseline Conditions

Terrestrial Ecology

In order to determine an ecological baseline for terrestrial ecology at the proposed deep water port a Preliminary Ecological Appraisal (PEA) was undertaken in May 2017.

The main objectives of the PEA were as follows:

- Identify and map the broad habitats present on the site;
- Search for field evidence of a range of protected or notable faunal species which may frequent the survey area;
- Identify suitable habitat for protected or notable faunal species in the survey area;
- Evaluation of the site based on the habitats or faunal species found;
- Identify the potential impacts to protected or notable faunal species, vegetation and habitats and outline appropriate mitigation methods; and
- Make recommendations for any further survey and/or species licensing requirements.

Desk study

To anticipate the potential ecological sensitivities at the site, a desk study was conducted in April 2017 in advance of the field studies. This included a review of:

- Existing data on statutory designated sites available through SNH Sitelink website[7] (up to 5km from the site);
- Existing data on non-statutory designated sites available through the Western Isles (Comhairle nan Eilean Siar) Council Local Development Plan (LDP)[8] (up to 2km from the site);
- Records of Ancient Woodland available through Sketchmap[9] (up to 2km from the site);
- Records from the Western Isles (Comhairle nan Eilean Siar) Council Biodiversity Officer
- Records from Scottish Badgers
- The UK Biodiversity Action Plan (UKBAP)[10] and the Western Isles (Comhairle nan Eilean Siar) Local Biodiversity Action Plan (LBAP)[11]; and
- The Scottish Biodiversity List[12].

Designated sites

Two statutory designated sites were found within 5km of the proposed deep water port. These are summarised in Table 4-8:

Table 4-8 Terrestrial designated sites

Site Name	Designation[13]	Distance and Orientation	Comment
Tong Saltings	SSSI	Approximately 2.35km north east of the site boundary of Deep Water Port.	Designated for breeding bird assemblages, mudflats, saltmarsh and sand dunes
Lewis Peatlands	SAC / SPA / RAMSAR	Approximately 4.29km west of the site boundary of Deep Water Port.	Designated as an SAC primarily for three Annex 1 habitats present on site 1) oligotrophic to mesotrophic standing waters with vegetation and Littorelletea uniflorae and/or of the Isoeta-Nanojuncetea. 2) Natural dystrophic lakes and ponds 3) Blanket Bogs Designated as a RAMSAR site for blanket bog features, the breeding bird assemblage, and the breeding bird population of Dunlin (*Calidris alpina schinzii*).

[7] SNH Sitelink here: https://gateway.snh.gov.uk/sitelink/. Accessed in April 2017
[8] The Western Isles Council LDP here: http://www.cne-siar.gov.uk/planningservice/localdevplan.asp Accessed in April 2017.
[9] Sketchmap available here: http://sketchmap.co.uk/. Accessed in April 2017
[10] The UKBAP here: http://jncc.defra.gov.uk/page-5717. Accessed in April 2017
[11] Western Isles LBAP here http://www.cne-siar.gov.uk/biodiversity/documents/Biodiversity%20Audit%202002.pdf Accessed in April 2017
[12] The Scottish Biodiversity List here: http://www.biodiversityscotland.gov.uk/advice-and-resources/scottish-biodiversity-list/. Accessed in April 2017
[13] SSSI (Site of Special Scientific Interest), SAC (Special Area of Conservation), RAMSAR (Ramsar convention on Wetlands), SPA (Special Protection Area),

There were no non-statutory designated sites were found within 2km of the site development.

Ancient woodland inventory

No ancient woodland was found within the site boundary of the proposed deep water port, and none were found to be located within 2km of the proposed development boundary.

Biodiversity action plan species

Species potentially relevant to the development site and listed in the LBAP for the Western Isles are summarised in Table 4-9. The LBAP also lists various invertebrate and plant species of conservation concern.

Table 4-9 Western Isles LBAP Species

Species	LBAP	UKBAP	SBL
Common Pipistrelle Bat *Pipistrellus pipistrellus*	✓	✓	✓
Natterer's Bat *Myotis nattereri*	✓	-	✓
Daubenton's bat *Myotis daubentonii*	✓	-	✓
Otter *Lutra lutra*	✓	✓	✓

Biodiversity action plan habitats

The Western Isles LBAP identified 10 priority habitats that were deemed potentially relevant to the development site. These habitats are listed in Table 4-10.

Table 4-10 Western Isles LBAP Habitats

Habitat	LBAP	UKBAP	SBL
Coastal sand dunes	✓	✓	✓
Machair	✓	✓	✓
Coastal vegetated shingle	✓	✓	✓
Seagrass	✓	✓	-
Coastal saltmarsh	✓	✓	✓
Mud in deep water	✓	✓	-
Maerl beds	✓	✓	-
Upland heathland	✓	✓	✓
Fens	✓	✓	-
Blanket bog	✓	✓	✓

Records from the Western Isles Council Biodiversity Officer were requested by email 'enquiries@cne-siar.gov.uk' on 26/04/2017, however none were received at the time of writing.

Field Surveys

In order to determine an ecological baseline for the deep water port development a Phase 1 habitat survey and a protected species survey were undertaken in May 2017.

A Phase 1 Habitat Survey is a method that rapidly records vegetation and wildlife habitat over large areas. The information is used to identify ecologically sensitive features, inform additional species surveys and, ultimately, recommend mitigation and enhancement measures in connection with a proposed development.

The Phase 1 Habitat Survey was undertaken according to the standard Joint Nature Conservation Committee method (JNCC, 2010). Field work was carried out on Thursday 4th May 2017. Weather conditions were favourable for fieldwork with bright and sunny conditions and temperatures between 10°C -13°C .

A total of six Phase 1 habitat types including buildings were recorded on the site:

- D5 Dry Heath
- G1 Standing Open Water
- H8.4 Coastal Grassland
- H3 Boulders / Rocks
- H2 Shingle/ Cobbles
- J3.6 Buildings

The main habitats are described in Appendix B: Habitat Information and Site Photography. In addition to this a map illustrating the findings of the survey is located in Appendix A (Drawing No. 169438-003).

Protected species

The field survey for protected species was undertaken in accordance with CIEEM guidelines (CIEEM, 2013). The survey focussed on faunal species that are most likely to be found in the habitats which make up the wider landscape, or where suitable habitat is available. However, all UK protected or notable species are considered when undertaking a field survey of this nature in order to assess how valuable the surveyed area is in terms of resources. Species that were searched for and survey methods applied included, but were not limited to:

- Bats (various species);
- Otter (*Lutra lutra*);

As West European hedgehog (*Erinaceus europaeus*), brown hare (*Lepus europaeus*) and amphibian species are listed on the Scottish Biodiversity List, a search for suitable habitat and presence of these species was also included.

Bats

No records of bats were received during the desk study. No bats or evidence of bats was found during the field survey. The habitats within the survey area offer negligible features on site for commuting and foraging bats. There is very little connectivity to the wider environment. The River Creed and Lews Castle grounds are located immediately to the north of the site boundary and would provide suitable habitat for bats including mature woodland, parkland and gardens but this area is not directly connected to the site for development.

Otter

No records of otter were received during the desk study. A boat was chartered to survey the coastline at low tide along with searches on the mainland. No otter resting places or other field evidence of otter were identified during the survey.

Birds

A search of the Western Isles LBAP provided the following list of birds deemed Priority species (Table 4-11):

Table 4-11 Western Isles LBAP Priority Bird Species

Species	Scientific Name
Common Scoter	*Melanitta nigra*
Spotted Flycatcher	*Muscicapa striata*
Red-throated Diver	*Gavia stellata*
Black-throated Diver	*Gavia arctica*
Great Northern Diver	*Gavia immer*
Slavonian Grebe	*Podiceps auritus*
Storm Petrel	*Hydrobates pelagicus*
Leach's Storm Petrel	*Oceanodroma leucorhoa*
Gannet	*Morus bassanus*
Cormorant	*Phalocrocorax carbo*
Whooper Swan	*Cygnus cygnus*
Greenland White-fronted Goose	*Anser albifrons flavirostris*
Greylag Goose (Scottish)	*Anser anser*
Barnacle Goose	*Branta leucopsis*
Shelduck	*Tadorna tadorna*
Wigeon	*Anas penelope*
Pintail	*Anas acuta*
Shoveler	*Anas clypeata*
Eider	*Somateria mollissima*
Merlin	*Falco columbarius*
Peregrine	*Falco peregrinus*

Species	Scientific Name
Ringed Plover	*Charadrius hiaticula*
Golden Plover	*Pluvialis apricaria*
Grey Plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*
Sanderling	*Calidris alba*
Purple Sandpiper	*Calidris maritima*
Dunlin	*Calidris alpina schinzii*
Bar-tailed Godwit	*Limosa lapponica*
Redshank	*Tringa totanus*
Whimbrel	*Numenius phaeopus*
Greenshank	*Tringa nebularia*
Arctic Skua	*Stercorarius parasiticus*
Common Tern	*Sterna hirundo*
Arctic Tern	*Sterna paradisaea*
Little Tern	*Sterna albifrons*
Razorbill	*Alca torda*
Short-eared Owl	*Asio flammeus*
Dipper	*Cinclus cinclus*
Twite	*Carduelis flavirostris*
Snow Bunting	*Plectrophenax nivalis*

The habitats recorded on site do not provide optimal conditions for the vast majority of bird species noted as Priority species. There is the potential for the site to support small numbers of over-wintering waders such as Ringed Plover and Purple Sandpiper where rocky foreshore habitat exists. The harbour itself could support numbers of diver and grebe species, although the Birds of the Outer Hebrides website[14] states that the main wintering areas for these species on Lewis are Broad Bay, Valtos and Braigh, the nearest of which is ~3.5km from the proposed development.

[14] http://www.western-isles-wildlife.com/Templates/birds_status_outer_hebrides.html

Several of the species noted above are qualifying species for the Lewis Peatlands SPA, which is located ~4.3km from the proposed development. Disturbance to these species from the proposed development is therefore considered not significant.

Marine Mammals and Fish

Developments in marine environments have the potential to affect key physical processes over wide areas. The EIA will assess potential direct and indirect impacts arising from the proposed deep water port development on marine mammals, their prey species, and fish species (specifically salmonids).

Marine Mammals

A desk study of the marine environment in the vicinity of the proposed deep water port development identified two areas with nature conservation designations (Table 4-12). In addition to these sites all species of dolphin, porpoise and whale are European Protected Species (EPS). Marine mammal species included in the Western Isles LBAP and UK BAP (UKBAP) are listed in Table 4-13 they are also UK priority species and as such should be included in the EIA. All the species are UK priority species and have been recorded in the coastal waters off Stornoway.

Table 4-12 Marine Designated Sites

Site Name	Designation	Distance and Orientation	Comment
Inner Hebrides and Minches	Special Area of Conservation (SAC)	Approximately 1.4km north east of the proposed deep water port	Harbour Porpoise
North East Lewis	Proposed Marine Protected Area	Less than 1km east of the proposed deep water port	Risso's Dolphin

Table 4-13 Marine mammal LBAP species

Common name	Scientific name
Harbour Porpoise*	*Phocoena phocoena*
Northern Right Whale	*Balaena glacialis*
Minke Whale*	*Balaenoptera acutorostrata*
Sei Whale	*Balaenoptera borealis*
Blue Whale	*Balaenoptera musculus*
Fin Whale	*Balaenoptera physalus*
Humpback Whale	*Megaptera novaeangilea*
Bottle-nosed Dolphin*	*Tursiops truncates*
Risso's Dolphin	*Grampus griseus*
White-beaked Dolphin*	*Lagenorhynchus albirostris*
Atlantic White-sided Dolphin*	*Lagenorhynchus acutus*

Common Dolphin	*Delphinus delphis*
Striped Dolphin	*Stenella coeruleoalba*
Northern Bottlenose Whale	*Hyperodoon ampullatus*
Cuvier's Beaked Whale	*Ziphius cavirostris*
Sowerby's Beaked Whale	*Mesoplodon bidens*
True's Beaked Whale	*Mesoplodon mirus*
Killer Whale	*Orcinus orca*
Long-finned Pilot Whale**	*Globicephala melas*
Sperm-Whale**	*Physeter macrocephalus (P. catodon)*

Recent records *http://www.magic.gov.uk/MagicMap.aspx
**http://seawatchfoundation.org.uk/legacy_tools/region.php?output_region=14

Further baseline data on marine mammals will be gathered during the EIA process by means of a more detailed desktop study.

Fish

During the Stornoway Masterplan consultation concern was raised by the Outer Hebrides Fisheries Trust (OHFT) and the Stornoway Angling Association (SAA) to the potential impact on migratory salmonids, (Atlantic Salmon (*Salmo salar*) and Sea Trout (*Salmo trutta*)) using the Stornoway harbour area and migration routes of fish through the proposed deep water port development area. The mouth of the River Creed a few hundred metres north of the boundary of the proposed deep water port. In 2017 the River Creed was classified by Marine Scotland Science (MSS) as a Grade 1 watercourse. This grading is based on data collected between 2011-2015, the data includes reported catches; estimated age composition and egg content of returning salmon; estimated stock levels; and areas of salmon habitat and the probability of achieving conservation limits (Science, 2017). The grading means that the River Creed is currently considered to have an 80% probability of meeting its conservation limits; this also recognises the effectiveness of existing non-statutory local management interventions. There are limitations to the data used to extrapolate the grading of Scottish rivers but the methods are well established and recognised internationally. If there are other empirical data available on the River Creed this will be sorted and used to assess the impact on salmonids in the area.

The Deep Water Port development lies in the direct migratory path of the salmon entering the River Creed.

4.3.3 Potentially Significant Effects

It is anticipated that the development of a deep water port at Arnish will comprise activities with the potential to impact on ecology in the area. Based on existing knowledge of the development it is envisaged that those activities will include:

- Direct loss of tidal and subtidal habitat over the footprint of the development;
- Underwater acoustic noise and shock during piling leading to altered behaviour, this could include lethal and sub lethal impacts on animals and their prey species;
- Visual light disturbance to intertidal and sub tidal species during the hours of darkness through the use of artificial lighting during construction and throughout the life of the port;
- Visual light disturbance to migratory routes during the hours of darkness through the use of artificial lighting during construction and throughout the life of the port;

- Blasting for navigation channels creating noise and vibration in the immediate area during construction;
- Temporary increase in suspended sediment and/or deposition from dredging and construction creating physical disturbance in the marine environment;
- Release of contaminants from disturbed sediments during construction;
- Environmental incidents and accidents and potential pollution from fuels, oils etc. potential source of pollution in the marine environment during construction and from ships using the deep water port;
- Seabed excavation works during construction;
- Indirect impacts through interruption of changes to coastal processes including tidal flows, local current and sediment movement during construction and as a result of the created deep water; and
- Increased vessel numbers post construction causing disturbance in the marine environment.

Terrestrial Ecology

The baseline data gathered from the ecological survey and desk study provides sufficient information to place the site in context with regard to ecological and conservation value. Based on our current understanding of the proposed development of a deep water port at Arnish and the field and desktop surveys, it is not anticipated that there will be any significant impacts during construction on terrestrial ecology; protected or notable faunal species, vegetation and habitats or any impacts post completion that need to be considered further.

Birds

Given the habitats on site, and from a review of relevant literature, it is considered that the proposed development would not result in any significant impacts on ornithology. Therefore ornithology can be scoped out of further assessment.

Marine Mammals and Fish

Underwater noise generated during the construction of the development should be highlighted as an area with the highest potential to impact the marine ecology in the area. Underwater noise can have an adverse effect on marine mammals and fish affecting movements, timing of migrations and foraging behaviours. Another area of risk to marine biodiversity is from pollution directly originating from construction.

Following the construction work and during the life of the deep water port impacts on marine biodiversity may be seen as a result of the construction leading to changes in hydrodynamic regime in the area.

It is recognised that Atlantic Salmon face a number of pressures during their life cycle that include but are not limited to predation, poor water quality, disease and parasites, barriers to migration, poor physical habitat quality, food availability, changes in the marine environment. Atlantic Salmon are listed on Annex 5 of the Habitats Regulations 1994 which implements the species protection requirements of the Habitats Directive in Scotland. Therefore based on existing available data and our current understanding of the proposed development it is our view that Atlantic Salmon should be considered further and scoped in.

In addition to this River Lamprey (*Lampetra fluviatilis*) and Sea Lamprey (*Petromyzon marinus*) together with the critically endangered European Eel (*Anguilla Anguilla*), are all UK BAP species and the impact of the proposed works on these species will also be considered in the EIA.

4.3.4 Assessment Methodology

The assessment of potential impacts will be undertaken against a baseline and the significance of these assessed using standard EIA criteria (i.e. as developed by the Institute of Environmental Management and Assessment (IEMA)) and professional judgement in line with Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2010) guidelines.

The methodology for the Ecological Impact Assessment (EcIA) will follow the Guidelines for Ecological Impact Assessment in the UK and Ireland: Marine and Coastal, by CIEEM (CIEEM, 2010) and the Guidelines for Ecological Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal by CIEEM (CIEEM, 2016). The British Standard Biodiversity: Code of Practice for Planning and Development (BS 42020:2013) cites the CIEEM EcIA Guidelines as the acknowledged reference on ecological impact assessment. The guidelines are consistent with the British Standard, which provides recommendations on topics such as professional practice, proportionality, pre-application discussions, ecological surveys, adequacy of ecological information, reporting and monitoring.

Any assessment should include all direct and indirect, lethal and non-lethal impacts on ecology that could reasonably occur during construction work and in operation of the new deep water port.

Terrestrial Ecology

Based on the results of the baseline survey no further targeted surveys of terrestrial ecology are required.

Birds

No further assessment of birds is required.

Marine Mammals and Fish

The assessment of the potential direct and indirect impacts on marine ecology will draw on the findings of the hydrodynamic studies and the conclusions for the impacts on water and sediment quality assessments. This will in turn determine the potential area of risk.

A desktop study to review current existing literature and data sets for marine mammals in the local area will be conducted. When detailed proposals for construction and operation of the deep water port become available specific requirements for survey will be identified. This may include surveys to determine presence/absence, abundance and other behavioural aspects of marine mammals using the area proposed for the deep water port. Any requirement for additional surveys will be agreed through discussion with SNH and Marine Scotland. The deep water port area is not within any sites designated for marine mammals but connections to the wider area will be considered. The need to include underwater noise studies will be discussed with the competent authority, Marine Scotland.

It is anticipated that a Marine Mammal Observation Protocol (MMOP) will be required so that the proposed construction works, particularly piling, dredging and disposal, do not cause unnecessary disturbance to marine mammals (cetaceans and seals). This is likely to incorporate the use of suitably qualified Marine Mammal Observers (MMOs) and Passive Acoustic Monitoring (PAM) Operators, competent in the identification of marine mammals, being present during construction. The MMOs will undertake observation for marine mammals during high sound producing activities (piling and heavy engineering activities), and during dredging and disposal operations. The PAM Operators will set up monitoring stations/transects and listen for the presence of marine mammals within the mitigation zone before and during high sound producing activities. It is likely that a MMOP will be incorporated into a Marine Mammal Protection Plan (MMPP).

If mitigation is not possible or appropriate and an impact on European Protected Species (EPS) is envisaged then it may be appropriate to apply for an EPS licence from the licensing authority, Marine Scotland.

All available data on fish movements in the deep water port area and the River Creed will be collated. The need to include underwater noise studies will be discussed with the competent authority, Marine Scotland. It is considered that no fisheries surveys are required to assess direct impacts on the River Creed, in addition to those already undertaken by the Fisheries Trust.

4.4 Cultural Heritage and Archaeology

4.4.1 Introduction

This section of the EIA Scoping Report outlines the baseline archaeological and cultural heritage conditions at the site and considers the likely significant potential effects from the proposed development on heritage assets.

4.4.2 Baseline Conditions

There are 19 known heritage assets within the Site (Table 4-14, and Appendix A: Drawings).

Table 4-14 Heritage Assets within the Site Boundary

Asset	Description	NGR
SM5347	WW2 gun emplacements	NB 43100 30500
102813	Wreck, unknown	NB 42320 30840
102824	Wreck, The Arnish	NB 42640 30740
102825	Wreck, Bjorn	NB 42810 31040
102826	Wreck, Andalina	NB 42780 31110
102827	Wreck, Alabama	NB 42380 31550
102828	Wreck, Portugal	NB 42720 31580
102846	Wreck, Marjory	NB 42540 31120
142506	Abandoned boat, unknown	NB 42223 31476
142507	Dyke, Arnish	NB 42312 30585
142509	Factory, Arnish	NB 42573 30284
142510	Engineering Workshop, Arnish	NB 42768 30520
142511	Field System, Arnish	NB 42850 30976
142516	Field System, Arnish	NB 43010 30769
142524	Sea Defences, Arnish	NB 42948 30409
142525	Dyke, Arnish	NB 42801 30278
142526	Sea defences, Arnish	NB 42698 30263
142527	Dyke, Arnish	NB 42629 30257
142528	Dyke, Arnish	NB 42613 30230

These range in date from the post-medieval to the modern period, with the majority being of late post-medieval date. There is one Scheduled Monument within the Site, with the remainder being undesignated HER entries. The Scheduled Monument comprises a Second World War coastal gun battery on Arnish Point (SM5347). The undesignated Historic Environment Record (HER) entries include seven shipwrecks within Cala Ghlumaig, as well as onshore post-medieval field systems, sea defences and dykes, and the factory and engineering workshop on Arnish Point.

The HER does record six other entries within the Site boundary. However, none of these survives as an archaeological feature and they are not considered heritage assets in this Scoping Report. They include the sites of three shipwrecks destroyed in the 1970s during the land reclamation works associated with construction of the Arnish fabrication yard, documentary records of two ships grounded in the nineteenth century but subsequently refloated, and a record of the approximate location of a stone object (likely to be a fishing weight) discovered on Arnish Point.

Within 1km of the Site boundary there are a further two Scheduled Monuments, both from the prehistoric period; an Iron Age dun (SM5397) in Loch Arnish and a chambered cairn (SM6550) in the grounds of Lews Castle. There are also two Listed Buildings; one Category B (Arnish lighthouse and attendant buildings) and one Category C (a monument, commemorating Prince Charles Edward Stuart's journey here in 1746, after Culloden). The Inventory Garden and Designed Landscape (IGDL) comprising the grounds of Lews Castle and Lady Lever Park (GDL00263) is located to the north-west and some of the IGDL is within 1km of the Site.

4.4.3 Potentially Significant Effects during Construction

Groundworks comprising onshore excavation and offshore dredging and land reclamation required for the proposed development have the potential to impact directly upon known heritage assets present within the Site. Impacts will potentially be of high magnitude as they could result in the complete destruction and removal of archaeological remains. Particular heritage assets potentially subject to direct impacts include four of the shipwrecks in Cala Ghlumaig (102813, 102826, 102828, 102846), and the abandoned boat (142506) and dyke (142507) onshore. It is understood that the scheduled gun battery (SM5347) will be outside the proposed construction footprint and will be subject to no direct impacts.

In addition to possible impacts upon known heritage assets, the proposed development has the potential to impact upon hitherto unknown buried archaeological remains. The level of effect will be dependent upon the finalised masterplan and construction methods associated with the proposed development.

4.4.4 Potentially Significant Effects post-Completion

The proposed development has the potential to affect the settings of designated heritage assets including Scheduled Monuments, Listed Buildings and an Inventory Garden and Designed Landscape.

Designated heritage assets up to 1 km distant from the Site have been identified. Given the local topography and the character of the heritage assets, it is unlikely that significant setting effects will occur.

4.4.5 Inclusion or Exclusion from EIA

Cultural heritage and archaeology will be scoped into the EIA.

The potential for direct effects upon heritage assets within the proposed Deep Water Port development will be assessed in the EIA. This will be informed by desk-based assessment and a walkover survey. The methodology to be employed in assessing direct effects is outlined below in Section 4.4.7.

The potential for indirect effects upon the setting or character of designated heritage assets will also be assessed in the EIA. The potential for impacts upon all designated heritage assets within 1 km of the Site boundary will be considered. The assessment will also consider the potential for non-visual settings effects, such as that which could potentially result from elevated traffic, lighting and noise. The methodology to be employed in assessing indirect (setting) effects is outlined below in Section 4.4.7 and will be informed by guidance notes published by HES.

4.4.6 Design and Mitigation

Where significant effects are identified, the ES chapter will put forward mitigation proposals. These proposals will seek to avoid or reduce identified effects. Where it is impossible to avoid or reduce the level of effect the ES chapter will consider the potential to offset any significant effects. Comhairle nan Eilean Siar's Archaeology

Service and Historic Environment Scotland (HES) will be consulted in order to in establish appropriate design responses or mitigation measures required to avoid, minimise or offset significant effects.

4.4.7 EIA Assessment Methodology

Baseline Assessment

The primary source of information for the presence and significance of known assets within the Site is contained within the National Record of the Historic Environment (as held by HES), the Comhairle nan Eilean Siar HER and the designated asset data sets held by HES. All heritage assets within 1km of the Site boundary will be identified to allow for an assessment of direct impacts and identify assets beyond the Site boundary which may be subject to setting impacts. A walkover survey will also be undertaken in order to more fully understand the historic environment baseline conditions at the site and inform the impact assessment.

The ES chapter will fully describe the baseline historic environment conditions, collating the results of desk-based data gathering and a walkover survey. It will identify areas where the proposed development may impact upon heritage assets and include a constraints map for direct impacts.

Designated heritage assets within a distance of up to 1km from the Site boundary have been assessed from a desk-based perspective for the purposes of this Scoping Report. Six designated heritage assets are located within 1 km of the Site. However, the majority of these are located beyond the Site boundary and given the topography of the Site and the character of the heritage assets significant setting effects are not anticipated.

Assessment of Significance / Assessment Criteria

This sub-section sets out the methodology for assessing direct and indirect effects upon heritage assets. It takes account of Scottish Planning Policy (SPP) (Scottish Government 2014), Historic Environment Scotland Policy Statement (HESPS) (HES 2016) and PAN 2/2011: Planning and Archaeology (Scottish Government 2011). HES's guidance notes on setting (HES 2016a), contained within the series *Managing Change in the Historic Environment,* will also be considered.

The Assessor

Headland Archaeology Ltd conforms to the standards of professional conduct outlined in the Chartered Institute for Archaeologists' Code of Conduct, the CIfA Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology, the CIfA Standards and Guidance for Historic Environment Desk Based Assessments and Field Evaluations.

Headland Archaeology Ltd is a Registered Archaeological Organisation of the Chartered Institute for Archaeologists. This status ensures that there is regular monitoring and approval by external peers of our internal systems, standards and skills development.

Headland Archaeology Ltd is ISO 9001:2008 accredited, in recognition of the Company's Quality Management System.

Heritage Assets

A heritage asset (or historic asset) is any element of the historic environment which has cultural significance. Both discrete features, and extensive landscapes defined by a specific historic event, process or theme, can be defined as heritage assets; and assets may overlap or be nested within one another.

Designated assets include Scheduled Monuments, Listed Buildings, World Heritage Sites, Conservation Areas, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas. Other assets may also be locally designated through policies in the Local Plan.

The majority of heritage assets are not designated. Some undesignated assets are recorded in Historic Environment Records or Sites and Monuments Records (HERs/SMRs) maintained by local authorities and other agencies. However, many heritage assets are currently unrecorded, and the information contained in HERs and SMRs is not definitive, since they may include features which, for instance, have been entirely removed, or are of uncertain location, dubious identification, or negligible importance. The identification of undesignated heritage assets is therefore to some extent a matter of professional judgement.

Some heritage assets may coincide with visual receptors or landscape character areas, which are addressed in Section 4.2 (Landscape and Visual), and in such cases it is important to recognise the difference in approach between these two topics. Cultural heritage assessment addresses effects on the cultural heritage significance of heritage assets, which may result from, but are not equivalent to, visual impacts. Similarly, an effect on a landscape character area does not equate to an effect on the cultural heritage significance of heritage assets within it.

Heritage importance, cultural significance and sensitivity

Cultural heritage impact assessment is concerned with effects on *cultural significance*, which is a quality that applies to all heritage assets, and as defined in 'Historic Environment Scotland Policy Statement 2016' (Annex 1, paragraph 3), may be artistic, archaeological, architectural, historic, traditional, aesthetic, scientific or social, and may be 'inherent in the monument itself, its fabric, setting, use, associations, meanings, records, related monuments and related objects'. This use of the word 'significance', referring to the sum of the values we attach to an asset because of its heritage interest, should not be confused with the usage in EIA terminology where the significance of an effect reflects the weight that should be attached to it in a planning decision.

The *importance* of a heritage asset is the overall value assigned to it based on its cultural significance, reflecting its statutory designation or, in the case of undesignated assets, the professional judgement of the assessor (Table 4-15). Assets of national importance and international importance are assigned a high and very high level respectively. Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas are, by definition, of national importance. The criterion for Listing is that a building is of 'special architectural or historic interest'; following HESPS Note 2.17, Category A refers to 'buildings of national or international importance', Category B to 'buildings of regional or more than local importance', and Category C to 'buildings of local importance'. Conservation Areas are not defined as being of national importance, and are therefore assigned to a medium level. Any feature which does not merit consideration in planning decisions due to its cultural significance may be said to have negligible heritage importance; in general, such features are not considered as heritage assets and are excluded from the assessment.

Table 4-15 Criteria for Assessing the Importance of Heritage Assets

Importance of the asset	Criteria
Very high	World Heritage Sites and other assets of equal international importance
High	Category A Listed Buildings, Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields, Historic Marine Protected Areas and undesignated assets of national importance
Medium	Category B Listed Buildings, Conservation Areas, and undesignated assets of regional importance
Low	Category C Listed Buildings and undesignated assets of lesser importance

Cultural significance is assessed in relation to the criteria in HESPS Annexes 1-6, which are intended primarily to inform decisions regarding heritage designations, but may also be applied more generally in identifying the 'special characteristics' of a heritage asset, which contribute to its cultural significance and should be protected, conserved and enhanced according to SPP paragraph 137. Annex 1 is widely applicable in assessing the cultural significance of archaeological sites and monuments, for instance, while the criteria in Annex 2 can be used in defining the architectural or historic interest of buildings, whether listed or not.

The special characteristics which contribute to an asset's cultural significance may include elements of its setting. Setting is defined in 'Managing Change in the Historic Environment: Setting' (HES 2016, Section 1) as 'the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced'. The setting of an asset is defined and analysed according to Stage 2 of the three-stage approach promoted in 'MCHE: Setting', with reference to factors listed on pages 9-10. The relevance of these factors to the understanding, appreciation and experience of the asset determines how, and to what extent, an asset's cultural significance derives from its setting. All heritage assets have settings; however, not all assets are equally sensitive to impacts on their settings. In some cases, setting may contribute very little to the asset's cultural significance, or only certain elements of the setting may be relevant.

Assessment of the magnitude of impacts on cultural significance

The magnitude of an impact is a measure of the degree to which the cultural significance of a heritage asset will be increased or diminished by the development. This definition of magnitude applies to impacts on the setting, as well as impacts on the physical fabric, of an asset. Impacts on the settings of heritage assets are assessed with reference to the factors listed in 'MCHE: Setting' Stage 3 (evaluate the potential impact of the proposed changes, pages 10-11). It is important to note that the magnitude of an impact resulting from an impact on setting is not a direct measure of the visual prominence, scale, proximity or other attributes of the development itself, or of the extent to which the setting itself is changed; therefore, Landscape and Visual Impact Assessment criteria for scale/magnitude cannot be applied directly in determining the magnitude of effect on the setting of a heritage asset. It is also necessary to consider whether, and to what extent, the characteristics of the setting which would be affected contribute to the asset's cultural significance.

Magnitude is assessed as high/medium/low, and adverse/beneficial, or negligible, using the criteria in Table 4-16 as a guide. In assessing the effects of a development, it is often necessary to take into account various impacts which affect an asset's significance in different ways, and balance adverse impacts against beneficial impacts. For instance, there may be adverse impacts on an asset's fabric *and* on its setting, offset by a beneficial impact resulting from archaeological investigation. The residual effect is an overall measure of how the asset's significance is reduced or enhanced.

Table 4-16 Criteria for Assessing the Magnitude of Impacts on Heritage Assets

Magnitude of Impact	Guideline Criteria
High beneficial	Elements of the asset's physical fabric which would otherwise be lost, severely compromising its cultural significance, are preserved in situ; or Elements of the asset's setting, which were previously lost or unintelligible, are restored, greatly enhancing its cultural significance.

Magnitude of Impact	Guideline Criteria
Medium beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to an appreciable but partial loss of cultural significance, are preserved in situ; or Elements of the asset's setting are considerably improved, appreciably enhancing its cultural significance; or Research and recording leads to a considerable enhancement to the archaeological or historical interest of the asset.
Low beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to a slight loss of cultural significance, are preserved in situ; or Elements of the asset's setting are improved, slightly enhancing its cultural significance; or Research and recording leads to a slight enhancement to the archaeological or historical interest of the asset.
Negligible	The asset's fabric and/or setting is changed in ways which do not beneficially or adversely affect its cultural significance.
Low adverse	Elements of the asset's fabric and/or setting which are of very limited relevance to its significance are lost or changed, resulting in a very slight loss of cultural significance; or Elements of the asset's fabric and/or setting which contribute to its cultural significance are minimally affected, resulting in a very slight loss of cultural significance.
Medium adverse	Elements of the asset's fabric and/or setting which contribute to its significance are affected, but to a limited extent, resulting in an appreciable but partial loss of the asset's cultural significance.
High adverse	Key elements of the asset's fabric and/or setting are lost or fundamentally altered, such that the asset's cultural significance is lost or severely compromised.

Assessment of the significance of effects

The significance of an effect (EIA 'significance') on the cultural significance of a heritage asset, resulting from a direct or indirect physical impact, or an impact on its setting, is assessed by combining the magnitude of the impact and the importance of the heritage asset. The matrix in Table 4-17 provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly where the importance or impact magnitude levels are not clear or are borderline between categories. EIA significance may be described on a continuous scale from negligible to major; it is also common practice to identify effects as significant or not significant, and in this sense major and moderate effects are regarded as significant in EIA terms, while minor effects are 'not significant'.

Table 4-17 Criteria for Assessing the Significance of Effects on Heritage Assets

Asset importance	Magnitude of Impact			
	High	**Medium**	**Low**	**Negligible**
Very high	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Major to moderate	Negligible
Medium	Major	Major to moderate	Moderate to minor	Negligible
Low	Major to moderate	Moderate to minor	Minor	Negligible

Cumulative Effects

Cumulative effects relating to cultural heritage are for the most part limited to indirect effects upon the settings of heritage assets. As there are no specific guidelines with regard to undertaking cumulative assessment for heritage assets, this assessment will follow the criteria for assessing setting impacts as set out above. The assessment of cumulative effects will consider whether there would be an increased impact upon the setting of heritage assets as a result of adding the proposed development to a baseline, which may include existing, under construction, consented or proposed developments as agreed with the planning authority.

Those heritage assets which are included in the detailed setting assessment, under indirect effects for the proposed development, will also be considered when assessing the potential for cumulative effects. However, only those assets which are judged to have the potential to be subject to significant cumulative effects will be included in the detailed cumulative assessment provided. In assessing cumulative effects operational, under construction, consented and proposed developments will be considered. While all of these developments and development proposals will be considered, only those specific developments which would contribute to, or have the possibility to contribute to, cumulative effects on specific heritage assets will be discussed in detail in the text.

4.5 Noise

4.5.1 Introduction

The noise assessment will consider the potential for noise generated by the development to impact upon existing residential receptors. The significance of any noise impacts will also be predicted. The effects of construction noise on marine life shall be considered as part of the Ecology EIA assessment.

4.5.2 Baseline Conditions

Part of the proposed site is currently occupied by BiFab who operate an engineering / fabrication yard and quay. There is therefore a component of industrial noise present in the current noise environment at Arnish.

The port is otherwise located in a rural location, the closest residential receptors being across the water in Stornoway, greater than 1km to the north-west at its closest point

Outside of the site boundary sources that may generate noise include industrial/commercial activities in and around Stornoway. Considering the distances involved (greater than 1km), these are not considered to be significant.

4.5.3 Potentially Significant Effects during Construction

The noise from certain construction activities has the potential to impact upon existing noise sensitive receptors. Construction details have not been finalised at this stage. The degree of impact during the construction phase will depend upon;

- The nature of construction activities being carried out; this includes the type and size of machinery/plant involved, combinations of activities happening simultaneously and HGV routes in and around the site;
- Location of construction activities relative to the closest noise sensitive receptors;
- Duration of proposed activities;
- Construction site operating times; and
- Extent of noise mitigation measures in place.

Noise generating activities during the construction phase are understood to include;

- Bulk blasting of rock from slopes behind the quay;
- Dredging of an area of the sea bed adjacent to the new quay. It is understood this may be carried out by a cutter suction dredger or large backhoe dredger on a hopper barge;
- Land reclamation using material from rock blasting and dredging;
- Piling of steel tubes into the sea bed as part of the main quay wall / side wall of the ferry berth construction;
- Road improvement works; and
- HGV and construction plant movements in and around the site.

4.5.4 Potentially Significant Effects post-Completion

Certain activities during the operational phase have the potential to generate noise, these include;

- Loading / unloading activities within the heavy lift area;
- Berthing and unloading gantries for oil delivery vessels;
- Loading / unloading and berthing activities from cruise liners and freight ferries;
- Engineering and fabrication works; and
- Increased road traffic on the newly upgraded link road between the site and the A859.

4.5.5 Inclusion or Exclusion from EIA

Construction Noise;

Details of construction activities have not been finalised at this stage. When this information is known, construction noise from these activities shall be assessed as part of the EIA. Details on the specifications, locations and durations of potentially noise plant and equipment shall be obtained from the contractor and used to determine the most exposed sensitive receptors to construction noise. Baseline noise surveys pre-construction shall be carried out to determine the existing noise climate.

Noise from construction activities shall be predicted at the most exposed residential receptors following guidance provided in *BS5228-1:2009; Code of Practice for Noise and Vibration Control on Construction and Open Sites.* Predicted increases in levels above baseline shall be assessed in order to determine the significance of effects. The results of the assessment can be used to inform a construction noise management plan, to help mitigate any effects at the most exposed sensitive receptors.

Operational Noise;

The site is located in a rural location, the closest residential receptors being in Stornoway, greater than 1km to the north-east at its closest point. Due to the distances involved, and that there is currently industrial noise present at the site, significant noise impacts are not anticipated.

An assessment of operational noise at the closest residential receptors requires detailed information of activities, items of plant/machinery, along with durations involved. When such information is known in more detail a desktop assessment shall be carried out to determine if there is a noise impact at the closest residential receptors in Stornoway. If sufficient information is available to make this assessment it may be included as part of the EIA, otherwise it may be provided as a stand-alone assessment at a later date.

4.5.6 EIA Assessment Methodology

A desktop assessment of operational noise shall be carried out; as mentioned in Section 4.5.5; due to the distances of greater than 1km between source and receivers this is not likely to be significant. If sufficient information is available to carry out the desktop assessment it may be included as part of the EIA, otherwise it may be provided as a stand-alone assessment at a later date.

The construction noise assessment shall be carried out following the guidance outlined below.

BS5228-1:2009; Code of Practice for Noise and Vibration Control on Construction and Open Sites.

Methods for calculating noise produced by construction and open sites such as quarries are provided in BS5228-1:2009. The document gives source data for different types of noise source, as well as methods for calculating noise from stationary and mobile plant. Specific advice on noise from sources such as piling is provided. BS5228 does not give full guidance on noise limits, however, guidance is provided on setting appropriate day and night-time limits. Recommendations for basic methods of noise control relating to construction and open sites where activities/operations generate significant noise levels are provided.

The construction noise impact assessment will comprise the following elements;

- Measurement of existing baseline noise environment at a sample of 2-3 areas representative of the most exposed noise sensitive receptors surrounding the development. Measurement positions will be agreed with Comhairle nan Eilean Siar Council Environmental Health Department.
- Review of construction activities, locations, noise data and identification of sensitive receptors to be considered in the assessment (to be agreed with Comhairle nan Eilean Siar Environmental Health Department)
- Calculation and assessment of construction noise at most exposed sensitive receptors; comparison to baseline noise levels.
- If necessary, provide advice on potential mitigation measures necessary to reduce the significance of the construction noise impact.

Sensitive receptors to be included in the assessment are likely to include residential properties on Newton Street, Builnacraig Street and Battery Park Road.

The potential for cumulative interaction has been considered in relation to the Applicant's other proposed development i.e. Newton Marina. Although the Applicant will seek a Scoping Opinion for both sites, at this stage, it has not been determined whether or not both will proceed at the same time, and therefore it is impossible to determine if there are likely to be cumulative noise impacts at this stage. Should both developments proceed simultaneously, given the primary receptors of cumulative effects would be those residential properties specified above, construction noise impacts from the Port development would be partly mitigated by the intervening

distance and it is unlikely that peak construction activity would occur simultaneously. At this stage, it is proposed to scope out cumulative noise assessment.

4.6 Air Quality

4.6.1 Introduction

The development has the potential to impact local air quality in a number of ways with the key issues in relation to air quality being traffic emissions from the local road network both surrounding and accessing the site and dust emissions during the construction phase.

4.6.2 Baseline Conditions

In order to inform the Scoping Report, the relevant 1km background air quality concentration maps were obtained from the Scottish Air Quality and DEFRA websites. The 2016 measured annual average concentrations of NO_2, PM_{10} and $PM_{2.5}$ are 4.19µg/m^3, 7.38µg/m^3 and 4.62µg/m^3 respectively for background square (142500, 930500). This indicates the good air quality within the area of the site with the concentrations well below the relevant National Air Quality Objectives of 40µg/m^3, 18µg/m^3 and 10µg/m^3 respectively.

The 2016 Air Quality Progress Report for Comhairle nan Eilean Siar Council (the most up-to-date report available) does not identify any Air Quality Management Areas (AQMAs) within the council area.

Comhairle nan Eilean Siar Council does not currently operate any automatic air quality monitoring stations within their boundary and monitoring via diffusion tubes is limited to within Stornoway circa 1.38miles to the north and therefore not representative of conditions at the proposed development.

4.6.3 Potentially Significant Effects during Construction

Potential exists for certain construction activities to generate dust and impact existing residents. Impacts can arise at various construction phases including Earthworks, Demolition, Construction and Trackout and have the potential to cause dust soiling, human health and ecological impacts if not managed appropriately.

4.6.4 Potentially Significant Effects post-Completion

Potential exists for an increase in traffic in the vicinity of the surrounding road network and in turn increases in the pollutants NO_2, PM_{10} and $PM_{2.5}$ which are most commonly associated with traffic emissions. This has the potential to impact both existing and future residents.

4.6.5 Inclusion or Exclusion from EIA

The primary long-term concern in relation to air quality is the emissions generated by traffic and the subsequent impact on the local ambient air quality at residential and public areas located within the vicinity of the main road network. The main pollutants of concern associated with road traffic emissions are NO_2, PM_{10} and $PM_{2.5}$.

It is estimated that the development will not lead to a significant increase in road traffic on the surrounding roads. Further to this, with data indicating that air quality is good in the vicinity of the site it is anticipated that any increase in exhaust emissions would have a negligible effect on air quality at sensitive receptors. This will therefore not be assessed as part of the EIA.

Construction of the proposed development is considered to be a temporary impact and can be controlled through developing a site-specific Dust Management Plan as part of a Construction Environmental Management Plan (CEMP). The dust impact assessment requires specific information on site operations during construction, including preparatory earthworks, general construction and the potential for trackout during construction of the proposed development. Currently this information is still being finalised. It is therefore proposed to defer the construction dust assessment and formulation of a construction dust management plan until such time as details on construction have been finalised.

Accordingly, there is no requirement for a specific air quality EIA Report chapter. The findings of the construction dust assessment will be incorporated into the Other Issues chapter.

4.7 Water Environment

4.7.1 Introduction

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. This section of the EIA will therefore address all of these subject areas, in addition to geology. The associated interactions between the water environment, ecology and fisheries will be considered within the ecology section of the EIA.

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 EIA.

The development proposals for the deep water port at Arnish have the potential to cause changes to the baseline hydro(geo)logical conditions and the ongoing coastal processes at the site, and in the wider area. Given the importance of water as a valued resource, coastal processes to the surrounding environment, and of ensuring sustainable development, an assessment of the water environment and coastal processes is considered essential.

4.7.2 Baseline Conditions

The proposed deep water port development site lies within the coastal inlet of Cala Ghlumaig, located on the north-eastern shore of Arnish Point at the mouth of Stornoway Harbour. The tidal embayment of Stornoway Harbour extends up to 3km in length, and around 1.5km in width at its widest point, covering an area of just over 3km^2.

Geology

The site is partially underlain by Protocataclasite (Outer Hebrides Thrust Complex), with Gneiss (Lewisian) present immediately to the west, and Conglomerate (Stornoway) to the north and east. There are no significant superficial deposits mapped within the vicinity of the site (BGS, n.d.).

Coastal Processes

Tidal currents within the Stornoway Harbour embayment are insignificant. The wave climate is dominated by locally generated wind waves, whilst standing wave oscillations (seiches) can occur within the harbour (up to 0.5m in amplitude) when atmospheric depressions pass northwards. A small quantity of silt and peat is deposited in Stornoway Harbour from the Bayhead River during high flow events. Maintenance dredging of this material is infrequently required (once a decade) as a result (Ramsay & Brampton, 2000). The European Nature Information

System (EUNIS) seabed habitat map shows the dominant seabed habitat within the harbour embayment to be rock or other hard strata, present within a low energy environment (EMODnet, 2017).

Tidal Water Levels

Tidal levels at Stornoway Harbour as presented within the Admiralty Tide Tables (UKHO, 2017) are shown in . The mean tidal range at Stornoway is 4.1m during spring tides and 1.7m during neap tides.

Table 4-18 Tidal Range at Stornoway

Tide Condition	Chart Datum (mCD)	Ordnance Datum (mOD)
Highest Astronomical Tide (HAT)	5.5	2.79
Mean High Water Spring (MHWS)	4.8	2.09
Mean High Water Neap (MHWN)	3.7	0.99
Mean Low Water Neap (MLWN)	2.0	-0.71
Mean Low Water Spring (MLWS)	0.7	-2.01

Extreme sea levels have been predicted around the whole UK coastline and published by the Environmental Agency/Department for Environmental Food and Rural Affairs report (McMillan et al., 2011). 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, SEPA have updated the original estimates. The SEPA derived extreme sea levels, predicted at a point within Stornoway Harbour, are 3.4m Above Ordnance Datum (AOD) for the 1 in 200 year return period event and 3.51mAOD for the 1 in 1,000 year return period event .

Hydrology

The two main inflows of freshwater to the Stornoway Harbour embayment are the Bayhead River, which enters at the northern (inland) tip of the harbour, and the Abhainn Ghrioda, which enters the harbour on the western shore, opposite Goat Island. Bayhead River is a minor watercourse with a catchment area of under 8km^2. The Abhainn Ghrioda is a larger watercourse, with a catchment area of around 50km^2, however the inflow of freshwater remains insignificant relative to the much larger volume of seawater exchanged within the harbour embayment.

There is a single mapped inflow of freshwater to Cala Ghlumaig, the Allt Poll a' Choire enters the bay at the north-western corner. This is a minor watercourse originating from a small lochan a few hundred metres to the south-west. It is considered likely that there may also be some local discharges from piped drainage systems, particularly in the vicinity of the fabrication yard.

Water Quality

The coastal waters of Stornoway Harbour are classified under the Water Framework Directive (WFD) monitoring programme as a coastal waterbody. The waterbody is classified as being of overall 'Good' status in 2015, with a hydromorphological status of 'High'. Of the watercourses discharging to Stornoway Harbour only the Abhainn Ghrioda is large enough to be classified, with an overall status of 'High' in 2015 (SEPA, n.d.).

4.7.3 Potentially Significant Effects during Construction

The proposed development will involve construction activities in and near the water environment, including land reclamation, new quay walls and seabed dredging. The key potential environmental impacts on the water environment and coastal processes during construction and operation have been identified and are outlined below:

- Potential changes in the local wave climate;
- Potential changes in local flood risk and drainage;
- Potential contamination of coastal water and sediments through spillages and/or sediment transfer (oil, fuels and suspended solids); and
- Potential interactions between water environment impacts and associated ecology.

4.7.4 Potentially Significant Effects post-Completion

Potentially significant effects arising from the post-completion phase (i.e. once the development has been built), are likely to arise from the same potential impacts as highlighted above within section 4.7.3.

4.7.5 Inclusion or Exclusion from EIA

The nature of the proposed works, including land reclamation, new quay wall construction and capital dredge requirement, raises the potential for impacts on the local wave climate, and associated impacts on the local fishing fleet, ferry transport link and other harbour users. A wave modelling study is therefore proposed in order to assess the potential impact of the proposed works on the wave climate within Stornoway harbour.

Given the absence of significant tidal currents, sediment input and transport within the harbour, and the prominence of bedrock around the foreshore, it is considered unlikely that there would be any significant impact from the proposed development on tidal currents or sediment processes. It is proposed that a desk based study of local hydrodynamic conditions within the harbour embayment should be undertaken to confirm this understanding.

Site investigation will be required within the proposed works area, particularly the dredge pocket, in order to determine the nature of the substrate, the likely implications for the project, and licencing requirements.

Assessment of the potential for particulate and chemical contamination of water will be central to the assessment. The prevention of pollution during construction and operational phases will be a specific focus of the EIA and recommendations made for the adoption of good working practices, including suitable drainage measures, in line with appropriate guidance and not to the detriment of existing conditions.

The proposed development will be considered in light of potential flood risk, including wave overtopping and surface water drainage.

4.7.6 Design and Mitigation

Where any significant effects on the water environment or coastal processes are identified as part of the EIA process, recommendations for design alteration or mitigation which could avoid, reduce or remedy the adverse effects will be identified.

4.7.7 EIA Assessment Methodology

The assessment will follow standard EIA procedures and will include:

- Desk based review of the design of the proposed development in relation to the local water environment 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 and ground conditions at the site and environs;
- Review of hydrology, catchment characteristics, local drainage and water quality conditions;
- Review of coastal processes including bathymetry, tidal levels, river and tidal flow currents, wave action, bed sediment type and distribution, sediment transport and deposition, geology;
- Site investigation within proposed dredge pocket to establish nature of dredge material;
- Wave modelling study to establish baseline and design conditions;
- Flood risk assessment, including wave overtopping and surface water drainage with climate change scenarios; 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 significance;
  - Identification and assessment of mitigation measures to reduce or avoid any potential impacts of the proposed development; and
  - Statement of residual impacts.

Potential impacts arising from the development will be predicted and evaluated by comparison with environmental quality standards, sediment quality standards, and water and sediment quality objectives. The observed baseline data will initially be used along with expert opinion to qualitatively assess the potential impacts and the significance to receptors.

4.8 Traffic and Transport

4.8.1 Introduction

The transport related issues associated with the proposed development have been assessed against national and local policies set out in the following documents:

- National Planning Framework (NPF) 3;
- Planning Advice Note 75 Planning for Transport;
- Outer Hebrides Local Development Plan (LDP) 2 – Working Towards A New Plan (2012);
- The Transport Strategy for the Highlands and Islands – Hitrans (2008 – 2021);

The principal objective of the policies in the above documents is to support the promotion of accessibility by all modes of travel in order to support sustainable economic growth.

National Planning Framework (NPF3) states plans and decisions should take account whether:

- The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- Safe and suitable access to the site can be achieved for all people; and
- Improvements can be undertaken within the transport network that cost effectively limits the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts are severe.

Outer Hebrides Local Development Plan (LDP) 2 supports sustainable developments that

- Support development that reflects the scale and function of Stornoway,

- Promotes opportunities for economic growth,
- Ensure the sustainability of settlements by reducing the emissions which cause climate change and adapting to its effects; and
- Maximise the re-use of previously developed land, in the built out areas.

The Transport Strategy for the Highlands and Islands sets out the thirteen-year transport strategy for the area from 2008 to 2021. The Plan is produced by the Highlands and Islands Transport Partnership (HITRANS) on behalf of the five local authorities (Argyll and Bute, Highland, Moray, Orkney Islands and Comhairle nan Eilean Siar).

The Transport Strategy for the Highlands and Islands is focused on ways to address challenges within three key areas:

- Supporting economic development and regeneration;
- Addressing climate change;
- Supporting safe and sustainable communities

Dredged material will be used as an infill, and as such will alleviate the need for HGVs. There may be a limited number of vans and HGVs delivering. It is anticipated that staff will be transported to the site in company vehicles in order to minimise disruption to local residents during the construction period, however, there will also a number of staff who travel using their own vehicle.

4.8.2 Baseline Situation

Site Access

The A859 is the main road from Stornoway on Lewis to Leverburgh (An t-Ob) on Harris and then on to the end of the island at Rodel. The A859 starts at a roundabout with the A857 to the north of Stornoway, and slowly turns round to take its south-westerly course across Lewis.

Access to the proposed development site at Arnish is approximately 1km North of Loch Cnoc a' Choilich via a single track road from the junction with the A859. The Deep Water Port at Arnish will be approximately 3.5km from main spinal route.

Data Sources

Traffic flow data for the A859 recorded during 2015 (the most recent information available) was obtained from the Department for Transport website (DfT, 2013).

The main period of traffic generation will potentially be during the construction period. It is likely that most of the dredge material will be reused as infill material, and only a limited volume will be taken of site for treatment/ disposal.

The delivery of goods and materials, as well as the transport of construction personnel to and from the site will result in additional traffic on the network. Construction traffic has the potential to affect other road users, such as drivers, cyclists and pedestrians, as well as people living and working close to the affected road network. The following types of impacts will be assessed: changes in traffic conditions and their potential for delays and congestion; pedestrians and cyclist conditions and their potential conflict with road traffic; and changes in traffic related noise levels.

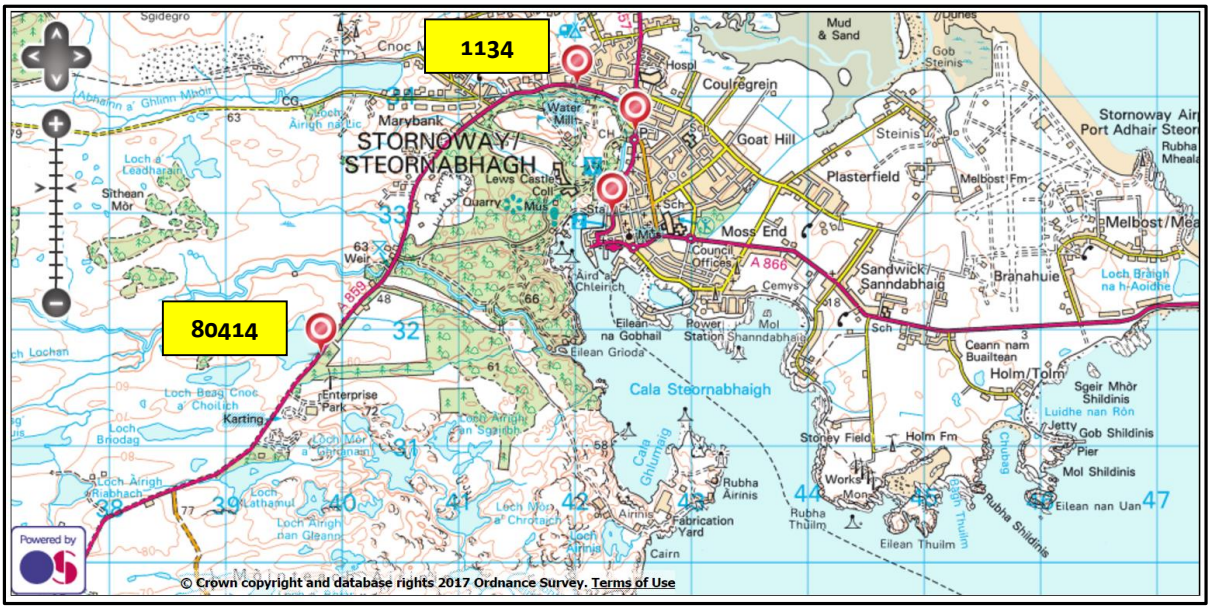
The Department for Transport holds annual average daily flow (AADF) traffic data from automatic traffic counters on the A859 in the vicinity of the site1. The hourly flow profile (with class breakdown) for the count undertaken in 2015 has been used as baseline traffic flow data. Table 4-19 summarises this data, while Figure 4-1 highlighting the traffic count points.

Table 4-19 Traffic Flow Information (ADDF) 2015 Data

Count point id:	Road	Grid Ref.	Start Junction	End Junction	Annual average daily flow (All Motor Vehicles)	Total HGV
80414	A859[15]	139800, 931800	A858	A859	656	67
1134	A858[16]	142000, 934100	B8060	A858	6964	205

The road approaching Arnish from Stornoway relatively lightly used, and is currently used by vehicles accessing the unclassified road Arnish Industrial Estate.

Figure 4-1 Traffic Point



Road Safety

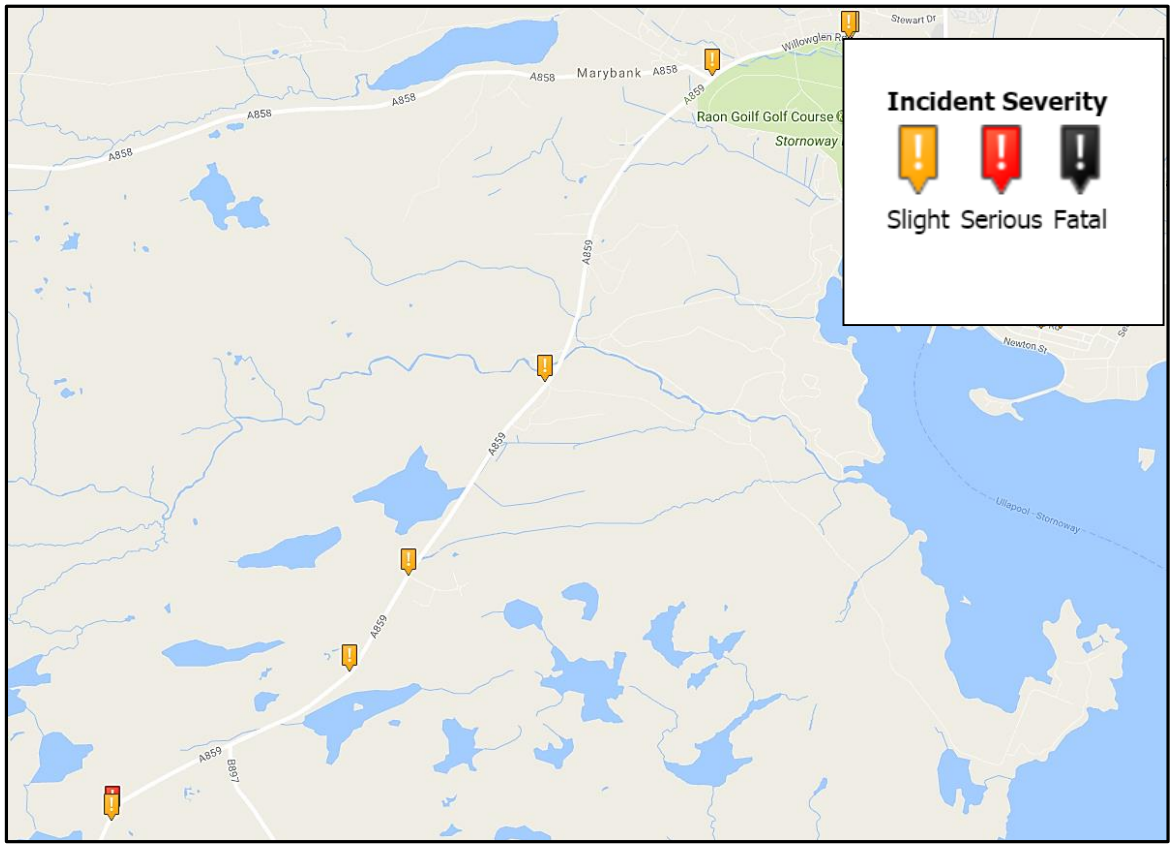
CrashMap[17] was interrogated to identify the number of road traffic incidents within the vicinity of the proposed Deep Water Port. CrashMap uses data collected by the police about road traffic incidents on British roads where someone is injured which is then compiled in to an easy to use format showing each incident on a map. Incidents are plotted to within 10m of their location. Table 4-20 indicates that there have been 8 Incidents in the five years up to, and including, 2016. Figure 4.2 shows the location of the incidents.

Table 4-20 Road Traffic Incidents

Year	Slight	Serious	Fatal
2012	1	0	0
2013	2	0	0
2014	1	0	0
2015	2	1	0
2016	1	0	0
Total	**7**	**1**	**0**

[15] https://www.dft.gov.uk/traffic-counts/cp.php?la=Comhairle+nan+Eilean+Siar#80414
[16] https://www.dft.gov.uk/traffic-counts/cp.php?la=Comhairle+nan+Eilean+Siar#1134
[17] http://www.crashmap.co.uk/search#

Figure 4-2 Road Traffic Incidents



4.8.3 Potentially Significant Effects during Construction

The following are considered to be the key potential effects with respect to traffic and transport during construction:

- Effects upon the levels of traffic experienced at the existing harbour;
- Effects upon the condition/structure of the road network;
- Environmental effects resulting from associated noise, vibration, and air pollution impacts;
- Effects upon pedestrians and other similar users in terms of delays and severance/amenity impacts (due to physical barriers or the effects of increased traffic flows);
- Road safety and the potential for accidents;
- The effects of heavy/abnormal loads on the road network;
- Ensuring the safe operation of the harbour with particular respect to existing marine traffic during harbour operation.

With respect to marine traffic, during construction there is the potential for incidents to occur as a result of the presence of dredging and other construction plant in the water. As with all construction works taking place in the marine environment, standard measures will need to be put in place to reduce the navigation risk to other vessels; for example, the construction works would need to be appropriately marked, construction plant be appropriately lit, and notices to Mariners issued, etc.

4.8.4 Potentially Significant Effects post-Completion

During the operational phase the Deep Water Port it is not considered likely to be a significant traffic generator. Although traffic associated with Arnish Industrial Estate is already present; any significant increase in activities has the potential to increase traffic on the local road network.

4.8.5 Inclusion or Exclusion from EIA

Details of construction activities, including the source and transportation method used to deliver incoming construction materials have not been finalised at this stage. When this information is known, construction traffic generated as a result of these activities shall be assessed as part of the EIA. Details on the specifications, locations and duration of traffic movements shall be determined from the contractor. Baseline traffic surveys pre-construction shall be carried out to determine existing traffic conditions.

4.8.6 EIA Methodology

The assessment will be broadly based on the Institute of Environmental Assessment (IEA)[18] *Guidelines for the Environmental Assessment of Road Traffic*. A site visit will be undertaken to observe background transport conditions and identify access constraints/ opportunities.

This guidance is the only document available which sets out a methodology for assessing potentially significant traffic-related environmental impacts where a proposed development is likely to give rise to changes in traffic flows.

The receptors that will be assessed are the users of local roads and the occupiers and users of land that front the local roads. This is because a change in characteristics, such as an increase in traffic and composition of HGVs, could adversely affect them.

The following rules, summarised from the IEMA guidelines, be used as a screening process to define the scale and extent of this assessment.

- Rule 1: Include roads where traffic flows are predicted to increase by more than 30% (or where the numbers of HGVs are predicted to increase by more than 30%).
- Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

The IEMA guidelines elaborate on Rule 1 stating that projected changes in traffic of less than 10% create no discernible environmental impact, given that daily variations in background traffic flow may fluctuate by this amount, and that a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment.

The IEMA guidelines also identify groups, locations and areas which may be sensitive to changes in traffic conditions and which should be considered for assessment. Groups, locations and areas could, for example, include pedestrians, cyclists, shopping areas, schools and accident hotspots. Where traffic flows are predicted to increase by 10% or more, those relevant sensitive groups, locations and areas will be assessed. It should also be noted that the IEMA guidelines also state that other affected parties could be added if the assessor considers it appropriate.

[18] Now the Institute of Environmental Management and Assessment (IEMA)

The potential impacts resulting from construction and development traffic likely to be generated by the proposed development will be considered in relation to the following areas:

- Traffic generation;
- HGV accessibility;
- Severance;
- Driver Delay;
- Pedestrian Delay;
- Pedestrian Amenity, Fear and Intimidation; and
- Accidents and Safety, including driver distraction.

4.9 Other Issues

4.9.1 Introduction

This section incorporates those issues which are relevant to the proposed development however to do merit or justify a full chapter within the EIA Report, or similarly where there is no standard methodology. As discussed within section 3.4 of this Scoping Report, the changes to the EIA Regulations include requirement to consider climate change and natural disasters. This section also discusses cumulative assessment in relation to other elements of a proposed Masterplan for Stornoway, and air quality considerations as referred to within section 4.6.5.

4.9.2 Climate Change

Climate change has taken a prominent position within policy and legislation at a national level, with the Climate Change (Scotland) Act 2009 creating a long-term framework for ensuring reduction in Scottish greenhouse gas emissions of 80% by 2050.

Under Schedule 4(4), the EIA Regulations require "*a description of the factors specified in 4(3) likely to be significant affected by the development…(including) climate (for example greenhouse gas emissions, impacts relevant to adaption*)". In addition, Schedule 4(5)(f) of the EIA Regulations requires a "*description of the likely significant effects of the development on the environment resulting from…the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change".*

It is considered at the Scoping stage that the proposed development would not result in a significant effect upon climate given the nature of the development. Any increase in emissions created during either construction or operation is likely to be negligible, and pollution and emissions control would be discussed within a detailed Construction Environmental Management Plan (CEMP). Discussion of the vulnerability of the project to climate change is primarily concerned with the water environment, including flood risk and wave overtopping due to increases in sea level. This would be covered within the modelling and impact assessment within the Water Environment chapter.

4.9.3 Natural Disasters

The proposed development is not located within an area of significant seismic activity, nor are climatic factors prone to creating disasters such as tsunamis, hurricanes or catastrophic flooding. Accordingly consideration of natural disasters is scoped out of the EIA.

4.9.4 Air Quality

Air Quality would form part of the Other Issues chapter as discussed within section 4.6.5, in particular reference to dust.

4.9.5 Cumulative Assessment

Those environmental topics which are considered to require cumulative assessment are included within the relevant sections of section 4. It is not proposed to incorporate a separate cumulative assessment elsewhere within the EIA Report. It is acknowledged that the proposed development is part of a larger Masterplan for the area which has been promoted by the Applicant. It is also acknowledged that a separate Masterplan is in the early stages of being promoted by Comhairle nan Eilean Siar. Given there is no committed development at this stage, it is not considered practical or appropriate to include cumulative assessment of other Masterplan development in the harbour area given assessment would be based upon assumption, conjecture and hypothesis.

5 CONTENT AND STRUCTURE OF THE ENVIRONMENTAL STATEMENT

5.1 Content and Structure

Following the rationale set out within the above sections, it is proposed that the final ES is set out within the following structure:

- Volume 1: EIA Report, containing:
  - Preface
  - Chapter 1: Introduction
  - Chapter 2: EIA Methodology and Scoping
  - Chapter 3: The Proposed Development
  - Chapter 4: Planning Policy Context
  - Chapter 5: Landscape and Visual
  - Chapter 6: Ecology
  - Chapter 7: Cultural Heritage and Archaeology
  - Chapter 8: Noise
  - Chapter 9: Water Environment
  - Chapter 10: Traffic and Transport
  - Chapter 11: Other Issues
  - Chapter 12: Schedule of Mitigation
  - Chapter 13: Conclusions
- Volume 2: Figures, containing relevant supplementary figures and drawings relevant to Volume 1 chapters;
- Volume 3: Technical Appendices, including reports and technical background documents which support the main assessments contained within Volume 1; and
- A standalone Non-Technical Summary (NTS).

6 CONCLUSIONS

It is anticipated that the proposed development will fall under Schedule 1 of the 2017 EIA Regulations, it is appropriate to request a Scoping Opinion from Comhairle nan Eilean Siar under Regulation 17(1). Sufficient baseline information has been provided regarding the proposed development and the surrounding and receiving environment upon which to base a decision.

The information and methodologies contained within this report allow the Council, Marine Scotland and other consultees to advise and approve the scope of work and add relevant information and guidance as required. We would be very grateful to receive a formal Scoping Opinion within a 5 week period and are committed to working with all consultees to deliver a proportionate, robust EIA that benefits the Western Isles.

For the benefit of doubt, the environmental topics we propose to scope **in** to the EIA Report are:

- Landscape and Visual;
- Ecology;
- Cultural Heritage and Archaeology;
- Noise;
- Water Environment; and
- Traffic and Transport.

It is proposed that all other topics, including air quality, are scoped out.

APPENDICES AND DRAWINGS

A DRAWINGS

Drawing No 169438-001
Drawing No. 1917/105C
Drawing No. 1917/203A
Drawing No. 169438-003
Drawing Heritage Assets

Reproduced from Ordnance Survey digital map data © Crown copyright 2017. All rights reserved. Licence number 0100031673.

Legend

Stornoway Deep Water Site Boundary

Do not scale this map

Client: Stornoway Port Authority

Project: Stornoway Deep Water Port

Title: Stornoway Deep Water Port Site Boundary

Status: FINAL

Drawing No.: 169438-001

Revision:

Scale: 1:10,000

A3

Date: 11 May 2017

Drawn: SMC

Checked: IB

Approved: GF

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045

Stornoway Port Masterplan

Stornoway Deep Water Port

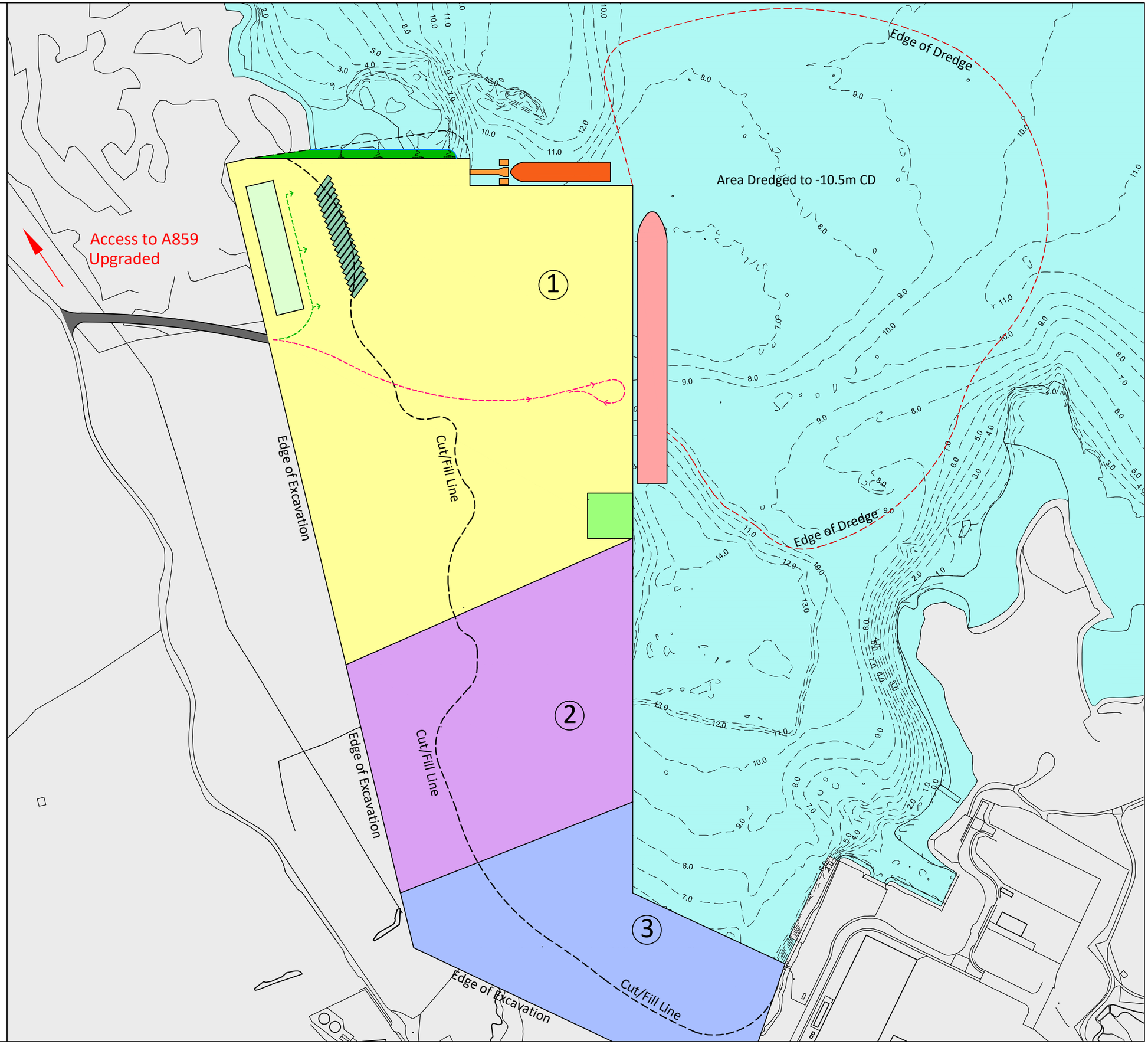
Scale - 1:4,000

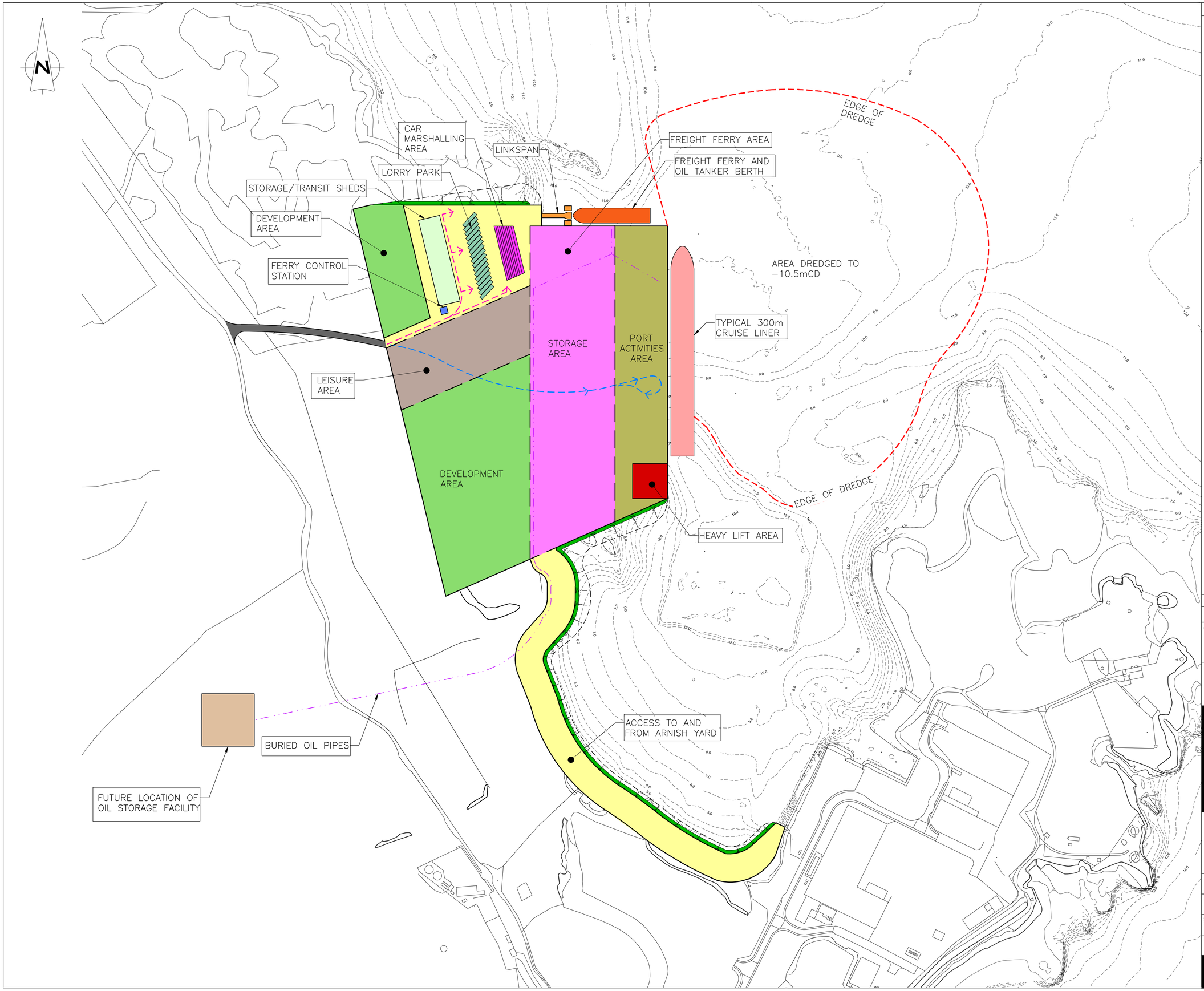
- Access Road
- Phase 1 Reclamation Area
- Lorry Park
- Warehousing
- Freight Ferry
- Heavy Lift Area
- Rock Armour Protection
- Cruise Liner
- Linkspan
- Phase 2 Reclamation + Quay
- Phase 3 Reclamation + Quay
- Route for Coaches
- Route for Lorries
- Dredge Outline
- MHWS

0 50 100 200m

Note: Seabed Contours in Metres Below Chart Datum

Drawing No.	1917/105C





GENERAL NOTES

1. ALL LEVELS ARE IN METRES AND RELATE TO CHART DATUM, UNLESS NOTED OTHERWISE.

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D
A	02.05.17	GENERAL REVISIONS	JR	JP	JP

AMENDMENTS

CLIENT

STORNOWAY PORT AUTHORITY

PROJECT

STORNOWAY PORT MASTERPLAN

Wallace Stone
CONSULTING CIVIL ENGINEERS

GLASGOW
0141 554 8233
glasgow@wallacestone.co.uk

DINGWALL
01349 866775
dingwall@wallacestone.co.uk

HEBRIDES
01851 612454
hebrides@wallacestone.co.uk

DRAWING TITLE

DEEP WATER PORT PHASE 1

DRAWN	CHECKED	APPROVED
JA	JP	JP
DATE	DATE	DATE
20.04.17	APR 17	APR 17

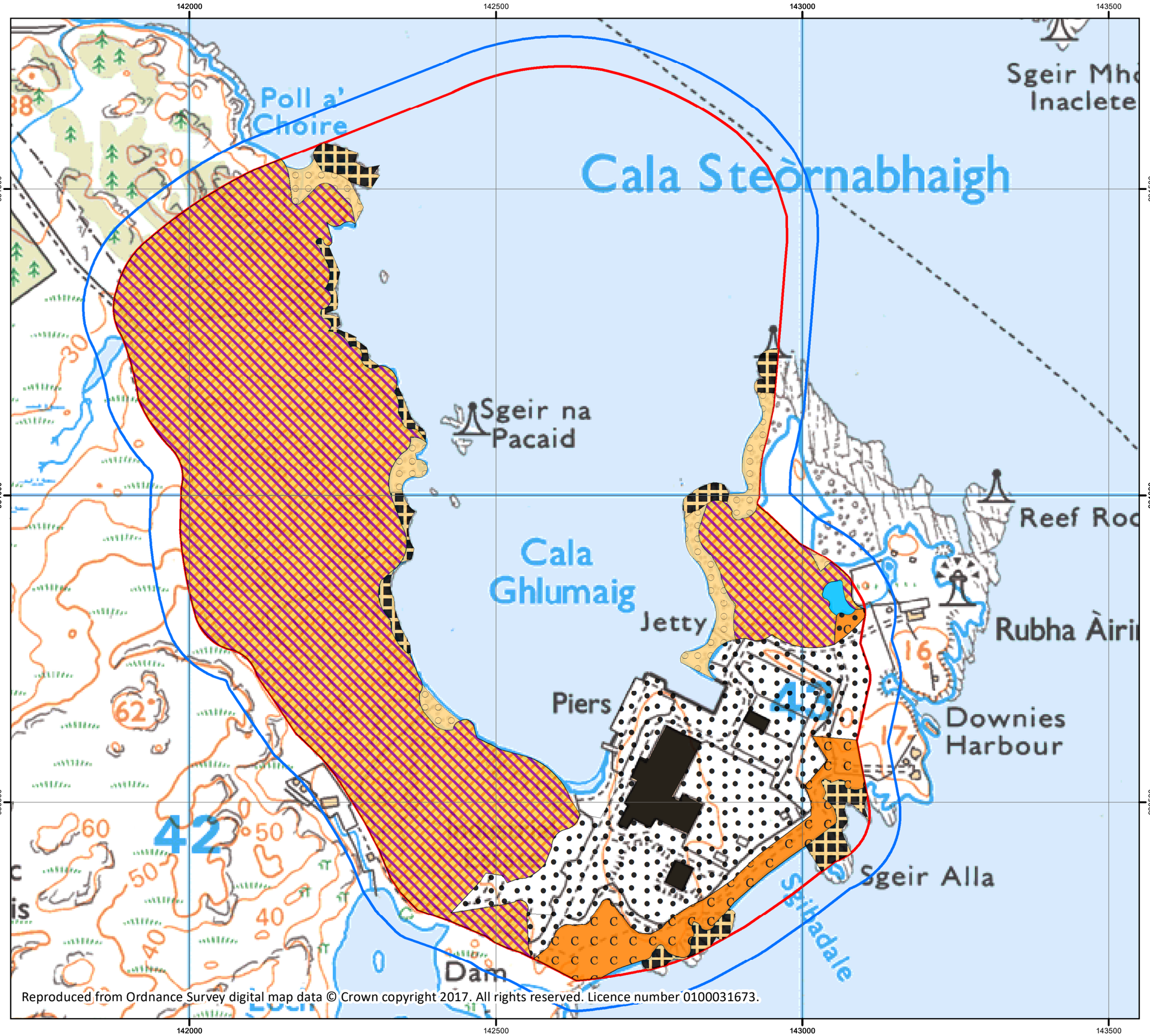
SCALE (A1) 1:2500

STAGE: INFORMATION

REVISION: A

PROJECT No. 1917

DRAWING No. 203



Reproduced from Ordnance Survey digital map data © Crown copyright 2017. All rights reserved. Licence number 0100031673.

Legend

- Stornoway Deep Water Site Boundary
- 50m Survey Buffer

JNCC Habitat Code

- D6 Dry Heath
- G1 Standing Open Water
- H1.2 Shingle
- H1.3 Rock Outcrop
- H8.4 Coastal Ground
- J3.6 Buildings
- J4 Bare Ground

Do not scale this map

Client: Stornoway Port Authority

Project: Stornoway Deep Water Port

Title: Phase 1 Habitat Map

Status: FINAL

Drawing No.: 169438-003

Revision:

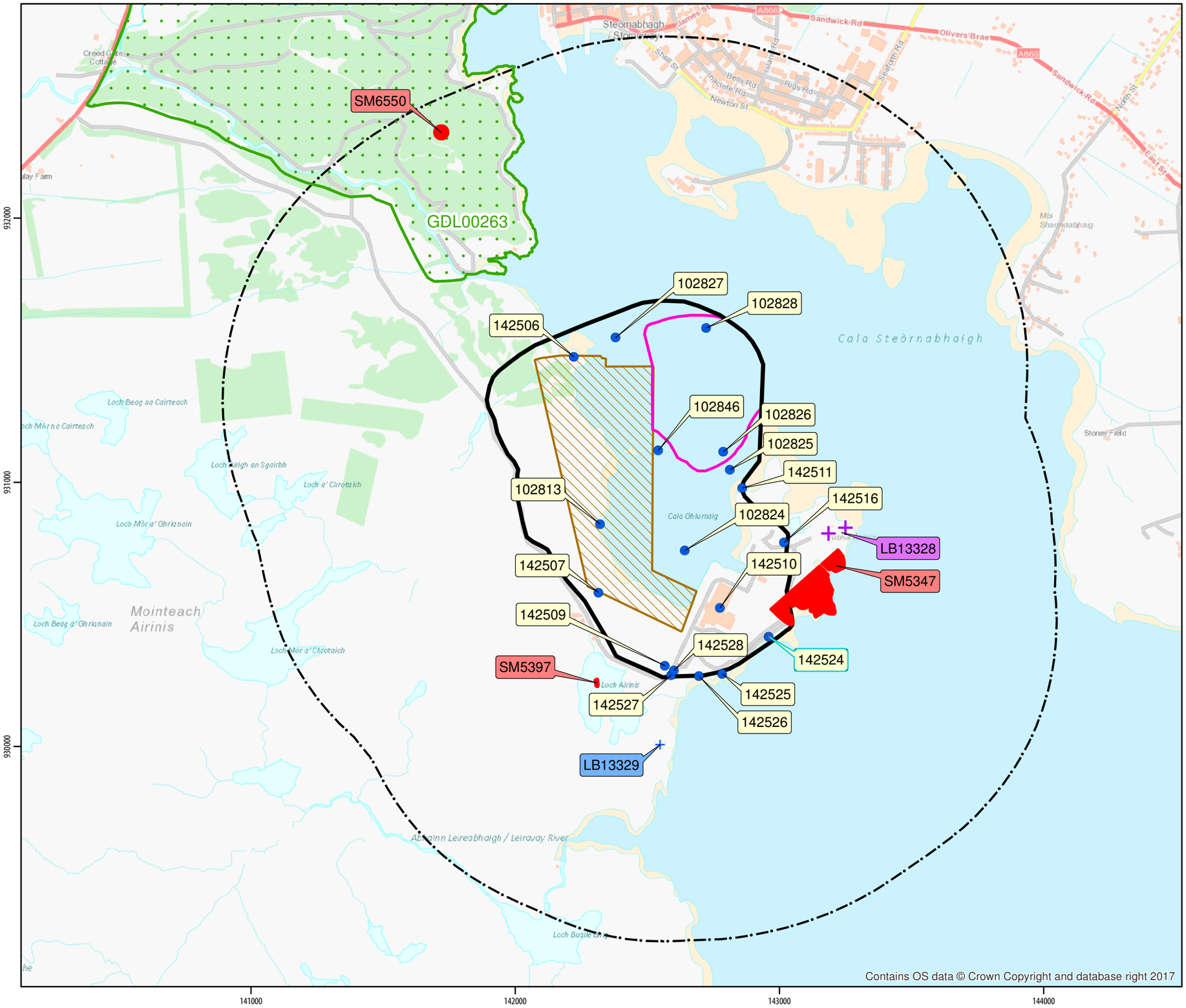
Scale: 1:6,000

A3

Date: 28 June 2017

Drawn	Checked	Approved
GV	CP	GF

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045



HEADLAND ARCHAEOLOGY
SCOTLAND
13 Jane Street
Edinburgh EH6 5HE
0131 467 7705
www.headlandarchaeology.com

KEY

- HER Entry
- Scheduled Monument
- Category B Listed Building
- Category C Listed Building
- Inventory Garden and Designed Landscape
- Site Boundary
- Proposed Dredging
- Proposed Reclamation
- 1km Radius

HER information
derived from Pastmap data
dated 15/05/17 © Crown Copyright

Scheduled Monument, Listed Building and Inventory Garden and Designed Landscape area information derived from Historic Environment Scotland data dated Jan 2017.

© Crown Copyright.
All rights reserved 2017.

N

1:15,000 @ A3

0 360m

FIGURE XX Heritage Assets within Study Area

B HABITAT INFORMATION AND SITE PHOTOGRAPHY

Phase 1 Habitat Survey

A total of six Phase 1 habitat types including buildings were recorded on the site:

- D6 Wet Heath
- G1 Standing Open Water
- H8.4 Coastal Grassland
- H1.3 Boulders / Rocks
- H1.2 Shingle/ Cobbles
- J3.6 Buildings

D6 Wet Heath

Wet heath is located along the western boundary of the site. The area is dominated by *Erica tetralix*, *Calluna vulgaris*, grasses sedges and sphagnum bog mosses.

G1 Standing Open Water

A small area of open water of Loch Airinis is located within the buffer area of the phase 1 habitat survey in the south east of the site.

H8.4 Coastal Grassland

Grassland which includes maritime species and was found on shallow slopes and level areas by the sea, and along the cliff tops. Species include*, Plantago maritima* and *Armeria maritima. Festuca rubra* was the dominant species. Other species included, *Anthyllis vulneraria*, *Lotus corniculatus*.

H1.3 Boulders / Rocks above high- tide mark

H1.2 Shingle / Cobbles above high-tide mark

6.1.1 J3.6 Buildings

Buildings associated with previous and existing industrial use are marked on the map.

Photo 1: Coastline of the east of the site, photograph shows coastal grassland and the rocky outcrops

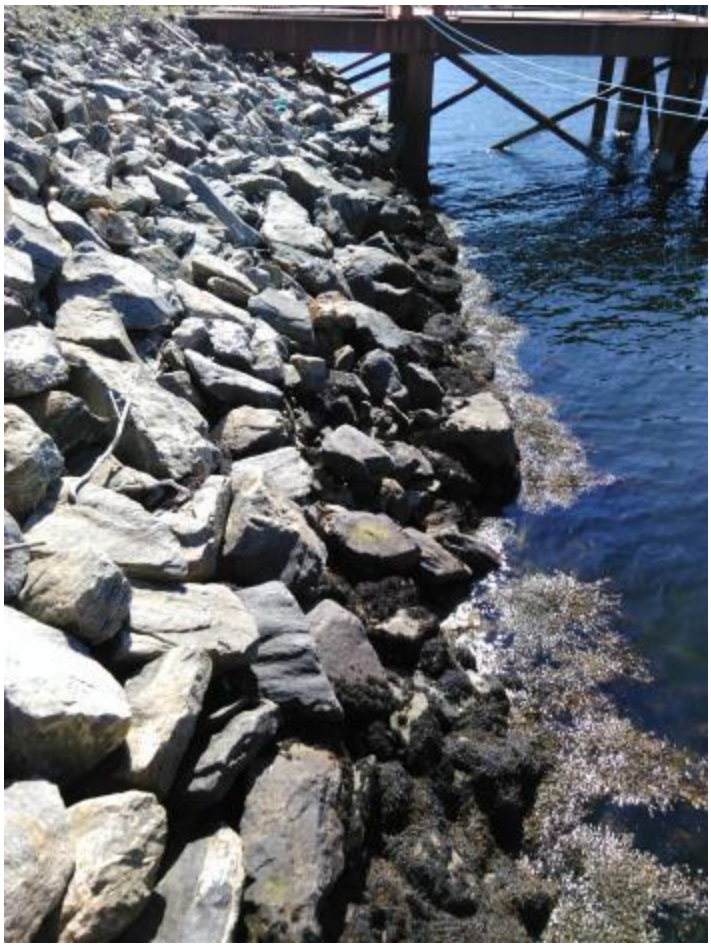


Photo 2: Rock armour of the piers and jetty located within the site

Photo 3: Existing industrial units on site

Photo 4: Coastline searched by boat for signs of protected species specifically otter

Photo 5: Rocks along coastline and coastal grassland eastern boundary of site

Stornoway Port Authority
Stornoway Deep Water Port / Arnish Industrial Site EIA Scoping Report

December 2017

Stornoway Port Authority
Stornoway Deep Water Port / Arnish Industrial Site EIA Scoping Report

Client:	Stornoway Port Authority
Document number:	7777
Project number:	169438
Status:	Final
Author:	Various
Reviewer:	Campbell Fleming
Date of issue:	14 December 2017
Filename:	169438- Deep_Water_Port_Arnish_Scoping_Report

Glasgow

Craighall Business Park
8 Eagle Street
Glasgow
G4 9XA
0141 341 5040
info@envirocentre.co.uk
www.envirocentre.co.uk

Aberdeen

Banchory Business Centre
Burn O'Bennie Road
Banchory
AB31 5ZU
01330 826 596

Inverness

Alder House
Cradlehall Business Park
Inverness
IV2 5GH
01463 794 212

Edinburgh

Suite 114
Gyleview House
3 Redheughs Rigg
Edinburgh
EH12 9DQ
0131 516 9530

This report has been prepared by EnviroCentre Limited with all reasonable skill and care, within the terms of the Contract with Stornoway Port Authority ("the Client"). The report is confidential to the Client, and EnviroCentre Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced or altered without the prior written approval of EnviroCentre Limited.

Contents

1 Introduction 3
1.1 Background 3
1.2 The Applicant 3
1.3 Project Team 4
1.4 Planning History and Need for the Proposed Development 4
1.5 Scoping under the EIA Regulations 4
1.6 The Legislative Context 5
1.7 Consultation and Stakeholders 6
2 The Proposed Development 7
2.1 Site and the Surrounding Area 7
2.2 The Proposed Development 8
3 Approach to EIA 17
3.1 Introduction 17
3.2 General Approach to Assessment 17
3.3 Mitigation 18
4 Potentially Significant Environmental Effects 20
4.1 Introduction 20
4.2 Landscape and Visual 20
4.3 Ecology 32
4.4 Cultural Heritage and Archaeology 42
4.5 Noise 48
4.6 Air Quality 51
4.7 Water Environment 52
4.8 Traffic and Transport 55
4.9 Other Issues 60
5 Content and Structure of the Environmental Statement 62
5.1 Content and Structure 62
6 Conclusions 63

Appendices

A Drawings
B Habitat Information and Site Photography

Figures

Figure 2-1 Cutter Suction Dredger 9
Figure 2-2 Pipe Delivery System 9
Figure 2-3 Typical Backhoe Dredger and Self-Propelled Hopper Barge 10
Figure 2-4 Example Quay Wall Construction Method 11
Figure 2-5 Cathodic Protection Anodes 12
Figure 2-6 Tie Rods 12
Figure 2-7 Reclamation 13
Figure 2-8 Rock Armour 14
Figure 2-9 Quay Fendering 15
Figure 4-1 Traffic Point 57
Figure 4-2 Road Traffic Incidents 58

Tables

Table 4-1 Sensitivity Criteria 21
Table 4-2 Susceptibility Criteria 26
Table 4-3 Landscape Value 27
Table 4-4 Susceptibility to Change 28
Table 4-5 Magnitude of Change 29
Table 4-6 Scale of Effect 30
Table 4-7 Significance of Effect 31
Table 4-8 Terrestrial designated sites 33
Table 4-9 Western Isles LBAP Species 34
Table 4-10 Western Isles LBAP Habitats 34
Table 4-11 Western Isles LBAP Priority Bird Species 36
Table 4-12 Marine Designated Sites 38
Table 4-13 Marine mammal LBAP species 38
Table 4-14 Heritage Assets within the Site Boundary 42
Table 4-15 Criteria for Assessing the Importance of Heritage Assets 45
Table 4-16 Criteria for Assessing the Magnitude of Impacts on Heritage Assets 46
Table 4-17 Criteria for Assessing the Significance of Effects on Heritage Assets 47
Table 4-18 Tidal Range at Stornoway 53
Table 4-19 Traffic Flow Information (ADDF) 2015 Data 57
Table 4-20 Road Traffic Incidents 57

1 INTRODUCTION

1.1 Background

EnviroCentre Ltd has been appointed by Stornoway Port Authority (SPA) in respect of Environmental Impact Assessment (EIA) Scoping in relation to a proposed new development, approximately 2km south of Stornoway (as demonstrated within Appendix A: Drawing No 169438-001). The purpose of this report is to seek a Scoping Opinion under the EIA Directive as transposed into relevant Scottish EIA Regulations under The Marine Works (Environmental Impact Assessment (Scotland) Regulations 2017 and the Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017. We understand that both Transport Scotland and Marine Scotland are committed to providing a joint response under both Regulations.

A similar request has been made to Comhairle nan Eilean Siar (the Council) in respect of EIA advice under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, and a Scoping Opinion was issued on 10th November 2017.

This Scoping Report has been laid out as follows:

- Section 1 introduces the applicant, the regulatory background to which this Scoping Request is made;
- Section 2 sets out a description of the proposed development upon which to base potentially significant environmental effects upon. This development description will evolve as engineering design progresses;
- Section 3 sets out the approach to EIA based upon the legislative context introduced within section 1;
- Section 4 discusses potentially significant environmental effects on a topic by topic basis, and offers methodologies for the assessment of those environmental topics;
- Section 5 discusses the content and structure of any potential EIA, based upon the findings of section 4; and
- Section 6 concludes the findings of the Scoping Report.

1.2 The Applicant

Stornoway Port is the primary port for the Western Isles and one of the busiest ports on the west coast, north of the Clyde. The Port is central to the economy of the island, facilitating the lifeline ferry service and supporting almost all economic activities from fishing and aquaculture, to construction, retail and marine leisure.

The Port is run by Stornoway Port Authority (SPA), a Trust Port, with a Board contributing a range of skills and experience. SPA's Board is committed to supporting activities that will benefit the local community, both socially and economically.

Stornoway Port Authority take such steps as it may consider necessary or expedient for the conservancy, protection, regulation, maintenance and improvements of the harbour and the navigation thereof and for these purposes the Authority may:

- Manage, regulate, improve and maintain the harbour;
- Do all other things, which in its opinion are expedient to facilitate the proper carrying on or development of the harbour.

1.3 Project Team

This Scoping Report has been prepared by EnviroCentre Ltd with input from other organisations shown in Table 1.1.

Table 1.1: The Project Team

Topic	Specialist
EIA, Ecology, Water, Noise, Air Quality, Traffic & Transport and Other Issues	EnviroCentre Ltd.
Landscape and Visual	Doug Harman Landscape Planning
Cultural Heritage and Archaeology	Headland Archaeology
Engineering Design	Wallace Stone
Planning and Harbour Revision Order	Barton Willmore

1.4 Planning History and Need for the Proposed Development

The proposed development of Stornoway Deep Water Port was identified within the SPAs' Draft Masterplan for Stornoway, dated 26th November 2016. This formed a masterplan which set out proposed land use and a growth strategy in the harbour area for the next 20 years. Whilst this does not represent adopted Supplementary Planning Guidance (SPG) by Comhairle nan Eilean Siar, it represents a positive vision for the future of Stornoway and was subject to public consultation on 13th and 14th December 2016.

SPA is aware that the Port of Stornoway is crucial to the economic future of Stornoway and the Outer Hebrides. The masterplan is driven by economic opportunities for the town, and will support job creation and a sustainable community. Along with the Deep Water Port the first phase of the Masterplan development would also include the development of Bayhead and the Newton Marina redevelopment.

Outer Hebrides Local Development Plan 2012

The Outer Hebrides Local Development Plan identifies the location of development as a safeguarded, first phase, site in the National Renewables Infrastructure Plan (Prop E1a Arnish, Lewis)

The core of the industrial estate is identified as the prime location for energy related development or other appropriate large scale uses that utilise its facilities and/or require a deep water harbour.

Preferred development would be in use classes 4-6:

- Use class 4: Business;
- Use class 5: General industrial; and
- Use class 6: Storage or distribution.

1.5 Scoping under the EIA Regulations

As the proposed development contains elements which are above Mean High Water Springs (MHWS) and below Mean Low Water Springs (MLWS), consents will be required from the Council (for any elements not covered under SPAs' permitted development rights, either currently or as part of any HRO), MSLOT and Transport Scotland for those elements within their jurisdiction. Accordingly, one EIA will be prepared to cover all consenting regimes.

By virtue of its nature, size and location, the proposed development could potentially have (if unmitigated) significant adverse effects on the environment and due to the size and potential impacts generated by the proposed development, the Applicant is committed to providing an EIA.

The purpose of EIA Scoping is to:

- *"Identify the key issues to be considered;*
- *Identify those matters which can be either be scoped out or which need not be addressed in detail; and*
- *Discuss and agree appropriate methods of impact assessment, including survey methodology, where relevant".*

In accordance with EIA Regulations, this Scoping Report is submitted to MSLOT and Transport Scotland with the intention that it should form the basis of their Scoping Opinion. Other statutory consultees, local people and organisations and other stakeholders, are invited to comment on the potential environmental effects to be included within the EIA and the assessment methodologies to be used. As such, it should be noted that this document does not seek to assess the environmental effects of the proposed development as this is the purpose of the EIA which will be carried out once the design has been sufficiently evolved.

1.6 The Legislative Context

The continued management and development of the harbour is subject to European and national legislation of which the following is the principal legislation relevant to the current development programme:

- The Harbours Act 1964, to be determined by Transport Scotland to grant a Harbour Empowerment or Revision Order to empower Stornoway Port Authority to undertake works or vary its existing harbour powers;
- The Town and Country Planning (Scotland) Act 1997, as amended by the Planning etc. (Scotland) Act 2006 – any applications for Planning Permission will be determined by the Council;
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017;
- The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
- The Environmental Impact Assessment (Miscellaneous Amendments Relating to Harbours, Highways and Transport) Regulations 2017; and
- The Marine (Scotland) Act 2010 (Marine Licences) – to be consented by MSLOT.

Marine (Scotland) Act 2010.

A Marine Licence would be required for the deposit or removal of a substance or object below the mean high water springs mark. Marine Scotland stipulate that any associated dredging works taking place, that involves disposal at sea, then a Marine Licence for Sea Disposal may also be required.

Under Section 20(1) of the Marine (Scotland) Act 2010 (from 0 -12nm) and Section 65(1) of the Marine and Coastal Access Act 2009 (from 12 – 200nm)[1], a marine licence from Scottish Ministers is required if organisation intends to carry out certain acts in the Scottish marine area. These acts can include:

- The deposit of substances or objects into the sea or onto the sea bed;
- The removal of substances or objects from the sea bed;
- Construction, alteration and improvement works;
- Dredging; or

[1] Circular 1/2015 The Relationship Between the Statutory Land Use Planning System and Marine Planning and Licencing - http://www.gov.scot/Publications/2015/06/5851/4

- The deposit or use of explosives.

1.7 Consultation and Stakeholders

The Applicant recognises the importance of consultation and community involvement throughout the project development process in line with "PAN 3/2010 Community Engagement" (PAN 3/2010). PAN 1/2013 also reinforces the importance of public involvement in the Scoping process and makes it clear that the EIA process is intended to ensure that consultation bodies and the public have opportunity to express their opinion on both the proposed development and the ES.

The Applicant has held informal pre-application discussions with local stakeholders during consultation events in December 2016 and has sought pre-application advice from Comhairle nan Eilean Siar, Transport Scotland and MSLOT. This advice has been reflected in this Report and will be taken forward to design of the proposed development as appropriate.

2 THE PROPOSED DEVELOPMENT

2.1 Site and the Surrounding Area

2.1.1 The Site

The site is located approximately 1.5 - 2km south of Stornoway, on the Isle of Lewis. The site consists of Arnish Point Industrial Estate, including a quayside, fabrication yard and an area of coast on two sides of a peninsula. The site is accessed from the west via the junction at the A859.

SPA, on behalf of Highlands and Islands Enterprise, operates the deep-water pier at Arnish which is regularly used by offshore construction vessels delivering cargo to the Arnish fabrication yard. The Arnish fabrication facility, operated by BiFab, is currently used to manufacture and assemble oil and gas equipment. It is also likely to continue to be used for both onshore and offshore wind and tidal arrays. The yard is modest by industry standards with a 100 metre quay, 60,000 m^2 of open storage assembly halls covering 17,400 m^2. The proposed development is adjacent to the BiFab yard, but no proposals are contained within it.

A deep water berth and more quayside space are required, as well as improved road access. Further details are contained within section 2.2.1.

2.1.2 The Surrounding Area

Stornoway Port Authority (SPA) is the primary port for the Western Isles and one of the busiest ports on the west coast, north of the Clyde. The Port is central to the economy of the island, facilitating the lifeline ferry service and supporting almost all economic activities from fishing and aquaculture, to construction, retail and marine leisure. The Port is run by SPA, a Trust Port, with a Board contributing a range of skills and experience. SPA's Board is committed to supporting activities that will benefit the local community, both socially and economically

There is a strong marine tourism sector in Stornoway that provides a solid foundation for future growth. Stornoway is the focus of the £53 million per year tourism sector in the Western Isles. The town and surrounding area have a good offer for marine leisure and other tourists. This includes the newly renovated Lews Castle and grounds, Harris Tweed, Callanish Standing Stones, golf, distillery, blackhouses, beaches, sailing, etc. In addition, Stornoway is an established port of call on the cruise circuit, attracting 66 scheduled calls in 2016. Stornoway attracts relatively few large cruise vessels as those over 156 metres in length cannot berth at the Port and passengers are brought ashore by tender. This is increasingly unpopular, and impractical in bad weather.

Growth in the cruise market around Scotland is strong, especially for large vessels. To maintain and grow the cruise market in Stornoway, a facility for berthing cruise ships of 300 metres or more is needed.

Stornoway Port has been used as a service base for survey vessels exploring the waters west of the Hebrides and is the natural choice for a home port for developers working in that area. The port is the closest to the Atlantic shelf, and with the close proximity of the airport with direct flights to Aberdeen, Inverness, Glasgow and Edinburgh, together with a regular thrice daily ferry service, both personnel, equipment and stores can be delivered to the island quickly and efficiently.

The Port regularly handles specialist cargos of fuel, aviation fuel, gas, coal, road salt, cement, wind turbines, transformers, fish farm equipment and feed, and a variety of other general cargo items. The proposed development by the Applicant at Goat Island, in respect of Newton Marina, is situated approximately 1.5km to the north-east.

2.2 The Proposed Development

2.2.1 Outline Description

A new multi-purpose Deep Water Port is proposed on the west shore of Glumaig Bay, a few kilometres south of Stornoway Harbour. It is estimated that construction would commence in either 2019 or 2020.

Four phases are intended, with Phase 1 being detailed now and the remaining three phases to be detailed at a later date (however an outline element of detail will be provided for Phases 2 to 4 to allow for a planning permission in principle application to be lodged alongside marine licencing and Harbour Revision Order). The first phase of the proposals provides 430m of quay with 10m water depth at lowest tide; a new freight ferry berth 150m long at 8m water depth, a marshalling area, a heavy lift area, 10ha of laydown, storage and development land behind the quay. The proposals also incorporate a 25m wide access corridor around the south side of Glumaig Bay, connecting Arnish Yard to the new quay.

The main quay would consist of 250m of solid quay wall, with a 180m finger pier extending to the north. The finger pier would be 20m wide, supported on steel tube piles and will accommodate the freight ferry on its western face, leaving the 430m main quay free for cruise liners and other activities.

The proposals are designed to provide the following:

- Alongside berthing for cruise liners of all sizes;
- Waiting and turning area for buses serving cruise liner passengers;
- Ferry berth, linkspan and marshalling area (freeing up the current car ferry to provide an additional daily sailing);
- Extensive laydown and storage area with dedicated heavy lift area – to service renewables and decommissioning projects;
- Berthing and unloading gantries for oil delivery vessels, with pipelines to new storage tanks nearby (moving oil storage out of Stornoway town); and
- Dedicated area for leisure activities buildings and rock climbing wall.

The project also provides improvements to the current access road to Arnish Yard from the main Stornoway/Tarbert road (A859) with a direct access to the Deep Water Port.

Phases 2, 3 and 4 will be installed in the future to increase the berthing length and laydown area.

2.2.2 Earthworks

At the heart of the project is the excavation of 600,000m^3 of rock from the steep slopes behind the quay, to provide the infill material to build the reclamation, and to add in the cleared area beneath the excavation.

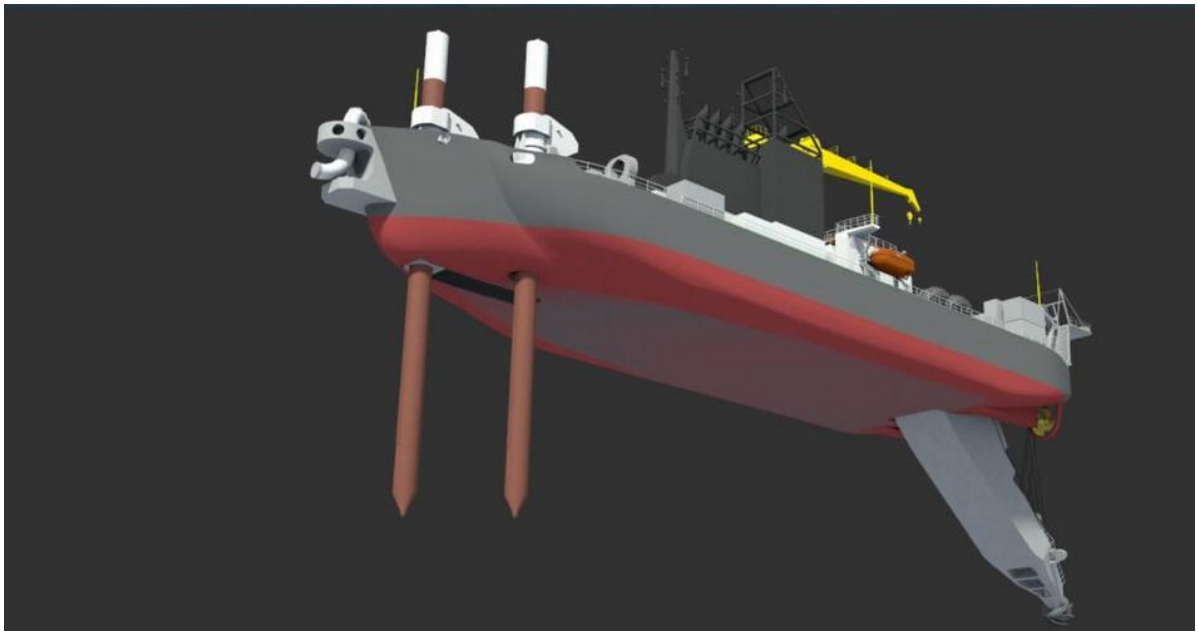
The rock would be prepared by bulk blasting, before being loaded onto a fleet of dumper trucks, moved to the adjacent reclamation area, tipped, spread and compacted. Using material produced so near at hand is very efficient, as is the freeing up of additional ground beneath the excavated rock.

2.2.3 Dredging

A large area of sea bed (approximately 200,000m^2) adjacent to the new quay requires to be dredged to provide access to the quay and berthing alongside in all tides for vessels drawing up to 10m. The dredge volume is estimated at 440,000m^3.

A recent seismic survey has confirmed that no rock will be in the dredge and the material, which is expected to consist of sediments, sands and gravels, and should all be dredgable without any blasting. Marine boreholes are currently being undertaken to confirm the findings of the seismic survey and provide more information on which to assess the most suitable method of dredging.

Figure 2-1 Cutter Suction Dredger



It seems likely that the bulk of the material will be suitable for incorporation in the reclamation. The material may also allow dredging by cutter suction dredger, as above (Figure 2-1), with the uprisings delivered to the reclamation site along a pipe supported on floats (Figure 2-2).

Figure 2-2 Pipe Delivery System

This method, if feasible, would lead to substantial savings in cost for the project. The dredging could also be conducted after completion of the quay wall, greatly reducing the sediment plume around the deposit site.

If the material is not suitable for cutter suction dredging and pumping ashore, the most efficient method would involve the use of a large backhoe dredger on a spud leg barge, feeding self-propelled hopper barges, which would move inshore and dump the material, through bottom opening doors, in the reclamation area.

Figure 2-3 Typical Backhoe Dredger and Self-Propelled Hopper Barge

This method would take a longer time to complete, and would be more expensive.

Whatever method was used, as much dredged material as possible would be used in construction of the reclamation. Any material that was unsuitable for use in the works would require to be disposed of at sea at a licenced disposal site.

2.2.4 Piling

The main 250m long quay wall will be of steel sheet piles with a reinforced concrete capping beam, tied back with steel tie bars to buried steel sheet pile anchor walls.

The quay walls will be of the 'combi-wall' type, with large diameter (estimated at 2.2m) steel tubes at 3 metre centres grouted into sockets drilled into the sea bed strata and bedrock. The gaps between the tubes, which will be equipped with standard clutches, are filled with conventional sheet piles, which are forced into the sea bed, a few metres only, with a vibrating pile driver.

All of the quay wall piles will be equipped with cathodic protection anodes, and painted with epoxy paint above the mid-tide level, to protect against corrosion. The tie rods will be wrapped in denso tape before burial to protect them from corrosion. There will be an estimated 4,700 tonnes of steel in the piles and 700 tonnes in the tie rods.

The tubular steel bearing piles for the 180m finger pier will be installed as far as possible by vibrating pile driver. Once they reach rock, or the driving becomes too much for the vibrating hammer, impact driving will be used to reach a set. Bearing piles are also required at the linkspan abutment and dolphins, and at the heavy lift area, with steel tube piles installed for the finger pier.

There are an estimated 2,900 tonnes of tubular bearing piles in total. These piles will be provided with cathodic protection anodes and a suitable paint system above mid-tide level as described for the quay wall piles.

Wherever piles require to be driven by impact hammer, a marine mammal observer will be on duty and piling will be suspended wherever sightings or acoustic monitoring indicates the presence of cetaceans in the area. Soft-start techniques will be used to minimise the impact upon any cetaceans that are in the area and unnoticed.

Figure 2-4 Example Quay Wall Construction Method

Figure 2-5 Cathodic Protection Anodes

Figure 2-6 Tie Rods

2.2.5 Reclamation

The reclaimed material, from dredging uprisings and from the excavated rock to landward, will be compacted from mid-tide upwards to minimise any settlement, and the wall tie rods placed inside oversized ducts over the outer five metres, to allow for the small amount of settlement that might occur over time (Figure 2-7).

Drainage will be arranged to allow collection of all surface water, and, in areas where there is any risk of oil spillage, interceptors will be used to prevent pollution of the sea.

Services ducts will be buried to allow easy installation of pipes and cables after completion of the reclamation. At this stage it is envisaged that a substantial strip of the area behind the main quay wall will be capped with a heavy concrete slab, while the storage and development areas further back will have a well finished crushed rock surfacing.

Figure 2-7 Reclamation

2.2.6 Armouring

The south end of the reclamation, where it joins the future phase 2, will be graded to a suitable slope, and the face protected with rock armouring. The armouring will consist of secondary armour, small enough to prevent any loss of reclamation through its voids, and primary armour, large enough to resist the incident wave action while preventing any loss of secondary armour through its voids (Figure 2-8).

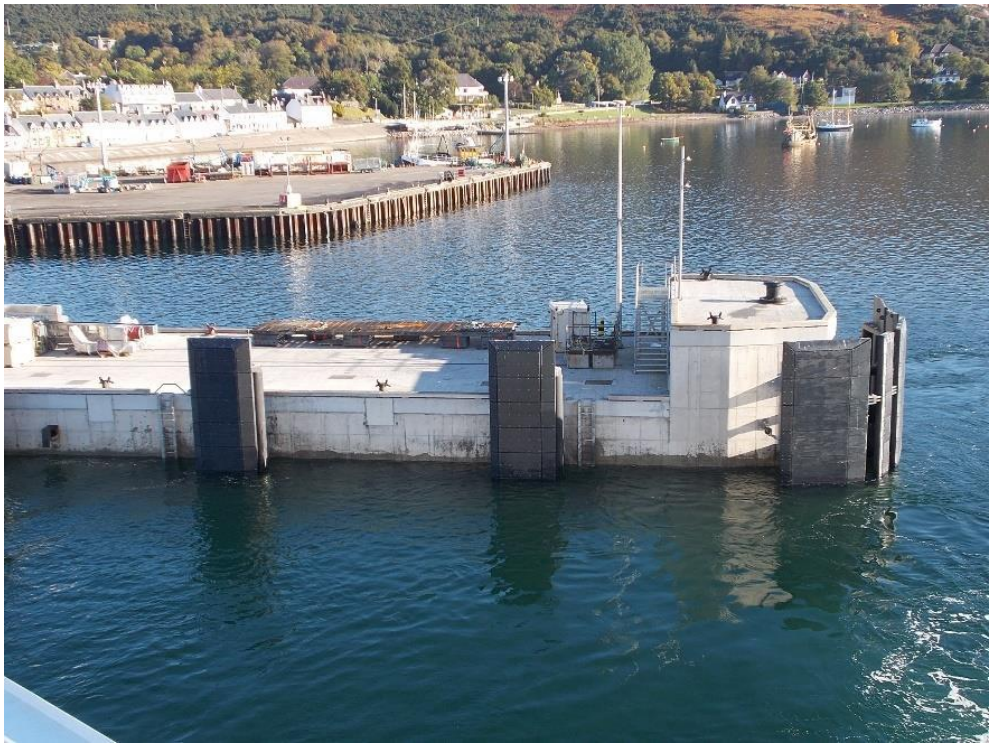
Figure 2-8 Rock Armour

2.2.7 Fendering

The main quay will be equipped with fendering suitable for all the vessel types likely to berth there. In the absence of full details of the target vessel, we have assumed panel fenders (contact panels 6m x 2.5m), each with a rubber cone fender at two levels (deck level and mid-tide level) and the necessary restraint chains (Figure 2-9).

The fenders on either corner will require to be of larger capacity, as the full mass of the vessel may impact on its centre of gravity at those locations. The freight ferry berth will be accommodating frequent berthing manoeuvres and the ferry will have side belting which projects up to 300mm from the vessel's side and ensures that all berthing loads are directed into the car deck, which is extremely strong. Due to the geometry of this berthing arrangement, hull contact with either the top or bottom of the fender panel is likely using a two level cone design. The freight ferry berth would be equipped with parallel motion fenders which keep the fender panel vertical at all times during berthing operations.

Figure 2-9 Quay Fendering



2.2.8 Access Roads

A new link to the Phase 1 development will be installed from the existing access road to Arnish Yard, providing a relatively straight route with no steep gradients. Some improvements to the existing Arnish access road to the A859 will also be required. The new access road to Arnish Yard from the Phase 1 works around the south end of Glumaig Bay, will be constructed using material won from rock excavation and/or dredging, its appearance softened where possible with landscaping using material from the link road overburden.

Wherever the road line requires an exposed seaward face, rock armouring will be used to protect against erosion. The access road will be 25m wide and will facilitate renewables and decommissioning projects at Arnish Yard by providing easy, level-gradient access from the deep water berth to and from the yard.

2.2.9 Indicative Areas

For the purposes of quantifying the relative areas of the engineering features described above, indicative areas of reclamation, access road and armouring are detailed below. These may change should development design progress throughout the pre-application period.

Table 2.1: Indicative Areas

Engineering feature	**Area in m²**
Phase 1	
Area of reclamation below MHWS	52,228m²
Area of reclamation below MLWS	48,647m²

Engineering feature	**Area in m²**
Area of rock armoured slopes below MHWS	7,342m²
Area of rock armoured slopes below MLWS	7,264m²
Area of access road currently below MHWS	3,110m²
Area of access road currently below MLWS	3,350m²
Area of access road rock armoured slopes below MHWS	1,535m²
Area of access road rock armoured slopes below MLWS	1,535m²
Phase 2	
Area of reclamation below MHWS	46,307m²
Area of reclamation below MLWS	40,962m²
Area of rock armoured slopes below MHWS	3,390m²
Area of rock armoured slopes below MLWS	3,350m²
Phase 3	
Area of reclamation below MHWS	44,621m²
Area of reclamation below MLWS	38,245m²
Phase 4	
Area of reclamation below MHWS	35,486m²
Area of reclamation below MLWS	28,493m²
Area of rock armoured slopes below MHWS	1,614m²
Area of rock armoured slopes below MLWS	768m²

3 APPROACH TO EIA

3.1 Introduction

The objectives of an EIA are to:

- Establish the availability of the baseline data;
- Request that statutory consultees provide any relevant environmental information relating to the site and the surrounding area;
- Define a survey and assessment framework from which a comprehensive overall assessment can be produced; and
- Provide a focus for the consenting authorities and the consultees' considerations – in terms of:
    - Potential impacts to be assessed;
    - Assessment methodologies to be used;
    - Other areas that should be considered; and
    - Any other environmental issues of perceived concern.

The aim of the Scoping Report is to assist MSLOT and its consultees to form an opinion as to the likely effects of the proposed development. It describes the proposed development and provides information with regard to the environment.

It seeks to identify potential environmental impacts of the proposed development and most importantly to reach agreement on which of the impacts could lead to significant environmental effects. The EIA will be focussed on assessing the potentially significant effects and propose mitigation measures to reduce the residual effects on the environment. The scoping process will eliminate those environmental issues which do not require further consideration.

3.2 General Approach to Assessment

The project team benefits from significant experience and technical expertise in environmental assessment and development of housing projects and will ensure that the EIA will be carried out in accordance with the EIA Regulations.

The potential environmental impacts during construction, operation and decommissioning will be identified and assessed in the ES, based upon the recommendations of the technical EIA team, consultation with statutory consultees, other interested parties and local communities. Topic assessments will be undertaken using best practice methodology, following industry guidelines whenever appropriate and carried out by specialists with relevant professional experience.

Schedule 4 of the EIA Regulations states the information to be included within the EIA. Each assessment will consider these criteria and assess them whenever appropriate to the proposed development. This also highlights that the emphasis of the EIA process should be on assessing likely significant effects, rather than every environmental effect associated with a development.

Impartial professional consultants (as set out in Table 1.1) will assess the likely significant environmental effects identified. These specialist assessments will generally incorporate:

- Site visits;
- Collection of baseline data regarding the site and surroundings;
- Identification of the likely significant effects of the proposed development; and

- Recommendations on how these effects could be avoided or reduced.

For each topic the proposed methodology to be used within technical topics is set out within Section 4 of this Scoping Report. Cumulative effects will be assessed within each ES chapter as appropriate, at a scale appropriate to that subject and in line with best practice guidance currently available.

It is essential that the methodology used for assessing the significance of environmental effects is set out clearly and transparently within an EIA Report and is justifiable. Significance is generally determined through a combination of the sensitivity of a receptor or resource to an effect and the magnitude of the change resulting from the proposed development, however where this differs the full methodology is explained within the relevant section as appropriate.

Significant effects are more likely to be predicted where important resources, or numerous or sensitive receptors, could be subject to impacts of considerable magnitude. Effects are unlikely to be significant where low value or non-sensitive resources, or a small number of receptors, are subject to minor impacts. The assessment of significance of an environmental effect resulting from the proposed development will have regard to the following:

- Sensitivity, importance or value of the resource or receptor;
- Extent and magnitude of the effect;
- Duration of the effect;
- Nature of the effect;
- Performance against environmental quality standards; and
- Compatibility with environmental policies.

The methods for predicting the nature and magnitude of any 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 thus qualitative assessments are used. Such assessments rely on previous experience and professional judgement. The methodologies used for assessing each topic area will be described within the individual chapters of the ES and will follow best practice guidelines where applicable.

3.3 Mitigation

The EIA Regulations state that the EIA Report must contain a "*description of the measures envisaged in order to prevent, reduce and where possible, offset any significant adverse effects on the environment*."

As outlined in PAN 1/2017 there is a widely accepted strategy for mitigation which will be followed when considering the environmental effects of the proposed development. This comprises (in order of preference): avoidance, reduction, compensation and remediation. In addition, consideration will be given to providing the opportunity for enhancement. Mitigation and, if appropriate, monitoring proposals, will be described clearly within the ES. The mitigation will be achievable and will be delivered through appropriate mechanisms.

3.4 Requirements of the EIA Regulations

In addition to those items explained above, the EIA Report will either include discussion of, or scope out via section 4 of this Scoping Report, the following items:

- A description of the development, including description of the location, its physical characteristics, land-use requirements during construction and operation, a description of characteristics of the operational phase, and an estimate of the types and quantities of expected residues and emissions;

- A description of reasonable alternatives, including development design, size, scale, and a justification of the project choices made;
- A description of the baseline environmental situation and an outline of the likely evolution thereof without implementation of the proposed development;
- An assessment of the environmental baseline for each environmental topic scoped into the EIA, with reference to those items specified within Schedule 4 (5) of the EIA Regulations;
- A description of mitigation and monitoring measures (where applicable); and
- A description of any expected adverse impacts in relation to the vulnerability of the proposed development to risks of major accidents and/or disasters which are relevant to the project.

4 POTENTIALLY SIGNIFICANT ENVIRONMENTAL EFFECTS

4.1 Introduction

This section discusses potentially significant effects. Each of the environmental topics discussed within this section could have the potential to be impacted by the proposed Deep Water Port development at Arnish, or conversely environmental features may impact upon the proposed development. By establishing the extent of potential impacts and subsequent effects, the topic can be scoped into the ES, or scoped out of the ES.

4.2 Landscape and Visual

4.2.1 Introduction

This section addresses the potential direct and indirect effects of the proposed development on landscape resources and visual receptors. These are defined respectively within paragraph 3.21 of the Guidelines for Landscape and Visual Impact Assessment (GLVIA)[2] as:

"*…the constituent elements of the landscape, its specific aesthetic or perceptual qualities and the character of the landscape*"

and

"*…the people who will be affected by changes in views or visual amenity at different places*".

To help inform the scope of a Landscape and Visual Impact Assessment as part of the EIA process, an initial landscape and visual appraisal was undertaken as a desk study exercise to identify the following:

- the landscape character of the site and surrounding area;
- the 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 landscape/seascape;
- any potentially significant landscape and visual effects during construction and post-completion;
- recommendations for mitigating any potentially significant adverse effects; and
- recommendations for further study.

4.2.2 Baseline Conditions

The purpose of the baseline desk study is to record the existing landscape and visual resources, against which the potential effects of the proposed development, can be judged. To inform this, the following baseline conditions have been identified and described:

- landscape character;
- seascape character;
- landscape designations; and
- key views and visual receptors.

[2] Landscape Institute and Institute of Environmental Assessment (2013). *Guidelines for Landscape and Visual Impact Assessment.* Third edition.

Landscape character

As detailed in the *Western Isles landscape character assessment*[3], the site of the proposed development is located within the *Rocky Moor* LCT landscape character type (LCT). To the east of Stornoway, the landscape is characterised by a *Crofting* LCT and to the north of the harbour, *Boggy Moor* LCT.

The *Rocky Moor* landscape is characterised by '*smooth dip slopes which combine with rocky convexities to create a rocky and stepped landscape. Inland rocky moor tends to merge with boggy moor or mountain massif and where it extends to the shoreline, it forms a coastline of convex landforms dipping into deep water*'.

Although information on landscape character provides a useful framework in which to describe the landscape and predict effects, the information provided in the landscape character assessment is relatively broad brush. Furthermore, given the coastal location of the site, the character of the seascape is also an important factor to consider.

Seascape character

Seascape character is made up of physical characteristics of hinterland, coast and sea plus a range of perceptual responses to the seascape, as well as visual aspects. Although no detailed sescape characrer assessment has been undertaken for the study area, a regional/national coastal character assessment was undertaken in support of a study on the sensitivity and capacity of the Scottish seascape in relation to windfarms[4]. As detailed within this study, the site of the proposed development is located within the *Low Rocky Islands Coast* seascape character type (SCT) which exhibits the following key characteristics:

- low rocky coastline, cliffs and fragmented coastline in places backed by moorland;
- sparsely settled, small crofting settlements along coastline, large settlement at Stornoway with some industrial development, airport and busy port;
- views of the Minch and beyond views of distant hills on mainland particularly distinctive Assynt; and
- parts of this landscape feel remote except Stornoway area.

In assessing sensitivity to wind turbines, the study identifies the following seascape sensitivities and these provide a sound framework in which to assess the potential impacts of the proposed development.

Table 4-1 Sensitivity Criteria

Sensitivity criteria	Analysis
Scale and Openness	Fairly open and large – medium scale apart from to the north of this area where the landscape is more contained and smaller scale.
Form	Horizontal emphasis particularly to the north of Stornoway and on the Eye Peninsula, gently undulating with cliffs at coast. The form becomes more complex further south with a more fragmented and contained seascape.
Settlement	Sparse settlement in the north, major settlement including some industry around Stornoway and crofting settlements elsewhere. Some uninhabited areas.
Pattern/Foci	Foci and pattern varied. Foci include views to Assynt on clear days, important headlands and peninsulas e.g. Tolsta and the Eye peninsula.
Lighting	Stornoway is lit but the rest of the seascapes and out at sea are dark.
Movement	Busy port at Stornoway but generally the rest of the area is fairly quiet including some uninhabited areas to the north of Tolsta.

[3] Scottish Natural Heritage (1998). *Western Isles landscape character assessment*.
[4] Scottish Natural Heritage (2005). *An assessment of the sensitivity and capacity of the Scottish seascape in relation to windfarms*.

Sensitivity criteria	Analysis
Aspect	Easterly aspect across sea. From settlement, roads, ferries. There is a heritage trail from Tolsta to the North of Lewis and open sea views over to Skye are important here.
Modification/Remoteness /Sense of Naturalness	There is modification in parts, around Stornoway and some telecommunications masts etc. The crofting patterns, whilst traditional, can in places appear in contrast to the rougher, wilder and more natural surroundings. Generally though a largely natural and remote area, particularly in the hinterland of Lewis.
Exposure	Feels exposed to the north of this area where coastline becomes more linear, hinterland is flatter and sheltered areas are fewer.

Landscape designations

None of the site is covered by any landscape designations although *Lews Castle and Lady Lever Park* is a Garden and Designed Landscape (GDL) designation that covers a relatively large part of the western bank of the Bayhead River where it meets the harbour. It is located approximately 2km to the north of the site at its closest point.

As detailed in the designation citation[5], the GDL is '*a prime example of a mid-late 19th century ornamental and estate landscape, rare on Lewis, laid out with coastal and riverside carriage drives and walks. The designed landscape comprises a series of distinctive wooded parklands contrasting dramatically with the prevailing openness of the island landscape'.* It is also noted that GDL makes an '*outstanding contribution to the setting of Stornoway'*.

The closest National Scenic Area (NSA) is the *South Lewis, Harris and North Uist* NSA, which is located approximately 26 km south-west of Stornoway. Two parts of this NSA are also identified as Wild Land Areas[6].

Key views and visual receptors

Although no detailed analysis of the zone of theoretical visibility has been undertaken at this stage, it is evident that views of the site are relatively localised. In general, these are restricted by nearby containing rising ground, large areas of woodland to the west of the harbour and extensive built development across the town.

However, as the site of the proposed development is located south west of Stornoway harbour, there is a relatively large number of nearby receptors with open views towards it. This includes residents and visitors in Stornoway, and recreational users in and around the harbour. Daily ferries from Stornoway to Ullapool also pass in very close proximity to the site.

Situated on the north-west side of Stornoway Harbour overlooking the town, Lews Castle commands panoramic views and is prominent on the sea approach to Lewis. The Castle is situated mid-way on the east-facing, heavily wooded hillside and dominates views from Stornoway. Views from Lews Castle and Lady Lever Park overlook Stornoway, the inner harbour and town. Extensive views are also obtained from the summit of Cnoc Croich across to Lews Castle, the island's hinterland and the harbour. Similar views of the site are also experienced from areas of low rising moorland to the south of the harbour.

There is a dense network of Core Paths across the *Lews Castle and Lady Lever Park* GDL and several other 'wider footpaths' to the north and east of the town. The nearest National Cycle Network (NCN) route is NCN 780 which passes approximately 7.5 km to the south-west of the site at its closest point.

[5] http://portal.historicenvironment.scot/designation/GDL00263
[6] http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-policy-and-guidance/wild-land/

4.2.3 Potentially Significant Effects during Construction

As noted previously, the site benefits from a relatively contained setting whereby areas of low-rising ground and headlands, extensive woodland cover across *Lews Castle and Lady Lever Park* and built development in Stornoway is likely to restrict the extent of landscape and visual impacts to the local area.

During the construction phase, the presence and operation of plant machinery, delivery vehicles and the construction of infrastructure is likely to significantly affect the views of some nearby residents, road users and recreational boat users in the harbour. The views of recreational users from Lews Castle and Lady Lever Park (and associated Core Path Network) could also be significantly affected.

In addition to the likely localised extent of effects, the presence of nearby industrial development and activity will also help to limit the nature of landscape and seascape effects during construction. Nonetheless, it likely that some short term direct and indirect significant effects on the character of the harbour during construction would result, particularly on nearby areas of the coast that have an undeveloped and peaceful character.

In order for the potential impacts to be fully identified, further survey work is required which is likely to focus on the following:

- local landscape character;
- local seascape character;
- Lews Castle and Lady Lever Park GDL;
- views and amenity of nearby residents;
- views of and amenity nearby road users;
- views and amenity of Core Paths users; and
- views and amenity of ferry passengers and other recreational boat users.

4.2.4 Potentially Significant Effects post-Completion

At this stage, the potential for significant landscape and visual effects post-completion is somewhat dependent on the quality of design of the Deepwater Port at Arnish and associated infrastructure. During the iterative design process, it will be important to consider the landscape and seascape setting of the harbour and ensure where possible, important views are protected and enhanced through the provision of a high quality development. Until the design is finalised, it assumed that some localised significant landscape and visual impacts could result and these will be explored through further field survey on the following receptors:

- local landscape character;
- local seascape character;
- Lews Castle and Lady Lever Park GDL;
- views and amenity of nearby residents;
- views and amenity of nearby road users;
- views and amenity of Core Paths users; and
- views and amenity of ferry passengers and other recreational boat users.

4.2.5 Inclusion or Exclusion from EIA

Based on the findings of this desk-based appraisal and the potential for significant effects during construction and post-completion as detailed above, it is recommended that a full Landscape and Visual Impact Assessment (LVIA) is undertaken as part of an EIA.

4.2.6 Design and Mitigation

Where any significant landscape and visual effects are identified as part of the LVIA process, recommendations for mitigation which could be implemented in order to avoid, reduce or remedy adverse effects will be identified. As part of this, a series of landscape designs aims will be suggested to help ensure that as far as possible, the proposed development minimises its impact and integrates positively with its sensitive harbour setting.

4.2.7 EIA Assessment Methodology

As part of the EIA process, a full Landscape and Visual Impact Assessment would be undertaken in accordance with the *Guidelines for Landscape and Visual Impact Assessment* (GLVIA), version 3 (Landscape Institute and the Institute of Environmental Management and Assessment 2013). The LVIA would be based on the following methodology.

Evaluation of the Existing Environment – the Baseline

The baseline review for the landscape and visual resource has three elements:

1. Description – a systematic review of existing information and policy relating to the existing landscape and visual resource;
2. Classification – analysis of the data to subdivide the landscape/seascape resource into discrete areas of recognisable character and identification of the visual receptors; and
3. Evaluation – Use of professional judgement to apply sensitivity criteria to a landscape/seascape or visual resource with reference to specified criteria.

The baseline review is undertaken through desk-based data review followed by a site survey to verify the findings, and then analysis of the data. This process is described in detail in the following paragraphs.

Desk Based Data Review

Existing mapping, legislation, policy documents and other written, graphic and digital data relating to the proposal and broader study area is reviewed. This includes the following documents:

- Outer Hebrides Local Development Plan (2012);
- Western Isles landscape character assessment (1998);
- Ordnance Survey maps; and
- Digital sources of mapping and aerial photography.

The desk study also establishes the main users of the area, key viewpoints and key features, thus defining the visual baseline which requires to be verified on site. The potential visual receptors are identified and classified according to their associated use (settlements, footpaths, roads etc.). The aim of the baseline review of visual resources is to ensure that an appropriate range of viewpoints is included in the visual assessment. The potential extent of visibility of the proposed development as identified in the preliminary Zone of Theoretical Visibility (ZTV) provides the basis upon which the potential visual receptors are initially identified.

The desk study informs subsequent site work, which allows the confirmation of the Landscape/Seascape Character Types (LCTs/SCTs) and Landscape/Seascape Character Areas (LCAs/SCAs) where applicable.

Site Survey

Field survey work is carried out to verify and, if required, refine the landscape/seascape character types identified within the study area, and to gain a full appreciation of the relationship between the proposed development, and the landscape.

The baseline visual resource is verified during the survey work and at this time, the validity of the list of representative viewpoints used in the LVIA. Since the ZTV is based on a 1:50,000 digital terrain model, it does not capture local landform. There are times when a viewpoint selected from analysis of the ZTV does not actually have any views to the proposed development. In some instances, this can be remedied by slight adjustments of the grid references, although the location must remain relevant to the particular receptor(s) for which the viewpoint was selected. It is also important to ensure that the viewpoints remain a representative selection of views.

Data Analysis

Analysis and reporting of the baseline resource takes place after the completion of the desk and field surveys. The baseline landscape and visual review provides a description, classification, and evaluation of the landscape and visual resource of the study area.

The baseline review provides a robust description of the landscape and visual resource from which to assess the landscape and visual effects of the proposed development and to advice, in landscape and visual terms, on the development's acceptability in principle and upon its siting, layout and design. This involves identification of all the landscape and visual receptors and analysis of the sensitivity of each of these receptors to the proposed development.

Extent of the Study Area and Viewpoint Selection

Maps of Zone of theoretical visibility (ZTVs) are prepared using digital terrain models based on a maximum height of the proposed development. These represent the 'worst case' area of theoretical visibility where the proposed development may theoretically be seen. The ZTVs are based entirely on topographic factors and do not account for any screening effects provided by vegetation, buildings or minor variations in landform or the orientation of view. Therefore, the extent of any ZTVs tends to be greater than actual visibility and does not take account of climatic factors such as light conditions.

The ZTV for the proposed development is then used as a basis for the further assessment and evaluation of the magnitude of visual impacts.

Through the initial stages of the desk study, viewpoints are selected to represent views experienced from a variety of receptors, within different landscape character types and at a variety distances from the proposed development where the view may be apparent.

A study area centred on a likely 5 km radius from the proposed development will be used for the study of landscape and visual effects. Given the relative scale of the development and the character of the landscape, significant effects are very unlikely to be experienced at distances over 5 km.

Landscape/seascape Susceptibility and Value

The GLVIA indicates that landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgements of their susceptibility to the type of proposal and the value attached to the landscape.

Landscape Susceptibility

This LVIA includes an assessment of factors affecting the susceptibility of the landscape to the changes brought about by the proposed development, in order to identify any variation at the local scale. The following table sets out attributes of landscape/seascape character that are typically considered in assessing susceptibility.

Table 4-2 Susceptibility Criteria

Susceptibility Criteria	***Lower***	***Higher***
Scale	Large-scale or vast	Intimate or small-scale
Enclosure	Open or exposed, windswept	Enclosed or confined, sheltered
Landform	Flat, smooth, regular, rolling, gently undulating, or flowing landform	Dramatic, steep, mountainous, rugged, or complex landform with prominent peaks or ridges
Diversity	Simple or uniform, e.g. Moorland or forestry plantations	Complex or diverse, variety of land cover
Landcover pattern and line	Sweeping lines, or indistinct or irregular patterns	Strong and regular linear features, geometric or rectilinear patterns, or planned landscapes
Settlement and infrastructure	Frequent masts, pylons, industrial elements, modern buildings, infrastructure, settlements or main roads	No obvious modern settlement, buildings, infrastructure or main roads
Perception of landscape change	Modern or clearly dynamic showing obvious land use changes	Little or no land use changes, or with obvious historical continuity
Tranquillity	Busy, with evidence of human activity, noise or regular movement	Remote or tranquil with strong sense of stillness or solitude
Settings and skylines	Low lying areas that do not tend to feature in views from populated areas or main transport routes	Areas with topographic features that define the setting, backdrop, outlook or skyline of populated areas or main transport routes

Landscape Value

The assessment takes as its starting point the recognised value of the landscape, for example, as identified by landscape designations.

In addition, the assessment considers the following factors, in order to identify how the relative landscape value may vary at the local scale. The factors set out in the following table are adapted from paragraphs 5.28-5.31 of the GLVIA and other guidance (Scottish Natural Heritage and Countryside Agency 2004 Figure 1b).

Table 4-3 Landscape Value

Factors affecting Landscape value	
Condition/intactness	The degree to which the landscape is unified or intact
Scenic quality	The extent to which the landscape appeals, primarily to the visual senses
Perceptual aspects	The degree to which the landscape is recognised for perceptual qualities, such as its sense of remoteness
Rarity	The presence of unusual elements or features in the landscape or the presence of an unusual LCT
Representativeness	The degree to which the landscape contains important examples of elements or features, or is of a particular character that is considered important
Conservation interests	Cultural or natural heritage interests that add to the value of the landscape and/or are of value in themselves
Recreational value	Evidence of recreational activity where experience of the landscape is important, such as recognised scenic routes
Associations	Recognised cultural or historical associations that contribute to perceptions of the natural beauty of the landscape

Sensitivity of Visual Receptors

The sensitivity of each visual receptor is assessed in terms of susceptibility to change in views or visual amenity as well as the value attached to particular views.

Susceptibility to Change

People generally have differing responses to views and visual amenity depending on the context (e.g. location, time of day, degree of exposure), and their purpose for being in a particular place (e.g. whether for recreation, travelling through the area, residence or employment). Susceptibility to change is therefore a function of:

- The occupation or activity of people experiencing the view or visual amenity; and
- The extent to which their attention or interest may be focused on the landscape around them.

The following table illustrates some examples of the relative susceptibility of some of the key visual receptors within the Study Area. Note that different individuals or groups of people at one location may have different levels of susceptibility.

Table 4-4 Susceptibility to Change

High	Medium	Low
Residents within dwellings or curtilage	People at their place of work, where views are an important part of the setting, such as a countryside ranger	People at their place of work whose attention is likely to be focused on their work or activity, not on their surroundings
Users of recognised national trails, whose attention or interest is likely to be focused on the landscape or on particular views	N/A	People engaged in active outdoor sports or recreation and less likely to focus on the view
Road users where appreciation of the landscape is an important part of the experience, such as recognised scenic routes	Road users likely to be travelling for other purposes than just the view, such as commuter routes	N/A
Visitors to heritage assets or to other attractions, such as recognised beauty spots, where views of the surroundings are an important part of the experience	N/A	N/A

Value attached to particular views

Judgments are also be made about the value attached to views, based on the following considerations:

- Recognised value – such as views from heritage assets or designated landscapes;
- Inclusion in guidebooks or on tourist maps, the facilities provided for visitors or references to the view in literature or art; and
- The relative number of people who are likely to experience the view.

People that are more susceptible to change at viewpoints of recognised value are more likely to be significantly affected by any given change.

Assessing Effects

The impact assessment aims to identify all the potential landscape and visual effects of the development taking account of any proposed mitigation measures. This is carried out by:

- Assessing the magnitude of change brought about by the proposed development on each of the receptors identified in the baseline review;
- The effect is then predicted by combining the sensitivity and importance of the receptor (as identified in the baseline review) with the magnitude of change; and
- Lastly, the significance of the predicted effect is assessed in a logical and well-reasoned analysis.

The assessment aims to describe the changes in the character and the landscape resources that are expected to result from the proposed development. It covers both landscape effects (changes in the fabric, character and key defining characteristics of the landscape); and the visual effects (changes in available views of the landscape and the significance of those changes on people).

Magnitude of Landscape Change

Each effect on landscape receptors is also assessed in terms of its size or scale, the geographical extent of the area influenced and its duration and reversibility.

Size or Scale of Effect

This is judged using the factors set out in the following table:

Table 4-5 Magnitude of Change

Rating	Criteria
Very large	Highly obvious change, affecting the majority of the key characteristics and defining the experience of the landscape
Large	Obvious change, affecting many key characteristics and the experience of the landscape
Medium	Noticeable but not obvious change, affecting some key characteristics and the experience of the landscape
Small	Minor change, affecting some characteristics and the experience of the landscape slightly
Negligible	Little perceptible change

Geographical Extent of Effect

The geographical area over which the landscape effects would be experienced (regional, local or restricted to the site) is also taken into account. This is distinct from the scale of the change. For example, a small change to the landscape over a large geographical area could be comparable to a very large change affecting a much more localised area.

Magnitude of Visual Effect

Visual effects result from the changes in the content or character of views and visual amenity, due to changes in the landscape. The assessment of visual effects takes account of both the sensitivity of the visual receptors (individuals or groups of people) and the magnitude of the change on their views and visual amenity.

The magnitude of the visual effect resulting from the Proposed Development is evaluated in terms of size or scale, geographical extent, duration and reversibility.

Size or Scale of Effect

This is based on the interpretation of a combination of a range of factors. Some of these are largely quantifiable and include:

- Distance and direction of the viewpoint from the Proposed Development;
- Extent of the Proposed Development visible from the viewpoint
- Scale of the change in the view, including the proportion of the field of view occupied by the Proposed Development;
- Degree of contrast with the existing landscape elements and characteristics in terms of background, form, pattern, scale, movement, colour, texture, mass, line or height;
- The relative amount of time during which the effect would be experienced and whether views would be full, partial or glimpses; and

- Orientation of receptors in relation to the Proposed Development, e.g. whether views are oblique or direct.

Table 4-6 Scale of Effect

Rating	Description	Appearance in field of vision
Very high	Dominant	Commanding, controlling the view Creation/removal of a dominant visual focus Highly uncharacteristic elements or pattern introduced Most of the view affected
High	Prominent	Major change to the view, striking, sharp, unmistakeable, easily seen Creation/removal of major visual focus Uncharacteristic elements or pattern introduced Large proportion of the view affected
Medium	Conspicuous	Noticeable change to the view, distinct, clearly visible, well defined Creation or removal of a visual focus that may compete Some elements of the Proposed Development fit the existing pattern Some of the view affected
Low	Apparent	Minor change to the view but still evident Little change to focus of the view Fits intrinsic visual composition Little of the view affected
Negligible	Inconspicuous	No real change to perception of the view Weak, not legible, hardly discernible

Geographical Extent

The extent over which the changes would be visible is also taken into account.

The magnitude of visual change arising from the Development is described as High, Medium, Low or Negligible based on the overall extent of visibility. For individual viewpoints it will depend upon the combination of a range of factors:

- The distance of the viewpoint from the development;
- The duration of effect;
- Extent of the development visible from the viewpoint;
- The angle of view in relation to main receptor activity;
- The proportion of the field of view occupied by the development;
- The background to the development; and
- The extent of other built development visible.

Other factors may also influence the visual effect. These relate to both human perception and to the physical environment itself. Factors which tend to reduce the apparent magnitude include the following:

- An absence of visual clues;
- A complex and varied scene; and
- Low relative elevation of view

Factors which tend to increase the apparent magnitude include the following:

- Visual clues;
- A simple scene; and
- High relative elevation of view.

Sequential Visual Effects

Sequential visual effects typically occur when moving along a linear route, as the observer moves from one point to another and gains views of other developments or a different view of the same development.

Significance of Effects on Landscape and Visual Receptors

The assessment of significance is based on professional judgement, considering both the sensitivity of the receptor and the predicted magnitude of effect resulting from the Proposed Development.

Major loss of landscape features or characteristics across an extensive area that are important to the integrity of a nationally valued landscape are likely to be of greatest significance. Short-term effects on landscape features or characteristics over a restricted part of a landscape of lower value are likely to be of least significance

The degree of significance of effects on visual receptors is determined from a combined evaluation of the sensitivity of the visual receptor and the magnitude of the visual effect.

Effects are more likely to be significant on people who are particularly sensitive to changes in views and visual amenity, or who experience effects at recognised and important viewpoints, or from recognised scenic routes. Large scale changes which introduce new, discordant or intrusive elements into the view are also more likely to be significant than small changes or changes involving features already present within the view.

The significance of any identified landscape or visual effect is assessed as Major, Moderate, Minor or Negligible effect. These categories have been determined by consideration of viewpoint or landscape sensitivity and predicted magnitude of change as described above, with the table below used as a guide to correlating sensitivity and magnitude to determine significance of effects. It should be noted that this is a guide only, and there will be times when the combination of sensitivity and magnitude yield a slightly different result from that predicted by the table. Where this discrepancy leads to prediction of significant effect, it is explained in the text.

Table 4-7 Significance of Effect

Magnitude of Change				
Sensitivity	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major to moderate	Moderate	Moderate to minor
Medium	Major to moderate	Moderate	Moderate to minor	Minor
Low	Moderate	Moderate to minor	Minor	Minor to none
Negligible	Moderate to minor	Minor	Minor to none	None

Assessment of significance of landscape and visual effects

Where overall effects are predicted to be *major* (shaded dark grey) these are considered to be equivalent to significant effects, as referred to in the *Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations* 2017. Overall effects of moderate to major (shaded light grey) may be significant if experienced over an extensive proportion of a receptor, area or route. Changes of moderate or less are not likely to result in significant effects.

4.3 Ecology

4.3.1 Introduction

The assessment of ecology will consider the geographical area potentially affected by the development of a deep water port at Arnish. Particular attention will be given to:

- Terrestrial ecology, protected habitats and species;
- Birds; and
- Marine mammals and fish.

The proposals have the potential to affect ecology in the immediate vicinity of the development footprint in terms of direct habitat losses. It is also envisaged that a range of other effects on ecology in the wider area could occur, these include but are not limited to, ecological interactions and changes in hydrodynamic regime, physical disturbance during construction and operation of the port, and underwater noise and pollution arising from construction activities. These areas will all be considered in the assessment. Impact of the development on the water environment including hydrology, hydrogeology, water quality and coastal processes will be considered in the Water section of the EIA.

Each area of ecology listed above will be considered in turn.

4.3.2 Baseline Conditions

Terrestrial Ecology

In order to determine an ecological baseline for terrestrial ecology at the proposed deep water port a Preliminary Ecological Appraisal (PEA) was undertaken in May 2017.

The main objectives of the PEA were as follows:

- Identify and map the broad habitats present on the site;
- Search for field evidence of a range of protected or notable faunal species which may frequent the survey area;
- Identify suitable habitat for protected or notable faunal species in the survey area;
- Evaluation of the site based on the habitats or faunal species found;
- Identify the potential impacts to protected or notable faunal species, vegetation and habitats and outline appropriate mitigation methods; and
- Make recommendations for any further survey and/or species licensing requirements.

Desk study

To anticipate the potential ecological sensitivities at the site, a desk study was conducted in April 2017 in advance of the field studies. This included a review of:

- Existing data on statutory designated sites available through SNH Sitelink website[7] (up to 5km from the site);
- Existing data on non-statutory designated sites available through the Western Isles (Comhairle nan Eilean Siar) Council Local Development Plan (LDP)[8] (up to 2km from the site);
- Records of Ancient Woodland available through Sketchmap[9] (up to 2km from the site);
- Records from the Western Isles (Comhairle nan Eilean Siar) Council Biodiversity Officer
- Records from Scottish Badgers
- The UK Biodiversity Action Plan (UKBAP)[10] and the Western Isles (Comhairle nan Eilean Siar) Local Biodiversity Action Plan (LBAP)[11]; and
- The Scottish Biodiversity List[12].

Designated sites

Two statutory designated sites were found within 5km of the proposed deep water port. These are summarised in Table 4-8:

Table 4-8 Terrestrial designated sites

Site Name	Designation[13]	Distance and Orientation	Comment
Tong Saltings	SSSI	Approximately 2.35km north east of the site boundary of Deep Water Port.	Designated for breeding bird assemblages, mudflats, saltmarsh and sand dunes
Lewis Peatlands	SAC / SPA / RAMSAR	Approximately 4.29km west of the site boundary of Deep Water Port.	Designated as an SAC primarily for three Annex 1 habitats present on site 1) oligotrophic to mesotrophic standing waters with vegetation and Littorelletea uniflorae and/or of the Isoeta-Nanojuncetea. 2) Natural dystrophic lakes and ponds 3) Blanket Bogs Designated as a RAMSAR site for blanket bog features, the breeding bird assemblage, and the breeding bird population of Dunlin (*Calidris alpina schinzii*).

[7] SNH Sitelink here: https://gateway.snh.gov.uk/sitelink/. Accessed in April 2017
[8] The Western Isles Council LDP here: http://www.cne-siar.gov.uk/planningservice/localdevplan.asp Accessed in April 2017.
[9] Sketchmap available here: http://sketchmap.co.uk/. Accessed in April 2017
[10] The UKBAP here: http://jncc.defra.gov.uk/page-5717. Accessed in April 2017
[11] Western Isles LBAP here http://www.cne-siar.gov.uk/biodiversity/documents/Biodiversity%20Audit%202002.pdf Accessed in April 2017
[12] The Scottish Biodiversity List here: http://www.biodiversityscotland.gov.uk/advice-and-resources/scottish-biodiversity-list/. Accessed in April 2017
[13] SSSI (Site of Special Scientific Interest), SAC (Special Area of Conservation), RAMSAR (Ramsar convention on Wetlands), SPA (Special Protection Area),

There were no non-statutory designated sites were found within 2km of the site development.

Ancient woodland inventory

No ancient woodland was found within the site boundary of the proposed deep water port, and none were found to be located within 2km of the proposed development boundary.

Biodiversity action plan species

Species potentially relevant to the development site and listed in the LBAP for the Western Isles are summarised in Table 4-9. The LBAP also lists various invertebrate and plant species of conservation concern.

Table 4-9 Western Isles LBAP Species

Species	LBAP	UKBAP	SBL
Common Pipistrelle Bat *Pipistrellus pipistrellus*	✓	✓	✓
Natterer's Bat *Myotis nattereri*	✓	-	✓
Daubenton's bat *Myotis daubentonii*	✓	-	✓
Otter *Lutra lutra*	✓	✓	✓

Biodiversity action plan habitats

The Western Isles LBAP identified 10 priority habitats that were deemed potentially relevant to the development site. These habitats are listed in Table 4-10.

Table 4-10 Western Isles LBAP Habitats

Habitat	LBAP	UKBAP	SBL
Coastal sand dunes	✓	✓	✓
Machair	✓	✓	✓
Coastal vegetated shingle	✓	✓	✓
Seagrass	✓	✓	-
Coastal saltmarsh	✓	✓	✓
Mud in deep water	✓	✓	-
Maerl beds	✓	✓	-
Upland heathland	✓	✓	✓
Fens	✓	✓	-
Blanket bog	✓	✓	✓

Records from the Western Isles Council Biodiversity Officer were requested by email 'enquiries@cne-siar.gov.uk' on 26/04/2017, however none were received at the time of writing.

Field Surveys

In order to determine an ecological baseline for the deep water port development a Phase 1 habitat survey and a protected species survey were undertaken in May 2017.

A Phase 1 Habitat Survey is a method that rapidly records vegetation and wildlife habitat over large areas. The information is used to identify ecologically sensitive features, inform additional species surveys and, ultimately, recommend mitigation and enhancement measures in connection with a proposed development.

The Phase 1 Habitat Survey was undertaken according to the standard Joint Nature Conservation Committee method (JNCC, 2010). Field work was carried out on Thursday 4th May 2017. Weather conditions were favourable for fieldwork with bright and sunny conditions and temperatures between 10°C -13°C .

A total of six Phase 1 habitat types including buildings were recorded on the site:

- D5 Dry Heath
- G1 Standing Open Water
- H8.4 Coastal Grassland
- H3 Boulders / Rocks
- H2 Shingle/ Cobbles
- J3.6 Buildings

The main habitats are described in Appendix B: Habitat Information and Site Photography. In addition to this a map illustrating the findings of the survey is located in Appendix A (Drawing No. 169438-003).

Protected species

The field survey for protected species was undertaken in accordance with CIEEM guidelines (CIEEM, 2013). The survey focussed on faunal species that are most likely to be found in the habitats which make up the wider landscape, or where suitable habitat is available. However, all UK protected or notable species are considered when undertaking a field survey of this nature in order to assess how valuable the surveyed area is in terms of resources. Species that were searched for and survey methods applied included, but were not limited to:

- Bats (various species);
- Otter (*Lutra lutra*);

As West European hedgehog (*Erinaceus europaeus*), brown hare (*Lepus europaeus*) and amphibian species are listed on the Scottish Biodiversity List, a search for suitable habitat and presence of these species was also included.

Bats

No records of bats were received during the desk study. No bats or evidence of bats was found during the field survey. The habitats within the survey area offer negligible features on site for commuting and foraging bats. There is very little connectivity to the wider environment. The River Creed and Lews Castle grounds are located immediately to the north of the site boundary and would provide suitable habitat for bats including mature woodland, parkland and gardens but this area is not directly connected to the site for development.

Otter

No records of otter were received during the desk study. A boat was chartered to survey the coastline at low tide along with searches on the mainland. No otter resting places or other field evidence of otter were identified during the survey.

Birds

A search of the Western Isles LBAP provided the following list of birds deemed Priority species (Table 4-11):

Table 4-11 Western Isles LBAP Priority Bird Species

Species	Scientific Name
Common Scoter	*Melanitta nigra*
Spotted Flycatcher	*Muscicapa striata*
Red-throated Diver	*Gavia stellata*
Black-throated Diver	*Gavia arctica*
Great Northern Diver	*Gavia immer*
Slavonian Grebe	*Podiceps auritus*
Storm Petrel	*Hydrobates pelagicus*
Leach's Storm Petrel	*Oceanodroma leucorhoa*
Gannet	*Morus bassanus*
Cormorant	*Phalocrocorax carbo*
Whooper Swan	*Cygnus cygnus*
Greenland White-fronted Goose	*Anser albifrons flavirostris*
Greylag Goose (Scottish)	*Anser anser*
Barnacle Goose	*Branta leucopsis*
Shelduck	*Tadorna tadorna*
Wigeon	*Anas penelope*
Pintail	*Anas acuta*
Shoveler	*Anas clypeata*
Eider	*Somateria mollissima*
Merlin	*Falco columbarius*
Peregrine	*Falco peregrinus*

Species	Scientific Name
Ringed Plover	*Charadrius hiaticula*
Golden Plover	*Pluvialis apricaria*
Grey Plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*
Sanderling	*Calidris alba*
Purple Sandpiper	*Calidris maritima*
Dunlin	*Calidris alpina schinzii*
Bar-tailed Godwit	*Limosa lapponica*
Redshank	*Tringa totanus*
Whimbrel	*Numenius phaeopus*
Greenshank	*Tringa nebularia*
Arctic Skua	*Stercorarius parasiticus*
Common Tern	*Sterna hirundo*
Arctic Tern	*Sterna paradisaea*
Little Tern	*Sterna albifrons*
Razorbill	*Alca torda*
Short-eared Owl	*Asio flammeus*
Dipper	*Cinclus cinclus*
Twite	*Carduelis flavirostris*
Snow Bunting	*Plectrophenax nivalis*

The habitats recorded on site do not provide optimal conditions for the vast majority of bird species noted as Priority species. There is the potential for the site to support small numbers of over-wintering waders such as Ringed Plover and Purple Sandpiper where rocky foreshore habitat exists. The harbour itself could support numbers of diver and grebe species, although the Birds of the Outer Hebrides website[14] states that the main wintering areas for these species on Lewis are Broad Bay, Valtos and Braigh, the nearest of which is ~3.5km from the proposed development.

[14] http://www.western-isles-wildlife.com/Templates/birds_status_outer_hebrides.html

Several of the species noted above are qualifying species for the Lewis Peatlands SPA, which is located ~4.3km from the proposed development. Disturbance to these species from the proposed development is therefore considered not significant.

Marine Mammals and Fish

Developments in marine environments have the potential to affect key physical processes over wide areas. The EIA will assess potential direct and indirect impacts arising from the proposed deep water port development on marine mammals, their prey species, and fish species (specifically salmonids).

Marine Mammals

A desk study of the marine environment in the vicinity of the proposed deep water port development identified two areas with nature conservation designations (Table 4-12). In addition to these sites all species of dolphin, porpoise and whale are European Protected Species (EPS). Marine mammal species included in the Western Isles LBAP and UK BAP (UKBAP) are listed in Table 4-13 they are also UK priority species and as such should be included in the EIA. All the species are UK priority species and have been recorded in the coastal waters off Stornoway.

Table 4-12 Marine Designated Sites

Site Name	Designation	Distance and Orientation	Comment
Inner Hebrides and Minches	Special Area of Conservation (SAC)	Approximately 1.4km north east of the proposed deep water port	Harbour Porpoise
North East Lewis	Proposed Marine Protected Area	Less than 1km east of the proposed deep water port	Risso's Dolphin

Table 4-13 Marine mammal LBAP species

Common name	Scientific name
Harbour Porpoise*	*Phocoena phocoena*
Northern Right Whale	*Balaena glacialis*
Minke Whale*	*Balaenoptera acutorostrata*
Sei Whale	*Balaenoptera borealis*
Blue Whale	*Balaenoptera musculus*
Fin Whale	*Balaenoptera physalus*
Humpback Whale	*Megaptera novaeangilea*
Bottle-nosed Dolphin*	*Tursiops truncates*
Risso's Dolphin	*Grampus griseus*
White-beaked Dolphin*	*Lagenorhynchus albirostris*
Atlantic White-sided Dolphin*	*Lagenorhynchus acutus*

Common Dolphin	*Delphinus delphis*
Striped Dolphin	*Stenella coeruleoalba*
Northern Bottlenose Whale	*Hyperodoon ampullatus*
Cuvier's Beaked Whale	*Ziphius cavirostris*
Sowerby's Beaked Whale	*Mesoplodon bidens*
True's Beaked Whale	*Mesoplodon mirus*
Killer Whale	*Orcinus orca*
Long-finned Pilot Whale**	*Globicephala melas*
Sperm-Whale**	*Physeter macrocephalus (P. catodon)*

Recent records *http://www.magic.gov.uk/MagicMap.aspx
**http://seawatchfoundation.org.uk/legacy_tools/region.php?output_region=14

Further baseline data on marine mammals will be gathered during the EIA process by means of a more detailed desktop study.

Fish

During the Stornoway Masterplan consultation concern was raised by the Outer Hebrides Fisheries Trust (OHFT) and the Stornoway Angling Association (SAA) to the potential impact on migratory salmonids, (Atlantic Salmon (*Salmo salar*) and Sea Trout (*Salmo trutta*)) using the Stornoway harbour area and migration routes of fish through the proposed deep water port development area. The mouth of the River Creed a few hundred metres north of the boundary of the proposed deep water port. In 2017 the River Creed was classified by Marine Scotland Science (MSS) as a Grade 1 watercourse. This grading is based on data collected between 2011-2015, the data includes reported catches; estimated age composition and egg content of returning salmon; estimated stock levels; and areas of salmon habitat and the probability of achieving conservation limits (Science, 2017). The grading means that the River Creed is currently considered to have an 80% probability of meeting its conservation limits; this also recognises the effectiveness of existing non-statutory local management interventions. There are limitations to the data used to extrapolate the grading of Scottish rivers but the methods are well established and recognised internationally. If there are other empirical data available on the River Creed this will be sorted and used to assess the impact on salmonids in the area.

The Deep Water Port development lies in the direct migratory path of the salmon entering the River Creed.

4.3.3 Potentially Significant Effects

It is anticipated that the development of a deep water port at Arnish will comprise activities with the potential to impact on ecology in the area. Based on existing knowledge of the development it is envisaged that those activities will include:

- Direct loss of tidal and subtidal habitat over the footprint of the development;
- Underwater acoustic noise and shock during piling leading to altered behaviour, this could include lethal and sub lethal impacts on animals and their prey species;
- Visual light disturbance to intertidal and sub tidal species during the hours of darkness through the use of artificial lighting during construction and throughout the life of the port;
- Visual light disturbance to migratory routes during the hours of darkness through the use of artificial lighting during construction and throughout the life of the port;

- Blasting for navigation channels creating noise and vibration in the immediate area during construction;
- Temporary increase in suspended sediment and/or deposition from dredging and construction creating physical disturbance in the marine environment;
- Release of contaminants from disturbed sediments during construction;
- Environmental incidents and accidents and potential pollution from fuels, oils etc. potential source of pollution in the marine environment during construction and from ships using the deep water port;
- Seabed excavation works during construction;
- Indirect impacts through interruption of changes to coastal processes including tidal flows, local current and sediment movement during construction and as a result of the created deep water; and
- Increased vessel numbers post construction causing disturbance in the marine environment.

Terrestrial Ecology

The baseline data gathered from the ecological survey and desk study provides sufficient information to place the site in context with regard to ecological and conservation value. Based on our current understanding of the proposed development of a deep water port at Arnish and the field and desktop surveys, it is not anticipated that there will be any significant impacts during construction on terrestrial ecology; protected or notable faunal species, vegetation and habitats or any impacts post completion that need to be considered further.

Birds

Given the habitats on site, and from a review of relevant literature, it is considered that the proposed development would not result in any significant impacts on ornithology. Therefore ornithology can be scoped out of further assessment.

Marine Mammals and Fish

Underwater noise generated during the construction of the development should be highlighted as an area with the highest potential to impact the marine ecology in the area. Underwater noise can have an adverse effect on marine mammals and fish affecting movements, timing of migrations and foraging behaviours. Another area of risk to marine biodiversity is from pollution directly originating from construction.

Following the construction work and during the life of the deep water port impacts on marine biodiversity may be seen as a result of the construction leading to changes in hydrodynamic regime in the area.

It is recognised that Atlantic Salmon face a number of pressures during their life cycle that include but are not limited to predation, poor water quality, disease and parasites, barriers to migration, poor physical habitat quality, food availability, changes in the marine environment. Atlantic Salmon are listed on Annex 5 of the Habitats Regulations 1994 which implements the species protection requirements of the Habitats Directive in Scotland. Therefore based on existing available data and our current understanding of the proposed development it is our view that Atlantic Salmon should be considered further and scoped in.

In addition to this River Lamprey (*Lampetra fluviatilis*) and Sea Lamprey (*Petromyzon marinus*) together with the critically endangered European Eel (*Anguilla Anguilla*), are all UK BAP species and the impact of the proposed works on these species will also be considered in the EIA.

4.3.4 Assessment Methodology

The assessment of potential impacts will be undertaken against a baseline and the significance of these assessed using standard EIA criteria (i.e. as developed by the Institute of Environmental Management and Assessment (IEMA)) and professional judgement in line with Chartered Institute of Ecology and Environmental Management (CIEEM) (CIEEM, 2010) guidelines.

The methodology for the Ecological Impact Assessment (EcIA) will follow the Guidelines for Ecological Impact Assessment in the UK and Ireland: Marine and Coastal, by CIEEM (CIEEM, 2010) and the Guidelines for Ecological Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal by CIEEM (CIEEM, 2016). The British Standard Biodiversity: Code of Practice for Planning and Development (BS 42020:2013) cites the CIEEM EcIA Guidelines as the acknowledged reference on ecological impact assessment. The guidelines are consistent with the British Standard, which provides recommendations on topics such as professional practice, proportionality, pre-application discussions, ecological surveys, adequacy of ecological information, reporting and monitoring.

Any assessment should include all direct and indirect, lethal and non-lethal impacts on ecology that could reasonably occur during construction work and in operation of the new deep water port.

Terrestrial Ecology

Based on the results of the baseline survey no further targeted surveys of terrestrial ecology are required.

Birds

No further assessment of birds is required.

Marine Mammals and Fish

The assessment of the potential direct and indirect impacts on marine ecology will draw on the findings of the hydrodynamic studies and the conclusions for the impacts on water and sediment quality assessments. This will in turn determine the potential area of risk.

A desktop study to review current existing literature and data sets for marine mammals in the local area will be conducted. When detailed proposals for construction and operation of the deep water port become available specific requirements for survey will be identified. This may include surveys to determine presence/absence, abundance and other behavioural aspects of marine mammals using the area proposed for the deep water port. Any requirement for additional surveys will be agreed through discussion with SNH and Marine Scotland. The deep water port area is not within any sites designated for marine mammals but connections to the wider area will be considered. The need to include underwater noise studies will be discussed with the competent authority, Marine Scotland.

It is anticipated that a Marine Mammal Observation Protocol (MMOP) will be required so that the proposed construction works, particularly piling, dredging and disposal, do not cause unnecessary disturbance to marine mammals (cetaceans and seals). This is likely to incorporate the use of suitably qualified Marine Mammal Observers (MMOs) and Passive Acoustic Monitoring (PAM) Operators, competent in the identification of marine mammals, being present during construction. The MMOs will undertake observation for marine mammals during high sound producing activities (piling and heavy engineering activities), and during dredging and disposal operations. The PAM Operators will set up monitoring stations/transects and listen for the presence of marine mammals within the mitigation zone before and during high sound producing activities. It is likely that a MMOP will be incorporated into a Marine Mammal Protection Plan (MMPP).

If mitigation is not possible or appropriate and an impact on European Protected Species (EPS) is envisaged then it may be appropriate to apply for an EPS licence from the licensing authority, Marine Scotland.

All available data on fish movements in the deep water port area and the River Creed will be collated. The need to include underwater noise studies will be discussed with the competent authority, Marine Scotland. It is considered that no fisheries surveys are required to assess direct impacts on the River Creed, in addition to those already undertaken by the Fisheries Trust.

4.4 Cultural Heritage and Archaeology

4.4.1 Introduction

This section of the EIA Scoping Report outlines the baseline archaeological and cultural heritage conditions at the site and considers the likely significant potential effects from the proposed development on heritage assets.

4.4.2 Baseline Conditions

There are 19 known heritage assets within the Site (Table 4-14, and Appendix A: Drawings).

Table 4-14 Heritage Assets within the Site Boundary

Asset	Description	NGR
SM5347	WW2 gun emplacements	NB 43100 30500
102813	Wreck, unknown	NB 42320 30840
102824	Wreck, The Arnish	NB 42640 30740
102825	Wreck, Bjorn	NB 42810 31040
102826	Wreck, Andalina	NB 42780 31110
102827	Wreck, Alabama	NB 42380 31550
102828	Wreck, Portugal	NB 42720 31580
102846	Wreck, Marjory	NB 42540 31120
142506	Abandoned boat, unknown	NB 42223 31476
142507	Dyke, Arnish	NB 42312 30585
142509	Factory, Arnish	NB 42573 30284
142510	Engineering Workshop, Arnish	NB 42768 30520
142511	Field System, Arnish	NB 42850 30976
142516	Field System, Arnish	NB 43010 30769
142524	Sea Defences, Arnish	NB 42948 30409
142525	Dyke, Arnish	NB 42801 30278
142526	Sea defences, Arnish	NB 42698 30263
142527	Dyke, Arnish	NB 42629 30257
142528	Dyke, Arnish	NB 42613 30230

These range in date from the post-medieval to the modern period, with the majority being of late post-medieval date. There is one Scheduled Monument within the Site, with the remainder being undesignated HER entries. The Scheduled Monument comprises a Second World War coastal gun battery on Arnish Point (SM5347). The undesignated Historic Environment Record (HER) entries include seven shipwrecks within Cala Ghlumaig, as well as onshore post-medieval field systems, sea defences and dykes, and the factory and engineering workshop on Arnish Point.

The HER does record six other entries within the Site boundary. However, none of these survives as an archaeological feature and they are not considered heritage assets in this Scoping Report. They include the sites of three shipwrecks destroyed in the 1970s during the land reclamation works associated with construction of the Arnish fabrication yard, documentary records of two ships grounded in the nineteenth century but subsequently refloated, and a record of the approximate location of a stone object (likely to be a fishing weight) discovered on Arnish Point.

Within 1km of the Site boundary there are a further two Scheduled Monuments, both from the prehistoric period; an Iron Age dun (SM5397) in Loch Arnish and a chambered cairn (SM6550) in the grounds of Lews Castle. There are also two Listed Buildings; one Category B (Arnish lighthouse and attendant buildings) and one Category C (a monument, commemorating Prince Charles Edward Stuart's journey here in 1746, after Culloden). The Inventory Garden and Designed Landscape (IGDL) comprising the grounds of Lews Castle and Lady Lever Park (GDL00263) is located to the north-west and some of the IGDL is within 1km of the Site.

4.4.3 Potentially Significant Effects during Construction

Groundworks comprising onshore excavation and offshore dredging and land reclamation required for the proposed development have the potential to impact directly upon known heritage assets present within the Site. Impacts will potentially be of high magnitude as they could result in the complete destruction and removal of archaeological remains. Particular heritage assets potentially subject to direct impacts include four of the shipwrecks in Cala Ghlumaig (102813, 102826, 102828, 102846), and the abandoned boat (142506) and dyke (142507) onshore. It is understood that the scheduled gun battery (SM5347) will be outside the proposed construction footprint and will be subject to no direct impacts.

In addition to possible impacts upon known heritage assets, the proposed development has the potential to impact upon hitherto unknown buried archaeological remains. The level of effect will be dependent upon the finalised masterplan and construction methods associated with the proposed development.

4.4.4 Potentially Significant Effects post-Completion

The proposed development has the potential to affect the settings of designated heritage assets including Scheduled Monuments, Listed Buildings and an Inventory Garden and Designed Landscape.

Designated heritage assets up to 1 km distant from the Site have been identified. Given the local topography and the character of the heritage assets, it is unlikely that significant setting effects will occur.

4.4.5 Inclusion or Exclusion from EIA

Cultural heritage and archaeology will be scoped into the EIA.

The potential for direct effects upon heritage assets within the proposed Deep Water Port development will be assessed in the EIA. This will be informed by desk-based assessment and a walkover survey. The methodology to be employed in assessing direct effects is outlined below in Section 4.4.7.

The potential for indirect effects upon the setting or character of designated heritage assets will also be assessed in the EIA. The potential for impacts upon all designated heritage assets within 1 km of the Site boundary will be considered. The assessment will also consider the potential for non-visual settings effects, such as that which could potentially result from elevated traffic, lighting and noise. The methodology to be employed in assessing indirect (setting) effects is outlined below in Section 4.4.7 and will be informed by guidance notes published by HES.

4.4.6 Design and Mitigation

Where significant effects are identified, the ES chapter will put forward mitigation proposals. These proposals will seek to avoid or reduce identified effects. Where it is impossible to avoid or reduce the level of effect the ES chapter will consider the potential to offset any significant effects. Comhairle nan Eilean Siar's Archaeology

Service and Historic Environment Scotland (HES) will be consulted in order to in establish appropriate design responses or mitigation measures required to avoid, minimise or offset significant effects.

4.4.7 EIA Assessment Methodology

Baseline Assessment

The primary source of information for the presence and significance of known assets within the Site is contained within the National Record of the Historic Environment (as held by HES), the Comhairle nan Eilean Siar HER and the designated asset data sets held by HES. All heritage assets within 1km of the Site boundary will be identified to allow for an assessment of direct impacts and identify assets beyond the Site boundary which may be subject to setting impacts. A walkover survey will also be undertaken in order to more fully understand the historic environment baseline conditions at the site and inform the impact assessment.

The ES chapter will fully describe the baseline historic environment conditions, collating the results of desk-based data gathering and a walkover survey. It will identify areas where the proposed development may impact upon heritage assets and include a constraints map for direct impacts.

Designated heritage assets within a distance of up to 1km from the Site boundary have been assessed from a desk-based perspective for the purposes of this Scoping Report. Six designated heritage assets are located within 1 km of the Site. However, the majority of these are located beyond the Site boundary and given the topography of the Site and the character of the heritage assets significant setting effects are not anticipated.

Assessment of Significance / Assessment Criteria

This sub-section sets out the methodology for assessing direct and indirect effects upon heritage assets. It takes account of Scottish Planning Policy (SPP) (Scottish Government 2014), Historic Environment Scotland Policy Statement (HESPS) (HES 2016) and PAN 2/2011: Planning and Archaeology (Scottish Government 2011). HES's guidance notes on setting (HES 2016a), contained within the series *Managing Change in the Historic Environment,* will also be considered.

The Assessor

Headland Archaeology Ltd conforms to the standards of professional conduct outlined in the Chartered Institute for Archaeologists' Code of Conduct, the CIfA Code of Approved Practice for the Regulation of Contractual Arrangements in Field Archaeology, the CIfA Standards and Guidance for Historic Environment Desk Based Assessments and Field Evaluations.

Headland Archaeology Ltd is a Registered Archaeological Organisation of the Chartered Institute for Archaeologists. This status ensures that there is regular monitoring and approval by external peers of our internal systems, standards and skills development.

Headland Archaeology Ltd is ISO 9001:2008 accredited, in recognition of the Company's Quality Management System.

Heritage Assets

A heritage asset (or historic asset) is any element of the historic environment which has cultural significance. Both discrete features, and extensive landscapes defined by a specific historic event, process or theme, can be defined as heritage assets; and assets may overlap or be nested within one another.

Designated assets include Scheduled Monuments, Listed Buildings, World Heritage Sites, Conservation Areas, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas. Other assets may also be locally designated through policies in the Local Plan.

The majority of heritage assets are not designated. Some undesignated assets are recorded in Historic Environment Records or Sites and Monuments Records (HERs/SMRs) maintained by local authorities and other agencies. However, many heritage assets are currently unrecorded, and the information contained in HERs and SMRs is not definitive, since they may include features which, for instance, have been entirely removed, or are of uncertain location, dubious identification, or negligible importance. The identification of undesignated heritage assets is therefore to some extent a matter of professional judgement.

Some heritage assets may coincide with visual receptors or landscape character areas, which are addressed in Section 4.2 (Landscape and Visual), and in such cases it is important to recognise the difference in approach between these two topics. Cultural heritage assessment addresses effects on the cultural heritage significance of heritage assets, which may result from, but are not equivalent to, visual impacts. Similarly, an effect on a landscape character area does not equate to an effect on the cultural heritage significance of heritage assets within it.

Heritage importance, cultural significance and sensitivity

Cultural heritage impact assessment is concerned with effects on *cultural significance*, which is a quality that applies to all heritage assets, and as defined in 'Historic Environment Scotland Policy Statement 2016' (Annex 1, paragraph 3), may be artistic, archaeological, architectural, historic, traditional, aesthetic, scientific or social, and may be 'inherent in the monument itself, its fabric, setting, use, associations, meanings, records, related monuments and related objects'. This use of the word 'significance', referring to the sum of the values we attach to an asset because of its heritage interest, should not be confused with the usage in EIA terminology where the significance of an effect reflects the weight that should be attached to it in a planning decision.

The *importance* of a heritage asset is the overall value assigned to it based on its cultural significance, reflecting its statutory designation or, in the case of undesignated assets, the professional judgement of the assessor (Table 4-15). Assets of national importance and international importance are assigned a high and very high level respectively. Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields and Historic Marine Protected Areas are, by definition, of national importance. The criterion for Listing is that a building is of 'special architectural or historic interest'; following HESPS Note 2.17, Category A refers to 'buildings of national or international importance', Category B to 'buildings of regional or more than local importance', and Category C to 'buildings of local importance'. Conservation Areas are not defined as being of national importance, and are therefore assigned to a medium level. Any feature which does not merit consideration in planning decisions due to its cultural significance may be said to have negligible heritage importance; in general, such features are not considered as heritage assets and are excluded from the assessment.

Table 4-15 Criteria for Assessing the Importance of Heritage Assets

Importance of the asset	Criteria
Very high	World Heritage Sites and other assets of equal international importance
High	Category A Listed Buildings, Scheduled Monuments, Inventory Gardens and Designed Landscapes, Inventory Historic Battlefields, Historic Marine Protected Areas and undesignated assets of national importance
Medium	Category B Listed Buildings, Conservation Areas, and undesignated assets of regional importance
Low	Category C Listed Buildings and undesignated assets of lesser importance

Cultural significance is assessed in relation to the criteria in HESPS Annexes 1-6, which are intended primarily to inform decisions regarding heritage designations, but may also be applied more generally in identifying the 'special characteristics' of a heritage asset, which contribute to its cultural significance and should be protected, conserved and enhanced according to SPP paragraph 137. Annex 1 is widely applicable in assessing the cultural significance of archaeological sites and monuments, for instance, while the criteria in Annex 2 can be used in defining the architectural or historic interest of buildings, whether listed or not.

The special characteristics which contribute to an asset's cultural significance may include elements of its setting. Setting is defined in 'Managing Change in the Historic Environment: Setting' (HES 2016, Section 1) as 'the way the surroundings of a historic asset or place contribute to how it is understood, appreciated and experienced'. The setting of an asset is defined and analysed according to Stage 2 of the three-stage approach promoted in 'MCHE: Setting', with reference to factors listed on pages 9-10. The relevance of these factors to the understanding, appreciation and experience of the asset determines how, and to what extent, an asset's cultural significance derives from its setting. All heritage assets have settings; however, not all assets are equally sensitive to impacts on their settings. In some cases, setting may contribute very little to the asset's cultural significance, or only certain elements of the setting may be relevant.

Assessment of the magnitude of impacts on cultural significance

The magnitude of an impact is a measure of the degree to which the cultural significance of a heritage asset will be increased or diminished by the development. This definition of magnitude applies to impacts on the setting, as well as impacts on the physical fabric, of an asset. Impacts on the settings of heritage assets are assessed with reference to the factors listed in 'MCHE: Setting' Stage 3 (evaluate the potential impact of the proposed changes, pages 10-11). It is important to note that the magnitude of an impact resulting from an impact on setting is not a direct measure of the visual prominence, scale, proximity or other attributes of the development itself, or of the extent to which the setting itself is changed; therefore, Landscape and Visual Impact Assessment criteria for scale/magnitude cannot be applied directly in determining the magnitude of effect on the setting of a heritage asset. It is also necessary to consider whether, and to what extent, the characteristics of the setting which would be affected contribute to the asset's cultural significance.

Magnitude is assessed as high/medium/low, and adverse/beneficial, or negligible, using the criteria in Table 4-16 as a guide. In assessing the effects of a development, it is often necessary to take into account various impacts which affect an asset's significance in different ways, and balance adverse impacts against beneficial impacts. For instance, there may be adverse impacts on an asset's fabric *and* on its setting, offset by a beneficial impact resulting from archaeological investigation. The residual effect is an overall measure of how the asset's significance is reduced or enhanced.

Table 4-16 Criteria for Assessing the Magnitude of Impacts on Heritage Assets

Magnitude of Impact	**Guideline Criteria**
High beneficial	Elements of the asset's physical fabric which would otherwise be lost, severely compromising its cultural significance, are preserved in situ; or Elements of the asset's setting, which were previously lost or unintelligible, are restored, greatly enhancing its cultural significance.

Magnitude of Impact	Guideline Criteria
Medium beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to an appreciable but partial loss of cultural significance, are preserved in situ; or Elements of the asset's setting are considerably improved, appreciably enhancing its cultural significance; or Research and recording leads to a considerable enhancement to the archaeological or historical interest of the asset.
Low beneficial	Elements of the asset's physical fabric which would otherwise be lost, leading to a slight loss of cultural significance, are preserved in situ; or Elements of the asset's setting are improved, slightly enhancing its cultural significance; or Research and recording leads to a slight enhancement to the archaeological or historical interest of the asset.
Negligible	The asset's fabric and/or setting is changed in ways which do not beneficially or adversely affect its cultural significance.
Low adverse	Elements of the asset's fabric and/or setting which are of very limited relevance to its significance are lost or changed, resulting in a very slight loss of cultural significance; or Elements of the asset's fabric and/or setting which contribute to its cultural significance are minimally affected, resulting in a very slight loss of cultural significance.
Medium adverse	Elements of the asset's fabric and/or setting which contribute to its significance are affected, but to a limited extent, resulting in an appreciable but partial loss of the asset's cultural significance.
High adverse	Key elements of the asset's fabric and/or setting are lost or fundamentally altered, such that the asset's cultural significance is lost or severely compromised.

Assessment of the significance of effects

The significance of an effect (EIA 'significance') on the cultural significance of a heritage asset, resulting from a direct or indirect physical impact, or an impact on its setting, is assessed by combining the magnitude of the impact and the importance of the heritage asset. The matrix in Table 4-17 provides a guide to decision-making but is not a substitute for professional judgement and interpretation, particularly where the importance or impact magnitude levels are not clear or are borderline between categories. EIA significance may be described on a continuous scale from negligible to major; it is also common practice to identify effects as significant or not significant, and in this sense major and moderate effects are regarded as significant in EIA terms, while minor effects are 'not significant'.

Table 4-17 Criteria for Assessing the Significance of Effects on Heritage Assets

Asset importance	Magnitude of Impact			
	High	**Medium**	**Low**	**Negligible**
Very high	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Major to moderate	Negligible
Medium	Major	Major to moderate	Moderate to minor	Negligible
Low	Major to moderate	Moderate to minor	Minor	Negligible

Cumulative Effects

Cumulative effects relating to cultural heritage are for the most part limited to indirect effects upon the settings of heritage assets. As there are no specific guidelines with regard to undertaking cumulative assessment for heritage assets, this assessment will follow the criteria for assessing setting impacts as set out above. The assessment of cumulative effects will consider whether there would be an increased impact upon the setting of heritage assets as a result of adding the proposed development to a baseline, which may include existing, under construction, consented or proposed developments as agreed with the planning authority.

Those heritage assets which are included in the detailed setting assessment, under indirect effects for the proposed development, will also be considered when assessing the potential for cumulative effects. However, only those assets which are judged to have the potential to be subject to significant cumulative effects will be included in the detailed cumulative assessment provided. In assessing cumulative effects operational, under construction, consented and proposed developments will be considered. While all of these developments and development proposals will be considered, only those specific developments which would contribute to, or have the possibility to contribute to, cumulative effects on specific heritage assets will be discussed in detail in the text.

4.5 Noise

4.5.1 Introduction

The noise assessment will consider the potential for noise generated by the development to impact upon existing residential receptors. The significance of any noise impacts will also be predicted. The effects of construction noise on marine life shall be considered as part of the Ecology EIA assessment.

4.5.2 Baseline Conditions

Part of the proposed site is currently occupied by BiFab who operate an engineering / fabrication yard and quay. There is therefore a component of industrial noise present in the current noise environment at Arnish.

The port is otherwise located in a rural location, the closest residential receptors being across the water in Stornoway, greater than 1km to the north-west at its closest point

Outside of the site boundary sources that may generate noise include industrial/commercial activities in and around Stornoway. Considering the distances involved (greater than 1km), these are not considered to be significant.

4.5.3 Potentially Significant Effects during Construction

The noise from certain construction activities has the potential to impact upon existing noise sensitive receptors. Construction details have not been finalised at this stage. The degree of impact during the construction phase will depend upon;

- The nature of construction activities being carried out; this includes the type and size of machinery/plant involved, combinations of activities happening simultaneously and HGV routes in and around the site;
- Location of construction activities relative to the closest noise sensitive receptors;
- Duration of proposed activities;
- Construction site operating times; and
- Extent of noise mitigation measures in place.

Noise generating activities during the construction phase are understood to include;

- Bulk blasting of rock from slopes behind the quay;
- Dredging of an area of the sea bed adjacent to the new quay. It is understood this may be carried out by a cutter suction dredger or large backhoe dredger on a hopper barge;
- Land reclamation using material from rock blasting and dredging;
- Piling of steel tubes into the sea bed as part of the main quay wall / side wall of the ferry berth construction;
- Road improvement works; and
- HGV and construction plant movements in and around the site.

4.5.4 Potentially Significant Effects post-Completion

Certain activities during the operational phase have the potential to generate noise, these include;

- Loading / unloading activities within the heavy lift area;
- Berthing and unloading gantries for oil delivery vessels;
- Loading / unloading and berthing activities from cruise liners and freight ferries;
- Engineering and fabrication works; and
- Increased road traffic on the newly upgraded link road between the site and the A859.

4.5.5 Inclusion or Exclusion from EIA

Construction Noise;

Details of construction activities have not been finalised at this stage. When this information is known, construction noise from these activities shall be assessed as part of the EIA. Details on the specifications, locations and durations of potentially noise plant and equipment shall be obtained from the contractor and used to determine the most exposed sensitive receptors to construction noise. Baseline noise surveys pre-construction shall be carried out to determine the existing noise climate.

Noise from construction activities shall be predicted at the most exposed residential receptors following guidance provided in *BS5228-1:2009; Code of Practice for Noise and Vibration Control on Construction and Open Sites.* Predicted increases in levels above baseline shall be assessed in order to determine the significance of effects. The results of the assessment can be used to inform a construction noise management plan, to help mitigate any effects at the most exposed sensitive receptors.

Operational Noise;

The site is located in a rural location, the closest residential receptors being in Stornoway, greater than 1km to the north-east at its closest point. Due to the distances involved, and that there is currently industrial noise present at the site, significant noise impacts are not anticipated.

An assessment of operational noise at the closest residential receptors requires detailed information of activities, items of plant/machinery, along with durations involved. When such information is known in more detail a desktop assessment shall be carried out to determine if there is a noise impact at the closest residential receptors in Stornoway. If sufficient information is available to make this assessment it may be included as part of the EIA, otherwise it may be provided as a stand-alone assessment at a later date.

4.5.6 EIA Assessment Methodology

A desktop assessment of operational noise shall be carried out; as mentioned in Section 4.5.5; due to the distances of greater than 1km between source and receivers this is not likely to be significant. If sufficient information is available to carry out the desktop assessment it may be included as part of the EIA, otherwise it may be provided as a stand-alone assessment at a later date.

The construction noise assessment shall be carried out following the guidance outlined below.

BS5228-1:2009; Code of Practice for Noise and Vibration Control on Construction and Open Sites.

Methods for calculating noise produced by construction and open sites such as quarries are provided in BS5228-1:2009. The document gives source data for different types of noise source, as well as methods for calculating noise from stationary and mobile plant. Specific advice on noise from sources such as piling is provided. BS5228 does not give full guidance on noise limits, however, guidance is provided on setting appropriate day and night-time limits. Recommendations for basic methods of noise control relating to construction and open sites where activities/operations generate significant noise levels are provided.

The construction noise impact assessment will comprise the following elements;

- Measurement of existing baseline noise environment at a sample of 2-3 areas representative of the most exposed noise sensitive receptors surrounding the development. Measurement positions will be agreed with Comhairle nan Eilean Siar Council Environmental Health Department.
- Review of construction activities, locations, noise data and identification of sensitive receptors to be considered in the assessment (to be agreed with Comhairle nan Eilean Siar Environmental Health Department)
- Calculation and assessment of construction noise at most exposed sensitive receptors; comparison to baseline noise levels.
- If necessary, provide advice on potential mitigation measures necessary to reduce the significance of the construction noise impact.

Sensitive receptors to be included in the assessment are likely to include residential properties on Newton Street, Builnacraig Street and Battery Park Road.

The potential for cumulative interaction has been considered in relation to the Applicant's other proposed development i.e. Newton Marina. Although the Applicant will seek a Scoping Opinion for both sites, at this stage, it has not been determined whether or not both will proceed at the same time, and therefore it is impossible to determine if there are likely to be cumulative noise impacts at this stage. Should both developments proceed simultaneously, given the primary receptors of cumulative effects would be those residential properties specified above, construction noise impacts from the Port development would be partly mitigated by the intervening

distance and it is unlikely that peak construction activity would occur simultaneously. At this stage, it is proposed to scope out cumulative noise assessment.

4.6 Air Quality

4.6.1 Introduction

The development has the potential to impact local air quality in a number of ways with the key issues in relation to air quality being traffic emissions from the local road network both surrounding and accessing the site and dust emissions during the construction phase.

4.6.2 Baseline Conditions

In order to inform the Scoping Report, the relevant 1km background air quality concentration maps were obtained from the Scottish Air Quality and DEFRA websites. The 2016 measured annual average concentrations of NO_2, PM_{10} and $PM_{2.5}$ are 4.19µg/m^3, 7.38µg/m^3 and 4.62µg/m^3 respectively for background square (142500, 930500). This indicates the good air quality within the area of the site with the concentrations well below the relevant National Air Quality Objectives of 40µg/m^3, 18µg/m^3 and 10µg/m^3 respectively.

The 2016 Air Quality Progress Report for Comhairle nan Eilean Siar Council (the most up-to-date report available) does not identify any Air Quality Management Areas (AQMAs) within the council area.

Comhairle nan Eilean Siar Council does not currently operate any automatic air quality monitoring stations within their boundary and monitoring via diffusion tubes is limited to within Stornoway circa 1.38miles to the north and therefore not representative of conditions at the proposed development.

4.6.3 Potentially Significant Effects during Construction

Potential exists for certain construction activities to generate dust and impact existing residents. Impacts can arise at various construction phases including Earthworks, Demolition, Construction and Trackout and have the potential to cause dust soiling, human health and ecological impacts if not managed appropriately.

4.6.4 Potentially Significant Effects post-Completion

Potential exists for an increase in traffic in the vicinity of the surrounding road network and in turn increases in the pollutants NO_2, PM_{10} and $PM_{2.5}$ which are most commonly associated with traffic emissions. This has the potential to impact both existing and future residents.

4.6.5 Inclusion or Exclusion from EIA

The primary long-term concern in relation to air quality is the emissions generated by traffic and the subsequent impact on the local ambient air quality at residential and public areas located within the vicinity of the main road network. The main pollutants of concern associated with road traffic emissions are NO_2, PM_{10} and $PM_{2.5}$.

It is estimated that the development will not lead to a significant increase in road traffic on the surrounding roads. Further to this, with data indicating that air quality is good in the vicinity of the site it is anticipated that any increase in exhaust emissions would have a negligible effect on air quality at sensitive receptors. This will therefore not be assessed as part of the EIA.

Construction of the proposed development is considered to be a temporary impact and can be controlled through developing a site-specific Dust Management Plan as part of a Construction Environmental Management Plan (CEMP). The dust impact assessment requires specific information on site operations during construction, including preparatory earthworks, general construction and the potential for trackout during construction of the proposed development. Currently this information is still being finalised. It is therefore proposed to defer the construction dust assessment and formulation of a construction dust management plan until such time as details on construction have been finalised.

Accordingly, there is no requirement for a specific air quality EIA Report chapter. The findings of the construction dust assessment will be incorporated into the Other Issues chapter.

4.7 Water Environment

4.7.1 Introduction

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. This section of the EIA will therefore address all of these subject areas, in addition to geology. The associated interactions between the water environment, ecology and fisheries will be considered within the ecology section of the EIA.

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 EIA.

The development proposals for the deep water port at Arnish have the potential to cause changes to the baseline hydro(geo)logical conditions and the ongoing coastal processes at the site, and in the wider area. Given the importance of water as a valued resource, coastal processes to the surrounding environment, and of ensuring sustainable development, an assessment of the water environment and coastal processes is considered essential.

4.7.2 Baseline Conditions

The proposed deep water port development site lies within the coastal inlet of Cala Ghlumaig, located on the north-eastern shore of Arnish Point at the mouth of Stornoway Harbour. The tidal embayment of Stornoway Harbour extends up to 3km in length, and around 1.5km in width at its widest point, covering an area of just over 3km^2.

Geology

The site is partially underlain by Protocataclasite (Outer Hebrides Thrust Complex), with Gneiss (Lewisian) present immediately to the west, and Conglomerate (Stornoway) to the north and east. There are no significant superficial deposits mapped within the vicinity of the site (BGS, n.d.).

Coastal Processes

Tidal currents within the Stornoway Harbour embayment are insignificant. The wave climate is dominated by locally generated wind waves, whilst standing wave oscillations (seiches) can occur within the harbour (up to 0.5m in amplitude) when atmospheric depressions pass northwards. A small quantity of silt and peat is deposited in Stornoway Harbour from the Bayhead River during high flow events. Maintenance dredging of this material is infrequently required (once a decade) as a result (Ramsay & Brampton, 2000). The European Nature Information

System (EUNIS) seabed habitat map shows the dominant seabed habitat within the harbour embayment to be rock or other hard strata, present within a low energy environment (EMODnet, 2017).

Tidal Water Levels

Tidal levels at Stornoway Harbour as presented within the Admiralty Tide Tables (UKHO, 2017) are shown in . The mean tidal range at Stornoway is 4.1m during spring tides and 1.7m during neap tides.

Table 4-18 Tidal Range at Stornoway

Tide Condition	Chart Datum (mCD)	Ordnance Datum (mOD)
Highest Astronomical Tide (HAT)	5.5	2.79
Mean High Water Spring (MHWS)	4.8	2.09
Mean High Water Neap (MHWN)	3.7	0.99
Mean Low Water Neap (MLWN)	2.0	-0.71
Mean Low Water Spring (MLWS)	0.7	-2.01

Extreme sea levels have been predicted around the whole UK coastline and published by the Environmental Agency/Department for Environmental Food and Rural Affairs report (McMillan et al., 2011). 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, SEPA have updated the original estimates. The SEPA derived extreme sea levels, predicted at a point within Stornoway Harbour, are 3.4m Above Ordnance Datum (AOD) for the 1 in 200 year return period event and 3.51mAOD for the 1 in 1,000 year return period event .

Hydrology

The two main inflows of freshwater to the Stornoway Harbour embayment are the Bayhead River, which enters at the northern (inland) tip of the harbour, and the Abhainn Ghrioda, which enters the harbour on the western shore, opposite Goat Island. Bayhead River is a minor watercourse with a catchment area of under 8km^2. The Abhainn Ghrioda is a larger watercourse, with a catchment area of around 50km^2, however the inflow of freshwater remains insignificant relative to the much larger volume of seawater exchanged within the harbour embayment.

There is a single mapped inflow of freshwater to Cala Ghlumaig, the Allt Poll a' Choire enters the bay at the north-western corner. This is a minor watercourse originating from a small lochan a few hundred metres to the south-west. It is considered likely that there may also be some local discharges from piped drainage systems, particularly in the vicinity of the fabrication yard.

Water Quality

The coastal waters of Stornoway Harbour are classified under the Water Framework Directive (WFD) monitoring programme as a coastal waterbody. The waterbody is classified as being of overall 'Good' status in 2015, with a hydromorphological status of 'High'. Of the watercourses discharging to Stornoway Harbour only the Abhainn Ghrioda is large enough to be classified, with an overall status of 'High' in 2015 (SEPA, n.d.).

4.7.3 Potentially Significant Effects during Construction

The proposed development will involve construction activities in and near the water environment, including land reclamation, new quay walls and seabed dredging. The key potential environmental impacts on the water environment and coastal processes during construction and operation have been identified and are outlined below:

- Potential changes in the local wave climate;
- Potential changes in local flood risk and drainage;
- Potential contamination of coastal water and sediments through spillages and/or sediment transfer (oil, fuels and suspended solids); and
- Potential interactions between water environment impacts and associated ecology.

4.7.4 Potentially Significant Effects post-Completion

Potentially significant effects arising from the post-completion phase (i.e. once the development has been built), are likely to arise from the same potential impacts as highlighted above within section 4.7.3.

4.7.5 Inclusion or Exclusion from EIA

The nature of the proposed works, including land reclamation, new quay wall construction and capital dredge requirement, raises the potential for impacts on the local wave climate, and associated impacts on the local fishing fleet, ferry transport link and other harbour users. A wave modelling study is therefore proposed in order to assess the potential impact of the proposed works on the wave climate within Stornoway harbour.

Given the absence of significant tidal currents, sediment input and transport within the harbour, and the prominence of bedrock around the foreshore, it is considered unlikely that there would be any significant impact from the proposed development on tidal currents or sediment processes. It is proposed that a desk based study of local hydrodynamic conditions within the harbour embayment should be undertaken to confirm this understanding.

Site investigation will be required within the proposed works area, particularly the dredge pocket, in order to determine the nature of the substrate, the likely implications for the project, and licencing requirements.

Assessment of the potential for particulate and chemical contamination of water will be central to the assessment. The prevention of pollution during construction and operational phases will be a specific focus of the EIA and recommendations made for the adoption of good working practices, including suitable drainage measures, in line with appropriate guidance and not to the detriment of existing conditions.

The proposed development will be considered in light of potential flood risk, including wave overtopping and surface water drainage.

4.7.6 Design and Mitigation

Where any significant effects on the water environment or coastal processes are identified as part of the EIA process, recommendations for design alteration or mitigation which could avoid, reduce or remedy the adverse effects will be identified.

4.7.7 EIA Assessment Methodology

The assessment will follow standard EIA procedures and will include:

- Desk based review of the design of the proposed development in relation to the local water environment 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 and ground conditions at the site and environs;
- Review of hydrology, catchment characteristics, local drainage and water quality conditions;
- Review of coastal processes including bathymetry, tidal levels, river and tidal flow currents, wave action, bed sediment type and distribution, sediment transport and deposition, geology;
- Site investigation within proposed dredge pocket to establish nature of dredge material;
- Wave modelling study to establish baseline and design conditions;
- Flood risk assessment, including wave overtopping and surface water drainage with climate change scenarios; 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 significance;
  - Identification and assessment of mitigation measures to reduce or avoid any potential impacts of the proposed development; and
  - Statement of residual impacts.

Potential impacts arising from the development will be predicted and evaluated by comparison with environmental quality standards, sediment quality standards, and water and sediment quality objectives. The observed baseline data will initially be used along with expert opinion to qualitatively assess the potential impacts and the significance to receptors.

4.8 Traffic and Transport

4.8.1 Introduction

The transport related issues associated with the proposed development have been assessed against national and local policies set out in the following documents:

- National Planning Framework (NPF) 3;
- Planning Advice Note 75 Planning for Transport;
- Outer Hebrides Local Development Plan (LDP) 2 – Working Towards A New Plan (2012);
- The Transport Strategy for the Highlands and Islands – Hitrans (2008 – 2021);

The principal objective of the policies in the above documents is to support the promotion of accessibility by all modes of travel in order to support sustainable economic growth.

National Planning Framework (NPF3) states plans and decisions should take account whether:

- The opportunities for sustainable transport modes have been taken up depending on the nature and location of the site, to reduce the need for major transport infrastructure;
- Safe and suitable access to the site can be achieved for all people; and
- Improvements can be undertaken within the transport network that cost effectively limits the significant impacts of the development. Development should only be prevented or refused on transport grounds where the residual cumulative impacts are severe.

Outer Hebrides Local Development Plan (LDP) 2 supports sustainable developments that

- Support development that reflects the scale and function of Stornoway,

- Promotes opportunities for economic growth,
- Ensure the sustainability of settlements by reducing the emissions which cause climate change and adapting to its effects; and
- Maximise the re-use of previously developed land, in the built out areas.

The Transport Strategy for the Highlands and Islands sets out the thirteen-year transport strategy for the area from 2008 to 2021. The Plan is produced by the Highlands and Islands Transport Partnership (HITRANS) on behalf of the five local authorities (Argyll and Bute, Highland, Moray, Orkney Islands and Comhairle nan Eilean Siar).

The Transport Strategy for the Highlands and Islands is focused on ways to address challenges within three key areas:

- Supporting economic development and regeneration;
- Addressing climate change;
- Supporting safe and sustainable communities

Dredged material will be used as an infill, and as such will alleviate the need for HGVs. There may be a limited number of vans and HGVs delivering. It is anticipated that staff will be transported to the site in company vehicles in order to minimise disruption to local residents during the construction period, however, there will also a number of staff who travel using their own vehicle.

4.8.2 Baseline Situation

Site Access

The A859 is the main road from Stornoway on Lewis to Leverburgh (An t-Ob) on Harris and then on to the end of the island at Rodel. The A859 starts at a roundabout with the A857 to the north of Stornoway, and slowly turns round to take its south-westerly course across Lewis.

Access to the proposed development site at Arnish is approximately 1km North of Loch Cnoc a' Choilich via a single track road from the junction with the A859. The Deep Water Port at Arnish will be approximately 3.5km from main spinal route.

Data Sources

Traffic flow data for the A859 recorded during 2015 (the most recent information available) was obtained from the Department for Transport website (DfT, 2013).

The main period of traffic generation will potentially be during the construction period. It is likely that most of the dredge material will be reused as infill material, and only a limited volume will be taken of site for treatment/ disposal.

The delivery of goods and materials, as well as the transport of construction personnel to and from the site will result in additional traffic on the network. Construction traffic has the potential to affect other road users, such as drivers, cyclists and pedestrians, as well as people living and working close to the affected road network. The following types of impacts will be assessed: changes in traffic conditions and their potential for delays and congestion; pedestrians and cyclist conditions and their potential conflict with road traffic; and changes in traffic related noise levels.

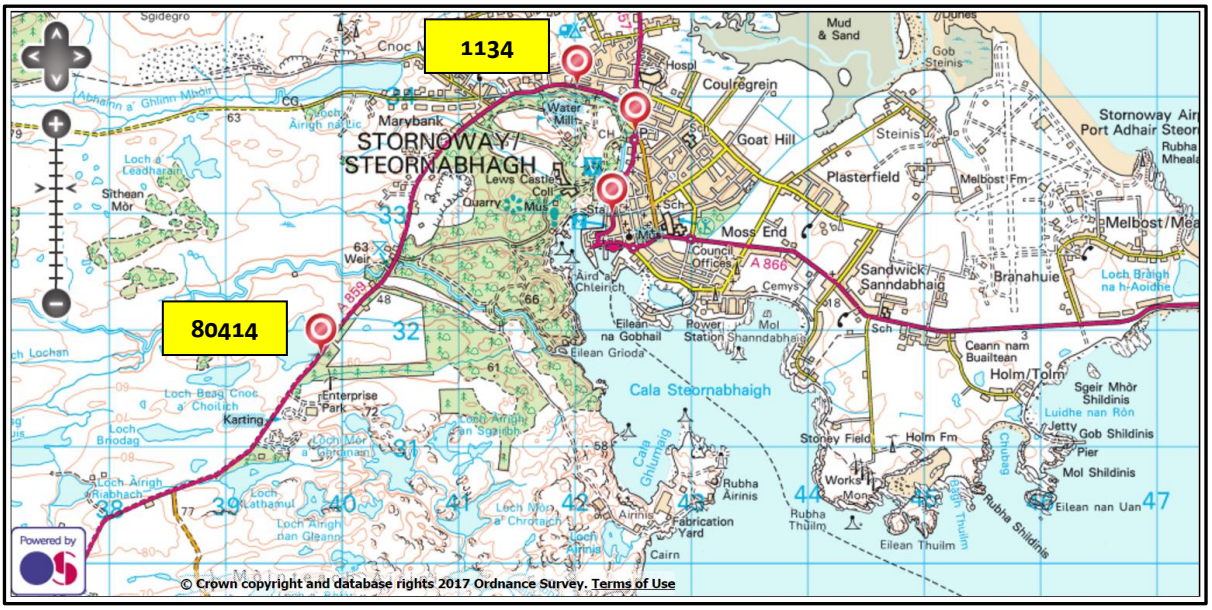
The Department for Transport holds annual average daily flow (AADF) traffic data from automatic traffic counters on the A859 in the vicinity of the site1. The hourly flow profile (with class breakdown) for the count undertaken in 2015 has been used as baseline traffic flow data. Table 4-19 summarises this data, while Figure 4-1 highlighting the traffic count points.

Table 4-19 Traffic Flow Information (ADDF) 2015 Data

Count point id:	Road	Grid Ref.	Start Junction	End Junction	Annual average daily flow (All Motor Vehicles)	Total HGV
80414	A859[15]	139800, 931800	A858	A859	656	67
1134	A858[16]	142000, 934100	B8060	A858	6964	205

The road approaching Arnish from Stornoway relatively lightly used, and is currently used by vehicles accessing the unclassified road Arnish Industrial Estate.

Figure 4-1 Traffic Point



Road Safety

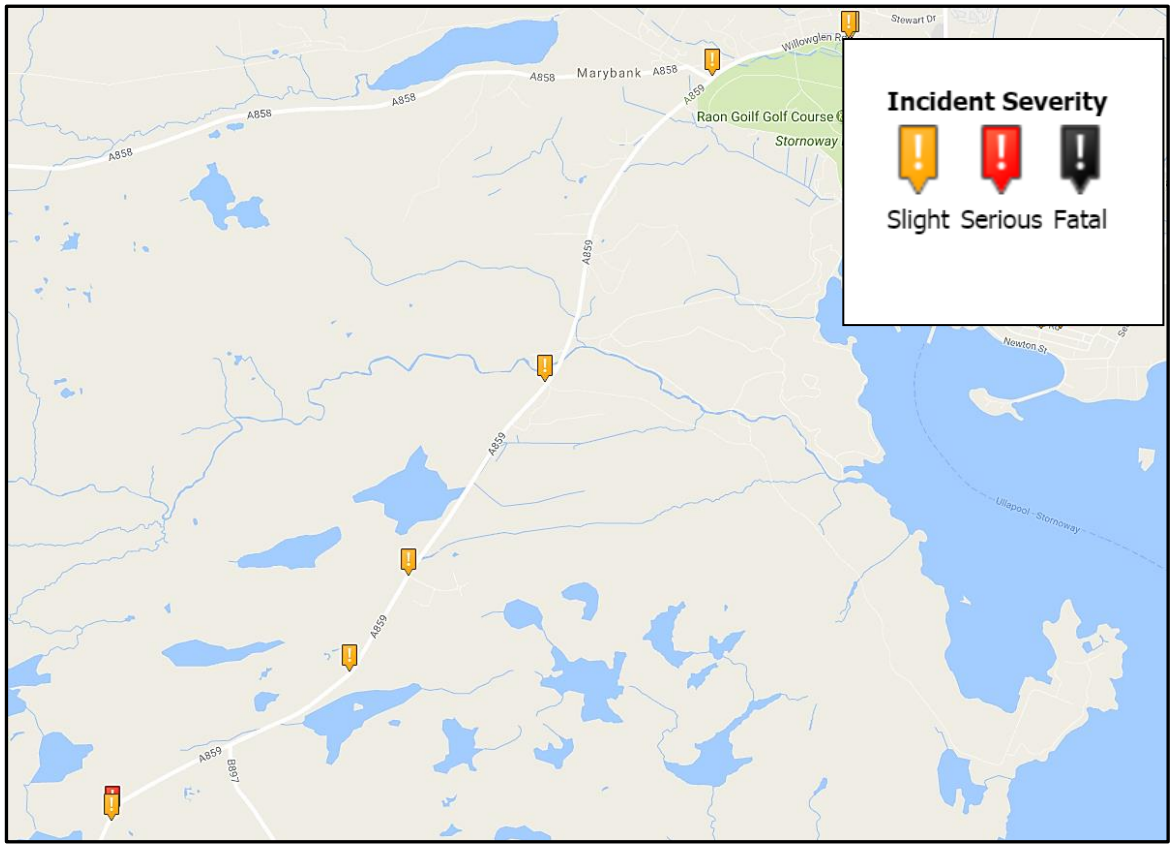
CrashMap[17] was interrogated to identify the number of road traffic incidents within the vicinity of the proposed Deep Water Port. CrashMap uses data collected by the police about road traffic incidents on British roads where someone is injured which is then compiled in to an easy to use format showing each incident on a map. Incidents are plotted to within 10m of their location. Table 4-20 indicates that there have been 8 Incidents in the five years up to, and including, 2016. Figure 4.2 shows the location of the incidents.

Table 4-20 Road Traffic Incidents

Year	Slight	Serious	Fatal
2012	1	0	0
2013	2	0	0
2014	1	0	0
2015	2	1	0
2016	1	0	0
Total	**7**	**1**	**0**

[15] https://www.dft.gov.uk/traffic-counts/cp.php?la=Comhairle+nan+Eilean+Siar#80414
[16] https://www.dft.gov.uk/traffic-counts/cp.php?la=Comhairle+nan+Eilean+Siar#1134
[17] http://www.crashmap.co.uk/search#

Figure 4-2 Road Traffic Incidents



4.8.3 Potentially Significant Effects during Construction

The following are considered to be the key potential effects with respect to traffic and transport during construction:

- Effects upon the levels of traffic experienced at the existing harbour;
- Effects upon the condition/structure of the road network;
- Environmental effects resulting from associated noise, vibration, and air pollution impacts;
- Effects upon pedestrians and other similar users in terms of delays and severance/amenity impacts (due to physical barriers or the effects of increased traffic flows);
- Road safety and the potential for accidents;
- The effects of heavy/abnormal loads on the road network;
- Ensuring the safe operation of the harbour with particular respect to existing marine traffic during harbour operation.

With respect to marine traffic, during construction there is the potential for incidents to occur as a result of the presence of dredging and other construction plant in the water. As with all construction works taking place in the marine environment, standard measures will need to be put in place to reduce the navigation risk to other vessels; for example, the construction works would need to be appropriately marked, construction plant be appropriately lit, and notices to Mariners issued, etc.

4.8.4 Potentially Significant Effects post-Completion

During the operational phase the Deep Water Port it is not considered likely to be a significant traffic generator. Although traffic associated with Arnish Industrial Estate is already present; any significant increase in activities has the potential to increase traffic on the local road network.

4.8.5 Inclusion or Exclusion from EIA

Details of construction activities, including the source and transportation method used to deliver incoming construction materials have not been finalised at this stage. When this information is known, construction traffic generated as a result of these activities shall be assessed as part of the EIA. Details on the specifications, locations and duration of traffic movements shall be determined from the contractor. Baseline traffic surveys pre-construction shall be carried out to determine existing traffic conditions.

4.8.6 EIA Methodology

The assessment will be broadly based on the Institute of Environmental Assessment (IEA)[18] *Guidelines for the Environmental Assessment of Road Traffic*. A site visit will be undertaken to observe background transport conditions and identify access constraints/ opportunities.

This guidance is the only document available which sets out a methodology for assessing potentially significant traffic-related environmental impacts where a proposed development is likely to give rise to changes in traffic flows.

The receptors that will be assessed are the users of local roads and the occupiers and users of land that front the local roads. This is because a change in characteristics, such as an increase in traffic and composition of HGVs, could adversely affect them.

The following rules, summarised from the IEMA guidelines, be used as a screening process to define the scale and extent of this assessment.

- Rule 1: Include roads where traffic flows are predicted to increase by more than 30% (or where the numbers of HGVs are predicted to increase by more than 30%).
- Rule 2: Include any specifically sensitive areas where traffic flows are predicted to increase by 10% or more.

The IEMA guidelines elaborate on Rule 1 stating that projected changes in traffic of less than 10% create no discernible environmental impact, given that daily variations in background traffic flow may fluctuate by this amount, and that a 30% change in traffic flow represents a reasonable threshold for including a highway link within the assessment.

The IEMA guidelines also identify groups, locations and areas which may be sensitive to changes in traffic conditions and which should be considered for assessment. Groups, locations and areas could, for example, include pedestrians, cyclists, shopping areas, schools and accident hotspots. Where traffic flows are predicted to increase by 10% or more, those relevant sensitive groups, locations and areas will be assessed. It should also be noted that the IEMA guidelines also state that other affected parties could be added if the assessor considers it appropriate.

[18] Now the Institute of Environmental Management and Assessment (IEMA)

The potential impacts resulting from construction and development traffic likely to be generated by the proposed development will be considered in relation to the following areas:

- Traffic generation;
- HGV accessibility;
- Severance;
- Driver Delay;
- Pedestrian Delay;
- Pedestrian Amenity, Fear and Intimidation; and
- Accidents and Safety, including driver distraction.

4.9 Other Issues

4.9.1 Introduction

This section incorporates those issues which are relevant to the proposed development however to do merit or justify a full chapter within the EIA Report, or similarly where there is no standard methodology. As discussed within section 3.4 of this Scoping Report, the changes to the EIA Regulations include requirement to consider climate change and natural disasters. This section also discusses cumulative assessment in relation to other elements of a proposed Masterplan for Stornoway, and air quality considerations as referred to within section 4.6.5.

4.9.2 Climate Change

Climate change has taken a prominent position within policy and legislation at a national level, with the Climate Change (Scotland) Act 2009 creating a long-term framework for ensuring reduction in Scottish greenhouse gas emissions of 80% by 2050.

Under Schedule 4(4), the EIA Regulations require "*a description of the factors specified in 4(3) likely to be significant affected by the development…(including) climate (for example greenhouse gas emissions, impacts relevant to adaption*)". In addition, Schedule 4(5)(f) of the EIA Regulations requires a "*description of the likely significant effects of the development on the environment resulting from…the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change".*

It is considered at the Scoping stage that the proposed development would not result in a significant effect upon climate given the nature of the development. Any increase in emissions created during either construction or operation is likely to be negligible, and pollution and emissions control would be discussed within a detailed Construction Environmental Management Plan (CEMP). Discussion of the vulnerability of the project to climate change is primarily concerned with the water environment, including flood risk and wave overtopping due to increases in sea level. This would be covered within the modelling and impact assessment within the Water Environment chapter.

4.9.3 Natural Disasters

The proposed development is not located within an area of significant seismic activity, nor are climatic factors prone to creating disasters such as tsunamis, hurricanes or catastrophic flooding. Accordingly consideration of natural disasters is scoped out of the EIA.

4.9.4 Air Quality

Air Quality would form part of the Other Issues chapter as discussed within section 4.6.5, in particular reference to dust.

4.9.5 Cumulative Assessment

Those environmental topics which are considered to require cumulative assessment are included within the relevant sections of section 4. It is not proposed to incorporate a separate cumulative assessment elsewhere within the EIA Report. It is acknowledged that the proposed development is part of a larger Masterplan for the area which has been promoted by the Applicant. It is also acknowledged that a separate Masterplan is in the early stages of being promoted by Comhairle nan Eilean Siar. It is also acknowledged that the SSE interconnector building, to the south of the site, is consented however the cable linkages are not.

Cumulative assessment would be considered between the Deep Water Port and the Newton Marina where concurrent environmental effects are apparent. It is not proposed to incorporate cumulative assessment of the Council's masterplan for the town.

5 CONTENT AND STRUCTURE OF THE ENVIRONMENTAL STATEMENT

5.1 Content and Structure

Following the rationale set out within the above sections, it is proposed that the final ES is set out within the following structure:

- Volume 1: EIA Report, containing:
  - Preface
  - Chapter 1: Introduction
  - Chapter 2: EIA Methodology and Scoping
  - Chapter 3: The Proposed Development
  - Chapter 4: Planning Policy Context
  - Chapter 5: Landscape and Visual
  - Chapter 6: Ecology
  - Chapter 7: Cultural Heritage and Archaeology
  - Chapter 8: Noise
  - Chapter 9: Water Environment
  - Chapter 10: Traffic and Transport
  - Chapter 11: Other Issues
  - Chapter 12: Schedule of Mitigation
  - Chapter 13: Conclusions
- Volume 2: Figures, containing relevant supplementary figures and drawings relevant to Volume 1 chapters;
- Volume 3: Technical Appendices, including reports and technical background documents which support the main assessments contained within Volume 1; and
- A standalone Non-Technical Summary (NTS).

6 CONCLUSIONS

It is anticipated that the proposed development will fall under Schedule 1 of the 2017 EIA Regulations, it is appropriate to request a Scoping Opinion from Comhairle nan Eilean Siar under Regulation 17(1). Sufficient baseline information has been provided regarding the proposed development and the surrounding and receiving environment upon which to base a decision.

The information and methodologies contained within this report allow the Council, Marine Scotland and other consultees to advise and approve the scope of work and add relevant information and guidance as required. We would be very grateful to receive a formal Scoping Opinion within a 5 week period and are committed to working with all consultees to deliver a proportionate, robust EIA that benefits the Western Isles.

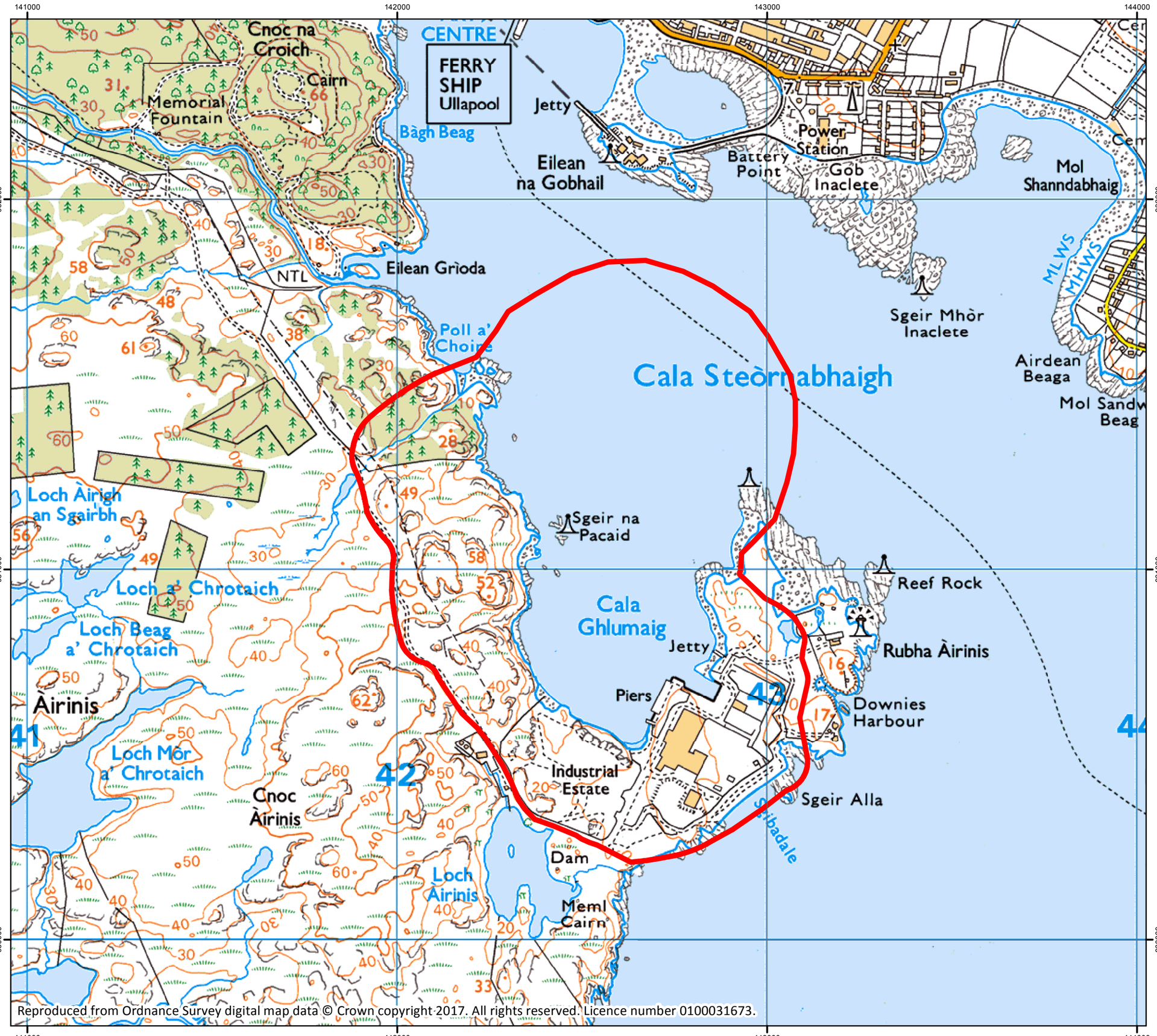
For the benefit of doubt, the environmental topics we propose to scope **in** to the EIA Report are:

- Landscape and Visual;
- Ecology;
- Cultural Heritage and Archaeology;
- Noise;
- Water Environment; and
- Traffic and Transport.

It is proposed that all other topics, including air quality, are scoped out.

APPENDICES AND DRAWINGS

A DRAWINGS



Reproduced from Ordnance Survey digital map data © Crown copyright 2017. All rights reserved. Licence number 0100031673.

Legend

Stornoway Deep Water Port / Arnish Industrial Site Boundary

Do not scale this map

Client
Stornoway Port Authority

Project
Stornoway Deep Water Port / Arnish Industrial Site

Title
Stornoway Deep Water Port / Arnish Industrial Site Boundary

Status
FINAL

Drawing No.
169438-001

Revision

Scale
1:10,000

A3

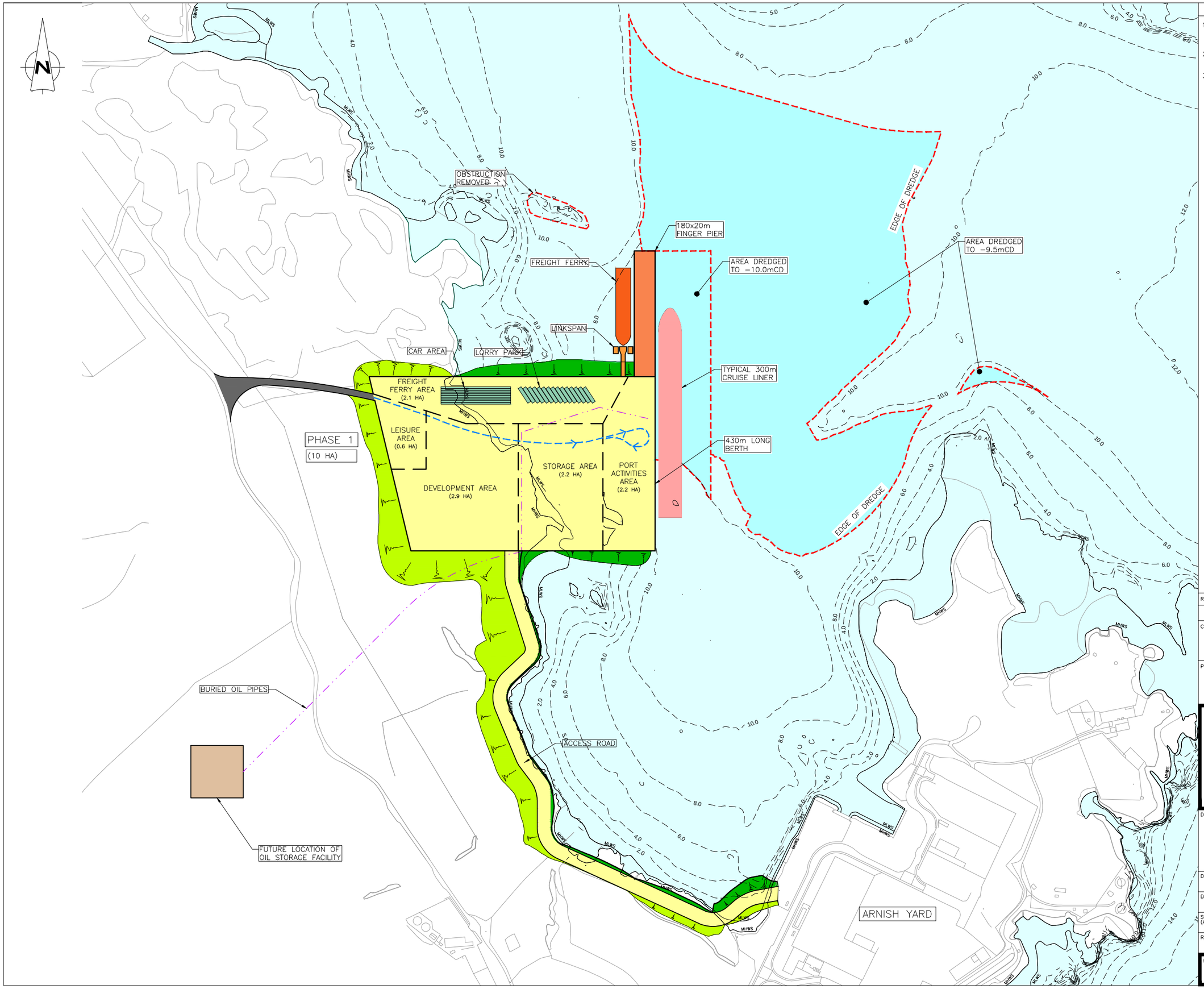
Date
7 Dec 2017

Drawn
SMC

Checked
IB

Approved
GF

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045



GENERAL NOTES

1. ALL LEVELS ARE IN METRES AND RELATE TO CHART DATUM, UNLESS NOTED OTHERWISE.
2. CHART DATUM IS 2.71m BELOW ORDNANCE DATUM.
3. TIDE LEVELS:−

HAT=	+5.5mCD	(+2.79mOD)
MHWS=	+4.8mCD	(+2.09mOD)
MLWS=	+0.7mCD	(−2.01mOD)
LAT=	0mCD	(−2.71mOD)

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D

AMENDMENTS

CLIENT

STORNOWAY PORT AUTHORITY

PROJECT

DEEP WATER PORT

Wallace Stone
CONSULTING CIVIL ENGINEERS

GLASGOW
0141 554 8233
glasgow@wallacestone.co.uk

DINGWALL
01349 866775
dingwall@wallacestone.co.uk

HEBRIDES
01851 612454
hebrides@wallacestone.co.uk

DRAWING TITLE

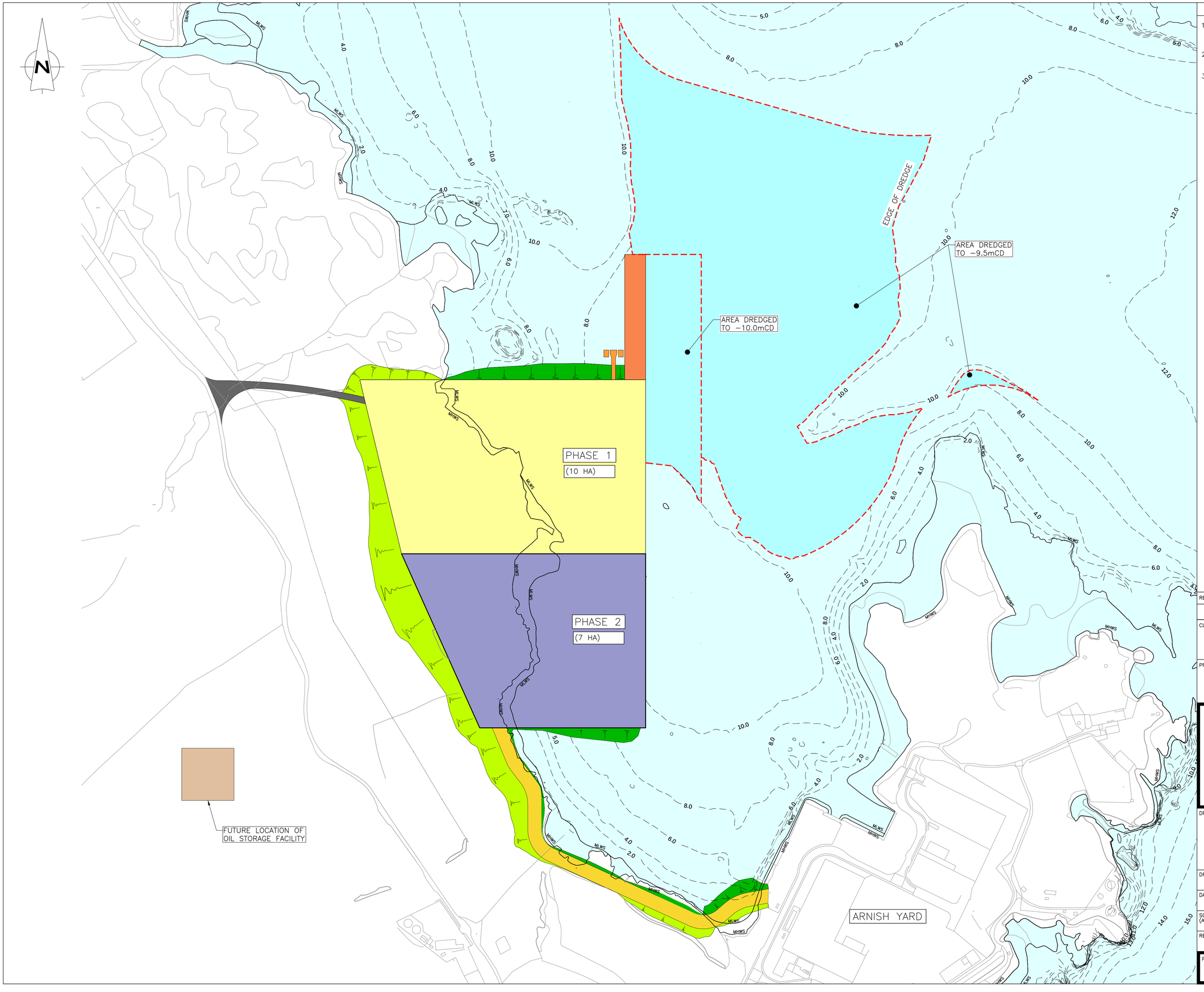
PHASE 1 LAYOUT

DRAWN	CHECKED	APPROVED
AB	RD	JP
DATE	DATE	DATE
NOV'17	NOV'17	DEC'17

SCALE (A1)	STAGE
1:2500	INFORMATION

REVISION

PROJECT No.	DRAWING No.
1980	901



GENERAL NOTES

1. ALL LEVELS ARE IN METRES AND RELATE TO CHART DATUM, UNLESS NOTED OTHERWISE.
2. CHART DATUM IS 2.71m BELOW ORDNANCE DATUM.
3. TIDE LEVELS:−

HAT=	+5.5mCD	(+2.79mOD)
MHWS=	+4.8mCD	(+2.09mOD)
MLWS=	+0.7mCD	(−2.01mOD)
LAT=	0mCD	(−2.71mOD)

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D

AMENDMENTS

CLIENT

STORNOWAY PORT AUTHORITY

PROJECT

DEEP WATER PORT

Wallace Stone
CONSULTING CIVIL ENGINEERS

GLASGOW
0141 554 8233
glasgow@wallacestone.co.uk

DINGWALL
01349 866775
dingwall@wallacestone.co.uk

HEBRIDES
01851 612454
hebrides@wallacestone.co.uk

DRAWING TITLE

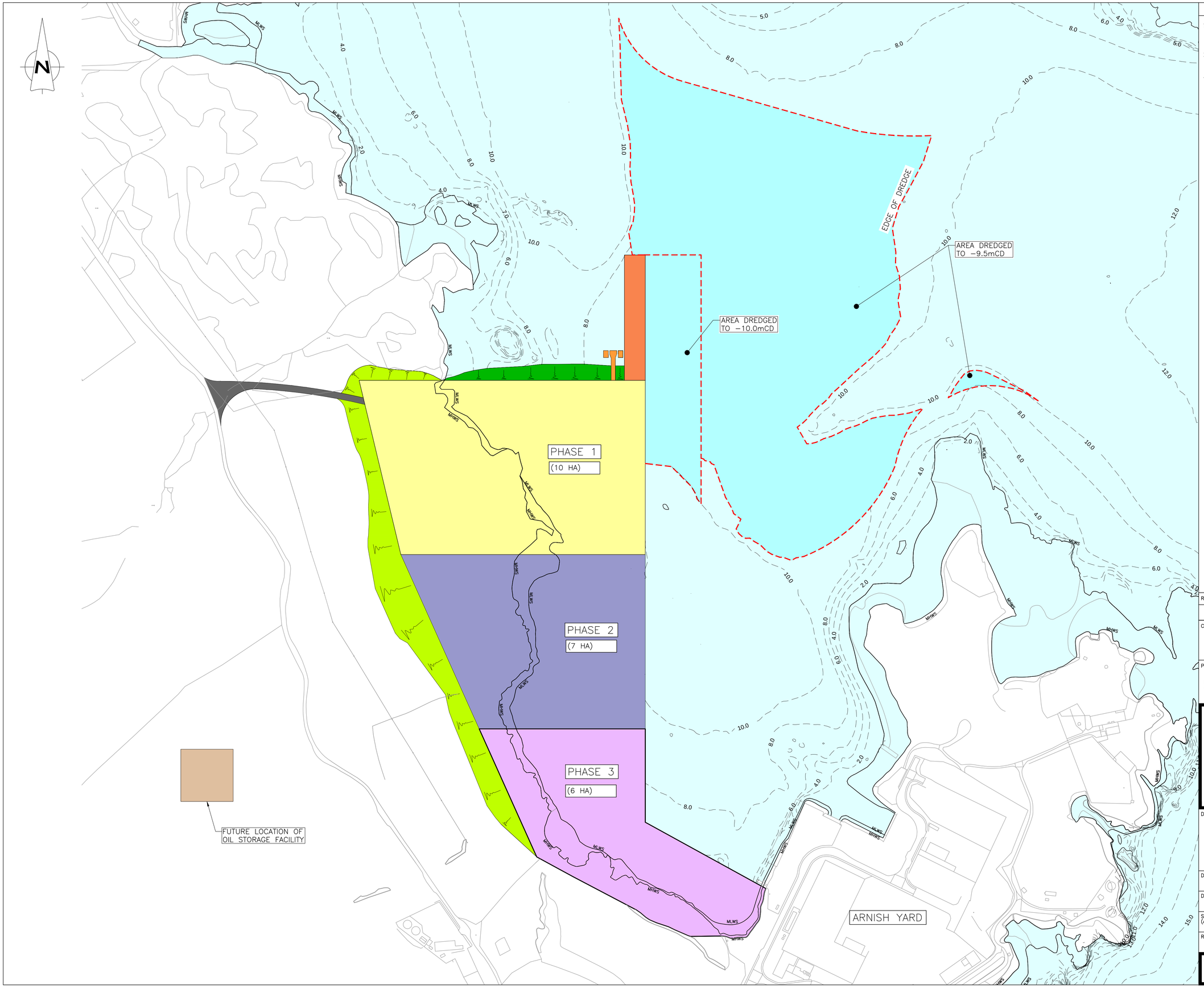
PHASE 2 LAYOUT

DRAWN	CHECKED	APPROVED
AB	RD	JP
DATE	DATE	DATE
NOV'17	NOV'17	DEC'17

SCALE (A1)	STAGE
1:2500	INFORMATION

REVISION

PROJECT No.	DRAWING No.
1980	902



GENERAL NOTES

1. ALL LEVELS ARE IN METRES AND RELATE TO CHART DATUM, UNLESS NOTED OTHERWISE.
2. CHART DATUM IS 2.71m BELOW ORDNANCE DATUM.
3. TIDE LEVELS:−

HAT=	+5.5mCD	(+2.79mOD)
MHWS=	+4.8mCD	(+2.09mOD)
MLWS=	+0.7mCD	(−2.01mOD)
LAT=	0mCD	(−2.71mOD)

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D

AMENDMENTS

CLIENT

STORNOWAY PORT AUTHORITY

PROJECT

STORNOWAY PORT MASTERPLAN

Wallace Stone
CONSULTING CIVIL ENGINEERS

GLASGOW
0141 554 8233
glasgow@wallacestone.co.uk

DINGWALL
01349 866775
dingwall@wallacestone.co.uk

HEBRIDES
01851 612454
hebrides@wallacestone.co.uk

DRAWING TITLE

PHASE 3 LAYOUT

DRAWN	CHECKED	APPROVED
AB	RD	JP
DATE	DATE	DATE
NOV'17	NOV'17	DEC'17

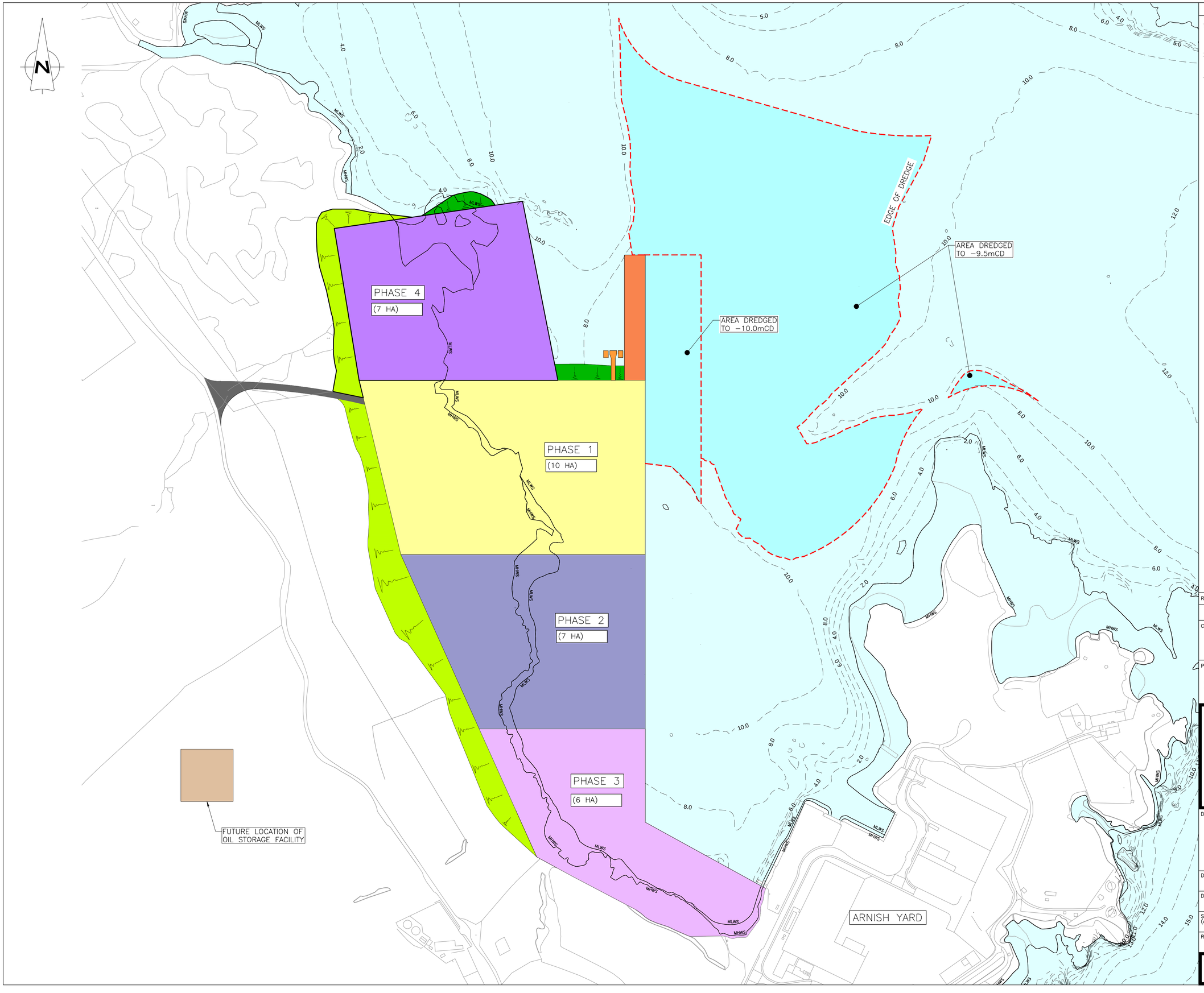
SCALE (A1) 1:2500

STAGE INFORMATION

REVISION

PROJECT No. 1980

DRAWING No. 903



GENERAL NOTES

1. ALL LEVELS ARE IN METRES AND RELATE TO CHART DATUM, UNLESS NOTED OTHERWISE.
2. CHART DATUM IS 2.71m BELOW ORDNANCE DATUM.
3. TIDE LEVELS:−

HAT=	+5.5mCD	(+2.79mOD)
MHWS=	+4.8mCD	(+2.09mOD)
MLWS=	+0.7mCD	(−2.01mOD)
LAT=	0mCD	(−2.71mOD)

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D

AMENDMENTS

CLIENT

STORNOWAY PORT AUTHORITY

PROJECT

STORNOWAY PORT MASTERPLAN

Wallace Stone
CONSULTING CIVIL ENGINEERS

GLASGOW
0141 554 8233
glasgow@wallacestone.co.uk

DINGWALL
01349 866775
dingwall@wallacestone.co.uk

HEBRIDES
01851 612454
hebrides@wallacestone.co.uk

DRAWING TITLE

PHASE 4 LAYOUT

DRAWN	CHECKED	APPROVED
AB	RD	JP
DATE	DATE	DATE
NOV'17	NOV'17	DEC'17

SCALE (A1) 1:2500

STAGE INFORMATION

REVISION

PROJECT No. 1980

DRAWING No. 904

Legend

- Stornoway Deep Water Port / Arnish Industrial Site Boundary
- 50m Buffer

Do not scale this map

Client: Stornoway Port Authority

Project: Stornoway Deep Water Port / Arnish Industrial Site

Title: Stornoway Deep Water Port / Arnish Industrial Site Boundary and 50m Buffer

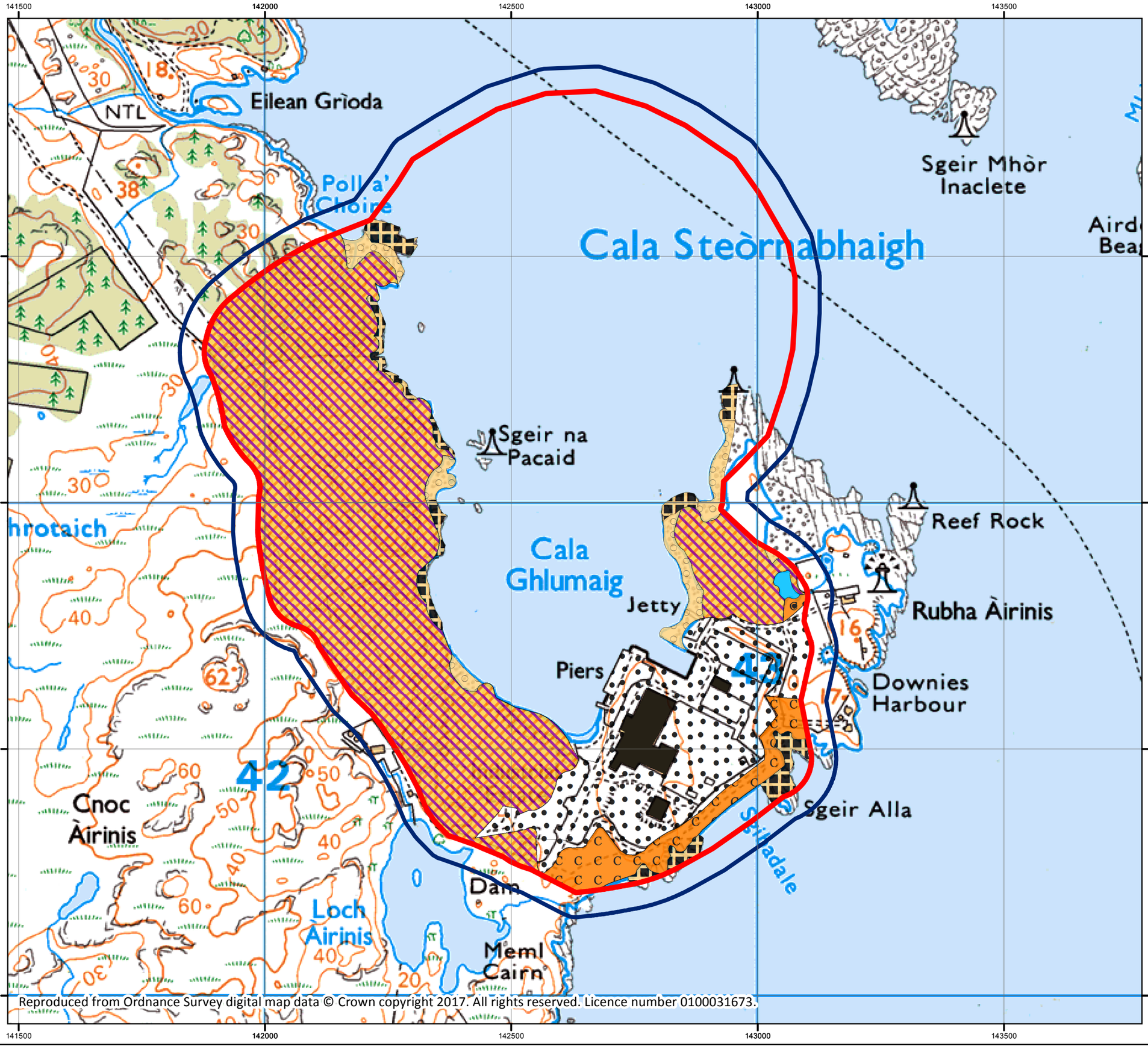
Status: FINAL

Drawing No.	Revision
169438-001	A

Scale		Date
1:10,000	A3	7 Dec 2017

Drawn	Checked	Approved
SMC	IB	GF

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045



Reproduced from Ordnance Survey digital map data © Crown copyright 2017. All rights reserved. Licence number 0100031673.

Legend

- Stornoway Deep Water Port / Arnish Industrial Site Boundary
- 50m Buffer

JNCC Habitat Code

- D6 Dry Heath
- G1 Standing Open Water
- H1.2 Shingle
- H1.3 Rock Outcrop
- H8.4 Coastal Ground (C)
- J3.6 Buildings
- J4 Bare Ground

Do not scale this map

Client: Stornoway Port Authority

Project: Stornoway Deep Water Port / Arnish Industrial Site

Title: Phase 1 Habitat Map

Status: FINAL

Drawing No.: 169438-003

Revision:

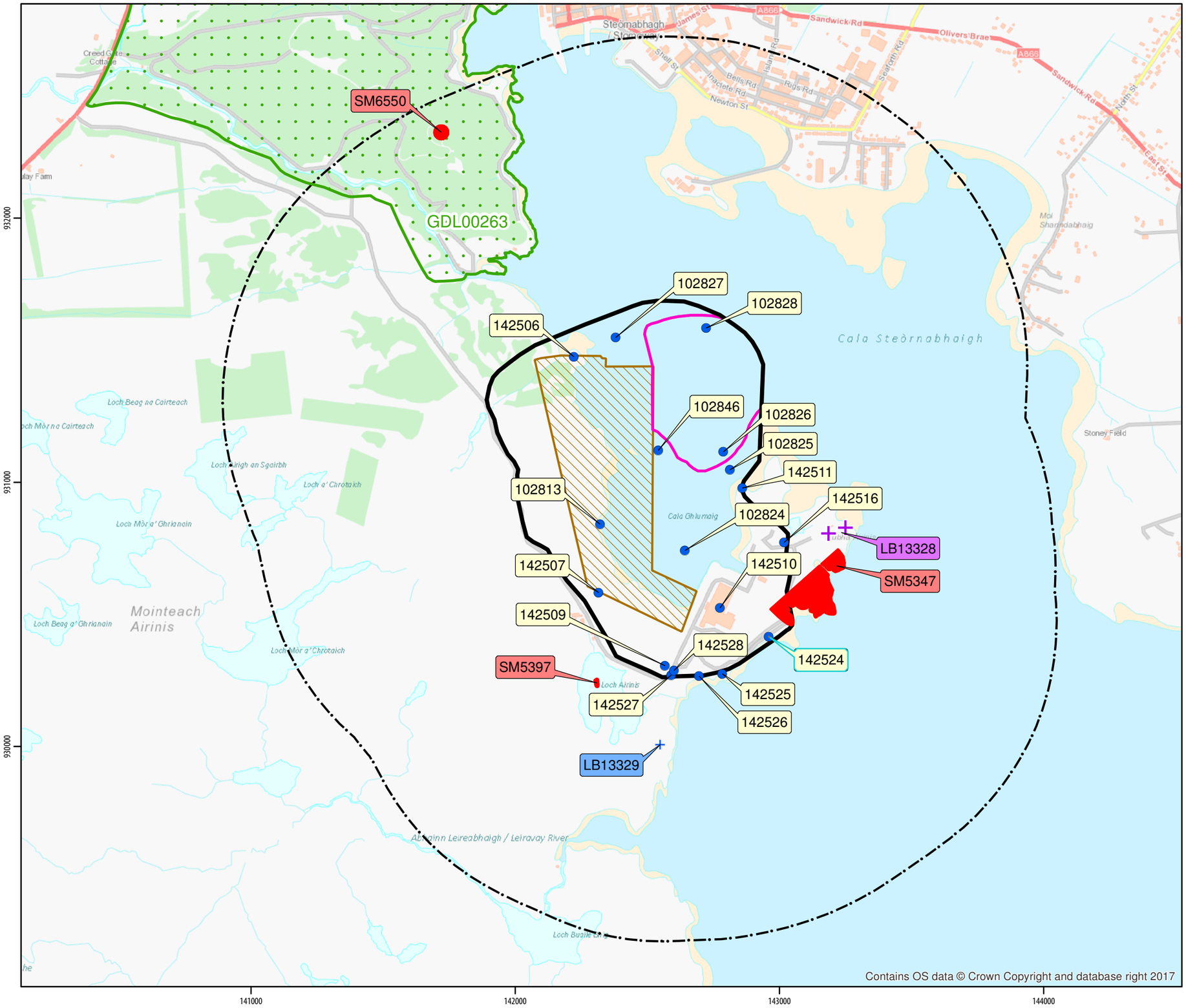
Scale: 1:7,500

A3

Date: 7 Dec 2017

Drawn	Checked	Approved
GV	CP	GF

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045



HEADLAND ARCHAEOLOGY
SCOTLAND
13 Jane Street
Edinburgh EH6 5HE
0131 467 7705
www.headlandarchaeology.com

KEY

- HER Entry
- Scheduled Monument
- Category B Listed Building
- Category C Listed Building
- Inventory Garden and Designed Landscape
- Site Boundary
- Proposed Dredging
- Proposed Reclamation
- 1km Radius

HER information
derived from Pastmap data
dated 15/05/17 © Crown Copyright

Scheduled Monument, Listed Building and Inventory Garden and Designed Landscape area information derived from Historic Environment Scotland data dated Jan 2017.

© Crown Copyright.
All rights reserved 2017.

N

1:15,000 @ A3

0 360m

FIGURE XX Heritage Assets within Study Area

B HABITAT INFORMATION AND SITE PHOTOGRAPHY

Phase 1 Habitat Survey

A total of six Phase 1 habitat types including buildings were recorded on the site:

- D6 Wet Heath
- G1 Standing Open Water
- H8.4 Coastal Grassland
- H1.3 Boulders / Rocks
- H1.2 Shingle/ Cobbles
- J3.6 Buildings

D6 Wet Heath

Wet heath is located along the western boundary of the site. The area is dominated by *Erica tetralix*, *Calluna vulgaris*, grasses sedges and sphagnum bog mosses.

G1 Standing Open Water

A small area of open water of Loch Airinis is located within the buffer area of the phase 1 habitat survey in the south east of the site.

H8.4 Coastal Grassland

Grassland which includes maritime species and was found on shallow slopes and level areas by the sea, and along the cliff tops. Species include*, Plantago maritima* and *Armeria maritima. Festuca rubra* was the dominant species. Other species included, *Anthyllis vulneraria*, *Lotus corniculatus*.

H1.3 Boulders / Rocks above high- tide mark

H1.2 Shingle / Cobbles above high-tide mark

6.1.1 J3.6 Buildings

Buildings associated with previous and existing industrial use are marked on the map.

Photo 1: Coastline of the east of the site, photograph shows coastal grassland and the rocky outcrops

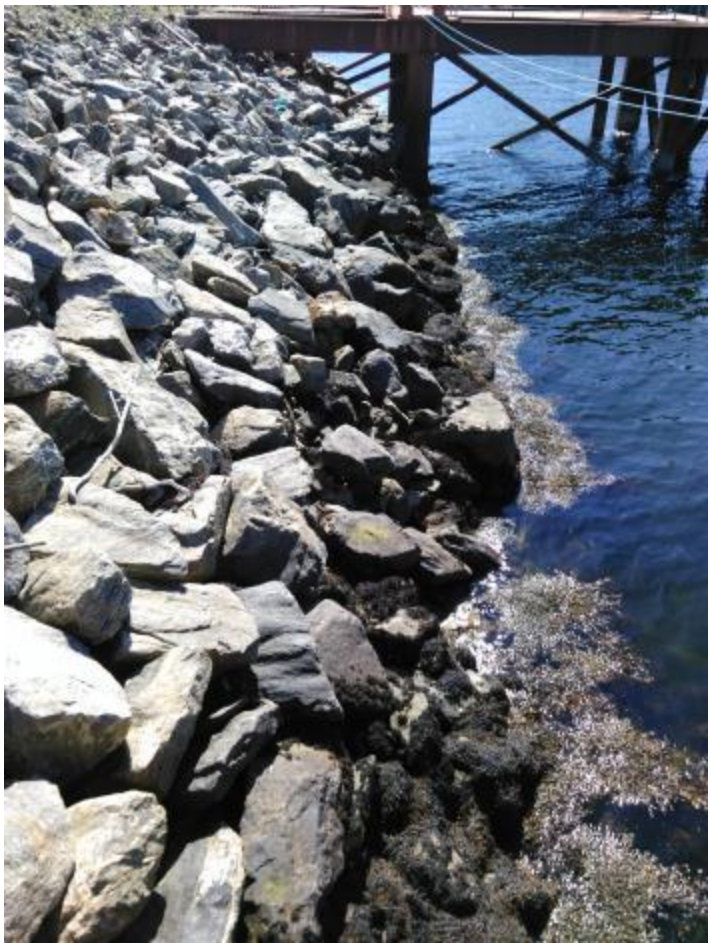


Photo 2: Rock armour of the piers and jetty located within the site

Photo 3: Existing industrial units on site

Photo 4: Coastline searched by boat for signs of protected species specifically otter

Photo 5: Rocks along coastline and coastal grassland eastern boundary of site

COMHAIRLE NAN EILEAN SIAR

Balivanich, Isle of Benbecula, HS7 5LA
Bail' a'Mhanaich, Beinn na Faoghla, HS7 5LA
Telephone 01870 602425
Fax 01870 602332
E-mail mferguson@cne-siar.gov.uk
Writer Morag Ferguson (01870 604990)
Our Ref MF/KMON
Your Ref
Date 9 November 2017

Stornoway Port Authority
C/o EnviroCentre
Per Craig Potter
Craighall Business Park
8 Eagle Street
Glasgow
G4 9XA

Dear Sir/Madam

ENVIRONMENTAL IMPACT ASSESSMENT - SCOPING OPINION

APPLICATION REFERENCE:	**17/00453**
TYPE OF APPLICATION:	**Scoping Opinion**
LOCATION OF DEVELOPMENT:	**Port, Arnish, Isle Of Lewis**
PROPOSED DEVELOPMENT:	**Proposed multi-purpose deep water port on west shore of Glumaig Bay, Arnish**
VALID APPLICATION RECEIVED:	**12 September 2017**

I refer to your request for a Scoping Opinion, as detailed above.

Please find Comhairle nan Eilean Siar's Scoping Opinion enclosed. The Scoping Opinion can also be accessed on the Comhairle's Public Access Planning Portal using the Reference No above.

Yours faithfully

[Redacted]

Morag Ferguson
Planning Manager (Development Management)
Development Department

SCOPING OPINION

ENVIRONMENTAL IMPACT ASSESSMENT (SCOTLAND) REGULATIONS 2011

APPLICATION REFERENCE NO:	17/00453
TYPE OF APPLICATION:	Scoping Opinion
COMPLETE APPLICATION RECEIVED:	12 September 2017
DEVELOPMENT DESCRIPTION:	Proposed multi-purpose deep water port on west shore of Glumaig Bay, Arnish
LOCATION OF DEVELOPMENT:	Port Arnish Isle Of Lewis
APPLICANT:	Stornoway Port Authority

Having studied the content of the 'Deep Water Port at Arnish - EIA Scoping Report' – dated September 2017 by Enviro Centre, and having sought the advice of consultation bodies, Comhairle nan Eilean Siar, as Planning Authority, hereby adopts the attached scoping opinion

[Redacted]

Date 9 November 2017 Signed:

Planning Manager (Development Management)

DECISION NOTICE SENT TO: Stornoway Port Authority

C/o EnviroCentre
Per Craig Potter
Craighall Business Park
8 Eagle Street
Glasgow
G4 9XA

A copy of this Scoping Opinion will be placed on the planning register and shall be sent to all consultees.

COMHAIRLE NAN EILEAN SIAR

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

Scoping Opinion of Comhairle nan Eilean Siar for the proposed development of Arnish Deep Water Port (17/00453/SCO_L)

07/11/2017

Contents

1. Introduction 5
2. Description of Development 5
3. Planning Policy Context 6
4. Comments on Scoping 7
   - 4.1. General Issues 7
   - 4.2. Landscape and Visual 8
   - 4.3. Ecology 8
   - 4.4. Cultural Heritage and Archaeology 12
   - 4.5. Noise 13
   - 4.6. Water Environment 13
   - 4.7. Scottish Water Assets 14
   - 4.8. Flooding 15
   - 4.9. Traffic and Transport 15
   - 4.10. Other Non-EIA Issues 15
5. Appendices 21

1. Introduction

1.1. Comhairle nan Eilean Siar ('the Comhairle') has received a request under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 ('the Regulations') for a scoping opinion in respect of the proposed development at Arnish Deep Water Port.

1.2. The proposed development is considered to constitute Schedule 1 development as defined by the EIA Regulations as it falls under Regulation 8 (2): "*Trading ports, piers for loading and unloading connected to land and outside ports (excluding ferry piers) which can take vessels of over 1,350 tonnes*".

1.3. The purpose of a scoping opinion is to provide the planning authorities opinion as to the information that should be supplied within the EIA report. This Scoping Response should be read as a response to and therefore in conjunction with 'Deep Water Port at Arnish EIA Scoping Report' - September 2017 by Enviro Centre.

1.4. This response sets out the opinion of Comhairle nan Eilean Siar on the Scope of the EIA Report with a focus on matters that are likely to result in a significant impact upon the Environment.

1.5. As part of the process of preparing this scoping opinion the Comhairle has consulted with a wide range of agencies (both statutory and non-statutory) to ensure the scoping opinion is fully informed.

2. Description of Development

2.1. The proposal is for a new multi-purpose Deep Water Port on the west shore of Glumaig Bay, a few kilometres south of Stornoway Harbour. The proposed site is across the bay from Arnish Fabrication Yard and load out quay.

2.2. The first phase of the proposals provides 400 metres of quay with 10 metres water depth at lowest tide, a new freight ferry berth and marshalling area, a heavy lift area 50m square, and 15ha of laydown, storage and development land behind the quay. The proposals also incorporate a 40m wide access corridor around the south side of Glumaig Bay, connecting Arnish Yard to the new quay.

2.3. The proposals are designed to provide the following:

- Alongside berthing for cruise liners of all sizes.
- Waiting and turning area for buses serving cruise liner passengers.
- Ferry berth, link-span and marshalling area (freeing up the current car ferry to provide an additional daily sailing).

- Extensive laydown and storage area with 50m square heavy lift area – to service renewables and decommissioning projects.
- Berthing and unloading gantries for oil delivery vessels, with pipelines to new storage tanks nearby (moving oil storage out of Stornoway town).
- Dedicated area for leisure activities buildings and rock climbing wall.
- The project also provides improvements to the current access road to Arnish Yard from the main Stornoway/Tarbert road (A859), with a direct access road to the Deep Water Port.

3. Planning Policy Context

3.1. In progressing the proposal and preparing the EIA Report, particular regard should be afforded to the relevant provisions of National Planning Framework (NPF3), National Marine Plan (NMP), Scottish Planning Policy (SPP), The Town and Country Planning (Environmental Impact Assessment)(Scotland) Regulations 2017, Circular 1/2017: The Town and Country Planning (Environmental Impact Assessment)(Scotland) Regulations 2017 as well as other relevant national policy guidance; the provisions of the Outer Hebrides Local Development Plan (adopted 2012), and other material planning policy considerations, including the LDP2 - Proposed Plan (2017).

National Planning Framework 3 (NPF3)

3.2. The NPF3 identifies Stornoway as one of five key ports and its deep water assets are noted as presenting significant opportunities for taking advantage of new shipping routes across the Arctic and for tourism development (cruise). Part of the existing Arnish Industrial Area is highlighted as part of the 'Low Carbon/ Renewable North Enterprise Area and identified as an N-RIP (National Renewables Investment Plan) site for distributed manufacturing. The 'Enterprise' areas have been created in order to stimulate manufacturing opportunities as well as investment and job creation and these locations offer opportunities for investment-led growth.

Outer Hebrides Development Plan

3.3. The proposed development is located on developed coastline (Pol 23) that is 'outwith settlement' (Pol 1) and is located adjacent (north) to proposal site 'E1a Arnish, Lewis' in the adopted Outer Hebrides Local Development Plan (2012). The applicant should note that the emerging LDP2 is scheduled to be adopted early in 2018. Once it is adopted this will be the policy framework on which subsequent planning applications are assessed. It is therefore recommended that LDP2 is considered alongside the LDP in the 'Desk Based Data Review'.

3.4. In the LDP2 Proposed Plan the proposed development is located adjacent (north) to Economic Development Proposal Site "PP17 Arnish". The emerging Plan also includes a new policy at the Proposed Plan stage entitled 'STY3 Development of Stornoway' to ensure development within the extent of the Stornoway Harbour Limits takes account of the Port Masterplan.

LDP2 – SEA – Revised Environmental Report (2017)

3.5. As part of the preparation of the emerging Plan, a Strategic Environmental Assessment was undertaken as required by Environment Assessment (Scotland) Act 2005. In addition to Policy STY3 Development of Stornoway Port Area (see response to Newton Marina), The Proposal Site Arnish was assessed and the assessment has been appended to this report. Due to the type and scale of development at this site, a number of environmental criteria were assessed as having negative impacts, some of which were mitigated to positive or neutral. The key ones were: Landscape and visual; cultural heritage; waste generated; water environment and flooding; contamination and impacts on peatland.

4. Comments on Scoping

4.1. ***General Issues***

4.1.1. The applicant should note that the emerging LDP2 is scheduled to be adopted early in 2018. Once it is adopted this replace the adopted LDP and will be the policy framework on which subsequent planning applications are assessed. It is therefore recommended that due to its likely imminent adoption LDP2 (Proposed Plan) 2017 is considered alongside the LDP (2012).'

<u>Port Masterplan - Phasing</u>

4.1.2. Details of the proposed phasing of other port masterplan projects should be included in the EIA. This will inform the extent to which cumulative assessment with other projects is required to be addressed within any particular EIA report.

<u>Single EIA report</u>

4.1.3. We note that as well as planning permission the development will also require a Marine Licence and it is intended to apply for a harbour revision order and it is the applicant's intention to complete a single EIA Report to cover all these requirements. We welcome the intention to complete a single EIA to cover the requirements of the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 and the Marine Works (Environmental Impact Assessment) Regulations 2017 (the Marine EIA Regulations) and Harbour

Revision Order. We ask that the EIA report include clear guidance setting out which elements of the project are covered by each of the regulatory regimes

4.1.4. Alternatives

4.1.5. Schedule 4, Paragraph 2 of the Environmental Impact Assessment (Scotland) Regulations 2017 requires all EIA reports to include information on the main alternatives studied and an indication of the main reasons for choosing the selected option, with reference to the environmental effects.

*4.2. **Landscape and Visual***

4.2.1. It is agreed that a Landscape and Visual impact assessment based on the site and immediate surroundings should be scoped into the EIA, using the methodology and guidance identified.

4.2.2. The proposal site is not within any areas designated for its landscape value. Although the development is likely to have a degree of adverse landscape and visual impact during its construction, the construction impacts are accepted as transitionary and the EIA focus should be to ensure that through careful design of the various elements that there will be no significant long term landscape or visual impacts.

4.2.3. It is recommended that in addition to the 'key views and visual receptors' identified in the scoping report that fuller consideration is given to the importance of the approach to Stornoway Harbour. It is a key gateway to the islands, where a significant amount of residents and visitors arrive by ferry. The Deep Water Port at Arnish will form a major component of their 'first impression' of Stornoway, the Isle of Lewis and the wider Outer Hebrides. It is recommended that consideration is given to the views from the ferry on approach and from the ferry terminal as a viewpoint.

4.2.4. A ZTV will identify key viewpoints in the wider landscape. It is suggested that a small number of viewpoints are identified within the Stornoway Conservation Area and in particular the Castle Grounds.

*4.3. **Ecology***

4.3.1. It is agreed that Birds should be scoped out of the EIA and Marine mammals and Fish scoped in. It is advised that Terrestrial mammals (otters) are scoped back in to the EIA to ensure the impacts on otters have been fully considered. Particular regard should be had to the impacts of noise generating activities on Marine Mammals.

4.3.2. SNH have advised that it is likely that the proposed development will have a significant environmental effect on harbour porpoise (within Inner Hebrides and the Minches candidate Special Area of Conservation), other cetacean species and otters:

4.3.3. *Based on the information provided the proposal could affect the Inner Hebrides and the Minches candidate Special Area of Conservation (cSAC), selected for its Harbour porpoise (Phocoena phocoena) interest. The proposals include piling, dredging and possibly dredge disposal. These are activities considered likely to affect harbour porpoise. If porpoise are too close to an intense noise source when it is initiated, hearing damage can occur. Disturbance to porpoise can occur over tens of kilometres from activities that generate a significant degree of underwater noise. Further details are available in the Ports and Harbours section of the Advice to Support Management at http://www.snh.gov.uk/docs/A1918723.pdf.*

4.3.4. *It is likely that both cetaceans and otters could be affected by the proposal. The SNH website has a summary of development considerations for European Protected Species (EPS) under the Habitats Regulations (http://www.snh.gov.uk/protecting-scotlandsnature/ protected-species/legal-framework/habitats-directive/euro/).*

4.3.5. *Several species of cetaceans occur regularly in Stornoway Harbour and its surrounds including Risso's dolphin (Grampus griseus), Short-beaked common dolphin (Delphinus delphis), Killer whale (Orcinus orca), Minke whale (Balaenoptera acutorostrata), Bottlenose dolphin (Tursiops truncatus) and Harbour porpoise (Phocoena phocoena). All these cetaceans are likely to be affected by similar aspects of the works (as described above) although the hearing characteristics of different species vary somewhat from harbour porpoise.*

4.3.6. *Otters are known to be present in the area affected by the development although we note an initial walk over survey did not find any evidence of otter holts, resting places or other field signs. The proposals include engineering works that could potentially result in the destruction of such shelters. It's unclear if the survey was comprehensive but there is a risk that construction and landscaping works could cause the destruction of an otter holt or resting place. The SNH website has a summary of development considerations for otters under the Habitats Regulations (http://www.snh.org.uk/publications/online/wildlife/otters/planning.asp).*

4.3.7. The site's status as a candidate SAC means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended (the "Habitats Regulations") or, for reserved matters the Conservation of Habitats and Species Regulations 2010 as amended apply. Consequently, the Comhairle as planning

authority will be required to consider the effect of the proposal on the cSAC before it can be consented by undertaking a Habitats Regulations Appraisal.

4.3.8. The EIA should therefore identify 'underwater noise' as a potentially significant effect with regard to marine mammals under 'Ecology' and include relevant underwater noise assessments and proposed mitigation measures to ensure there is sufficient information to inform the Habitats Regulations Appraisal. The EIA must include a Marine Mammal Protection Plan (MMPP) which has been informed by a Marine Mammal Observation Protocol (MMOP), utilising suitably qualified Marine Mammal Observer (MMOs) and Passive Acoustic Monitoring (PAM) operators, unless otherwise agreed with the Comhairle, SNH and Marine Scotland.

4.3.9. The EIA should also identify otter disturbance as a potentially significant effect with regard to otters under 'Ecology' and resurvey all suitable otter habitat (e.g. water courses, coasts, estuaries and wetlands) within 200m of the proposed works, following advice from SNH. The survey should be undertaken by an experienced otter surveyor, and should include a systematic search for spraints, paw prints, otter paths, slides, food remains, holts and places used for shelter. The survey report should include:

- details of any information gathered from Local Record Centres or other sources;
- names and experience of surveyors;
- descriptions of habitat surveyed and any limitations to the survey, such as access;
- details of survey methods, including survey area, date, time and weather conditions;
- map showing the location of otter signs, holts or shelters in context of the development.

4.3.10. The Comhairle requests that any decision on additional survey requirements agreed with SNH is also shared with them during the preparation of the EIA.

4.3.11. If the survey finds otters that could be affected by the proposal an 'otter protection plan' will need to be prepared. The protection plan should include:

- details of how the development is likely to affect otters;
- mitigation measures to be employed to avoid any offence and minimise impacts on otters;
- summary of any residual impacts once mitigation measures have been taken into account.

4.3.12. The Comhairle requests that any decision on additional survey requirements agreed with SNH is also shared with them during the preparation of the EIA.

4.3.13. Discussions with the Outer Hebrides Fisheries Trust (OHFT) and the Stornoway Angling Club confirm the risk of potentially significant effects on Salmon (Year 1 and Year 2) entering Stornoway Harbour to travel upriver to spawning grounds on the Creed and Glen river systems.

4.3.14. The River Creed is located just a few miles to the west of the town Stornoway in the Western Isles. The Stornoway Angling Club manage the system and advise that it is a renowned salmon and sea trout fishery with records dating back to 1871 and has been managed by the Stornoway Angling Association (SAA) since 2001. The SAA have restored the fishery (re-stocking, habitat improvement, poaching prevention). The 5 year averages for salmon and sea trout catches are now 164 and 193, respectively. The highest sea trout catch was in 2003 (355) and the highest salmon catch in 2007 (308). In 2015, 138, salmon, 309 sea trout and 437 finnock were recorded.

4.3.15. The fishery consists of the lower 4 miles of the river, both banks, where there are 20 named pools, and fishing on 2 lochs. Unusually for the Western Isles there is extensive fishing on the river where there are numerous holding pools as well as other runs where fish can be caught during high water. The Glen river system is a smaller system and has recently been subject to extensive restoration works by the OHFT.

4.3.16. Impacts on salmon should include risks and mitigation measures related to loss of habitat, impacts of sediment suspension in the water column and sediment transportation within the bay and upriver from dredging operations. Noise generated by construction operations including, blasting and dredging may also impact on wild fish and consideration requires to be given to the impacts of noise on fish entering the bay en route to the Creed and Glen River systems.

4.3.17. SEPA have stated that they are satisfied that there are unlikely to be significant effects on groundwater dependant terrestrial habitats and wetlands and that no further survey work in required in this regard.

4.3.18. The SNH website has a summary of development considerations for European Protected Species (EPS) under the Habitats Regulations (http://www.snh.gov.uk/protecting-scotlandsnature/ protected-species/legal-framework/habitats-directive/euro/).

4.4. ***Cultural Heritage and Archaeology***

4.4.1. It is agreed that Cultural Heritage and archaeology as set out in Paragraph 4.4.5 should be scoped in to the EIA. Siting and design of development should take into account the setting of any listed buildings, Stornoway Conservation Area and Lews Castle and Lady Lever Park.

4.4.2. It is noted that there is one scheduled monument within the site boundary (SM 5347 Arnish Point, gun emplacements). It is understood, however, that the scheduled gun battery will be outside the proposed construction footprint and will be subject to no direct impacts.

4.4.3. Stornoway has a long established history as a key port and the Comhairle Archaeology Service recommends that in terms of information to support a marine licence application that the archaeological desk based assessment should also present all relevant marine geophysical survey data appropriate to the zone of development. It should be noted that Stornoway Port Authority may already hold this information and that a marine archaeologist should interpret any existing data. This data will further inform the marine planning consent aspect of this development as set out in Scotland's National Marine Plan 2015.

4.4.4. Additionally although the potential for the impact on unknown archaeological remains during the construction and post construction phases of the development has been noted; this aspect in the EIA report should also consider the potential for paleo-environmental remains to be present.

4.4.5. Historic Scotland advises that detailed guidance on the application of national policy is set out in our 'Managing Change in the Historic Environment' series available online at www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/managing-change-in-the-historic-environment-guidance-notes/. Technical advice is available through our Technical Conservation website at www.engineshed.org.

4.5. ***Noise***

4.5.1. Environmental Health has confirmed that there are nearby receptors that will be affected during the construction and operational phase. It is agreed that construction and operational noise impacts should be addressed within the EIA.

4.6. ***Water Environment***

4.6.1. It is agreed that impacts on the water environment during construction to achieve improved standards of water quality should be addressed in the EIA. The following information should be of assistance in ensuring no detriment to water quality:

Surface Water and Foul Drainage

4.6.2. SEPA have advised that there may be existing surface (and foul) water drainage outfalls in the locality. Any redevelopment provides an opportunity to upgrade the treatment of these discharges and bring them in line with current practice. All existing discharges and their treatment systems must be shown on a site map.

4.6.3. Surface water runoff must be treated by sustainable drainage systems (SUDS) therefore it is important to ensure that adequate space to accommodate SUDS is incorporated within the site layout.

4.6.4. Proposals to include oil interceptors are welcomed. The proposals should meet the treatment requirements of CIRIA C753. A site plan showing the proposed SUDS treatment train must be submitted. Different areas of the development will require different levels of treatment. For example run-off from car parking or marshalling areas will require greater treatment than roof run-off.

4.6.5. The Simple Index Approach calculation (Section 26.7.1 of the guidance) should be used for the lower risk areas within the site. For yard areas, refuelling areas or areas where there is a higher pollution risk, a detailed risk assessment (Section 26.7.3 of CIRIA C753) must be submitted. SEPA are likely to regulate discharges from high risk areas under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (As Amended) (CAR).

4.6.6. Comments on the acceptability of post-development runoff rates for flood control should be sought from the local authority flood prevention unit. Comments from Scottish Water should be sought where the SUDS proposals would be adopted by them. SEPA encourage the design of SUDS to Sewers for Scotland Second Edition standards and the adoption of SUDS features by Scottish Water as they are of the view that this leads to best standards and maintenance. Impacts on Freshwater

4.6.7. The preliminary site layout should be amended to avoid direct impacts on the Allt Poll a'Choire watercourse, which should be protected by a 50 m no-development buffer.

4.6.8. Where the Allt Poll a'Choire requires a road crossing then this should be a bottomless culvert or traditional style bridge, shown to accommodate the 1 in 200 year flood event. Guidance on the design of water crossings can be found in our Construction of River Crossings Good Practice Guide.

4.6.9. If water abstractions or dewatering are proposed, a table of volumes and timings of groundwater abstractions and related mitigation measures must be provided.

Pollution

4.6.10. A Construction Environmental Management Plan (CEMP) is not required with the application provided that the detailed site plans, requested elsewhere in this response, demonstrate how impacts on the environment have been minimised through site design. All mitigation should be detailed within a suitably robust schedule of mitigation. The schedule of mitigation should be supported by these site specific maps and plans. These must include reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils at any one time) and regulatory requirements. They should set out the daily responsibilities of ECOWs, how site inspections will be recorded and acted upon and proposals for a planning monitoring enforcement officer. Please refer to SEPA's Guidance for Pollution Prevention (GPPs).

4.6.11. The scoping report confirms the potential for oil storage at the new facility. The developer should confirm the proposed inventory of hazardous substances and where it could lie in terms of falling under the scope of the COMAH regulations and associated Hazardous Substances Consent. Finally, if petrol is being handled then the oil storage terminal will need to have appropriate petrol vapour recovery infrastructure and have a Pollution Prevention and Control Part B permit.

4.7. ***Scottish Water Assets***

4.7.1. Scottish Water has confirmed that there are no 'Scottish Water drinking water catchments' or 'water abstraction sources', which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed development.

4.7.2. They also confirm that are no existing Scottish Water assets within the site boundary. However in the event that any Scottish Water asset conflicts are identified then early contact should be made with the Scottish Water Asset Impact

Team (AIT) at service.relocation@scottishwater.co.uk. All detailed design proposals relating to the protection of Scottish Water's assets should be submitted to the AIT for review and written acceptance. Works should not take place on site without prior written acceptance by Scottish Water.

4.7.3. Annex 1 also includes a list of precautions to be taken when working within the vicinity of Scottish Water assets. This list of precautions is not exhaustive but should be taken into account as the development progresses through the planning and development process.

*4.8. **Flooding***

4.8.1. The site lies partly within the medium likelihood (0.5% annual probability or 1 in 200 year) flood extent of the SEPA Flood Maps and may therefore be at medium to high risk of flooding. However we appreciate that this development needs to be located in this area for operational reasons.

4.8.2. Normally SEPA request compensatory flood storage to be provided for lost functional floodplain volume. However, in undefended tidal areas, loss of floodplain capacity is unlikely to have any impact on water levels and provision of compensatory storage is not required. This applies to development where the use is compatible with the coastal location and the land reclamation is justified in wider policy terms.

4.8.3. All new development, including development on reclaimed land, should be above the estimated 1 in 200 year flood level for the area which is 3.4 m AOD, unless that particular aspect of the proposal needs to be lower for operational reasons. This will enable the developments to be more resilient during times of flood or storm events. SEPA recommend a minimum 600mm freeboard is added to allow for modelling uncertainties and the use of water resistant materials and forms of construction as appropriate.

*4.9. **Traffic and Transport***

4.9.1. It is agreed that potentially significant effects from construction related traffic be scoped into the EIA.

*4.10. **Other Non-EIA Issues***

Alternative Transport

4.10.1. Opportunity should be taken to improve road safety, promote green transport, active travel, provide bicycle storage, and address access issues, particularly at stress points. The new developments should meet the Car Parking standards set out in the Local Development Plan, or provide a justification of the proposed

provision and non-conformity with the Standard. Details should be provided as to how pedestrians and cyclists will be accommodated.

Soils

4.10.2. The supporting information should contain sufficient detail of the project to allow a full assessment to be made of the likely effects of mineral extraction, together with appropriate control, mitigation and monitoring measures.

4.10.3. In accordance with Paragraphs 52 to 57 of Planning Advice Note 50 Controlling the Environmental Effects of Surface Mineral Workings (PAN 50) a Site Management Plan should be submitted which includes the following information on the excavation area:

A. A map showing the location, size, depths and dimensions.

B. A map showing any stocks of rock, overburden, soils and temporary and permanent infrastructure including tracks, buildings, oil storage, pipes and drainage, overlain with all lochs and watercourses to a distance of 250 metres. You need to demonstrate that a site specific proportionate buffer can be achieved. On this map, a site-specific buffer must be drawn around each loch or watercourse proportionate to the depth of excavations and at least 10m from access tracks. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse, drawings of what is proposed in terms of engineering works.

C. You need to provide evidence of the suitability of the material to be excavated for the proposed use, including any risk of pollution caused by degradation of the rock.

D. A ground investigation report giving existing seasonally highest water table including sections showing the maximum area, depth and profile of working in relation to the water table.

E. A site map showing cut-off drains, silt management devices and settlement lagoons to manage surface water and dewatering discharge. Cut-off drains must be installed to maximise diversion of water from entering quarry works.

F. A site map showing proposed water abstractions with details of the volumes and timings of abstractions.

G. A site map showing the location of pollution prevention measures such as spill kits, oil interceptors, and drainage associated with welfare facilities, recycling and bin storage and vehicle washing areas. The drawing notes should include a commitment to check these daily.

H. A site map showing where soils and overburden will be stored including details of the heights and dimensions of each store, how long the material will be stored for and how soils will be kept fit for restoration purposes.

I. Where the development will result in the disturbance of peat or other carbon rich soils then the submission must also include a detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements and excavation areas overlain so it can clearly be seen how the development minimises disturbance of peat and the consequential release of CO2. The application should investigate whether there are local opportunities to use any disturbed material in peatland restoration works, such as improvements to old peat cuttings. This could help mitigate impacts on peat.

J. Sections and plans detailing how restoration will be progressed including the phasing, profiles, depths and types of material to be used.

K. Details of how the rock will be processed in order to produce a grade of rock that will not cause siltation problems during its end use

4.10.4. The application should detail space to accommodate the provision of recycling facilities, both during the construction phase as well as the completed development.

4.10.5. There is a waste management license for the temporary storage of shotblast waste at the site. SEPA understand that this material was to be put to suitable use, probably in concrete, as part of the expansion works at the site. We ask that the assessment specifically covers the proposals for use of this material.

As in line with the Policy ED5 Minerals in the LDP2 Proposed Plan, proposals for the extraction of minerals to or on the site of the associated development must be accompanied by full restoration proposals and aftercare. The EIA should detail proposals for the phased restoration and aftercare of the site, including its intended afteruse.

<u>Population and Human Health</u>

4.10.6. The scoping report does not consider the potential for effect on ‘population and human health’, which is now a requirement under the Environmental Impact Assessment (Scotland) Regulations 2017. While there are unlikely to be significant environmental effects arising consideration should be given to the related issues within supporting information.

4.10.7. There is no prescribed definition of population and human health within EIA, but it is generally understood to encompass a range of personal, social, economic, physiological and environmental factors which determine the health status of individuals or populations.

4.10.8. Within the supporting information the consequences of the development for employment, businesses and residents in the area and direct and indirect impacts on tourism and recreational interests in the vicinity.

4.10.9. We would recommend consideration is given to ways in which the proposal can improve and protect health and well-being. Information obtained during the consultation of the Stornoway Port Masterplan could be useful baseline data in this regard.

4.10.10. We would suggest consideration is given to the following:

- Activities: employment and local businesses; leisure and tourism facilities (particularly impacts on countryside access to the Arnish peninsula and coastline, which is popular with fishermen, walkers and visitors to the lighthouse and Bonnie Prince Charlie's Cairn and the WW2 gun emplacements).
- Physical Environment: place-making; public realm; green infrastructure; historic environment.
- Property: vacancy rates and vacant sites at Arnish; recent developments and rental values.
- Accessibility: pedestrian football, accessibility, active travel and ease of movement; parking; signage and ease of navigation.
- Community: attitudes, perceptions and aspirations.

<u>Additional information – Water</u>

4.10.11. Any proposed engineering works within the water environment above Mean High Water Springs or any proposed abstractions or discharges will require authorisation under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Management of surplus peat, soils or dredging spoil may require an exemption under The Waste Management Licensing (Scotland) Regulations 2011. Proposed crushing or screening will require a permit under The Pollution Prevention and Control (Scotland) Regulations 2012.

<u>Additional Information – Control of Major Accident Hazards</u>

4.10.12. If the proposed development is above the relevant threshold in COMAH then the COMAH Competent Authority should be contacted to discuss the regulatory requirements for such a facility.

Additional Information – Power

4.10.13. SSEN register no objections to the proposal but advise they have also forwarded it onto their investment team for their reference due to the scale of the planned works and the possibility that Arnish was being mooted as a new shore point for a potential sub-sea cable.

Plan requirements

4.10.14. All maps must be based on an adequate scale with which to assess the information. This could range from OS 1: 10,000 to a more detailed scale in more sensitive locations. Each of the maps below must detail all proposed upgraded, temporary and permanent site infrastructure. This includes all temporary or permanent access tracks, excavations, buildings, site compounds, laydown areas, storage areas and any other built elements.

Siting and Design

4.10.15. A high quality of design and place-making is expected to ensure the development fits well into its surrounding environment and contributes to wider socio, economic and environmental goals. The EIA should demonstrate that the principles of policy DP1 Design and Place-making policy of the LDP2-Proposed Plan have been taken into account and the proposal will reflect a satisfactory quality of place-making, siting, scale and design that respects and reflects local characteristics and complements the surrounding built and natural environment.

4.10.16. The principles to be adopted in the design process should be made explicit in the EIA and the applicant may wish to give consideration to producing a design and access statement as part of the EIA process. If appropriate, the EIA should provide design details such as: construction materials, design and finishing treatments, lighting, screening and the incorporation of any proposed naturalistic features.

4.10.17. The layout should be designed to minimise the extent of new works on previously undisturbed ground. A comparison of the environmental effects of alternative locations or layouts may be required.

Phasing and Cumulative Impact

4.10.18. The applicant states in 4.9.5 that as there is *"no committed development"* at this stage it is not practical to consider cumulative assessment of other masterplan

developments. However a scoping report has been received for Newton Basin Marina so it is assumed these two projects will be taken forward first and there is potential for overlap. If it is determined that there will be overlap, the EIA should include an assessment of the cumulative impact of the Project with other planned developments. Details of the proposed phasing of these two projects, and assumptions for other port masterplan projects, should be included in the EIA. Issues of particular concern include noise, ecology, and marine safety. Cumulative assessment should include marine activity as well as land-based.

5. Appendices

5.1. Consultee Reponses

Comhairle Archaeologist

Comment Date: Thu 19 Oct 2017

Archaeological Response 17/00453/SCO_L : - Deep Water Port, Glumaig Bay, Arnish. Port Arnish. Isle of Lewis.

The Comhairle Archaeology Service notes the inclusion of chapter 4.4 Cultural Heritage and Archaeology within the EIA Scoping document. The chapter identifies both terrestrial and marine historic environment assets and considers the potential impact effects on these features, during the construction and post construction phases of the development. Additionally the potential for the impact on unknown archaeological remains has been noted; this aspect should also consider the potential for palaeoenvironmental remains to be present.

The assessment methodology for the Environmental Statement will take the form of an archaeological desk-based assessment of all the relevant existing historic environment data; and this will be augmented by a walkover survey of the development area. The results of this assessment will further inform the overall development strategy and any further stages of assessment that may be required, where appropriate.
The appropriate legislation and guidelines have been acknowledged in the document.

The Comhairle Archaeology Service recommends that the desk based assessment should also present all relevant marine geophysical survey data appropriate to the zone of development. It should be noted that Stornoway Port Authority may already hold this information and that a marine archaeologist should interpret the existing data. This data will further inform the marine planning consent aspect of this development as set out in Scotland's National Marine Plan 2015.

TS TRNM (Transport Scotland)

Comment Date: Tue 17 Oct 2017

THE TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) PROPOSED MULTI-PURPOSE DEEP WATER PORT ON WEST SHORE OF GLUMAIG BAY, ARNISH, ISLE OF LEWIS

With reference to your recent consultation request on the above

development, I wish to inform you that from 1st October 2015, planning authorities are no longer required to consult with Scottish Ministers on EIA development.

Historic Scotland has merged with Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) to form Historic Environment Scotland (HES). HES is named as both a statutory consultee in the planning system and as a consultation body for Environmental Impact Assessment (EIA) purposes. Planning authorities are required to make their own arrangements for consulting HES directly on EIA development. Further information on these wider changes can be found in Historic Environment Circular 1.

In light of the above changes, the Scottish Government has taken the opportunity to streamline EIA consultation arrangements such that Transport Scotland will no longer respond to EIA consultations in a statutory capacity. Planning Authorities must, however, continue to consult Transport Scotland on applications where required by Regulation 25 and Schedule 5 of the Town and Country Planning (Development Management Procedure) (Scotland) Regulations 2013. These consultations should be sent to Transport Scotland's Development Management Team.
It should be stressed that this response relates only to the EIA consultation and Transport Scotland will respond separately to the planning application for this development by means of a TRNPA2 if formally consulted.
I trust that the above is satisfactory and should you wish to discuss any issues raised in greater detail, please do not hesitate to contact myself on 0141 272 7386.

Scottish Natural Heritage

Comment Date: Mon 09 Oct 2017

ARNISH DEEP WATER DEVELOPMENT, GLUMAIG BAY, ISLE OF LEWIS. SCREENING REQUEST - TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

Thank you for your consulting SNH on the above screening request which we received on 21st September 2017.

Summary

We advise that with regards to our interests the proposals are likely to have a significant environmental effect on harbour porpoise within Inner Hebrides and the Minches candidate Special Area of Conservation, other cetacean species and otters.
We are aware the proposed development contains elements which are above

and below Mean High Water Springs (MHWS), and will therefore likely require consents from both CnES and Marine Scotland. Given the complex regulatory regime covering the overall development we'd welcome the co-ordination of the EIA process between competent authorities (should you determine EIA is required). This response considers the full range of the proposed works associated with the development (not only those above MHWS).

EIA Screening & HRA Advice

Protected Areas

Based on the information provided the proposal could affect the Inner Hebrides and the Minches candidate Special Area of Conservation (cSAC), selected for its Harbour porpoise (Phocoena phocoena) interest.

The proposals include piling, dredging and possibly dredge disposal. These are activities considered likely to affect harbour porpoise. If porpoise are too close to an intense noise source when it is initiated, hearing damage can occur. Disturbance to porpoise can occur over tens of kilometres from activities that generate a significant degree of underwater noise. Further details are available in the Ports and Harbours section of the Advice to Support Management at http://www.snh.gov.uk/docs/A1918723.pdf.

The site's status as a candidate SAC means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended (the "Habitats Regulations") or, for reserved matters the Conservation of Habitats and Species Regulations 2010 as amended apply. Consequently, the competent authority will be required to consider the effect of the proposal on the cSAC before it can be consented (commonly known as Habitats Regulations Appraisal). The SNH website has a summary of the legislative requirements (http://www.snh.gov.uk/docs/A423286.pdf).

European Protected Species

It is likely that both cetaceans and otters could be affected by the proposal. The SNH
website has a summary of development considerations for European Protected Species
(EPS) under the Habitats Regulations (http://www.snh.gov.uk/protecting-scotlandsnature/
protected-species/legal-framework/habitats-directive/euro/).

Several species of cetaceans occur regularly in Stornoway Harbour and its surrounds including Risso's dolphin (Grampus griseus), Short-beaked common dolphin (Delphinus delphis), Killer whale (Orcinus orca), Minke whale (Balaenoptera acutorostrata), Bottlenose dolphin (Tursiops truncatus)

and Harbour porpoise (Phocoena phocoena). All these cetaceans are likely to be affected by similar aspects of the works (as described above) although the hearing characteristics of different species vary somewhat from harbour porpoise.

Otters are known to be present in the area affected by the development although we note an initial walk over survey did not find any evidence of otter holts, resting places or other field signs. The proposals include engineering works that could potentially result in the destruction of such shelters. It's unclear if the survey was comprehensive but there is a risk that construction and landscaping works could cause the destruction of an otter holt or resting place. The SNH website has a summary of development considerations for otters under the Habitats Regulation (http://www.snh.org.uk/publications/online/ wildlife/otters/planning.asp).

I hope you find the above comments useful, however should you wish to discuss the issues raised further, please don't hesitate to contact me.

Historic Environment Scotland

Comment Date: Thu 05 Oct 2017
The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017

Stornoway Deep Water Port
Scoping Report

Thank you for your consultation which we received on 21 September 2017 about the above scoping report. We have reviewed the details in terms of our historic environment interests. This covers world heritage sites, scheduled monuments and their settings, category A-listed buildings and their settings, inventory gardens and designed landscapes, inventory battlefields and historic marine protected areas (HMPAs).

Your archaeological and cultural heritage advisors will also be able to offer advice on the scope of the cultural heritage assessment. This may include heritage assets not covered by our interests, such as unscheduled archaeology, and category B- and C-listed buildings.
Proposed Development

I understand that the proposed development comprises a new multi-purpose Deep Water Port on the west shore of Glumaig Bay, a few kilometres south of Stornoway Harbour. The proposed site is across the bay from Arnish Fabrication Yard and load out quay.

The first phase of the proposals consists of 400 metres of quay with 10

metres water depth at lowest tide, a new freight ferry berth and marshalling area, a heavy lift area 50m square, and 15ha of laydown, storage and development land behind the quay. The proposals also incorporate a 40m wide access corridor around the south side of Glumaig Bay, connecting Arnish Yard to the new quay.

Scope of assessment

We have reviewed the submitted scoping report and note the content of Cultural Heritage and Archaeology chapter (chapter 4.4). We note that there is one scheduled monument within the site boundary (SM 5347 Arnish Point, gun emplacements). It is understood, however, that the scheduled gun battery will be outside the proposed construction footprint and will be subject to no direct impacts.

I can confirm we are content with the approach to assessment set out in the Scoping Report and agree that cultural heritage and archaeology should be scoped into the EIA.

Detailed guidance on the application of national policy is set out in our 'Managing Change in the Historic Environment' series available online at www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/managing-change-in-the-historic-environment-guidance-notes/. Technical advice is available through our Technical Conservation website at www.engineshed.org.

We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is Urszula Szupszynska and they can be contacted by phone on 0131 668 8653 or by email on Urszula.Szupszynska@hes.scot.

Development Planning

Comment Date: Thu 05 Oct 2017
1. Comments on Scoping
1.1 General

This project is an integral part of the Stornoway Port Authority's Port Masterplan, which aims to grow and develop the port area while contributing to the socio-economic prosperity of Stornoway and the Outer Hebrides.

The Local Development Plan endorses the Stornoway Port Masterplan and recognises it as an important opportunity to increases economic activity in the islands and in the case of Arnish, support key major ambition for the islands to become a global player in renewable energy generation and manufacturing.

Although consideration of the Stornoway Port Masterplan forms part of Policy STY3 Development of Stornoway Port Area of the emerging Outer Hebrides Local Development Plan 2 (LDP2) - Proposed Plan, the potential for significant environmental effects still need to be fully evaluated.
This project represents an integral part of a larger plan, of which the phasing is yet unclear; as such the EIA should be considered in respect of its relationship to the wider Port masterplan development.

In addition to the assessment measures proposed in the scoping report, it is recommended that any subsequent EIA report should further includes the following issues:

1.2 Policy Context
1.2.1 Policy Provisions

In progressing the proposal and preparing any subsequent EIA Report, particular regard should be afforded to the relevant provisions of National Planning Framework (NPF3), National Marine Plan (NMP), Scottish Planning Policy (SPP), The Town and Country Planning (Environmental Impact Assessment)(Scotland) Regulations 2017, Circular 1/2017: The Town and Country Planning (Environmental Impact Assessment)(Scotland) Regulations 2017 as well as other relevant national policy guidance; the provisions of the Outer Hebrides Local Development Plan (adopted 2012), and other material planning policy considerations, including the Outer Hebrides Local Development Plan 2 - Proposed Plan (2017).

1.2.2 National Planning Framework 3 (NPF3)
The NPF3 identifies Stornoway as one of five key ports and its deep water assets are noted as presenting significant opportunities for taking advantage of new shipping routes across the Arctic and for tourism development (cruise). Arnish itself is also highlighted as part of the 'Low Carbon/ Renewable North Enterprise Area and identified as an N-RIP (National Renewables Investment Plan) site for distributed manufacturing. The 'Enterprise' areas have been created in order to stimulate manufacturing opportunities as well as investment and job creation. These locations offer clear opportunities for investment-led growth.

1.2.3 Outer Hebrides Local Development Plan (2012)

The proposed development is located on developed coastline (Pol 23) that is 'outwith settlement' (Pol 1) and is located adjacent (north) to proposal site 'E1a Arnish, Lewis' in the adopted Outer Hebrides Local Development Plan (2012).

1.2.4 Emerging Outer Hebrides Local Development Plan 3 - Proposed Plan (2017)

The proposed development is located adjacent (north) to Economic Development Proposal Site "PP17 Arnish". There are a number of constraints attached to PP17 as illustrated in the front pages of the appended proposal site template, which may be of interest in relation to this site:
CAA 17km Safeguarding Zone: Stornoway Airport, MOD Safeguarding Zone: Stornoway Airport; Druim A' Starraig above 45.7m, Stornoway Airport 3km notification, Stornoway Airport all developments, Scheduled Ancient Monuments adjacent, listed building adjacent. The site may be at risk of coastal flooding and therefore not all land within the allocation may be developable. Photographs and a topographic survey are required to demonstrate that all development will be above the 1 in 200 year flood level for the area which is 3.4 m AOD unless it is solely for water compatible uses or the location is essential for operational reasons. A flood risk assessment may be required to ensure that the layout and design addresses and proposes measures to remove any risk from flooding. Depending on siting of proposal Site levels and Finished Floor Levels relating to Ordnance Datum may be required to inform need for Flood Risk Assessment. Siting and design of development should take into account the setting of listed buildings, Stornoway Conservation Area and Lews Castle and Lady Lever Park.

The emerging Plan also includes a new policy at the Proposed Plan stage entitled 'STY3 Development of Stornoway' to ensure development within the extent of the Stornoway Harbour Limits takes account of the Port Masterplan.

1.2.5 LDP3 - Strategic Environmental Assessment - Revised Environmental Report (2017)

As part of the preparation of the emerging Plan, a Strategic Environmental Assessment was undertaken as required by Environment Assessment (Scotland) Act 2005. In addition to Policy STY3 Development of Stornoway Port Area (see response to Newton Marina), The Proposal Site Arnish was assessed and the assessment has been appended to this report. Due to the type and scale of development at this site, a number of environmental criteria were assessed as having negative impacts, some of which were mitigated to positive or neutral. The key ones were: Landscape and visual; cultural heritage; waste generated; water environment and flooding; contamination and impacts on peatland.

1.2.6 National Marine Plan

There is currently no Regional Marine Plan in place in the Outer Hebrides 'Scottish Marine Region'. Where there is no Regional Marine Plan the National Marine Plan applies. The National Marine Plan (2015) has a presumption in favour of sustainable development and use of the marine environment when it is consistent with its policies and objectives. This

principle is relevant to all marine activities, but is especially relevant for the key growth sectors which Scotland specialises in, which includes renewable energy activities. The NMP recognises that development of growth sectors is particularly important in more remote areas of Scotland and that sustainable development and use of the marine environment can provide multiple economic benefits at both a community and national level, including economic growth, skills development, employment, maintaining or increasing population levels and opportunities for investment and trade.

1.2 Comments on Scoping Topics
1.2.1 Desk Based Data Review

The applicant should note that the emerging LDP2 is likely to be adopted early in 2018. Once it is adopted this will be the policy framework on which subsequent planning applications are assessed. It is recommended that LDP2 is considered alongside the LDP in the 'Desk Based Data Review'.

1.2.2 Population and Human Health

The scoping report does not consider the potential for effect on 'population and human health', which is now a requirement under the Environmental Impact Assessment (Scotland) Regulations 2017. While there is no prescribed EIA definition of population and human health, it is generally understood to encompass a range of personal, social, economic, physiological and environmental factors which determine the health status of individuals or populations.

As the development site is at some distance from settlements, it is not anticipated that there would be any significant impacts, and that the majority of impacts would generally be positive or neutral due to job creation, potential relocation of industrial processes out of Stornoway etc. We would recommend an assessment is undertaken as part of the EIA and consideration is given to ways in which the proposal can improve and protect health and well-being.

We would recommend the following factors are considered:

o Activities: employment and local businesses; leisure and tourism facilities (particularly impacts on countryside access to the Arnish peninsula and coastline, which is popular with fishermen, walkers and visitors to the lighthouse and Bonnie Prince Charlie's Cairn and the WW2 gun emplacements).
o Physical Environment: place-making; public realm; green infrastructure; historic environment.
o Property: vacancy rates and vacant sites at Arnish; recent developments and rental values.
o Accessibility: pedestrian football, accessibility, active travel and ease of

movement; parking; signage and ease of navigation.
o Community: attitudes, perceptions and aspirations.

1.2.3 Phasing and Cumulative Impact

The applicant states that as there is "no committed development" at this stage it is not practical to consider cumulative assessment of other masterplan developments. However a scoping report has been received for Newton Marina so it is assumed these two projects will be taken forward first and there is potential for overlap.

The EIA should include an assessment of the cumulative impact of the Project with other planned developments and specialist assessments should be utilised to address potential cumulative impacts. Details of the proposed phasing of these two projects, and assumptions for other port masterplan projects, should be included in the EIA. Issues of particular concern include noise, ecology, and marine safety. Cumulative assessment should include marine activity as well as land-based.

1.2.4 Operational Marine Traffic and Marine Traffic Safety

The scoping report does not contain any details on anticipated marine traffic to the site in the operational stage. It is recommended that the baseline of current marine traffic and operation (including those at anchor) is presented along with the anticipated change in traffic and operation following the development to inform an assessment of the impact on marine traffic and safety.

1.2.5 Landscape and Visual

The proposal site is not within any areas designated for its landscape value. It is recommended that the 'key views and visual receptors' section give consideration to:
o The importance of Stornoway Harbour as principal gateway to the islands, where a significant amount of residents and visitors arrive by ferry. The marina will form a major component of their 'first impression' of Stornoway and the islands themselves. It is recommended that consideration is given to the ferry approach and terminal as a viewpoint in the Landscape and Visual Impact Assessment (LVIA).

1.2.6 Ecology (Vibration)

It is recommended that consideration of the impacts of underwater 'vibration', in addition to those arising from noise and pollution, should also be included in the Ecology assessment.

1.2.7 Transport and Traffic

The EIA should assess opportunities to improve road safety, promote active travel, and address access issues, particularly at stress points (e.g. blind junction of unclassified Arnish Road with the main A859). The EIA should detail how the new development meets the Car Parking standards set out in the Local Development Plan, or provide a justification of the proposed provision and non-conformity with the Standard. The EIA should detail how pedestrians and cyclists will be accommodated on site.

1.2.8 Design Principles

The EIA should demonstrate that the principles of policy DP1 Design and Place-making policy of the LDP2-Proposed Plan have been taken into account and the proposal will reflect a satisfactory quality of place-making, siting, scale and design that respects and reflects local characteristics and complements the surrounding built and natural environment where possible. The principles to be adopted in the design process should be made explicit in the EIA and the applicant may wish to give consideration to producing a design and access statement as part of the EIA process. If appropriate, the EIA should provide design details such as: construction materials, design and finishing treatments, lighting, signposting, screening and the incorporation of any proposed naturalistic features.

1.2.9 Marine aggregate extraction/dredging

The EIA should contain sufficient detail of the project to allow assessment of any impact, such as where mineral extraction and aggregate dredging will take place, what type and quantity of material will be removed, timescale of activity, and details of the disposal of any overburden (including disposal location), and details of proposals for the phased restoration and aftercare of the extraction site.

1.2.10 Flooding

The EIA should clarify that the proposed land based activities are located above an acceptable risk of flooding. If the Flood Risk Assessment is separate to the EIA, the EIA should contain sufficient synopsis of the FRA and detail how the development has been designed to mitigate any identified flood risk constraint through sustainable flood management measures.
Scottish Water (EIA Only)
Comment Date: Wed 04 Oct 2017
Drinking Water Protected Areas

A review of our records indicates that there are no Scottish Water drinking water catchments or water abstraction sources, which are designated as Drinking Water Protected Areas under the Water Framework Directive, in the area that may be affected by the proposed development.

Scottish Water Assets

A review of our records indicates there are no existing Scottish Water assets within the site boundary. However in the event that any Scottish Water asset conflicts are identified then early contact should be made with the Scottish Water Asset Impact Team (AIT) at service.relocation@scottishwater.co.uk. All detailed design proposals relating to the protection of Scottish Water's assets should be submitted to the AIT for review and written acceptance. Works should not take place on site without prior written acceptance by Scottish Water.

Annex 1 also includes a list of precautions to be taken when working within the vicinity of Scottish Water assets.

This list of precautions is not exhaustive but should be taken into account as the development progresses through the planning and development process.

If you have any questions relating to the above, or in relation to the information presented in Annex 1, please do not hesitate to contact me.

SEPA

Comment Date: Tue 03 Oct 2017

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 The Harbour Works (Environmental Impact Assessment) Regulations 1999 [excluding Part II] for Harbour Revision Orders or Harbour Empowerment Orders made under the Harbours Act 1964
The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017

Proposed multi-purpose deep water port on west shore of Glumaig Bay, Arnish
Port, Arnish, Isle of Lewis

Thank you for consulting SEPA on the scoping opinion for the above development proposal by way of your email, which we received on 22 September 2017. We would welcome engagement with the applicant at an early stage to discuss any of the issues raised in this letter.

We note that as well as planning permission the development will also require a Marine Licence and it is intended to apply for a harbour revision order and it is the developer's intention to complete a single EIA Report to cover all these requirements. We welcome this approach and provided the following advice which is applicable to the development as a whole. We ask

that the application include clear information outlining which elements are covered by each of the regulatory regimes. To be helpful this response is copied direct to Marine Scotland and Transport Scotland.

1. Works below Mean High Water Springs

1.1 For works below Mean High Water Springs, we generally do not provide site specific advice on works that will be regulated under The Marine (Scotland) Act 2010 or Harbours Acts. Instead, please refer to our standing advice on marine consultations within guidance document SEPA standing advice for The Department of Energy and Climate Change and Marine Scotland on marine consultations. Marine Scotland will be able to provide you with any site specific advice on marine impacts.

1.2 We welcome the proposals to re-use dredging spoil within the land reclamation works. We would specifically highlight our advice in Section 3.3 and 3.4 within the guidance document SEPA standing advice for The Department of Energy and Climate Change and Marine Scotland on marine consultations with regards the re-use of dredged material and remind the applicant to consider the potential risk of contaminants being present in the spoil.

2. Site layout

2.1 All maps must be based on an adequate scale with which to assess the information. This could range from OS 1: 10,000 to a more detailed scale in more sensitive locations. Each of the maps below must detail all proposed upgraded, temporary and permanent site infrastructure. This includes all temporary or permanent access tracks, excavations, buildings, borrow pits, site compounds, laydown areas, storage areas and any other built elements.

2.2 The layout should be designed to minimise the extent of new works on previously undisturbed ground. A comparison of the environmental effects of alternative locations or layouts may be required.

3. Surface water drainage

3.1 Surface water runoff must be treated by sustainable drainage systems (SUDS) therefore it is important to ensure that adequate space to accommodate SUDS is incorporated within the site layout.

3.2 We welcome the proposals to include oil interceptors. The proposals should meet the treatment requirements of CIRIA C753. A site plan showing the proposed SUDS treatment train must be submitted. Different areas of the development will require different levels of treatment. For example run-off from car parking or marshalling areas will require greater treatment than roof run-off.

3.3 The Simple Index Approach calculation (Section 26.7.1 of the guidance) should be used for the lower risk areas within the site. For yard areas, refuelling areas or areas where there is a higher pollution risk, a detailed risk assessment (Section 26.7.3 of CIRIA C753) must be submitted. We are likely to regulate discharges from high risk areas under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (As Amended) (CAR).

3.4 In addition there may be existing surface (and foul) water drainage outfalls in the locality. Any redevelopment provides an opportunity to upgrade the treatment of these discharges and bring them in line with current practice. All existing discharges and their treatment systems must be shown on a site map.

3.5 Comments on the acceptability of post-development runoff rates for flood control should be sought from the local authority flood prevention unit, and not from SEPA. Comments from Scottish Water should be sought where the SUDS proposals would be adopted by them. We encourage the design of SUDS to Sewers for Scotland Second Edition standards and the adoption of SUDS features by Scottish Water as we are of the view that this leads to best standards and maintenance.

4. Impacts on the fresh water environment

4.1 The preliminary site layout should be amended to avoid direct impacts on the Allt Poll a'Choire watercourse, which should be protected by a 50 m no-development buffer.

4.2 Where the Allt Poll a'Choire requires a road crossing then this should be a bottomless culvert or traditional style bridge, shown to accommodate the 1 in 200 year flood event. Guidance on the design of water crossings can be found in our Construction of River Crossings Good Practice Guide.

4.3 If water abstractions or dewatering are proposed, a table of volumes and timings of groundwater abstractions and related mitigation measures must be provided.

4.4 Further advice and our best practice guidance are available within the water engineering section of our website.

5. Flood risk

5.1 The site lies partly within the medium likelihood (0.5% annual probability or 1 in 200 year) flood extent of the SEPA Flood Maps and may therefore be at medium to high risk of flooding. However we appreciate that this development needs to be located in this area for operational reasons.

5.2 Normally we request compensatory flood storage to be provided for lost functional floodplain volume. However, in undefended tidal areas, loss of floodplain capacity is unlikely to have any impact on water levels and provision of compensatory storage is not required. This applies to development where the use is compatible with the coastal location and the land reclamation is justified in wider policy terms.

5.3 All new development, including development on reclaimed land, should be above the estimated 1 in 200 year flood level for the area which is 3.4 m AOD, unless that particular aspect of the proposal needs to be lower for operational reasons. This will enable the developments to be more resilient during times of flood or storm events. We would also recommend a minimum 600mm freeboard is added to allow for modelling uncertainties and the use of water resistant materials and forms of construction as appropriate.

6. Habitat survey

6.1 In relation to our interests in wetland we are content that no further survey work is required. We are satisfied that there are unlikely to be significant effects on groundwater dependant terrestrial habitats, wetlands we both have a duty to protect under Water Framework Directive.

7. Material excavation and use

7.1 In accordance with Paragraphs 52 to 57 of Planning Advice Note 50 Controlling the Environmental Effects of Surface Mineral Workings (PAN 50) a Site Management Plan should be submitted which includes the following information on the excavation area:

a) A map showing the location, size, depths and dimensions.
b) A map showing any stocks of rock, overburden, soils and temporary and permanent infrastructure including tracks, buildings, oil storage, pipes and drainage, overlain with all lochs and watercourses to a distance of 250 metres. You need to demonstrate that a site specific proportionate buffer can be achieved. On this map, a site-specific buffer must be drawn around each loch or watercourse proportionate to the depth of excavations and at least 10m from access tracks. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of the location, dimensions of the loch or watercourse, drawings of what is proposed in terms of engineering works.

c) You need to provide evidence of the suitability of the material to be excavated for the proposed use, including any risk of pollution caused by degradation of the rock.

d) A ground investigation report giving existing seasonally highest water table

including sections showing the maximum area, depth and profile of working in relation to the water table.

e) A site map showing cut-off drains, silt management devices and settlement lagoons to manage surface water and dewatering discharge. Cut-off drains must be installed to maximise diversion of water from entering quarry works.

f) A site map showing proposed water abstractions with details of the volumes and timings of abstractions.

g) A site map showing the location of pollution prevention measures such as spill kits, oil interceptors, drainage associated with welfare facilities, recycling and bin storage and vehicle washing areas. The drawing notes should include a commitment to check these daily.

h) A site map showing where soils and overburden will be stored including details of the heights and dimensions of each store, how long the material will be stored for and how soils will be kept fit for restoration purposes.

i) Where the development will result in the disturbance of peat or other carbon rich soils then the submission must also include a detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements and excavation areas overlain so it can clearly be seen how the development minimises disturbance of peat and the consequential release of CO2. The application should investigate whether there are local opportunities to use any disturbed material in peatland restoration works, such as improvements to old peat cuttings. This could help mitigate impacts on peat.

j) Sections and plans detailing how restoration will be progressed including the phasing, profiles, depths and types of material to be used.

k) Details of how the rock will be processed in order to produce a grade of rock that will not cause siltation problems during its end use.

7.2 There is a waste management licence for the temporary storage of shotblast waste at the site. It was our understanding that this material was to be put to suitable use, probably in concrete, as part of the expansion works at the site. We ask that the assessment specifically covers the proposals for use of this material.

8. Pollution prevention during construction

8.1 One of our key interests in relation to developments is pollution prevention measures during the periods of construction. We note the applicant's proposals for a Construction Environmental Management Plan

(CEMP). We can confirm that from our perspective, a CEMP need not be provided with the application. Instead, we expect the detailed site plans we have requested in this letter to demonstrate how impacts on the environment have been minimised through site design and all mitigation should be detailed within a suitably robust schedule of mitigation.

8.2 The schedule of mitigation should be supported by the above site specific maps and plans. These must include reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils at any one time) and regulatory requirements. They should set out the daily responsibilities of ECOWs, how site inspections will be recorded and acted upon and proposals for a planning monitoring enforcement officer. Please refer to the Guidance for Pollution Prevention (GPPs).

8.3 The scoping report confirms the potential for oil storage at the new facility. The developer should confirm the proposed inventory of hazardous substances and where it could lie in terms of falling under the scope of the COMAH regulations and associated Hazardous Substances Consent. Finally, if petrol is being handled then the oil storage terminal will need to have appropriate petrol vapour recovery infrastructure and have a Pollution Prevention and Control Part B permit.

Regulatory advice for the applicant

9. Regulatory requirements

9.1 Any proposed engineering works within the water environment above Mean High Water Springs or any proposed abstractions or discharges will require authorisation under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Management of surplus peat, soils or dredging spoil may require an exemption under The Waste Management Licensing (Scotland) Regulations 2011. Proposed crushing or screening will require a permit under The Pollution Prevention and Control (Scotland) Regulations 2012.

9.2 If the proposed development is above the relevant threshold in COMAH then the COMAH Competent Authority should be contacted to discuss the regulatory requirements for such a facility.

9.3 Details of regulatory requirements and good practice advice for the applicant can be found on the Regulations section of our website. If you are unable to find the advice you need for a specific regulatory matter, please contact a member of the regulations team in your local SEPA offices at: 2 James Square, James Street, Stornoway, Isle of Lewis, HS1 2QN - Tel: 01851 706477. They would be very happy to discuss and agree the options available for the use of the shotblast waste before the planning application is

submitted.

Should you wish to discuss this letter please do not hesitate to contact me on 01349 860359 or planning.dingwall@sepa.org.uk.

Marine Licensing
Comment Date: Mon 02 Oct 2017
MS-LOT are awaiting a request for a scoping opinion from the applicant under The Marine Works (Environmental Impact Assessment)(Scotland) Regulations 2017. As such we will not be providing comments on your consultation.

We expect the applicant will make use of both the Local Authority's scoping opinion and MS-LOT's scoping opinion and prepare one EIA report. We will then consult on this EIA report to ensure the marine aspects are dealt with fully.

Environmental Health
Comment Date: Fri 29 Sep 2017

Please find my response to the Arnish and Newton EIA Scoping Reports below.
I am satisfied for both the proposed developments to proceed to the planning application stage. Based on the information provided I would like noise impact assessments to be carried out at both sites as there are nearby receptors that will be affected during construction phase and actual operation. These assessments must be prepared by the developer and submitted to the local authority for further consideration.

Outer Hebrides Fisheries Trust
Thank you for consulting OHFT regarding the proposed development of a deep-water port
(Application 17/00453/SCO_L). OHFT would welcome engagement with the developers at all stages where there is concern for wild fish species. OHFT would like to highlight the following points:
Since the scoping document was published Scottish Government have released the proposed gradings for Scottish Rivers in 2018. This suggests the River Creed will drop from category 1 to 2. This also means the chances of the river meeting its egg requirement falls to 60-80%.
The greatest potential impact to wild salmonids posed by this development is silt and sediment disturbance during construction. EIA should pay significant attention to measures for controlling pollution.
Lastly OHFT hold electrofishing data for both the River Creed and Glen River which can be made freely available upon request.

5.2. Scottish Water Annex 1

Annex 1: Precautions to protect drinking water and Scottish Water assets during development activities

General requirements

1. The proposed timing of the works, including planned start and completion dates, should be submitted to Scottish Water in advance of any activities taking place on-site. This information should be submitted to

EIA@scottishwater.co.uk.

2. If a connection to the water or waste water network is required, a separate application must be made to the Scottish Water Development Operations Team for permission to connect. It is important to note that the granting of planning consent does not guarantee a connection to Scottish Water assets. The Development Operations Team can be contacted by telephone on **0800 389 0379** or via email at

developmentoperations@scottishwater.co.uk.

3. In the event of an incident occurring that could affect Scottish Water we should be notified without delay using the Customer Helpline number **0800 0778 778** and the local contact if known.

Protecting drinking water quality

Regulatory requirements

4. Scottish Water is required to ensure that any activity within a drinking water catchment does not affect the ability of Scottish Water to meet its regulatory requirements.

5. Water Treatment Works are designed to treat the specific parameters of the raw water source they receive (i.e. the specific chemical, biological and other characteristics of natural, untreated water). If the characteristics of the raw water change or deteriorate, it can affect the ability of the works to supply drinking water to customers at the required standards.

6. The regulations relating to the quality of drinking water supplied by Scottish Water are the Water Supply (Water Quality) (Scotland) Regulations 2001. Quality Standards are derived from the European Drinking Water Directive 98/83/EC.

7. Drinking water catchments feed Scottish Water abstractions which supply water to water treatment works. Under Article 7 of the Water Framework Directive, waters used for the abstraction of drinking water are designated as Drinking Water Protected Areas (DWPA). The objective of the Water Framework Directive is to ensure that no activity results in the deterioration of waters within the DWPA. If an activity falls within a DWPA or drinking water catchment, it is essential that water quality and quantity are protected

Specific precautions for drinking water protection

8. A detailed, site specific Construction Method Statement including e.g. Construction Environmental Management Plan, Risk Assessment, Pollution Prevention and Contingency Plan must be submitted to Scottish Water at least three months prior to the works commencing. This should be agreed with Scottish Water prior to any operations taking place. Any other associated documents (e.g. Drainage Plan, Peat Management Plan etc.) should also be submitted and agreed with Scottish Water at least three monthsprior to works commencing. In the first instance, this information should be supplied to

EIA@scottishwater.co.uk.

9. Where possible, infrastructure and activities should be located outside of the drinking water catchment. If this can be demonstrated to be impracticable then all infrastructure and activities should be located 100m from any watercourse where possible, and a minimum of 50m distant where 100m can be demonstrated to be undeliverable.

10. Any potential effect on the hydrology of the area resulting from the construction and operation of the proposed development should be assessed and the findings presented in the Environmental Statement or environmental appraisal accompanying the planning application. This should include consideration of natural drainage patterns, base flows/volume, retention/run-off rates and potential changes to water quantity. Any required mitigation measures and proposed monitoring should also be detailed in the Environmental Statement or environmental appraisal accompanying the planning application.

11. When constructing roads, drainage ditches and trenches, drainage should not be directed into adjacent catchments but retained within the existing catchment.

12. Any potential pollution risk which could affect water quality should be considered and mitigation measures implemented to prevent deterioration in water quality and pollution incidents. This includes sediment runoff, soil or peat erosion, management of chemicals and oils, etc. (see also point 16 below). This should be considered for operations at all stages of development including pre- and post-construction. Scottish Water V5 15/03/2016 ii

13. Mitigation measures to prevent pollution to watercourses should be outlined in the Environmental Statement or environmental appraisal accompanying the planning application, and adopted in the Construction Method Statement/Construction Environmental Management Plan prior to work starting onsite. Any measures implemented should be regularly checked, maintained and improved if pollution occurs.

14. Watercourses that feed into any watercourses or reservoirs that Scottish Water abstracts from should be considered when developing new road or access infrastructure. Any crossing of these watercourses should be kept to a minimum. Pollution prevention measures should be put in place at each crossing point and silt traps, or equivalent, should be installed at regular intervals to minimise the risk from pollution.

15. Once constructed, site roads and access routes should be regularly maintained to ensure minimal erosion, and hence run-off and pollution, from the road surface. Site roads should be constructed from inert, nonmetalliferous material, with low erodibility and low sulphide content.

16. No refuelling or storage of fuel or hazardous materials should take place within the drinking water catchment area. If this can be demonstrated to be impracticable, then the appropriate Scottish Environment Protection Agency (SEPA) Pollution Prevention Guidelines (PPG 2: Above ground oil storage, PPG 6: Working and Construction and Demolition Sites, PPG 8: Safe storage and disposal of fuel oils, PPG 21: Pollution incident response planning and PPG 22: Incident response – dealing with spills) should be followed. 50m buffers should be applied to all surface watercourses, groundwater borehole abstraction points and springs. Oil storage should be in accordance with The Water Environment (Oil Storage) Regulations (Scotland) 2006. There should be dedicated oil storage areas created. Spill kits should be located within all vehicles, plant and high risk areas.

17. Waste storage, concrete preparation and all washout areas should not be within the drinking water catchment area. If this can be demonstrated to be impracticable then this should be in dedicated areas

50m from a watercourse and designed to be contained and to prevent escape of materials/run-off to the environment.

18. Welfare/waste water facilities should preferably be located outside the drinking water catchment. If not practicable, then portable toilets should be used and waste disposed of off-site. Alternatively secondary treatment and soakaways should be used and, if required, a sampling chamber installed and sampling programme agreed. The proposed method of managing welfare and waste water facilities should be detailed in the Environmental Statement or environmental appraisal accompanying the planning application. If sampling is required, Scottish Water should be contacted via **EIA@scottishwater.co.uk** in the first instance.

19. Any proposed abstractions for activities such as welfare facilities or cement batching plants should be detailed in the Environmental Statement or environmental appraisal accompanying the planning application.

20. Induction training should be given to all personnel on-site and should include Scottish Water site sensitivities in relation to drinking water catchments and assets (see below), as well as spill response as outlined in PPG 22: Dealing with spills.

21. Construction and Environmental Management Plans, Pollution Prevention and Contingency Plan and associated documents should include the Scottish Water Customer Helpline Number **0800 0778 778** and the local contact details.

Protecting drinking water in peatland areas

22. When peat is present within the proposed area of activity the Environmental Statement or environmental appraisal accompanying the planning application should include an assessment on the potential release of colour and dissolved organic

carbon quality as a result of changes to hydrology and/or physical disturbance. This should cover the construction and post construction phases.

23. Excavations and ground disturbance in areas of deep peat should be avoided. Deep peat is considered to be peat greater than 0.5m deep.

24. The natural hydrology within peat should be maintained and/or restored. Any necessary measures to maintain natural drainage of peat and sub-surface hydrology, such as tailored drain spacing on access tracks, should be implemented as part of the design of the development.

25. Scottish Water requests that, where possible, access tracks in the drinking water catchment are constructed as floating tracks with adequate provision for maintaining existing drainage patterns.

26. Exposed soils and peat can release sediment, colour and dissolved organic carbon. The use of geotextiles, turf replacement and/or reseeding, should be undertaken as soon as possible.

27. Restoration of any degraded peat should be considered for areas within the drinking water catchment. Scottish Water V5 15/03/2016 iii

Protecting drinking water due to forestry activity

28. An assessment of any forestry activity, including felling, planting or other activity, likely to affect the drinking water catchment should be included in the Environmental Statement or environmental appraisal accompanying the planning application. Any specific mitigation measures should be identified and incorporated into the Construction Environmental Management Plan for the site prior to works commencing.

29. The Environmental Statement or environmental appraisal accompanying the planning application should include details on the harvesting/clearance process for any felling/woodland removal. The least disturbing method/s should be selected where possible.

30. Any historic drains and ditches within the site boundary that discharge directly to a watercourse in the drinking water catchment, these should be blocked and slowly discharged to a buffer area in line with current Forestry Commission Forest and Water Guidelines. Where possible, this should be undertaken in advance of any work being carried out on site, to provide protection for watercourses during site activities.

Monitoring requirements to protect drinking water quality

31. During construction, a programme of daily visual inspection of the watercourses, flow conditions (i.e. high, medium, low, or no flow), prevailing weather and any other pertinent observations, will be required to be implemented. The results should be recorded and the information submitted to Scottish Water (i.e. in a monthly progress report). This should be undertaken when water quality samples are taken. In the first instance proposals for monitoring should be provided to EIA@scottishwater.co.uk.

32. Depending on the vulnerability of the public water supply, Scottish Water may request that a water sampling programme shall be established and agreed with Scottish Water. This should assess the baseline water quality for a minimum of one year prior to any activities commencing on-site where possible, including ground investigations and any felling activities, to allow an accurate understanding of baseline conditions at the site. Water sampling should continue during construction and then postconstruction for a minimum of one year. Following completion of one year of sampling post-construction, this should be reviewed to determine whether this should continue for a further agreed period. The

parameters, frequency and sampling locations will also need to be agreed with Scottish Water. This monitoring will establish if any decline in water quality can be attributed to the development. It may also be necessary to establish trigger levels to determine when any potential issues should be reported to Scottish Water.

33. The appointed Contractor/Site Foreman or Ecological or Environmental Clerk of Works should have relevant knowledge and experience to provide advice and monitor compliance with measures for the protection of water quality in relation to abstractions for water supply.

34. Depending on the vulnerability of the public water supply, Scottish Water may request that a dedicated Environmental Manager be appointed and present on-site to assess and monitor any effects caused by the development.

Guidance documents

35. Please ensure that appropriate Guidance Documents are followed:

• Floating Roads on Peat. Forestry Civil Engineering and SNH. (August 2010).

• Constructed tracks in the Scottish Uplands, 2nd edition. SNH (June 2013).

• Forests and water UK Forestry Standard Guidelines, 5th Edition. Forestry Commission (2011).

• General Binding Rules under the Controlled Activities Regulations (see The Water Environment (Controlled Activities) Scotland Regulations (as amended) A Practical Guide, Version 7.2, SEPA (March 2015)).

• SEPA Pollution Prevention Guidance (http://www.sepa.org.uk/regulations/water/guidance/).

Protecting Scottish Water assets

36. If an activity associated with a development proposal is located within close proximity to Scottish Water assets, including water and waste water pipe infrastructure, treatment works and reservoirs etc., it is essential that these assets are protected from damage. To this end, the developer will be required to comply with Scottish Water's current process, guidance, standards and policies in relation to such matters.

37. Copies of Scottish Water's relevant record drawings can be obtained from the undernoted Asset Plan Providers. This is distinct from the right to seek access to and inspect apparatus plans at Scottish Waters area offices, for which no charge is applied. Scottish Water V5 15/03/2016 iv

Site Investigation Services (UK) Ltd

Tel: 0333 123 1223

Email: sw@sisplan.co.uk

www.sisplan.co.uk

National One-Call

Tel: 0844 800 9957

Email: swplans@national-one-call.co.uk

www.national-one-call.co.uk/swplans

Cornerstone Projects Ltd

Tel: 0151 632 5142

Email: enquiries@cornerstoneprojects.co.uk

http://www.cornerstoneprojects.co.uk/index.php/scottishwaterplans

38. It should be noted that the site plans obtained via the Asset Plan providers are indicative and their accuracy cannot be relied upon. It is therefore recommended that the developer contacts the **Scottish Water Asset Impact Team** at **service.relocation@scottishwater.co.uk** for further advice if assets are shown to be located in the vicinity of the proposed development, and where the exact location and the nature of the infrastructure shown could be a key consideration for the proposed development. An appropriate site investigation may be required to confirm the actual position of assets in the ground. Scottish Water will not be liable for any loss, damage or costs caused by relying upon plans or from carrying out any such site investigation.

39. Prior to any activity commencing, all known Scottish Water assets should be identified, located and marked-out.

40. Scottish Water expects method statements, safe systems of work and risk assessments to be prepared and submitted in advance to Scottish Water for formal review and acceptance. These documents shall consider and outline in detail how existing Scottish Water assets are to be protected and/or managed for the duration of any construction works and during operation of the development if relevant. These documents must be submitted to Scottish Water's Asset Impact team for formal prior written acceptance.

41. The developer shall obtain written acceptance from Scottish Water's Asset Impact Team where any site activities are intended to take place in the vicinity of

Scottish Water's assets. The Asset Impact Team can advise on any potential risk mitigation measures that may be required.

42. Scottish Water and its representatives shall be allowed access to Scottish Water assets at all times for inspection, maintenance and repair. This will also ensure that the Scottish Water assets are protected and that any Scottish Water requirements are being observed.

43. Any obstruction or hindrance of access to Scottish Water assets should be avoided. The prompt and efficient use and manipulation of valves, hydrants, meters or other apparatus is required at all times. There should also be no interference with the free discharge from water main scours or sewer overflows.

44. In the event of an incident occurring that could affect Scottish Water, including any damage to assets, Scottish Water should be notified without delay, using the Customer Helpline number **0800 0778 778**, and the local contact if known. Scottish Water apparatus should not be interfered with or operated by anyone other than Scottish Water personnel.

45. The 'offset distance' is the distance between any Scottish Water asset and adjacent properties and structures. Scottish Water reserves the right to ask for an offset distance in accordance with its own current policy and standards and to suit specific circumstances. The details of this requirement should be confirmed with Scottish Water as an early part of the design process.

46. Stationary plant, equipment, scaffolding, construction or excavated material, etc. should not be placed over, or close to, any Scottish Water assets without the prior written consent of Scottish Water which may be withheld depending on circumstances on-site.

47. Special care should be taken to avoid the burying of Scottish Water assets or the obstruction of sewers or manholes with fill or other material. Arrangements for altering the level of any chambers should be agreed in advance with Scottish Water and these should be constructed in accordance with Scottish Water requirements. The cost of any work to Scottish Water assets will be met by the project developer.

48. Excavation works (e.g. of wind turbine foundations) should not be carried out in the proximity of a water or waste water main without due notice having been given to Scottish Water and prior written acceptance obtained. The developer will comply fully with any Scottish Water specific site requirements.

49. Any tree planting associated with the development (e.g. compensatory planting or screening etc.) should be undertaken in line with Water for Scotland 3rd Edition (April 2015) to ensure that Scottish Water assets are not put at risk by future growth of tree roots. Scottish Water V5 15/03/2016 v

50. Vibration in close proximity to Scottish Water pipelines or ancillary apparatus should be managed in accordance with British Standard 5228-1:2009 (Code of practice for noise and vibration control on construction and open sites). The predicted levels of vibration should be agreed in advance with Scottish Water as part of the risk

assessment and method statement and agreed vibration monitoring arrangements will be required.

51. The developer will consider the possibility of increased loading on Scottish Water apparatus and measures will be taken to eliminate or mitigate increased loading on assets. Care should be taken to identify any assets which may be crossed by vehicles on the access route to the site and crossing points will be engineered to the requirements of Scottish Water. Any pipe crossing proposals are subject to prior written acceptance by Scottish Water.

52. Scottish Water will not accept liability for any costs incurred in fulfilling any of the above requirements during the development planning, construction or operational phases, either by the developer, the developer's associates, contractors or any other person or organisation involved in the project.

53. If the developer damages any Scottish Water asset they will be held liable for any costs resulting from this.

54. Scottish Water may require costs associated with the development to be reimbursed by the developer or the developer's agents.

marinescotland

Scottish Government
Riaghaltas na h-Alba
gov.scot

T: +44 (0)1224 295579 F: +44 (0)1224 295524
E: ms.majorprojects@gov.scot

Marine Scotland - Licensing Operations Team
Scoping Opinion

Stornoway Port Authority (per Envirocentre)
Arnish Deep Water Port
Arnish, Stornoway

THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017 (AS AMENDED)

SCOPING OPINION FOR THE PROPOSED MARINE LICENCE APPLICATION(S) TO CONSTRUCT WORKS, CARRY OUT DREDGING AND DEPOSIT THE ASSOCIATED DREDGE SPOIL WITHIN THE SCOTTISH MARINE AREA

Contents

1. Executive Summary 3
2. Introduction 6
2.1 Background to scoping opinion 6
2.2 The requirement for Environmental Impact Assessment 6
2.3 The content of the Scoping Opinion 6
3. Description of works 7
3.1 Background to the works 7
4. Aim of this Scoping Opinion 8
4.1 The scoping process 8
5. Consultation 9
6. Contents of the EIA report 11
6.1 Requirements of the 2017 MW Regulations 11
6.2 Non-Technical Summary ('NTS') 11
6.3 EU Guidance 12
6.4 Mitigation 12
6.5 Design Envelope 13
7. Interests to be considered within the EIA report 14
7.1 Introduction 14
7.2 Landscape and Visual 14
7.3 Ecology – Marine Mammals 14
7.4 Ecology – Fish 16
7.5 Ecology – Birds 17
7.6 Cultural Heritage and Archaeology 17
7.7 Air Quality 17
7.8 Water Environment 18
7.9 Traffic and Transport 19
7.10 Other Issues 20
8. Marine Planning 22
8.1 Background 22
8.2 The UK Marine Policy Statement 2011 22
8.3 Scotland's NMP 2015 22
8.4 Application and EIA Report 22

9. Multi-Stage Regulatory Approval 23
9.1 Background 23
10. Judicial review 24
11. Gaelic Language 24

Appendix I: Consultee Responses 25
Local Authority – Comhairle nan Eilean Siar - Planning Department 25
Historic Environment Scotland 26
Maritime and Coastguard Agency 28
Northern Lighthouse Board 30
Royal Yachting Association Scotland 31
Scottish Environment Protection Agency - Response 1 32
Scottish Environment Protection Agency - Response 2 37
Scottish Natural Heritage 40

Appendix II - Advice from Marine Scotland Science 44

Appendix III: Licensing Process 46

Appendix IV: Gap Analysis 48

Appendix V: Pre-Dredge Sampling Guidance 49

1. Executive Summary

This is the scoping opinion adopted by the Scottish Ministers, under regulation 14 of The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended) ("the 2017 MW Regulations"), as to the scope and level of detail of information to be provided in the Environmental Impact Assessment report ("EIA report") for the proposed construction and extension to the Arnish Deep Water Port, Arnish, Stornoway, in the Outer Hebrides. The scoping opinion has been requested by Envirocentre on behalf of the applicant, Stornoway Port Authority ("the applicant").

This scoping opinion is based on the information provided in the applicant's request, dated 15 December 2017, for the Scottish Ministers to adopt a scoping opinion. The request included the submission of a scoping report. The Scottish Ministers have consulted on the scoping report and the responses received have been taken into account in adopting this scoping opinion. The matters addressed by the applicant in the scoping report have been carefully considered and use has been made of professional judgment (based on expert advice from stakeholders and Marine Scotland in-house expertise) and experience in order to adopt this opinion.

The main potential issues identified are:

- Impacts to marine ecology, in particular noise impacts to marine mammals and fish; and
- Reduced water quality associated with sediment disturbance during construction.

Detailed information is provided in the specialist topic sections. Matters are not scoped out unless specifically addressed and justified by the applicant and confirmed as being scoped out by the Scottish Ministers. Table 1 summarises the Scottish Minister's advice on whether topics are to be scoped in or out.

Table 1: Scottish Minister's opinion as to whether topics are to be scoped in or out.

Topic	Reason for scoping in / out
Landscape and visual	Scoped IN. Based on the proposed scale and immediate surroundings, Scottish Ministers agree potential likely significant impacts.
Ecology – marine mammals	Scoped IN. Scottish Ministers agree impacts from underwater noise and increased sedimentation effects on marine mammals are potentially significant.
Ecology - fish	Scoped IN. Scottish Ministers agree impacts from underwater noise and increased sedimentation effects on fish are potentially significant.

Ecology - birds	Scoped OUT. Lack of sensitive receptors and negligible magnitude of effect. Scottish Ministers agree no likely significant impacts.
Cultural heritage and archaeology	Scoped OUT. Lack of vulnerable marine features. A protocol for archaeological discoveries should be included within the site specific Schedule of Mitigation ("SoM").
Noise	Scoped IN. Scottish Ministers agree impacts from underwater noise and increased sedimentation effects on marine mammals and fish are potentially significant. Marine aspect to be assessed in the appropriate Ecology section.
Air quality	Scoped OUT. Provided dust control are mitigated through a SoM, Scottish Ministers agree no likely significant impacts.
Water Environment – coastal processes	Scoped IN. Scottish Ministers will undertake a more robust assessment when more details on reclamation are available.
Water Environment – flooding	Scoped IN. Based on vulnerability of site and potential magnitude of effect, Scottish Ministers agree potential likely significant impacts.
Water Environment – water quality	Scoped IN. Scottish Ministers agree impacts from increased contaminants on benthic ecology receptors are potentially significant.
Water Environment – dredge and disposal	Scoped IN. Scottish Ministers agree impacts from dredge and disposal on benthic ecology receptors are potentially significant.
Traffic and transport	Scoped IN. Based on the navigation risk to other vessels, Scottish Ministers agree potential likely significant impacts.
Climate change – Greenhouse Gas Emissions ("GHG")	Scoped OUT. Provided pollution and emissions control are mitigated through a SoM, Scottish Ministers agree no likely significant impacts.
Impacts from major accidents and disasters	Scoped OUT. Provided use of a Safety Management System, Scottish Ministers agree no likely significant impacts.
Cumulative impacts	Scoped IN. Applicant proposed scoping out, but with particular concern over potential noise and vibration effects on marine mammals and fish, water quality / benthic impacts and marine traffic, Scottish Ministers advise scoping in.

For the avoidance of doubt, the adoption of this scoping opinion by the Scottish Ministers does not preclude the Scottish Ministers from requiring the applicant to submit additional information in connection with any EIA report submitted with their application for a marine licence relative to the proposed works.

In the event that an application is not submitted by the applicant for the proposed works within 12 months of the date of this scoping opinion, the Scottish Ministers recommend that the applicant seeks further advice from them regarding the potential to update the scoping opinion.

2. Introduction

2.1 Background to scoping opinion

2.1.1 We refer to your email of 15 December 2017 requesting a scoping opinion from the Scottish Ministers, under Regulation 14 of the 2017 MW Regulations. Your request included a scoping report which contained a description of the location of the works, including a plan sufficient to identify the area in which the works are proposed to be sited, and a description of the nature and purpose of the proposed works and their likely impact on the environment. The Scottish Ministers consider that they have been provided with sufficient information to adopt a scoping opinion.

2.2 The requirement for Environmental Impact Assessment

2.2.1 Under the 2017 MW Regulations, the Scottish Ministers, as the consenting authority, must not grant a regulatory approval for an EIA project unless an environmental impact assessment has been carried out in respect of that project and in carrying out such assessment the Scottish Ministers must take the environmental information into account. The works described in your scoping report fall under Schedule 1, paragraph 8(1) of the 2017 MW Regulations and therefore the works are automatically subjected to an EIA because their environmental effects are presumed to be significant.

2.3 The content of the Scoping Opinion

2.3.1 In regards to your request for a scoping opinion on the proposed content of the required EIA report, the Scottish Ministers have, in accordance with the 2017 MW Regulations, considered the documentation provided to date and consulted with the appropriate consultation bodies (see Appendix I) and scientific advisors (Appendix II) in reaching their scoping opinion.

2.3.2 The EIA process is vital in generating an understanding of the biological, chemical and physical processes operating in and around the proposed works location and those that may be impacted by the proposed activities. We would however state that references made within the scoping opinion with regard to the significance of impacts should not prejudice the outcome of the EIA process. It is therefore expected that these processes will be fully assessed in the EIA report unless scoped out.

3. Description of works

3.1 Background to the works

3.1.1 The proposal by the applicant is to develop a new multi-purpose Deep Water Port at Arnish Point Industrial Estate, located approximately 1.5 – 2km south of Stornoway, on the Isle of Lewis, in the Outer Hebrides. As well as requiring a marine licence, the works will also require planning permission and a harbour revision order and it is the applicants intention to complete a single EIA Report to cover all these requirements.

3.1.2 The proposed works comprise of the following main components:

- Construction of a quay consisting of a wall and finger pier;
- Excavation of rock from behind the quay to clear the area, with some re-use for reclamation and rock armour;
- Construction of a freight ferry berth, marshalling area, heavy lift area, laydown, storage and works land, with an access corridor connecting Arnish Yard to the new quay; and
- Back hoe or suction dredging with some re-use for reclamation and potentially some for sea disposal.

4. Aim of this Scoping Opinion

4.1 The scoping process

4.1.1 Scoping provides the first identification, and likely significance, of the environmental impacts of the proposal and the information needed to enable their assessment. The scoping process is designed to identify which impacts will or will not need to be addressed in the EIA report. This includes the scope of impacts to be addressed and the method of assessment to be used. The scoping process also allows consultees to have early input into the EIA process, to specify their concerns and to supply information that could be pertinent to the EIA process. In association with any comments herein, full regard has been given to the information contained within the documentation submitted with the scoping opinion request.

4.1.2 The Scottish Ministers have also used this opportunity to provide advice in relation to the licensing requirements, in addition to the EIA requirements (see Appendix III).

5. Consultation

5.1.1 On receipt of the scoping opinion request documentation, the Scottish Ministers, in accordance with the 2017 MW Regulations, initiated a 30 day consultation process, which commenced on 22 December 2017. The following bodies were consulted, those marked in **bold** provided a response, those marked in *italics* sent nil returns or stated they had no comments:

- British Shipping
- Caledonian Maritime Assets Limited
- **Comhairle nan Eilean Siar ("CnES")**
- The Crown Estate
- Defence Infrastructure Organisation
- Fisheries Management Scotland
- The Health and Safety Executive
- **Historic Environment Scotland ("HES")**
- Hebridean Whale and Dolphin Trust
- Inshore Fisheries Group
- Marine Scotland Fishery Office – Stornoway
- Marine Scotland Planning and Policy
- **Maritime Coastguard Agency ("MCA")**
- Marine Safety Forum
- **The Northern Lighthouse Board ("NLB")**
- Outer Hebrides Fisheries Trust
- Royal Society for the Protection of Birds
- **The Royal Yachting Association ("RYA")**
- **Scottish Environment Protection Agency ("SEPA")**
- Scottish Fishermen's Federation
- **Scottish Natural Heritage ("SNH")**
- Scottish Wildlife Trust
- Stornoway Angling Association
- Transport Scotland
- UK Chamber of Shipping
- Whale and Dolphin Conservation

5.1.2 From the list above, a total of 7 responses were received. Advice was also sought from Marine Scotland Science ("MSS"). The purpose of the consultation was to obtain advice and guidance from each consultee or advisor as to which potential effects should be scoped in or out of the EIA.

5.1.3 The Scottish Ministers are satisfied that the requirements for consultation have been met in accordance with the 2017 MW Regulations. The sections below

highlight issues which are of particular importance with regards to the EIA report and any marine licence application(s). Full consultation responses are attached in Appendix I and each should be read in full for detailed requirements from individual consultees. MSS advice is attached in Appendix II. The Scottish Ministers expect all consultee concerns to be addressed in the EIA report unless otherwise stated.

6. Contents of the EIA report

6.1 Requirements of the 2017 MW Regulations

6.1.1 An EIA report must be prepared in accordance with regulation 6 of the 2017 MW Regulations.

6.1.2 The 2017 MW Regulations require that the EIA report is prepared by competent experts and must be accompanied by a statement from the applicant outlining the relevant expertise or qualifications of those experts.

6.1.3 The EIA report must be based on this scoping opinion and include the information that may be reasonably required for reaching a reasoned conclusion, which is up to date, on the significant effects of the works on the environment, taking into account current knowledge and methods of assessment.

6.1.4 A gap analysis template is attached at Appendix IV to record the environmental concerns identified during the scoping process. This template should be completed and used to inform the preparation of the EIA report.

6.2 Non-Technical Summary ('NTS')

6.2.1 The EIA report must contain a Non-Technical Summary ("NTS") which should be concise and written in a manner that is appealing to read and easily understood. The NTS should highlight key points set out in the EIA report and must include (at least) the following:

- a description of the works comprising information on the site, design, size and other relevant features of the works;
- a description of the likely significant effects of the works on the environment;
- a description of the features of the works and any measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
- a description of the reasonable alternatives studied by the applicant, which are relevant to the works and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the works on the environment; and
- a summary of the information provided under paragraphs 1 to 9 of Schedule 4 of the 2017 MW Regulations.

6.3 EU Guidance

6.3.1 EU guidance on the preparation of a EIA report identifies the following qualities of a good EIA report:

- A clear structure with a logical sequence that describes, for example existing baseline conditions, predicted impacts (nature, extent and magnitude), scope for mitigation, proposed mitigation measures, significance of unavoidable/residual impacts for each environmental factor.
- A table of contents at the beginning of the document.
- A description of the consent procedure for the works and how EIA fits within it.
- Reads as a single document with appropriate cross-referencing.
- Is concise, comprehensive and objective.
- Is written in an impartial manner without bias.
- Includes a full description and comparison of the alternatives studied.
- Makes effective use of diagrams, illustrations, photographs and other graphics to support the text.
- Uses consistent terminology with a glossary.
- References all information sources used.
- Has a clear explanation of complex issues.
- Contains a good description of the methods used for the studies of each environmental topic.
- Covers each environmental topic in a way which is proportionate to its importance.
- Provides evidence of effective consultations (if some consultations have already taken place).
- Provides basis for effective consultations to come.
- Makes a commitment to mitigation (with a programme) and to monitoring.
- Has a NTS which does not contain technical jargon.
- Contains, where relevant, a reference list detailing the sources used for the description and assessments included in the report.

6.4 Mitigation

6.4.1 Within the EIA report it is important that all mitigating measures are:

- clearly stated;
- accurate;
- assessed for their environmental effects;
- assessed for their effectiveness;
- fully described with regards to their implementation and monitoring, and;
- described in relation to any consents or conditions

6.4.2 The EIA report should contain a mitigation table providing details of all proposed mitigation discussed in the various chapters. Refer to Appendix I for consultee comments on specific baseline assessment and mitigation.

6.4.3 Where potential environmental impacts have been fully investigated but found to be of little or no significance, it is sufficient to validate that part of the assessment by detailing in the EIA report:

- the work has been undertaken;
- what this has shown i.e. what impact if any has been identified; and
- why it is not significant.

6.5 Design Envelope

6.5.1 The exact nature of the work that is needed to inform the EIA may vary depending on the design choices. Where flexibility in the design envelope is required, this must be defined within the EIA report and the reasons for requiring such flexibility clearly stated. To address any uncertainty the EIA report must consider the potential impacts associated with each of the different scenarios. The criteria for selecting the worst case, and the most likely scenario, along with the potential impacts arising from these must also be described. The Scottish Ministers will determine the application based on the worst case scenario. The EIA will reduce the degree of design flexibility required and that the detail will be further refined in a Construction Method Statement ("CMS") to be submitted to the Scottish Ministers, for their approval, before works commence. Please note however the information provided in section 9 below regarding multi-stage regulatory consent. The CMS will freeze the design of the project and will be reviewed by the Scottish Ministers to ensure that the worst case scenario described in the EIA report is not exceeded.

7. Interests to be considered within the EIA report

7.1 Introduction

7.1.1 The scoping report considered the likely impacts of the works on the environment under the headings and topics addressed below. This section also contains a summary of the main points raised by consultees and the Scottish Ministers' opinion on whether EIA topics should be scoped in or out. The consultation responses are contained in Appendix I and the advice from MSS is in Appendix II and the applicant is advised to carefully consider these responses and use the advice and guidance contained within them to inform the EIA report.

7.2 Landscape and Visual

7.2.1 The applicant proposed scoping in Landscape and Visuals. The methodology of an impact assessment was agreed with CnES, based on the site and immediate surroundings, and presented in the scoping report. The proposed works did not raise any concerns with SNH who noted the report correctly identified there are no landscape designations on site (or likely to be affected by the works). SNH welcome the commitment to carry out an assessment and note the methodology proposed by the applicant looks to be appropriate.

7.2.2 The Scottish Ministers agree that landscape and visuals should be scoped into the EIA report.

7.3 Ecology – Marine Mammals

7.3.1 The applicant proposed scoping in noise and vibration associated with construction and operational phases.

7.3.2 The scoping report noted that the EIA report will assess the potential direct and indirect impacts arising from the works on marine mammals and provided information on the two marine designated sites near the works i.e.

- the Inner Hebrides and the Minches candidate Special Area of Conservation ("cSAC"), which is within 1km of the works and is selected for its harbour porpoise (*Phocoena phocoena*) interest; and
- the North East Lewis proposed Marine Protected Area ("pMPA"), which is less than 1km east of the proposed works, and is designated for Risso's dolphin (*Grampus griseus*) and sandeel habitat.

7.3.3 The scoping report also included information on which species of marine mammal have been recorded in the area. The applicant noted that underwater noise

generated during the construction of the works had the highest potential to impact the marine ecology in the area and that during operation impacts may arise from the construction leading to changes in the hydrodynamic regime in the area.

7.3.4 The scoping report provided details of how an assessment of the impacts will be carried out, which will include a desk top study of literature and data sets for marine mammals. The requirement for surveys to determine the presence/absence, abundance and other behavioural aspects of marine mammals using the area will be agreed with SNH and the Scottish Ministers. The need for underwater noise studies will be discussed with the Scottish Ministers.

7.3.5 The applicant notes that a Marine Mammal Protection Plan ("MMPP") will be required and this will include details of mitigation and the use of Marine Mammal Observers ("MMO") and Passive Acoustic Monitoring ("PAM"). The applicant notes that if mitigation is not possible or appropriate and an impact on European Protected Species ("EPS") is envisaged then an EPS licence will be required.

7.3.6 In their consultation response SNH note that the works could affect the conservation objectives of the cSAC as there will be impacts from underwater noise as noted above. SNH note that the Scottish Ministers will be required to carry out an appropriate assessment as required by the Conservation (Natural Habitats, &c.) Regulations 1994 and advise that the impacts on marine mammals are scoped in and that the EIA report contains sufficient information to carry out this assessment.

7.3.7 SNH also note that although the pMPA does not currently have policy protection current advice (Marine Scotland's MPA Management Handbook) is to take such sites into account through any licensing or consenting process. SNH notes there is potential for the proposed protected feature (Risso's dolphin) to be affected by the works. SNH also provide a list of cetacean species and seals that they consider should be included in any assessment.

7.3.8 SNH provided advice on otters and noted that although no otters were identified during surveys, they acknowledge that otter activity can change over time. SNH advise that otter surveys are repeated if more than 18 months elapse between the original survey and commencement of the works.

7.3.9 The applicant submitted a proposed strategy for underwater noise modelling to the Scottish Ministers on 02 February 2018. MSS provided advice on the proposed noise model (Appendix II) and provided detail on what they considered should be provided in the EIA report. SNH noted that the model should be extended to consider impact on all cetaceans and seals that occur regularly in the North Minch. SNH further commented that the model should inform the MMPP, and if required, appropriate mitigation should be put forward based on relevant best practice guidance. MSS notes that dredging and disposal work also has the potential

to cause non-acoustic injury to marine mammals, and this should be scoped in to the EIA report. MSS note the potential for effects on the harbour porpoise feature of the cSAC.

7.3.10 The response from SNH and the advice provided by MSS provide useful information and references to support carrying out an assessment of underwater noise and the applicant is advised to take this into consideration.

7.3.11 The Scottish Ministers agree:

- with SNH that otter surveys should be repeated if more than 18 months elapses between the original survey and commencement of works.
- that impacts from underwater noise and increased sedimentation effects on marine mammals are scoped into the EIA.
- that consideration should be given to the impact of the works on the features of the cSAC and of the pMPA.

7.4 Ecology – Fish

7.4.1 The applicant noted that outward migrating salmon smolts and returning adult salmon and sea trout may be present in the work area. The applicant note that the mouth of the River Creed is near the proposed works and has a Grade 1 watercourse grading which means it has an 80% probability of meeting its conservation limits. The applicant notes there are limitations to the data used to extrapolate the grading of Scottish rivers but that the methods are well established and recognised internationally. The applicant proposes to use other sources of empirical data where they are available to assess the impact on salmonids in the area. The impacts on fish identified are underwater noise during construction and pollution directly originating from the construction. The scoping report states that Atlantic salmon should be scoped into the EIA and that river lamprey (*Lampetra fluviatilis*), sea lamprey (*Petromyzon marinus*) and European eel (*Anguilla Anguilla*) will also be considered.

7.4.2 As part of the CnES response they provide advice provided by the Western Isles District Salmon Fisheries Board which welcomes and agrees with the proposed scope of the EIA but note that the River Creed should be considered Category 2 as this is the proposed conservation limit that will apply to the river during the harbour development. CnES also note that baseline data for the Glen River and River Creed is readily available from the Outer Hebrides Fisheries Trust.

7.4.3 MSS note that information on when salmon and sea trout are likely to be present will come from the local Fisheries Trust, District Salmon Fisheries Board and Angling Club. MSS note that what was recommended for marine mammals in

relation to underwater noise will also cover the needs of diadromous fish.

7.4.4 MSS comment in relation to dredging and reclamation works causing non-acoustic injury to marine mammals also applies to diadromous fish and this should be addressed in the assessment and mitigation actions. There may need to be consideration of whether high levels of suspended sediment which can be injurious to salmonids may be generated by dredging and disposal work and whether mitigation actions to address this may be needed.

7.4.5 The Scottish Ministers agree:

- that impacts from underwater noise and increased sedimentation effects on diadromous fish should be scoped into the EIA.

7.5 Ecology – Birds

7.5.1 The applicant considered it unlikely that birds will be significantly impacted by the site preparation or construction activities as no habitat sites are expected within the proposed work areas.

7.5.2 SNH provided advice that noted that no assessment of the effect upon birds are required as part of the EIA process due to the lack of sensitive features within the area and the minimal potential for impacts of the works.

7.5.3 The Scottish Ministers agree that birds can be scoped out of the EIA report.

7.6 Cultural Heritage and Archaeology

7.6.1 The applicant did not report any known marine features of archaeological importance within site boundary. HES noted one scheduled monument within the terrestrial area that is outside the proposed site boundary.

7.6.2 The Scottish Ministers advise the applicant that providing no archaeological materials are discovered during benthic surveys, the marine aspect of Cultural Heritage and Archaeology can be scoped out of the EIA report. A protocol for archaeological discoveries should be included within the site specific Schedule of Mitigation ("SoM") (either separate or contained within a Construction Environmental Management Plan ("CEMP") to ensure it is utilised in the event of an archaeological find.

7.7 Air Quality

7.7.1 The applicant considered that construction of the proposed works is a temporary impact and can be controlled through developing a site-specific Dust

Management Plan as part of a CEMP. CnES agreed that air quality/dust should be scoped out.

7.7.2 Provided mitigation is put in place through a Dust Management Plan, the Scottish Ministers agree that air quality can be scoped out of the EIA report.

7.8 Water Environment

7.8.1 The applicant considered that the proposed land reclamation, construction of new walls, dredging and subsequent increased surface water run-off will have the potential to affect changes in the:

- local wave climate;
- local flood risk and drainage;
- contamination of coastal water and sediments through spillages and/or sediment transfer (oil, fuels and suspended solids); and
- interactions between water environment impacts and associated ecology.

7.8.2 The proposed land reclamation has the potential to alter wave direction and local geomorphological characteristics. A Transitional and Coastal Morphological Impact Assessment System was undertaken by the Scottish Ministers to screen the proposed works for their likely impact to coastal morphology. The impact was deemed insignificant, however the Scottish Ministers will undertake a more robust assessment when more details on reclamation are available.

7.8.3 The applicant proposed to carry out a flood risk assessment and the findings, including wave overtopping and surface water drainage with climate change scenarios, should identify mitigation measures. SEPA provided two responses, one to the Council's consultation, and a further one after a stakeholder meeting with the applicant. In SEPA's initial council consultation response, they responded that there would be a medium to high risk of flooding at the proposed site.

7.8.4 The applicant proposes to re-use dredged material for reclamation. SEPA noted in their second response that more detail is required on the disposal options of waste generated, and what alternatives are available to minimise dredging works. Not all dredge material will be used to infill the land reclamation, and in order to minimise the potential effects, the applicant should consider the following mitigations:

- sediment contamination;
- correct disposal of hazardous waste and contaminated water;
- storage of chemicals and hydrocarbons in secondary containment, where applicable;
- adequate spill response equipment on site;

- installation of adequate surface water management facilities;
- regular maintenance to be undertaken on equipment; and
- designated wash down areas for concrete contaminated equipment and tools.

7.8.5 SEPA advised in their second response that the removal of underlying geology should also be minimised and alternative waste sources be investigated for any additional fill material.

7.8.6 The Scottish Ministers advise that:

- impacts from flooding are scoped in
- water quality is scoped in
- seabed sampling should be undertaken in line with the Pre-Disposal Sampling Guidelines as referenced in Appendix V. The results of this will be used to assess any potential impacts of mobilising historic contamination in the seabed.
- dredge and disposal options be scoped into the EIA report.

7.9 Traffic and Transport

7.9.1 The applicant noted that during the construction phases of the proposed works, safe operation of the harbour will need to be considered to reduce the navigation risk to other vessels. The MCA recommended the implementation of a robust Safety Management System ("SMS") to manage any incidents and risks, including severe storms and transport accidents. The NLB responded with requirements for modifications to lightings and markings, which they will advise further on at application stage.

7.9.2 With respect to impacts to recreational users, the Royal Yachting Association ("RYA") noted their concern over losing the best anchorage points at Arnish. The Scottish Ministers note their concern and advise the applicant to have on-going discussions with the RYA to agree their requirements to mitigate any potential impact.

7.9.3 The Scottish Ministers conclude Traffic and Transport within the EIA report should be scoped into the EIA report.

7.10 Other Issues

Climate Change

7.10.1 It is the view of the applicant that GHG emissions associated with construction are not anticipated to be significant. The applicant proposes that in order to reduce GHG emissions during construction, plant and vessels will be appropriately maintained.

7.10.2 The Scottish Ministers agree with the applicant that impacts from increased GHG emissions will be negligible, and provided pollution and emissions control could be mitigated through a SoM or CEMP, this can be scoped out.

7.10.3 The Scottish Ministers note the vulnerability of the works to climate change are to be covered within the modelling and impact assessment within the Water Environment chapter.

Impacts from Major Accidents and Disasters

7.10.4 Impacts from natural disasters were considered in the scoping report within the context of the potential risk associated with the location and proposed site use. The applicant proposed scoping out impacts from major accidents and disasters, noting that flooding/tidal surges are considered within the Water Environment section. The MCA recommended the works and implementation of a robust SMS for construction and operation to manage any incidents and risks, including severe storms and transport accidents.

7.10.5 Provided mitigations through a SMS are implemented, the Scottish Ministers agree with the applicant that impacts from major accidents and disasters can be scoped out of the EIA report.

Cumulative Impacts

7.10.6 The Scottish Ministers do not agree with the applicant that cumulative impacts should be scoped out. Details of the phasing of the proposed works and the proposed Newton Marina, as well as the proposed Western Isles HVDC link should be addressed. Cumulative impacts of particular concern are noise and vibration effects on marine mammals and fish, coastal processes and marine traffic, these should be addressed within the EIA report and are therefore scoped in.

Population and Human Health

7.10.7 The scoping report does not consider the potential for effect on 'population and human health', which is now a requirement under Regulation 5(3)(a) of the 2017

MW Regulations. The Scottish Ministers advise the applicant to follow recommendations of CnES as to the content and approach, and therefore conclude population and human health to be scoped into the EIA report.

8. Marine Planning

8.1 Background

8.1.1 The development of projects subject to EIA should be in accordance with the UK Marine Policy Statement and the National Marine Plan ("NMP").

8.2 The UK Marine Policy Statement 2011

8.2.1 The UK Administrations share a common vision of having clean, healthy, safe, productive and biologically diverse oceans and seas. Joint adoption of a UK-wide Marine Policy Statement provides a consistent high-level policy context for the development of marine plans across the UK to achieve this vision. It also sets out the interrelationship between marine and terrestrial planning regimes. It requires that when the Scottish Ministers make decisions that affect, or might affect, the marine area they must do so in accordance with the Statement.

8.3 Scotland's NMP 2015

8.3.1 Developed in accordance with the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 (as amended), the NMP provides a comprehensive statutory planning framework for all activities out to 200 nautical miles. This includes policies for the sustainable management of a wide range of marine industries. The Scottish Ministers must make authorisation and enforcement decisions, or any other decision that affects the marine environment, in accordance with the NMP. The NMP sets out a presumption in favour of sustainable works and use of the marine environment when consistent with the policies and objectives of the Plan.

8.4 Application and EIA Report

8.4.1 It should be noted that any changes produced after the EIA report is submitted may require further environmental assessment and public consultation.

9. Multi-Stage Regulatory Approval

9.1 Background

9.1.1 The 2017 MW Regulations contains provisions regulating the assessment of environmental impacts. A multi-stage approval process arises where an approval procedure comprises more than one stage, one stage involving a principal decision and one or more other stages involving an implementing decision(s) within the parameters set by the principal decision. While the effects which works may have on the environment must be identified and assessed at the time of the procedure relating to the principal decision if those effects are not identified or identifiable at the time of the principle decision, assessment must be undertaken at the subsequent stage.

9.1.2 The definition in the 2017 MW Regulations is as follows: "application for multi-stage regulatory approval" means an application for approval, consent or agreement required by a condition included in a regulatory approval where (in terms of the condition) that approval, consent or agreement must be obtained from the Scottish Ministers before all or part of the works permitted by the regulatory approval may be begun".

9.1.3 A marine licence, if granted, by the Scottish Ministers for your works at Arnish Deep Water Port may have several conditions attached requiring approvals etc. which fall under this definition, for example the approval of a CMS.

9.1.4 When making an application for multi-stage approval the applicant must satisfy the Scottish Ministers that no significant effects have been identified in addition to those already assessed in the EIA report. In doing so, the applicant must account for current (meaning at the time of the multi-stage application) knowledge and methods of assessment which address the likely significant effects of the works on the environment so to enable the Scottish Ministers to reach a reasoned conclusion which is up to date.

9.1.5 If during the consideration of information provided in support of an application for multi-stage regulatory approval the Scottish Ministers consider that the works may have significant environmental effects which have not previously been identified in the EIA report (perhaps due to revised construction methods or updated survey information), then information on such effects and their impacts will be required. This information will fall to be dealt with as additional information under the 2017 MW Regulations, and procedures for consultation, public participation, public notice and decision notice of additional information will apply.

10. Judicial review

All decisions may be subject to judicial review. A judicial review statement should be made available to the public.

11. Gaelic Language

If the proposed works are located in an area where Gaelic is spoken, the applicant is encouraged to adopt best practice by publicising details of the proposed works in both English and Gaelic.

Signed

[Redacted]

Lorraine Gray
09 March 2018
Authorised by the Scottish Ministers to sign in that behalf

Appendix I: Consultee Responses

Local Authority – Comhairle nan Eilean Siar - Planning Department

From: Morag Ferguson - Dev | G <mferguson@cne-siar.gov.uk> Sent: Wed 24/01/2018 10:26
To: Gray L (Lorraine)
Cc: MS Major Projects; Rachel Macleod
Subject: 17/00610/MLCON : Marine Licence and Harbour Revision Order Scoping Consultation: Deep Water Port and Newton Marina
Message Newton Basin scoping (planning).pdf Arnish Deep water scoping (planning).pdf

I refer to the requests received on 22 December 2017 for consultation comments on Scoping in relation to Marine Licence and Harbour Revision Order for the above.

Please note that both these projects have been subject to Scoping for the aspects of the development requiring Planning Permission.

A copy of the scoping response of the Authority in relation to the Planning aspects of these projects is attached and the responses to scoping contained therein should be taken into account and supplement the further comments below

- **Landscape and Visual impacts** - Proposed scope and approach agreed
- **Ecology** - Proposed scope and approach to acceptable subject to following advice:
  In relation to impacts on wild fish the following advice from the WIDSFB should be taken into account: WIDSFB welcome and agree with the proposed scope of the EIA especially the inclusion of Atlantic Salmon and broader aspects of fisheries and water quality. WIDSFB would like to reiterate that the River Creed should be considered category 2 as opposed to category 1 as this is the proposed conservation limit that will apply to the river during the harbour development. Baseline data for the Glen River and River Creed is readily available from the Outer Hebrides Fisheries Trust should this be required as part of the EIA.

  Ecology – It is noted that Inner Hebrides and Minches cSAC and North East Lewis Proposed Marine Protected Area have been identified as hosting Harbour Porpoise and Risso Dolphin respectively.

  Biodiversity - The Comhairle has only a part time resource with Biodiversity forming only part of the remit of the Environment Officer: contact details are Peter Coldwell, peter.coldwell@cne-siar.gov.uk Tel 01870 604990
- **Archaeology** – No response has been received from the Comhairle Archaeologist in relation to the current consultation but the Comhairle archaeologist (Kevin Murphy kevin.murphy@cne-siar.gov.uk Tel 07795824986) indicated satisfaction with the marine archaeology aspects in relation to the former consultation on scoping and confirmed that Marine archaeology should be scoped into the EIA.
- **Noise:** Environmental Health agree with the proposals as set out in the EIA scoping Report for Newton Basin and Arnish i.e. scope in Construction Noise for both, Scope out Operational noise for Marina and consider Operational noise for Deep water port further;
- **Air Quality/ Dust:** – Environmental Health agree with Scope Out
- **Transport** – Construction Phase : Agree to Scope in construction traffic impacts for both Newton and Deep Water port; Consider Operational Impacts once more information available.

I trust these comments are of assistance.

Historic Environment Scotland

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

By email to: lorraine.gray@gov.scot; ms.majorprojects@gov.scot

Dr Lorraine Gray
Marine Licensing Casework Manager
Marine Scotland

Longmore House
Salisbury Place
Edinburgh
EH9 1SH

Enquiry Line: 0131-668-8716
HMConsultations@hes.scot

Our ref: AMN/16/W
Our case ID: 300023529

18 January 2018

Dear Dr Gray

Marine (Scotland) Act 2010 and the Marine Works (Environmental Impact Assessment) Regulations 2017 (as amended) ("The EIA Regulations") and the Harbours Act 1964 ("The 1964 Act")
Deep Water Port, Stornoway
Scoping Report

Thank you for your consultation which we received on 22 December 2017 about the above scoping report. We have reviewed the details in terms of our historic environment interests. This covers world heritage sites, scheduled monuments and their settings, category A-listed buildings and their settings, inventory gardens and designed landscapes, inventory battlefields and historic marine protected areas (HMPAs).

The relevant local authority archaeological and cultural heritage advisors will also be able to offer advice on the scope of the cultural heritage assessment. This may include heritage assets not covered by our interests, such as unscheduled archaeology, and category B- and C-listed buildings.

Proposed Development

I understand that the proposed development comprises a new multi-purpose Deep Water Port on the west shore of Glumaig Bay, a few kilometres south of Stornoway Harbour. The proposed site is across the bay from Arnish Fabrication Yard and load out quay. The first phase of the proposals consists of 400 metres of quay with 10 metres water depth at lowest tide, a new freight ferry berth and marshalling area, a heavy lift area 50m square, and 15ha of laydown, storage and development land behind the quay. The proposals also incorporate a 40m wide access corridor around the south side of Glumaig Bay, connecting Arnish Yard to the new quay.

HISTORIC ENVIRONMENT SCOTLAND | ÀRAINNEACHD EACHDRAIDHEIL ALBA

Scope of Assessment

We have reviewed the submitted scoping report and note the content of Cultural Heritage and Archaeology chapter (chapter 4.4). We note that there is one scheduled monument within the site boundary (SM 5347 Arnish Point, gun emplacements). However, it is understood that the scheduled gun battery will be outside the proposed construction footprint and will be subject to no direct impacts.
On this basis, I can confirm we are content with the approach to assessment set out in the Scoping Report and agree that cultural heritage and archaeology should be scoped into the EIA.

Further Information

Detailed guidance on the application of national policy is set out in our 'Managing Change in the Historic Environment' series available online at www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/managing-change-in-the-historic-environment-guidance-notes/. Technical advice is available through our Technical Conservation website at www.engineshed.org.

We hope this is helpful. Please contact us if you have any questions about this response. The officer managing this case is Urszula Szupszynska and they can be contacted by phone on 0131 668 8653 or by email on Urszula.Szupszynska@hes.scot.

Yours sincerely

Historic Environment Scotland

Maritime and Coastguard Agency

From: Helen Croxson <Helen.Croxson@mcga.gov.uk> Sent: Tue 30/01/2018 10:46
To: MS Major Projects
Cc: Thomas Bulpit
Subject: FW: Scoping Report Consultation - Newton Marina and Arnish, Stornoway - Request for Opinion
Message 169438- Deep_Water_Port_Scoping_Report_Marine_Scotland and TS_final.pdf
169265- Newton_Marina_Scoping_Report_MSLOT TS-FINAL.PDF

Dear Lorraine,

Thank you for your email dated 22 December 2018 regarding the Stornoway Deep Water Port and Newton Marina Scoping Consultation. My apologies for the delay in replying to you.

We would expect the developers to consider any impact of the works on the safety of navigation, with appropriate risk mitigation measures. The various elements of the proposed works which fall below the mean high water mark will likely require a Marine Licence from Marine Scotland. The MCA is a statutory consultee to Marine Scotland and will consider any impact the works may have on vessels operating in the area, at that stage. We would expect the developers to notify the local HM Coastguard and local MCA Marine Office of the proposed works.

As the works fall within the jurisdiction of Stornoway Port Authority, we would like to point developers in the direction of the Port Marine Safety Code (PMSC). They will need to liaise and consult with Stornoway Port Authority to develop a robust Safety Management System (SMS) for the project under this code. The sections that we feel cover navigation safety under the PMSC and its Guide to Good Practice are as follows:

From the Guide to Good Practice, section 7 Conservancy, a Harbour Authority has a duty to conserve the harbour so that it is fit for use as a port, and a duty of reasonable care to see that the harbour is in a fit condition for a vessel to be able to use it safely. Section 7.7 Regulating harbour works covers this in more detail and have copied the extract below from the Guide to Good Practice.

7.7 Regulating harbour works

7.7.1 Some harbour authorities have the powers to license works where they extend below the high watermark, and are thus liable to have an effect on navigation. Such powers do not, however, usually extend to developments on the foreshore.

7.7.2 Some harbour authorities are statutory consultees for planning applications, as a function of owning the seabed, and thus being the adjacent landowner. Where this is not the case, harbour authorities should be alert to developments on shore that could adversely affect the safety of navigation. Where necessary, consideration should be given to requiring the planning applicants to conduct a risk assessment in order to establish that the safety of navigation is not about to be put at risk. Examples of where navigation could be so affected include:

- high constructions, which inhibit line of sight of microwave transmissions, or the performance of port radar, or interfere with the line of sight of aids to navigation;
- high constructions, which potentially affect wind patterns; and
- lighting of a shore development in such a manner that the night vision of mariners is impeded, or that navigation lights, either ashore and onboard vessels are masked, or made less conspicuous.

There is a British Standards Institution publication on Road Lighting, BS5489. Part 8 relates to a code of practice for lighting which may affect the safe use of aerodromes, railways, harbours and navigable Inland waterways.

We would also like to remind developers of any legal obligations, under part 9 of the Merchant Shipping Act 1995, to report all recoveries of wreck material to the Receiver of Wreck. Further guidance can be found at www.gov.uk/guidance/wreck-and-salvage-law.

Kind regards

Helen Croxson

Northern Lighthouse Board

Northern Lighthouse Board

84 George Street
Edinburgh EH2 3DA
Switchboard: 0131 473 3100
Fax: 0131 220 2093
Website: www.nlb.org.uk
Email: enquiries@nlb.org.uk

Your Ref: 169438 & 169265
Our Ref: PD/OPS/ML/S1_03_045

Dr Lorraine Gray
Marine Licensing Casework Manager
Marine Scotland – Marine Planning & Policy Division
Scottish Government
Marine Laboratory
375 Victoria Road
ABERDEEN
AB11 9DB

8 January 2018

Dear Lorraine,

MARINE (SCOTLAND) ACT 2010 & THE MARINE WORKS (ENVIRONMENTAL IMPACT ASSESSMENT) REGULATIONS 2017 (AS AMENDED) & THE HARBOURS ACT 1964 – STORNOWAY PORT AUTHORITY (PER ENVIROCENTRE LTD) – DEEP WATER PORT AND NEWTON MARINA SCOPING, STORNOWAY, ISLE OF LEWIS

Thank you for your email correspondence dated 22 December 2017 regarding the scoping opinion request submitted on behalf of **Stornoway Port Authority (per EnviroCentre Ltd)** in regards to their proposals for the Deep Water Port, Arnish and Newton Marina.

Northern Lighthouse Board has no objections to the proposed developments.

These developments will require some modifications to the lighting and marking arrangements within Stornoway Harbour. Northern Lighthouse Board will be happy to advise regarding these modifications, and will reply formally to any Marine Licence application.

Yours sincerely
[Redacted]

Peter Douglas
Navigation Manager

Royal Yachting Association Scotland

RYA Scotland

Caledonia House
1 Redheughs Rigg
South Gyle
Edinburgh
EH12 9DQ

Tel: +44 (0)131 317 7388
Fax: +44 (0)844 556 9549
Email: admin@ryascotland.org.uk
Web: www.ryascotland.org.uk

11 January 2018

Dr Lorraine Gray
Marine Scotland Licensing Operations Team
Scottish Government
Marine Laboratory,
375 Victoria Road,
Aberdeen,
AB11 9DB

Lorraine.Gray@gov.scot ms.majorprojects@gov.scot
Dear Dr Gray,

Scoping Report Consultation - Newton Marina and Arnish, Stornoway

I have read the scoping reports on behalf of RYA Scotland. Fortuitously, the request came shortly after I had received a copy of the revised *Clyde Cruising Club Sailing Directions and Anchorages: Outer Hebrides*.

In relation to the deep water port, most of the *traffic and transport* section relates to road traffic although the last bullet point in 4.8.3 relates to the safe operation of the harbour. The CCC Sailing Instructions note that berthing alongside is usually preferable to anchoring in Stornoway Harbour but that one of the three potential anchorages is Glumaig Bay. It is probably the best place to anchor in the harbour. The plans suggest that anchoring here would still be possible although commercial traffic would clearly be busier than at present. The EIA should explore with the Stornoway Port Authority whether this anchorage for recreational craft can remain and, if not, what the alternative will be for skippers who do not wish, for whatever reason, to use a pontoon berth. Mitigation will involve publicising any changes to the Clyde Cruising Club for incorporation into Sailing Direction updates.

I welcome the development of the Newton Marina. RYA Scotland has been closely involved in the development of *Awakening the Giant* and this proposal will help achieve the plan's aspirations. The second anchorage listed in the Sailing Directions is northwest of Eilean na Gobhail and close to the entrance of the new marina. As in the previous case, the Stornoway Port Authority ought to consider which anchorages will be available to recreational sailors and publish this information.

Yours sincerely

[Redacted]

Dr G. Russell FRMetS MCIEEM
Planning and Environment Officer, RYA Scotland

Scottish Environment Protection Agency - Response 1
Council response received 03 October 2018

SEPA
Scottish Environment Protection Agency
Buidheann Dion Àrainneachd na h-Alba

Our ref: PCS/155182
Your ref: 17/00453/SCO_L

If telephoning ask for:
Susan Haslam

3 October 2017

Morag Ferguson
Comhairle Nan Eilean Siar
Council Offices
Balivanich
Isle of Benbecula
Western Isles
HS7 5LA

By email only to: planningconsultations-ben@cne-siar.gov.uk

Dear Mrs Ferguson

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017
The Harbour Works (Environmental Impact Assessment) Regulations 1999 [excluding Part II] for Harbour Revision Orders or Harbour Empowerment Orders made under the Harbours Act 1964
The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
Proposed multi-purpose deep water port on west shore of Glumaig Bay, Arnish Port, Arnish, Isle of Lewis

Thank you for consulting SEPA on the scoping opinion for the above development proposal by way of your email, which we received on 22 September 2017. We would welcome engagement with the applicant at an early stage to discuss any of the issues raised in this letter.

We note that as well as planning permission the development will also require a Marine Licence and it is intended to apply for a harbour revision order and it is the developer's intention to complete a single EIA Report to cover all these requirements. We welcome this approach and provided the following advice which is applicable to the development as a whole. We ask that the application include clear information outlining which elements are covered by each of the regulatory regimes. To be helpful this response is copied direct to Marine Scotland and Transport Scotland.

1. Works below Mean High Water Springs

1.1 For works below Mean High Water Springs, we generally do not provide site specific advice on works that will be regulated under The Marine (Scotland) Act 2010 or Harbours Acts. Instead, please refer to our standing advice on marine consultations within guidance document SEPA standing advice for The Department of Energy and Climate Change and Marine Scotland on marine consultations. Marine Scotland will be able to provide you with any site specific advice on marine impacts.

1.2 We welcome the proposals to re-use dredging spoil within the land reclamation works. We would specifically highlight our advice in Section 3.3 and 3.4 within the guidance document SEPA standing advice for The Department of Energy and Climate Change and Marine Scotland on marine consultations with regards the re-use of dredged material and remind the applicant to consider the potential risk of contaminants being present in the spoil.

2. Site layout

2.1 All maps must be based on an adequate scale with which to assess the information. This could range from OS 1: 10,000 to a more detailed scale in more sensitive locations. Each of the maps below must detail all proposed upgraded, temporary and permanent site infrastructure. This includes all temporary or permanent access tracks, excavations, buildings, borrow pits, site compounds, laydown areas, storage areas and any other built elements.

2.2 The layout should be designed to minimise the extent of new works on previously undisturbed ground. A comparison of the environmental effects of alternative locations or layouts may be required.

3. Surface water drainage

3.1 Surface water runoff must be treated by sustainable drainage systems (SUDS) therefore it is important to ensure that adequate space to accommodate SUDS is incorporated within the site layout.

3.2 We welcome the proposals to include oil interceptors. The proposals should meet the treatment requirements of CIRIA C753. A site plan showing the proposed SUDS treatment train must be submitted. Different areas of the development will require different levels of treatment. For example run-off from car parking or marshalling areas will require greater treatment than roof run-off.

3.3 The Simple Index Approach calculation (Section 26.7.1 of the guidance) should be used for the lower risk areas within the site. For yard areas, refuelling areas or areas where there is a higher pollution risk, a detailed risk assessment (Section 26.7.3 of CIRIA C753) must be submitted. We are likely to regulate discharges from high risk areas under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (As Amended) (CAR).

3.4 In addition there may be existing surface (and foul) water drainage outfalls in the locality. Any redevelopment provides an opportunity to upgrade the treatment of these discharges and bring them in line with current practice. All existing discharges and their treatment systems must be shown on a site map.

3.5 Comments on the acceptability of post-development runoff rates for flood control should be sought from the local authority flood prevention unit, and not from SEPA. Comments from Scottish Water should be sought where the SUDS proposals would be adopted by them. We encourage the design of SUDS to Sewers for Scotland Second Edition standards and the adoption of SUDS features by Scottish Water as we are of the view that this leads to best standards and maintenance.

4. Impacts on the fresh water environment

4.1 The preliminary site layout should be amended to avoid direct impacts on the Allt Poll a'Choire watercourse, which should be protected by a 50 m no-development buffer.

4.2 Where the Allt Poll a'Choire requires a road crossing then this should be a bottomless culvert or traditional style bridge, shown to accommodate the 1 in 200 year flood event. Guidance on the design of water crossings can be found in our Construction of River Crossings Good Practice Guide.

4.3 If water abstractions or dewatering are proposed, a table of volumes and timings of groundwater abstractions and related mitigation measures must be provided.

4.4 Further advice and our best practice guidance are available within the water engineering section of our website.

5. Flood risk

5.1 The site lies partly within the medium likelihood (0.5% annual probability or 1 in 200 year) flood extent of the SEPA Flood Maps and may therefore be at medium to high risk of flooding. However we appreciate that this development needs to be located in this area for operational reasons.

5.2 Normally we request compensatory flood storage to be provided for lost functional floodplain volume. However, in undefended tidal areas, loss of floodplain capacity is unlikely to have any impact on water levels and provision of compensatory storage is not required. This applies to development where the use is compatible with the coastal location and the land reclamation is justified in wider policy terms.

5.3 All new development, including development on reclaimed land, should be above the estimated 1 in 200 year flood level for the area which is 3.4 m AOD, unless that particular aspect of the proposal needs to be lower for operational reasons. This will enable the developments to be more resilient during times of flood or storm events. We would also recommend a minimum 600mm freeboard is added to allow for modelling uncertainties and the use of water resistant materials and forms of construction as appropriate.

6. Habitat survey

6.1 In relation to our interests in wetland we are content that no further survey work is required. We are satisfied that there are unlikely to be significant effects on groundwater dependant terrestrial habitats, wetlands we both have a duty to protect under Water Framework Directive.

7. Material excavation and use

7.1 In accordance with Paragraphs 52 to 57 of Planning Advice Note 50 Controlling the Environmental Effects of Surface Mineral Workings (PAN 50) a Site Management Plan should be submitted which includes the following information on the excavation area:

a) A map showing the location, size, depths and dimensions.

b) A map showing any stocks of rock, overburden, soils and temporary and permanent infrastructure including tracks, buildings, oil storage, pipes and drainage, overlain with all lochs and watercourses to a distance of 250 metres. You need to demonstrate that a site specific proportionate buffer can be achieved. On this map, a site-specific buffer must be drawn around each loch or watercourse proportionate to the depth of excavations and at least 10m from access tracks. If this minimum buffer cannot be achieved each breach must be numbered on a plan with an associated photograph of

the location, dimensions of the loch or watercourse, drawings of what is proposed in terms of engineering works.

c) You need to provide evidence of the suitability of the material to be excavated for the proposed use, including any risk of pollution caused by degradation of the rock.

d) A ground investigation report giving existing seasonally highest water table including sections showing the maximum area, depth and profile of working in relation to the water table.

e) A site map showing cut-off drains, silt management devices and settlement lagoons to manage surface water and dewatering discharge. Cut-off drains must be installed to maximise diversion of water from entering quarry works.

f) A site map showing proposed water abstractions with details of the volumes and timings of abstractions.

g) A site map showing the location of pollution prevention measures such as spill kits, oil interceptors, drainage associated with welfare facilities, recycling and bin storage and vehicle washing areas. The drawing notes should include a commitment to check these daily.

h) A site map showing where soils and overburden will be stored including details of the heights and dimensions of each store, how long the material will be stored for and how soils will be kept fit for restoration purposes.

i) Where the development will result in the disturbance of peat or other carbon rich soils then the submission must also include a detailed map of peat depths (this must be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland - Peatland Survey (2017)) with all the built elements and excavation areas overlain so it can clearly be seen how the development minimises disturbance of peat and the consequential release of CO_2. The application should investigate whether there are local opportunities to use any disturbed material in peatland restoration works, such as improvements to old peat cuttings. This could help mitigate impacts on peat.

j) Sections and plans detailing how restoration will be progressed including the phasing, profiles, depths and types of material to be used.

k) Details of how the rock will be processed in order to produce a grade of rock that will not cause siltation problems during its end use.

7.2 There is a waste management licence for the temporary storage of shotblast waste at the site. It was our understanding that this material was to be put to suitable use, probably in concrete, as part of the expansion works at the site. We ask that the assessment specifically covers the proposals for use of this material.

8. Pollution prevention during construction

8.1 One of our key interests in relation to developments is pollution prevention measures during the periods of construction. We note the applicant's proposals for a Construction Environmental Management Plan (CEMP). We can confirm that from our perspective, a CEMP need not be provided with the application. Instead, we expect the detailed site plans

we have requested in this letter to demonstrate how impacts on the environment have been minimised through site design and all mitigation should be detailed within a suitably robust schedule of mitigation.

8.2 The schedule of mitigation should be supported by the above site specific maps and plans. These must include reference to best practice pollution prevention and construction techniques (for example, limiting the maximum area to be stripped of soils at any one time) and regulatory requirements. They should set out the daily responsibilities of ECOWs, how site inspections will be recorded and acted upon and proposals for a planning monitoring enforcement officer. Please refer to the Guidance for Pollution Prevention (GPPs).

8.3 The scoping report confirms the potential for oil storage at the new facility. The developer should confirm the proposed inventory of hazardous substances and where it could lie in terms of falling under the scope of the COMAH regulations and associated Hazardous Substances Consent. Finally, if petrol is being handled then the oil storage terminal will need to have appropriate petrol vapour recovery infrastructure and have a Pollution Prevention and Control Part B permit.

Regulatory advice for the applicant

9. Regulatory requirements

9.1 Any proposed engineering works within the water environment above Mean High Water Springs or any proposed abstractions or discharges will require authorisation under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Management of surplus peat, soils or dredging spoil may require an exemption under The Waste Management Licensing (Scotland) Regulations 2011. Proposed crushing or screening will require a permit under The Pollution Prevention and Control (Scotland) Regulations 2012.

9.2 If the proposed development is above the relevant threshold in COMAH then the COMAH Competent Authority should be contacted to discuss the regulatory requirements for such a facility.

9.3 Details of regulatory requirements and good practice advice for the applicant can be found on the Regulations section of our website. If you are unable to find the advice you need for a specific regulatory matter, please contact a member of the regulations team in your local SEPA offices at: 2 James Square, James Street, Stornoway, Isle of Lewis, HS1 2QN - Tel: 01851 706477. They would be very happy to discuss and agree the options available for the use of the shotblast waste before the planning application is submitted.

Should you wish to discuss this letter please do not hesitate to contact me on 01349 860359 or planning.dingwall@sepa.org.uk.

Yours sincerely

Susan Haslam
Senior Planning Officer
Planning Service

Ecopy: ms.marinelicensing@gov.scot; Yvonne.Edmond@transport.gov.scot (please redirect if necessary); mferguson@cne-siar.gov.uk

Scottish Environment Protection Agency - Response 2
Received 01 February 2018

SEPA
Scottish Environment Protection Agency
Buidheann Dion Àrainneachd na h-Alba

Our ref: PCS/156665
Your ref: 17/00453/SCO_L

If telephoning ask for:
Susan Haslam

1 February 2018

Morag Ferguson
Comhairle Nan Eilean Siar
By email only to: planningconsultations-sty@cne-siar.gov.uk

Lorraine Gray
Marine Scotland
By email only to: ms.majorprojects@gov.scot

Val Ferguson
Transport Scotland
By email only to: Val.Ferguson@transport.gov.scot

Dear Ms Ferguson, Ms Gray and Ms Ferguson

Harbours Act 1964
Marine (Scotland) Act 2010
The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017
The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017
Town and Country Planning (Scotland) Acts
Proposed multi-purpose deep water port on west shore of Glumaig Bay, Arnish Port, Arnish, Isle of Lewis

Following the informative meeting on 26 January 2018 SEPA takes the opportunity to provide the following further comments on the scoping of the project.

1. Site use

1.1 The scoping report suggested that the development would include "laydown and storage areas to service decommissioning projects." However, we understand from the meeting that decommissioning has more formally been identified as a use for the site and as a result the EIA will assess likely effects from the related activities. The development team has correctly identified that such works will require a Pollution Prevention and Control (PPC) authorisation from SEPA. Other works such as paint or chemical spraying and oil storage may also require PPC. We would welcome further clarification on what exactly is proposed for the site and how this will be assessed in the EIA. In the interim our general planning requirements for a development which is also be covered by PPC is that the planning application includes the following information for each process:

(a) A general description of the proposed process, techniques and technology choice.

(b) EITHER – details of proposed processes, techniques and technologies, an assessment of environmental impact associated with technology choice, including the process of producing a detailed list of receptors, a description of potential impact on sensitive receptors, proposed mitigation measures and emissions standards to be achieved;
OR – a demonstration that, assuming a worst-case scenario with sensitive receptors present, the development could reasonably achieve through existing technology agreed defined emissions standards.

(c) A statement relating to potential for abnormal or unusual events (e.g. non-routine emissions), the frequency and expected duration of the events, and the potential impact on sensitive receptors, in order to demonstrate the suitability of the location.

1.2 If necessary, we will provide further scoping advice on this aspect once we are clearer what is proposed.

2. Flood risk

2.1 We highlight the need to ensure that site level information is also provided to meters Above Ordnance Datum and draw your attention to the levels outlined in section 5.3 of our previous response.

3. Dredging

3.1 We suggest that dredging works should be minimised to those required to provide adequate access to the area and consideration be given to the use of suitable waste materials for infill works. The EIA Report should consider what alternatives are available. For example, opportunity to make use of waste materials for large quarries such as Glensanda or materials currently stored on the site or adjacent to it.

3.2 If the dredging works results in the generation of waste materials and it is proposed that that material will be disposed of on land then details of disposal options should also be outlined.

4. Quarrying

4.1 Similar to above, we suggest that on shore quarrying works should be minimise to those required to provide space for the development platform and alternative waste sources investigated for any additional fill material.

5. Water Framework Directive

5.1 To confirm SEPA will not provide advice on Water Framework Directive implications and assessment, but defer to MS-LOT on this issue.

6. Impacts on the freshwater environment

6.1 We highlight the need for a modification to the north access road to the site; this will need to be amended so that it is not on top of a watercourse.

6.2 We also reiterate our comments in relation to the need for amendments to Phase 4 of the development to ensure that impacts on the Allt Poll a'Choire are avoided. While we note that this is the same layout as proposed in the Stornoway Port Masterplan we highlight that SEPA was not consulted on the Masterplan and therefore this scoping process is our first opportunity to provide comment on its acceptability.

We would be very happy to provide advice on draft submissions covering those aspects of the development we have an interest, if this would be helpful.

Should you wish to discuss this letter please do not hesitate to contact me on 01349 860359 or planning.dingwall@sepa.org.uk.

Yours sincerely

Susan Haslam
Senior Planning Officer
Planning Service

Ecopy: CPotter@envirocentre.co.uk; mferguson@cne-siar.gov.uk

Disclaimer
This advice is given without prejudice to any decision made on elements of the proposal regulated by us, as such a decision may take into account factors not considered at this time. We prefer all the technical information required for any SEPA consents to be submitted at the same time as the planning or similar application. However, we consider it to be at the applicant's commercial risk if any significant changes required during the regulatory stage necessitate a further planning application or similar application and/or neighbour notification or advertising. We have relied on the accuracy and completeness of the information supplied to us in providing the above advice and can take no responsibility for incorrect data or interpretation, or omissions, in such information. If we have not referred to a particular issue in our response, it should not be assumed that there is no impact associated with that issue. Further information on our consultation arrangements generally can be found on our website planning pages.

Scottish Natural Heritage

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

BY EMAIL
FAO: Lorraine Gray
Marine Licensing Officer
Marine Scotland - Marine Planning & Policy
ms.marinelicensing@gov.scot

Date: 25 January 2018

Dear Lorraine

ARNISH DEEP WATER DEVELOPMENT, GLUMAIG BAY, ISLE OF LEWIS. SCOPING REQUEST – TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

Thank you for your consulting SNH on the above screening request which we received on 22nd December 2017. We provided EIA screening advice to CnES on 12 October 2017.

We advise that with regards to our interests the Scoping Report (December 2017) accurately identifies natural heritage receptors that may be significantly impacted by the proposal. We are in agreement with the report's recommendations on what should be scoped in to (and out of) the EIA Report.

The principal marine natural heritage issue arising from this development which will require further consideration in the EIAR is the potential effect of drilling/piling noise on marine mammals, particularly cetaceans, including harbour porpoise within Inner Hebrides and the Minches cSAC and the North East Lewis pMPA.

We are aware the proposed development contains elements which are above and below Mean High Water Springs (MHWS), and will therefore likely require consents from both the LPA and Marine Scotland. Given the complex regulatory regime covering the overall development we'd welcome the co-ordination of the EIA process between competent authorities. This response considers the entire scope of the proposed works associated with the development and not only those relevant to marine licensing.

In the absence of detailed proposals for the construction and operation of the Arnish Deepwater Port, the report commits to further consultation with SNH (and MS) to determine the scope of survey and /or other work that may be required to properly assess impacts on marine mammals and fish. This should be done before the marine licence is determined.

Annex A of this letter provides further detail to assist with the EIA process.

I hope you find the above comments useful, however should you wish to discuss the issues raised further, please don't hesitate to contact me.

ANNEX A – DETAILS TO ASSIST WITH THE EIA FOR ARNISH DEEPWATER PORT

We have a variety of guidance covering topics such as protected areas and protected species. We would expect the applicant to follow the latest guidance as published on our website via https://www.nature.scot/professional-advice/planning-and-development/natural-heritage-advice-planners-and-developers

Guidance on the EIA process is also available, including a link to our EIA handbook - https://www.nature.scot/professional-advice/planning-and-development/environmental-assessment/environmental-impact-assessment.

1. PROTECTED AREAS

Inner Hebrides and the Minches candidate Special Area of Conservation (cSAC)
The proposal (as defined by the EIA red line boundary) lies within 1 km of the Inner Hebrides and the Minches candidate Special Area of Conservation (SAC), selected for its harbour porpoise interest. Based on the information provided, the proposal could affect the conservation objectives of the site.

The most likely impact relates to disturbance to cetaceans (and seals) due to underwater noise generated during the construction phase of the project (principally from piling and/or drilling). Should any blasting be required this too will need consideration. Noise can adversely impact cetaceans (including harbour porpoise) by masking communication between animals, disturbing natural behaviour and distribution, impairing hearing or even, at close proximity, causing injury or death. The risk of such impacts is influenced by factors including location of the proposed activity, its duration, whether it is continuous or intermittent, time of day, and the methodology. However disturbance is possible over ranges of several kilometres from the actual operation

In addition to the EIA regulations, the site's status means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended (the "Habitats Regulations") also apply. Consequently, Marine Scotland will be required to consider the effect of the proposal on the *cSAC* before it can be consented. Given what we currently know, our view is that this proposal is likely to have a significant effect on harbour porpoise within the cSAC. Consequently, Marine Scotland are likely to be required to carry out an appropriate assessment. It is important that the EIAR contains sufficient information to support this assessment. We therefore advised that this topic should be scoped in (as per the Scoping Report recommendation).

We welcome the commitment to model underwater noise propagation to inform a Marine Mammal Protection Plan. To inform that process we advise that the following references should be considered:

- *Good Practice Guide for Underwater Noise Measurement*, National Measurement Office, Marine Scotland, The Crown Estate, Robinson, S.P., Lepper, P. A. and Hazelwood, R.A., NPL Good Practice Guide No. 133, ISSN: 1368-6550, 2014. http://www.npl.co.uk/upload/pdf/gpg133-underwater-noise-measurement.pdf

- Farcas A., Thompson P.M., Merchant N.D. (2016) Underwater noise modelling for environmental impact assessment. *Environmental Impact Assessment Review* Vol 57 pg 114-122 http://aura.abdn.ac.uk/bitstream/2164/7677/1/1_s2.0_S0195925515300202_main.pdf

Received levels, or acoustic thresholds, at which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for acute, incidental exposure to underwater anthropogenic sound should be considered. For assessment of impact to marine mammals we advise that the EIAR consider both Southall and NOAA injury thresholds:

- National Marine Fisheries Service (2016) *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts.* U.S Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178p. http://www.nmfs.noaa.gov/pr/acoustics/Acoustic%20Guidance%20Files/opr-55_acoustic_guidance_tech_memo.pdf

- Southall B.L., Bowles A.E., Ellison W.T., Finneran J.J., Gentry R.L., Greene Jr. C.R., Kastak D., Ketten D.R., Miller J.H., Nachitgall P.E., Richardson W.J., Thomas J.A., & Tyack P.L. (2007) Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendation. *Aquatic Mammals*, Vol 33 No 4 http://sea-inc.net/assets/pdf/mmnoise_aquaticmammals.pdf

Disturbance should also be assessed. We advise that there is currently no agreed disturbance threshold as such, but that assessments are moving away from identifying a fixed threshold, towards using a dose response curve as used in:

- Thompson P.M., Hastie G.D., Nedwell J., Barham R., Brookes K.L., Cordes L.S., Bailey H., & McLean N. (2013) Framework for assessing impacts of pile-driving noise from offshore wind farm construction on a harbour seal population *Environmental Impact Assessment Review* Vol 43 pg 73-85. https://www.abdn.ac.uk/lighthouse/documents/Thompson_et_al._2013_EIAR.pdf

However the NOAA interim disturbance thresholds may prove sufficient in this case: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html

While we expect the above guidance to be considered, the final assessment should be proportionate to the scale and risk of the works. We can provide further guidance on this aspect if required.

Appropriate mitigation should be put forward based on relevant best practice guidance including:

- Statutory nature conservation agency piling protocol (August 2010): http://jncc.defra.gov.uk/pdf/JNCC_Piling%20protocol_August_2010.pdf

Consideration should be given to the size of the noise mitigation zone and the best way to cover it. It is usual to apply a standard 500m radius, however consideration should be given to whether the harbour area, or a larger extent should be monitored. It should also consider the most appropriate viewpoints and the number of MMOs required.

Note: The proposed North East Lewis MPA mentioned in the scoping report (Table 4.12) has no policy protection at time of writing. However Marine Scotland advises that MPA proposals should be taken into account through any licensing or consenting process. The proposed protected features capable of being affected by the proposal are Risso's dolphin

The proposed site abuts the southern edge of the red line boundary for the development. Further information on development management and nature conservation MPAs is available at http://www.gov.scot/resource/0042/00428637.pdf. Our recommendation is that The EIAR also considers possible impacts on Risso's dolphins in this context.

2. PROTECTED SPECIES

Marine Mammals

Several species of cetaceans occur regularly in the North Minch including Risso's dolphin (*Grampus griseus*), Short-beaked common dolphin (*Delphinus delphis*), Killer whale (*Orcinus orca*), Minke whale (*Balaenoptera acutorostrata*), Humpback whale (*Megaptera novaeangliae*), Bottlenose dolphin (*Tursiops truncatus*) as well as Harbour porpoise (*Phocoena phocoena*). Harbour porpoise are resident in the region throughout the year while other species occur more frequently during the summer and autumn months. Grey (*Halichoerus grypus*) and Harbour (*Phoca vitulina*) seals are also sighted regularly. We recommend that the MMPP considers impact on all of the above cetacean species and seals. Although the hearing characteristics of these different species vary somewhat from harbour porpoise the advice given re the cSAC above, is also relevant to other marine mammals. It is possible that an EPS license will be required if the mitigation proposed in the MMPP is not possible or appropriate. Sufficient information should be provided in the EIAR to support such an application.

Birds

We are in agreement that impacts on birds can be scoped out of further assessment.

Otters

An otter survey has been carried out and did not find any sign of otters within the site. Although we have not seen the survey, if an appropriate methodology was followed we would agree with the Scoping Report that no further assessment is required (subject to confirmation on methodology). Otter activity can change over time and we recommend that otter surveys are repeated if more than 18 months elapses between the original survey and commencement of works (to avoid risk of an offence).

3. LANDSCAPE

In our view the proposed development does not raise any concerns with regard to landscape impacts of national importance. In addition the report correctly identifies there are no landscape designations on site (or likely to be effected by the development). The report recommends that a LVIA is undertaken as part of an EIA. We welcome that commitment as a matter of best practice for a development of this nature however we have no comment to make on its focus. The methodology proposed looks to be appropriate. Please note SNH does not act in an advisory capacity on Garden and Designed Landscape designations.

Appendix II - Advice from Marine Scotland Science

marinescotland
science

T: +44 (0)131 244 2500
MS_Renewables@gov.scot

The Scottish Government

Dr Lorraine Gray
Licensing Operations Team
Marine Scotland
375 Victoria Road
Aberdeen
AB11 9DB

STORNOWAY PORT AUTHORITY, NEWTON MARINA AND ARNISH DEEP WATER PORT, WESTERN ISLES - WESTERN ISLES COUNCIL RESPONSE

Marine Scotland Science has reviewed the submitted documents and has provided the following comments.

marine mammals

The example provided to illustrate an approach to assessment of underwater noise effects has some useful elements. However, there are several areas in which the approach, if taken in exactly the way, is likely to be inadequate. We provide a list of the elements that we recommend are addressed in the assessment:

1. A quantitative noise model should be used. This should account for the open water marine environment around the development, as opposed to the constrained freshwater environment of the River Tyne, as well as the water depth at the development (which will result in greater noise propagation than in the shallower river environment).
2. The example provided does not include assessment of piling activities, which MSS recommend should be the focus of the noise assessment, as these will be the noisiest activity undertaken. Dredging activities should also be included as they will generate noise, but note that dredging and disposal work also has the potential to cause non-acoustic injury to marine mammals, and this should be addressed in the assessment and in mitigation actions.
3. The species of concern in this development area include those in the example report, but also cover cetaceans, which are highly dependent upon hearing, including echolocation, to find food and navigate their environment. In particular, the assessment should consider effects to the harbour porpoise feature of the Inner Hebrides and the Minches cSAC, although several other cetacean species are also known to use the waters in the area.
4. All cetaceans are European Protected Species, which provides protection against killing, injury and disturbance. Guidance on EPS licensing in Scotland is available from http://www.scotland.gov.uk/Resource/0044/00446679.pdf. MSS recommend that the applicant undertakes an EPS risk assessment and applies for an EPS licence once more details of the project are available.

MSS considers that use of the NOAA/NMFS (2016) criteria for injury (PTS) to marine mammals is appropriate for the assessment (although we would also accept use of the Southall 2007 criteria). Exposure to noise levels sufficient to induce PTS in either seals or cetaceans is typically considered to be capable of causing injury, which is prohibited for both groups of species. If the assessment suggests that there is the potential for this, MSS would strongly recommend that suitable mitigation is put in place to avoid seals and cetaceans being exposed to noise sufficient to induce PTS.

MSS recommend that the applicant considers the findings of scientific studies of piling activities in the Cromarty Firth (Graham et al., 2017. Responses of bottlenose dolphins and harbour porpoises to impact and vibration piling noise during harbour construction. Ecosphere, 8(5): e01793). MSS can provide a copy if necessary.

diadromous fish
Outward migrating salmon smolts and returning adult salmon and sea trout may be present in the work area and the best information on when they are likely to be present or are present will come from local fisheries bodies such as the local Fisheries Trust, DSFB and Angling Club, or any direct observations. What is being recommended for marine mammals regarding underwater noise will also cover the needs of diadromous fish.

The marine mammal response notes that dredging and disposal work also has the potential to cause non-acoustic injury to marine mammals and that this should be addressed in the assessment and mitigation actions. This also applies to diadromous fish, and there may need to be consideration of whether high levels of suspended sediment which can be injurious to salmonids may be generated by dredging and disposal work and whether mitigation actions to address this may be needed.

Hopefully these comments are helpful to you. If you wish to discuss any matters further contact the MSS Renewables in-box at MS_Renewables@gov.scot

Yours sincerely

Paul Stainer

Marine Scotland Science

15 February 2018

Appendix III: Licensing Process

Application

The application letter must detail how many licences are being sought, what marine licensable activities are proposed and what legislation the application is being made under.

Applicants are required to submit two hard copies of EIA report together with an electronic copy in a user-friendly PDF format which will be placed on the Scottish Government website. If requested to do so by the Scottish Ministers the applicant must send to the Scottish Ministers such further hard copies of the EIA report as requested. Applicants may be asked to issue the EIA report directly to consultees and in which case consultee address lists should be obtained from the Scottish Ministers.

Requirement for Public Pre-Application Consultation ('PAC')

From 6th April 2014, applications received for certain activities are subject to a public pre-application consultation requirement. Activities affected will be large projects with the potential for significant impacts on the environment, local communities and other legitimate uses of the sea. This requirement allows local communities, environmental groups and other interested parties to comment on proposed works in their early stages and before an application for a marine licence is submitted.

The Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 can be accessed via

http://www.legislation.gov.uk/ssi/2013/286/made

Guidance on marine licensable activities subject to Pre-application Consultation can be obtained at:

http://www.gov.scot/Topics/marine/Licensing/marine/guidance/preappconsult

The licensing authority reserves the right not to accept an application in the absence of an acceptable PAC report.

Pre-Dredge Sampling

Please note that if it is intended to dispose of any dredged material at sea, adequate pre-dredge sample analysis must be submitted in support of the EIA report and marine licence dredging application. The licensing authority reserves the right not to accept an application in the absence of acceptable sediment analysis data.

Please refer to the pre-dredge sampling guidance provided in Appendix V.

Ordinance Survey ("OS") Mapping Records

Applicants are requested at application stage to submit a detailed OS plan showing

the site boundary and location of all deposits and onshore supporting infrastructure in a format compatible with The Scottish Government's Spatial Data Management Environment ("SDME"), along with appropriate metadata. The SDME is based around Oracle RDBMS and ESRI ArcSDE and all incoming data should be supplied in ESRI shape file format. The SDME also contains a metadata recording system based on the ISO template within ESRI ArcCatalog (agreed standard used by The Scottish Government); all metadata should be provided in this format.

Advertisement

Where the applicant has provided the Scottish Ministers with an EIA report, the applicant must publish their proposals in accordance with Regulation 16 of the 2017 MW Regulations and ensure that a reasonable number of copies of the EIA report are available for inspection at any place named in the publication. Licensing information and guidance, including the specific details of the adverts to be placed in the press, can be obtained from the Scottish Ministers. If additional information is submitted further public notices will be required

EPS licence

European Protected Species ("EPS") are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and The Conservation of Offshore Marine Habitats and Species Regulations 2017. All cetacean species (whales, dolphins and porpoise) are European Protected Species. If any activity is likely to cause disturbance or injury to a European Protected Species a licence is required to undertake the activity legally.

A licence may be granted to undertake such activities if certain strict criteria are met:

- there is a licensable purpose;
- there are no satisfactory alternatives, and;
- the actions authorised will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status in their natural range.

Applicants must give consideration to the three fundamental tests and should refer to the guidance on the protection of marine European Protected Species for more detailed information in relation to Scottish Inshore Waters. Applicants may choose to apply for an EPS licence following the determination of the EIA application and once construction methods have been finalised, however it is useful to include a shadow EPS assessment within the EIA report.

Basking sharks are also afforded protection under the Wildlife & Countryside Act 1981 (as Amended by the Nature Conservation (Scotland) Act 2004).

Appendix IV: Gap Analysis

Applicant to complete:

Consultee	Summary of response (key concern)	Response from applicant	Action required	Evidence sent to MS LOT

Appendix V: Pre-Dredge Sampling Guidance

Scottish Government
Riaghaltas na h-Alba
gov.scot

Marine Scotland

Pre-disposal Sampling Guidance
Version 1 – January 2017

Table of Contents

1. Introduction 1
2. Pre-disposal sampling stages 1
3. Sampling and analysis requirements 3
4. Submitting results 4

1. Introduction

Sea disposal operations are controlled by:

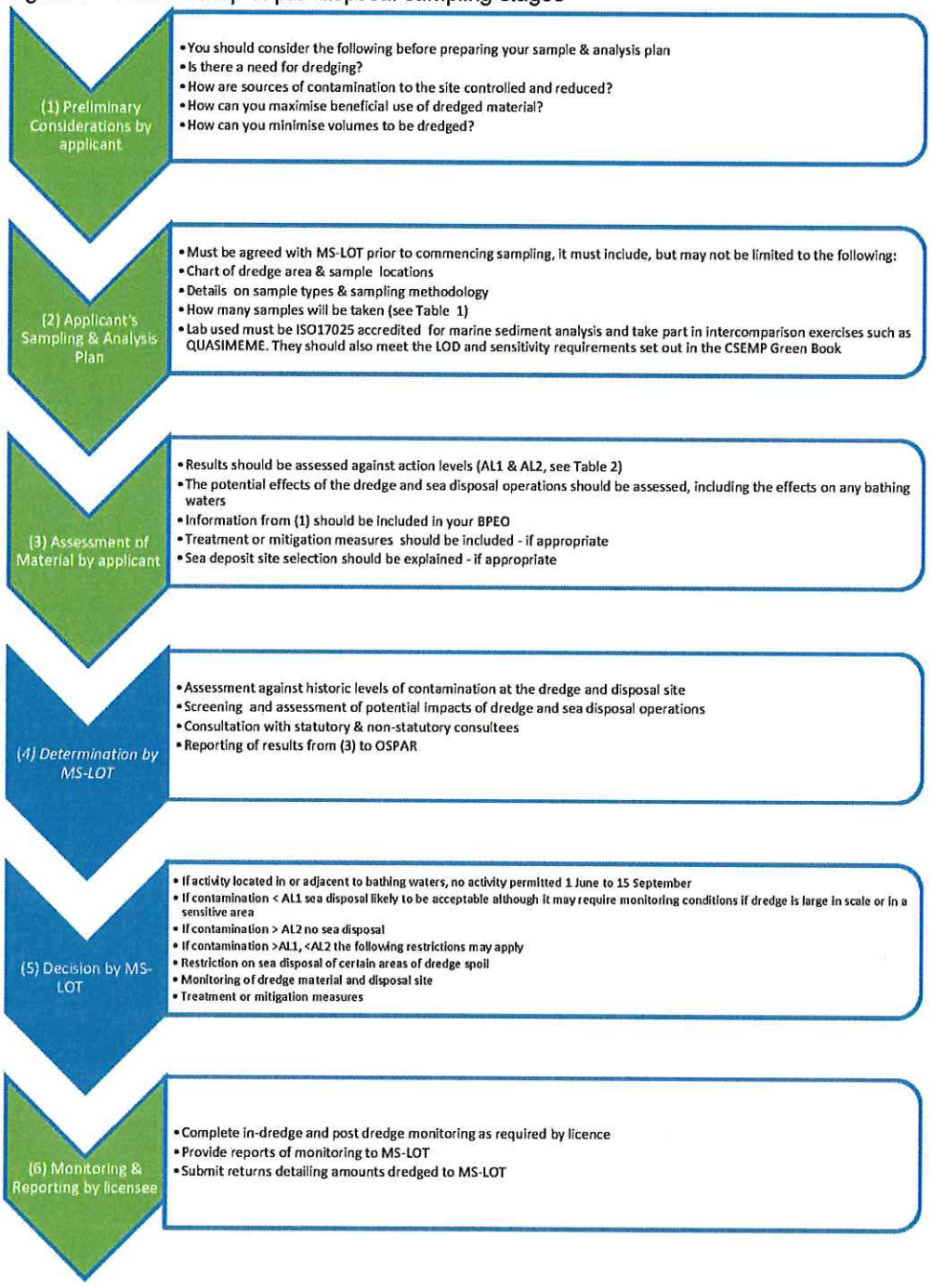
- Marine (Scotland) Act 2010;
- OSPAR Convention 1992, see also;
  - OSPAR Guidelines for the Management of Dredged Material at Sea;
  - JAMP Guidelines for Monitoring Contaminants in Sediments
- The EU Waste Directive;
- The London Convention & Protocol;
- The EU Water Framework Directive; and
- Scotland's National Marine Plan.

The requirements set out in this document will ensure applications are in compliance with the above. Deviations from these requirements are liable to result in delays in processing your application as well as the potential requirement for further sampling, analysis and assessment. Please retain **all** samples until determination of your application has been made in case further analysis is required.

2. Pre-disposal sampling stages

The process map (see Figure 1) shows the stages both applicant and MS-LOT must go through to determine a marine licence application for sea disposal activities.

Figure 1 – Process map of pre-disposal sampling stages



3. Sampling and analysis requirements

There are a minimum number of sample stations required for each dredge volume (see Table 1).

Table 1 – Minimum sample stations required by dredge volume

Proposed dredge volume (m^3)	No. of sample stations required
≤25,000	3
32,500	4
50,000	5
75,000	6
100,000	7
150,000	8
200,000	9
250,000	10
300,000	11
350,000	12
400,000	13
450,000	14
500,000	15
600,000	16
700,000	17
800,000	18
900,000	19
1,000,000	20
1,100,000	21
1,200,000	22
1,300,000	23
1,400,000	24
1,500,000	25
1,600,000	26
1,700,000	27
1,800,000	28
1,900,000	29
2,000,000	30
>2,000,000	Seek guidance from ms.marinelicensing@gov.scot

If you are dredging more than 1 metre in depth or in an area with known or suspected contamination you will be required to take core samples, cores should extend to the maximum dredge depth. Individual cores count as 1 station, so a 100,000m^3 dredge of over 1 metre would require 7 cores to be collected. When a core is collected you should sub-sample the surface layer (0-15cm) then every 50cm thereafter. Initially you should select sub-samples from the surface, middle and bottom of the core for analysis, with **all** sub-samples retained for further analysis.

Table 2 – Action Levels

Contaminant	Revised AL1 mg/kg dry weight (ppm)	Revised AL2 mg/kg dry weight (ppm)
Arsenic (As)	20	70
Cadmium (Cd)	0.4	4
Chromium (Cr)	50	370
Copper (Cu)	30	300
Mercury (Hg)	0.25	1.5
Nickel (Ni)	30	150
Lead (Pb)	50	400
Zinc (Zn)	130	600
Tributyltin	0.1	0.5
Polychlorinated Biphenyls	0.02	0.18
Polyaromatic Hydrocarbons		
Acenaphthene	0.1	
Acenaphthylene	0.1	
Anthracene	0.1	
Fluorene	0.1	
Naphthalene	0.1	
Phenanthrene	0.1	
Benzo[a]anthracene	0.1	
Benzo[b]fluoranthene	0.1	
Benzo[k]fluoranthene	0.1	
Benzo[a]pyrene	0.1	
Benzo[g,h,i]perylene	0.1	
Dibenzo[a,h]anthracene	0.01	
Chrysene	0.1	
Fluoranthene	0.1	
Pyrene	0.1	
Indeno(1,2,3cd)pyrene	0.1	
Total hydrocarbons	100	
Booster Biocide and		
Brominated Flame Retardents *		

*Provisional Action Levels for these compounds are subject to further investigation.

4. Submitting results

Results should be submitted to MS-LOT using the Pre-disposal Sampling Results form.

marinescotland science

T: +44 (0)131 244 2500
MS_Renewables@gov.scot

The Scottish Government

Dr Lorraine Gray
Licensing Operations Team
Marine Scotland
375 Victoria Road
Aberdeen
AB11 9DB

STORNOWAY PORT AUTHORITY, NEWTON MARINA AND ARNISH DEEP WATER PORT, WESTERN ISLES - WESTERN ISLES COUNCIL RESPONSE

Marine Scotland Science has reviewed the submitted documents and has provided the following comments.

marine mammals

The example provided to illustrate an approach to assessment of underwater noise effects has some useful elements. However, there are several areas in which the approach, if taken in exactly the way, is likely to be inadequate. We provide a list of the elements that we recommend are addressed in the assessment:

1. A quantitative noise model should be used. This should account for the open water marine environment around the development, as opposed to the constrained freshwater environment of the River Tyne, as well as the water depth at the development (which will result in greater noise propagation than in the shallower river environment).
2. The example provided does not include assessment of piling activities, which MSS recommend should be the focus of the noise assessment, as these will be the noisiest activity undertaken. Dredging activities should also be included as they will generate noise, but note that dredging and disposal work also has the potential to cause non-acoustic injury to marine mammals, and this should be addressed in the assessment and in mitigation actions.
3. The species of concern in this development area include those in the example report, but also cover cetaceans, which are highly dependent upon hearing, including echolocation, to find food and navigate their environment. In particular, the assessment should consider effects to the harbour porpoise feature of the Inner Hebrides and the Minches cSAC, although several other cetacean species are also known to use the waters in the area.
4. All cetaceans are European Protected Species, which provides protection against killing, injury and disturbance. Guidance on EPS licensing in Scotland is available from http://www.scotland.gov.uk/Resource/0044/00446679.pdf. MSS recommend that the applicant undertakes an EPS risk assessment and applies for an EPS licence once more details of the project are available.

MSS considers that use of the NOAA/NMFS (2016) criteria for injury (PTS) to marine mammals is appropriate for the assessment (although we would also accept use of the Southall 2007 criteria). Exposure to noise levels sufficient to induce PTS in either seals or cetaceans is typically considered to be capable of causing injury, which is prohibited for both groups of species. If the assessment suggests that there is the potential for this, MSS would strongly recommend that suitable mitigation is put in place to avoid seals and cetaceans being exposed to noise sufficient to induce PTS.

INVESTOR IN PEOPLE
POSITIVE ABOUT DISABLED PEOPLE

MSS recommend that the applicant considers the findings of scientific studies of piling activities in the Cromarty Firth (Graham et al., 2017. Responses of bottlenose dolphins and harbour porpoises to impact and vibration piling noise during harbour construction. Ecosphere, 8(5): e01793). MSS can provide a copy if necessary.

diadromous fish
Outward migrating salmon smolts and returning adult salmon and sea trout may be present in the work area and the best information on when they are likely to be present or are present will come from local fisheries bodies such as the local Fisheries Trust, DSFB and Angling Club, or any direct observations. What is being recommended for marine mammals regarding underwater noise will also cover the needs of diadromous fish.

The marine mammal response notes that dredging and disposal work also has the potential to cause non-acoustic injury to marine mammals and that this should be addressed in the assessment and mitigation actions. This also applies to diadromous fish, and there may need to be consideration of whether high levels of suspended sediment which can be injurious to salmonids may be generated by dredging and disposal work and whether mitigation actions to address this may be needed.

Hopefully these comments are helpful to you. If you wish to discuss any matters further contact the MSS Renewables in-box at MS_Renewables@gov.scot

Yours sincerely

Paul Stainer

Marine Scotland Science

15 February 2018

INVESTOR IN PEOPLE
POSITIVE ABOUT DISABLED PEOPLE

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

BY EMAIL
FAO: Lorraine Gray
Marine Licensing Officer
Marine Scotland - Marine Planning & Policy
ms.marinelicensing@gov.scot

Date: 25 January 2018

Dear Lorraine

ARNISH DEEP WATER DEVELOPMENT, GLUMAIG BAY, ISLE OF LEWIS. SCOPING REQUEST – TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (SCOTLAND) REGULATIONS 2017

Thank you for your consulting SNH on the above screening request which we received on 22nd December 2017. We provided EIA screening advice to CnES on 12 October 2017.

We advise that with regards to our interests the Scoping Report (December 2017) accurately identifies natural heritage receptors that may be significantly impacted by the proposal. We are in agreement with the report's recommendations on what should be scoped in to (and out of) the EIA Report.

The principal marine natural heritage issue arising from this development which will require further consideration in the EIAR is the potential effect of drilling/piling noise on marine mammals, particularly cetaceans, including harbour porpoise within Inner Hebrides and the Minches cSAC and the North East Lewis pMPA.

We are aware the proposed development contains elements which are above and below Mean High Water Springs (MHWS), and will therefore likely require consents from both the LPA and Marine Scotland. Given the complex regulatory regime covering the overall development we'd welcome the co-ordination of the EIA process between competent authorities. This response considers the entire scope of the proposed works associated with the development and not only those relevant to marine licensing.

In the absence of detailed proposals for the construction and operation of the Arnish Deepwater Port, the report commits to further consultation with SNH (and MS) to determine the scope of survey and /or other work that may be required to properly assess impacts on marine mammals and fish. This should be done before the marine licence is determined.

Annex A of this letter provides further detail to assist with the EIA process.

I hope you find the above comments useful, however should you wish to discuss the issues raised further, please don't hesitate to contact me.

Scottish Natural Heritage, 32 Francis Street, Stornoway, Isle of Lewis, HS1 2ND
Tel: 01851 705258 Fax: 01851 704900

e-mail: roddy.macminn@snh.gov.uk
www.nature.scot

Yours sincerely

RODDY MACMINN
Operations Officer
Argyll & Outer Hebrides

ANNEX A – DETAILS TO ASSIST WITH THE EIA FOR ARNISH DEEPWATER PORT

We have a variety of guidance covering topics such as protected areas and protected species. We would expect the applicant to follow the latest guidance as published on our website via https://www.nature.scot/professional-advice/planning-and-development/natural-heritage-advice-planners-and-developers

Guidance on the EIA process is also available, including a link to our EIA handbook - https://www.nature.scot/professional-advice/planning-and-development/environmental-assessment/environmental-impact-assessment.

1. PROTECTED AREAS

Inner Hebrides and the Minches candidate Special Area of Conservation (cSAC)
The proposal (as defined by the EIA red line boundary) lies within 1 km of the Inner Hebrides and the Minches candidate Special Area of Conservation (SAC), selected for its harbour porpoise interest. Based on the information provided, the proposal could affect the conservation objectives of the site.

The most likely impact relates to disturbance to cetaceans (and seals) due to underwater noise generated during the construction phase of the project (principally from piling and/or drilling). Should any blasting be required this too will need consideration. Noise can adversely impact cetaceans (including harbour porpoise) by masking communication between animals, disturbing natural behaviour and distribution, impairing hearing or even, at close proximity, causing injury or death. The risk of such impacts is influenced by factors including location of the proposed activity, its duration, whether it is continuous or intermittent, time of day, and the methodology. However disturbance is possible over ranges of several kilometres from the actual operation

In addition to the EIA regulations, the site's status means that the requirements of the Conservation (Natural Habitats, &c.) Regulations 1994 as amended (the "Habitats Regulations") also apply. Consequently, Marine Scotland will be required to consider the effect of the proposal on the *cSAC* before it can be consented. Given what we currently know, our view is that this proposal is likely to have a significant effect on harbour porpoise within the cSAC. Consequently, Marine Scotland are likely to be required to carry out an appropriate assessment. It is important that the EIAR contains sufficient information to support this assessment. We therefore advised that this topic should be scoped in (as per the Scoping Report recommendation).

We welcome the commitment to model underwater noise propagation to inform a Marine Mammal Protection Plan. To inform that process we advise that the following references should be considered:

- *Good Practice Guide for Underwater Noise Measurement*, National Measurement Office, Marine Scotland, The Crown Estate, Robinson, S.P., Lepper, P. A. and Hazelwood, R.A., NPL Good Practice Guide No. 133, ISSN: 1368-6550, 2014. http://www.npl.co.uk/upload/pdf/gpg133-underwater-noise-measurement.pdf

- Farcas A., Thompson P.M., Merchant N.D. (2016) Underwater noise modelling for environmental impact assessment. *Environmental Impact Assessment Review* Vol 57 pg 114-122 http://*aura.abdn.ac.uk/bitstream/2164/7677/1/1_s2.0_S0195925515300202_main.pdf*

Received levels, or acoustic thresholds, at which individual marine mammals are predicted to experience changes in their hearing sensitivity (either temporary or permanent) for acute, incidental exposure to underwater anthropogenic sound should be considered. For assessment of impact to marine mammals we advise that the EIAR consider both Southall and NOAA injury thresholds:

- National Marine Fisheries Service (2016) *Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts*. U.S Dept. of Commer., NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178p. http://www.nmfs.noaa.gov/pr/acoustics/Acoustic%20Guidance%20Files/opr-55_acoustic_guidance_tech_memo.pdf

- Southall B.L., Bowles A.E., Ellison W.T., Finneran J.J., Gentry R.L., Greene Jr. C.R., Kastak D., Ketten D.R., Miller J.H., Nachitgall P.E., Richardson W.J., Thomas J.A., & Tyack P.L. (2007) Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendation. *Aquatic Mammals*, Vol 33 No 4 http://sea-inc.net/assets/pdf/mmnoise_aquaticmammals.pdf

Disturbance should also be assessed. We advise that there is currently no agreed disturbance threshold as such, but that assessments are moving away from identifying a fixed threshold, towards using a dose response curve as used in:

- Thompson P.M., Hastie G.D., Nedwell J., Barham R., Brookes K.L., Cordes L.S., Bailey H., & McLean N. (2013) Framework for assessing impacts of pile-driving noise from offshore wind farm construction on a harbour seal population *Environmental Impact Assessment Review* Vol 43 pg 73-85. https://www.abdn.ac.uk/lighthouse/documents/Thompson_et_al._2013_EIAR.pdf

However the NOAA interim disturbance thresholds may prove sufficient in this case: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html

While we expect the above guidance to be considered, the final assessment should be proportionate to the scale and risk of the works. We can provide further guidance on this aspect if required.

Appropriate mitigation should be put forward based on relevant best practice guidance including:

- Statutory nature conservation agency piling protocol (August 2010): http://jncc.defra.gov.uk/pdf/JNCC_Piling%20protocol_August_2010.pdf

Consideration should be given to the size of the noise mitigation zone and the best way to cover it. It is usual to apply a standard 500m radius, however consideration should be given to whether the harbour area, or a larger extent should be monitored. It should also consider the most appropriate viewpoints and the number of MMOs required.

Note: The proposed North East Lewis MPA mentioned in the scoping report (Table 4.12) has no policy protection at time of writing. However Marine Scotland advises that MPA proposals should be taken into account through any licensing or consenting process. The proposed protected features capable of being affected by the proposal are Risso's dolphin

The proposed site abuts the southern edge of the red line boundary for the development. Further information on development management and nature conservation MPAs is available at http://www.gov.scot/resource/0042/00428637.pdf. Our recommendation is that The EIAR also considers possible impacts on Risso's dolphins in this context.

2. PROTECTED SPECIES

Marine Mammals

Several species of cetaceans occur regularly in the North Minch including Risso's dolphin (*Grampus griseus*), Short-beaked common dolphin (*Delphinus delphis*), Killer whale (*Orcinus orca*), Minke whale (*Balaenoptera acutorostrata*), Humpback whale (*Megaptera novaeangliae),* Bottlenose dolphin (*Tursiops truncatus*) as well as Harbour porpoise (*Phocoena phocoena*). Harbour porpoise are resident in the region throughout the year while other species occur more frequently during the summer and autumn months. Grey (*Halichoerus grypus)* and Harbour (*Phoca vitulina)* seals are also sighted regularly. We recommend that the MMPP considers impact on all of the above cetacean species and seals. Although the hearing characteristics of these different species vary somewhat from harbour porpoise the advice given re the cSAC above, is also relevant to other marine mammals. It is possible that an EPS license will be required if the mitigation proposed in the MMPP is not possible or appropriate. Sufficient information should be provided in the EIAR to support such an application.

Birds

We are in agreement that impacts on birds can be scoped out of further assessment.

Otters

An otter survey has been carried out and did not find any sign of otters within the site. Although we have not seen the survey, if an appropriate methodology was followed we would agree with the Scoping Report that no further assessment is required (subject to confirmation on methodology). Otter activity can change over time and we recommend that otter surveys are repeated if more than 18 months elapses between the original survey and commencement of works (to avoid risk of an offence).

3. LANDSCAPE

In our view the proposed development does not raise any concerns with regard to landscape impacts of national importance. In addition the report correctly identifies there are no landscape designations on site (or likely to be effected by the development). The report recommends that a LVIA is undertaken as part of an EIA. We welcome that commitment as a matter of best practice for a development of this nature however we have no comment to make on its focus. The methodology proposed looks to be appropriate. Please note SNH does not act in an advisory capacity on Garden and Designed Landscape designations.

CC Craig Potter (Envirocentre)

Technical Appendix 5.1

Stornoway Deep Water Port
Technical Appendix 5.1: Preliminary Ecological Appraisal

March 2018

Stornoway Deep Water Port
Technical Appendix 5.1: Preliminary Ecological Appraisal

Client:	Stornoway Port Authority
Document number:	8111
Project number:	670525
Status:	Final
Author:	Kate Elliott
Reviewer:	Kathy Dale
Date of issue:	30 March 2018
Filename:	Stornoway Deep Water Port PEA_Final

Glasgow

Craighall Business Park
8 Eagle Street
Glasgow
G4 9XA
0141 341 5040
info@envirocentre.co.uk
www.envirocentre.co.uk

Aberdeen

Banchory Business Centre
Burn O'Bennie Road
Banchory
AB31 5ZU
01330 826 596

Inverness

Alder House
Cradlehall Business Park
Inverness
IV2 5GH
01463 794 212

Edinburgh

Suite 114
Gyleview House
3 Redheughs Rigg
Edinburgh
EH12 9DQ
0131 516 9530

This report has been prepared by EnviroCentre Limited with all reasonable skill and care, within the terms of the Contract with Stornoway Port Authority ("the Client"). The report is confidential to the Client, and EnviroCentre Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced or altered without the prior written approval of EnviroCentre Limited.

Contents

1 Introduction 1
1.1 Remit 1
1.2 Aims and Objectives 1
1.3 Project Overview 1
1.4 Legislation and Policy 2
2 Methodology 3
2.1 Desk Study 3
2.2 Terrestrial Ecology 3
2.3 Birds 5
2.4 Marine Mammals 5
2.5 Fish 5
3 Results 6
3.1 Terrestrial Ecology 6
3.2 Birds 8
3.3 Marine Mammals 9
3.4 Fish 10
4 Potential Impacts 11
5 Further Survey and Good Practice Recommendations 12
5.1 Habitats 12
5.2 Bats 12
5.3 Birds 12
5.4 Marine Mammals and Fish 12
References 13

Appendices

A Site Location
B Phase 1 Habitat Survey Map

Tables

Table 2.1: Active Bat Roost Indicators and Potential Roosting Features in Buildings 4
Table 2.2: Potential Bat Roost Features in Trees 4
Table 2.3: Categorising PRFs in Trees 5
Table 3.1: Designated Sites 6
Table 3.2: Western Isle LBAP Species 6
Table 3.3: Western Isles LBAP Species 7
Table 3.4: Western Isles LBAP Priority Bird Species 8
Table 3.5: Designated Sites 9
Table 3.6: Marine Mammal LBAP species 9

1 INTRODUCTION

1.1 Remit

EnviroCentre Limited was commissioned on behalf of Stornoway Port Authority (SPA) to undertake a Preliminary Ecological Appraisal (PEA) to inform an Environmental Impact Assessment (EIA) in relation to the proposed development of a Deep Water Port at Arnish, 1.1km south of Stornoway, Isle of Lewis. The survey was requested to inform a Planning Permission in Principle application with an associated marine licence and Harbour Revision Order.

The 'site' is defined as the area demarcated by the red line boundary as shown in Appendix A. The 'survey area' constitutes the area of the 'site' plus appropriate buffer zones (shown in blue).

1.2 Aims and Objectives

The aim of the PEA was to provide an ecological baseline to be referred to in terms of the proposed development. The main objectives were as follows:

- Identify and map the broad habitats present on the site;
- Search for field evidence of a range of protected or notable faunal species which may frequent the survey area;
- Identify suitable habitat for protected or notable faunal species in the survey area;
- Evaluate the site based on the habitats or faunal species found;
- Identify the potential impacts to protected or notable faunal species, vegetation and habitats and outline appropriate mitigation methods; and
- Make recommendations for any further survey and/or species licensing requirements.

1.3 Project Overview

The Port of Stornoway is the primary port for the Western Isles and one of the busiest ports on the west coast of Scotland north of the Clyde. The Port is central to the economy of the island, facilitating the lifeline ferry service and supporting almost all economic activities from fishing and aquaculture, to construction, retail and marine leisure. The Port is run by SPA; SPA's Board is committed to supporting activities that will benefit the local community, both socially and economically, and is aware that the Port of Stornoway is crucial to the economic future of Stornoway and the Outer Hebrides. The masterplan is driven by economic opportunities for the town, and will support job creation and a sustainable community.

With water depths of around 10.5 m at lowest tide, a 430m long berth will easily accommodate a typical cruise ship size of 300m. The sea bed will be dredged to depths of -9.5 CD at the entrance to the bay and -10.5m CD at berthing locations.

In summary, the proposed development contains the following components:

- Dredging of approximately 400,000 m³ of sea bed in Glumaig Bay, Stornoway Harbour to a depth of 10.5m below Chart Datum (CD) alongside the berth and 9.5m in the remaining area of dredge[1];

[1] The difference in dredge depths is to allow operational flexibility of the berth.

- Re-using dredged material to create reclaimed land along the western shore of Glumaig Bay; the shortfall in dredged material will be made up by blasting and excavation of approximately 600,000m³ of rock;
- Rock armouring along reclamation slopes (approximately 30,000m^3) and exposed road lines;
- 250m long quay wall;
- 180m long multifunctional, double-sided finger pier;
- Linkspan;
- 10 hectare reclaimed and levelled area for port activities, industrial and storage uses;
- Cutting/filling, extraction and reshaping of the land including excavation of peat;
- Heavy lift area of 2500m^2
- Freight ferry line featuring roll-on, roll-off (ro-ro) berthing to allow for a dedicated freight ferry;
- Proposed culvert over the Allt Poll A' Choire Stream;
- Proposed access road to existing Arnish Road;
- Link road along the coast to existing Arnish Industrial Estate (two options available); and
- Utility and services infrastructure (water, electricity, fuel).

1.4 Legislation and Policy

European and national legislation, and national and local policy relevant to this report include:

- The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended);
- The Water Framework Directive (2000/60/EC);
- Environmental Impact Assessment (EIA) Directive (2014/52/EU);
- Wildlife and Countryside Act 1981 (as amended) (WCA);
- Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2017 (The EIA Regulations);
- Marine and Coastal Access Act 2009 (MCAA);
- The Conservation (Natural Habitats, &c.) Amendments (Scotland) Regulations 2007 (The Habitats Regulations);
- The Nature Conservation (Scotland) Act 2004 (NCA) ;
- The Wildlife and Natural Environment (Scotland) Act 2011 (WANE);
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017; and
- Outer Hebrides Development Plan.

2 METHODOLOGY

2.1 Desk Study

In order to anticipate the potential ecological sensitivities at the site, a desk study was conducted. This included a review of:

- Existing data on statutory designated sites available through Scottish Natural Heritage (SNH) Sitelink website[2] for statutory designated sites up to 5km from the site;
- Existing data on non-statutory designated sites available through the Western Isles (CneS) council and Local Development Plan (LDP)[3] (up to 2km from the site);
- Records of Ancient Woodland available through Sketchmap[4] (up to 2km from the site);
- UK Biodiversity Action Plan (UKBAP)[5];
- Western Isles Local Biodiversity Action Plan (LBAP)[6];
- Birds of the Outer Hebrides website[7]
- Scottish Biodiversity List (SBL) [8];
- Records from the Western Isles (CneS) Council Biodiversity Officer; and
- Records from Scottish Badgers;

2.2 Terrestrial Ecology

2.2.1 Phase 1 Habitat Survey

A Phase 1 Habitat Survey is a method that rapidly records vegetation and wildlife habitat over large areas. The output of this survey comprises a habitat map and associated photographs. The information is used to identify ecologically sensitive features, inform additional species surveys and, ultimately, recommend mitigation and enhancement measures in connection with the proposed development.

The Phase 1 Habitat Survey was undertaken according to the standard Joint Nature Conservation Committee method (JNCC, 2010) and CIEEM guidelines (CIEEM, 2013). The survey was undertaken on the 4th May 2017, with bright, sunny conditions and temperatures between 10-12 degrees Celsius.

2.2.2 Protected Species Survey

The field survey for protected species was also undertaken in accordance with CIEEM guidelines as referenced previously. The survey focused on faunal species that are most likely to be found in the habitats which make up the wider landscape, or where suitable habitat is present. However, all UK protected or notable species are considered when undertaking a field survey of this nature in order to assess how valuable the surveyed area is in terms of resources. Species that were searched for and survey methods applied included, but were not limited to:

[2] SNH (n.d.). SiteLink. Retrieved from http://gateway.snh.gov.uk/sitelink/
[3] The Western Isles Council LDP here: http://www.cne-siar.gov.uk/planningservice/localdevplan.asp Accessed in April 2017.
[4] Sketchmap available here: http://sketchmap.co.uk/. Accessed in April 2017
[5] JNCC (n.d.). The UK Biodiversity Action Plan. Joint Nature Conservation Committee. Retrieved from http://jncc.defra.gov.uk/ukbap
[6] Western Isles LBAP here http://www.cne-siar.gov.uk/biodiversity/documents/Biodiversity%20Audit%202002.pdf Accessed in April 2017
[7] http://www.western-isles-wildlife.com/Templates/birds_status_outer_hebrides.html (Accessed April 2017)
[8] Scottish Government (2013, April). Scottish Biodiversity List. http://www.gov.scot/Topics/Environment/Wildlife-Habitats/16118/Biodiversitylist/SBL.

- Bats (various species); and
- Otter (*Lutra lutra*). The results of the survey are presented in Technical Appendix 5.5.

The following species in addition to the above protected species were searched for due to being listed on nationally important biodiversity lists: the West European hedgehog (*Erinaceus europaeus*), brown hare (*Lepus europaeus*) and amphibian species which are listed on the UK BAP and the SBL.

2.2.2.1 Bats

Habitat Assessment

An assessment was undertaken in accordance with the criteria set out in the Bat Conservation Trust (BCT) Good Practice Guidelines (Collins, 2016). The suitability is assessed from Negligible to High and is based on the presence of roosting, commuting and foraging habitats and informs the design of subsequent survey work.

Preliminary Roost Assessment

Bats use a variety of roosts throughout the year, depending on their seasonal needs (*e.g.* breeding or hibernating etc.) and on the prevalent climatic conditions. A ground based external search for potential roosting sites on buildings and trees, and direct evidence of bats, was undertaken to identify those structures and features present within a site which may provide suitable habitat for roosting bats and may require further survey work. The survey was undertaken in accordance with the assessment criteria set out by the Bat Conservation Trust (BCT) (Collins, 2016).

The criteria used to assess the suitability of the building for bat roosts can be found in Table 2-1.

Table 2.1: Active Bat Roost Indicators and Potential Roosting Features in Buildings

Signs indicating possible use by bats	Features of buildings frequently used as bat roosts
Live bats or dead specimens	Gaps in windowsills and window panes
Droppings and their relative freshness, shape and size	Underneath peeling paintwork or lifted rendering
Feeding remains including the amount and type of prey	Behind hanging tiles, weatherboarding, eaves, soffit boxes, fascia and lead flashing
Urine splashes and fur-oil straining around crevices and holes	Under tiles and slates
Distinctive smell of bats	Gaps in brickwork and stonework

The indicators used to assess the suitability of trees for roosts are provided in Table 2.2

Table 2.2: Potential Bat Roost Features in Trees

PRFs in trees frequently used as roosts	Signs indicating possible use by bats
Hollows and cavities from woodpecker, rot and knot holes	Tiny scratches around PRF
Hazard beams and other vertical or horizontal cracks and splits in stems or branches	Staining around PRF
Partially detached platey bark	Bat droppings in or around PRF
Cankers, included bark and compression forks with potential cavities	Audible squeaking at dusk or during warm weather
Partially detached ivy with stem diameters in excess of 50mm	Flies around PRF
Bat or bird boxes	Smoothing of surfaces around cavity

According to their suitability to host roosting bats, the trees were categorised using the criteria in Table 2.3

Table 2.3: Categorising PRFs in Trees

Suitability	Trees
High	A tree with one or more potential roost features that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat
Moderate	A tree with one or more potential roost features that could be used by bats due their size, shelter, protection, conditions and/or surrounding habitat but unlikely to support a roost of high conservation status
Low	A tree of sufficient size and age to contain PRFs but with none seen from the ground; or features seen with only very limited roosting potential
Negligible	A tree with negligible features which is unlikely to be used by bats

2.3 Birds

A desk based assessment was undertaken to record the suitability of the habitats in the survey area to support bird populations within Lewis. Baseline information was collated from the Western Isles LBAP for a list of priority species.

2.4 Marine Mammals

Baseline information, to determine how marine mammals utilise the zone of influence of the proposed works, was collated from the following sources:

- Existing data on statutory designated sites available through Scottish Natural Heritage (SNH) Sitelink website[9] for statutory designated sites up to 5km from the site;
- Western Isles LBAP; and
- UKBAP.

2.5 Fish

Baseline information, to determine which species and how they are utilising the area of proposed works, was collated from the following sources:

- Outer Hebrides Fisheries Trust (OHFT); and
- Marine Scotland Science.

[9] SNH (n.d.). SiteLink. Retrieved from http://gateway.snh.gov.uk/sitelink/

3 RESULTS

3.1 Terrestrial Ecology

3.1.1 Designated Sites

Two statutory designated sites and two proposed marine designated sites were found within 5km of the proposed Newton Marina development. These are summarised in Table 3.1.

Table 3.1: Designated Sites

Site Name	Designation [10]	Distance and Orientation	Comment
Tong Saltings	SSSI	Approximately 1.6km north-east of the site boundary.	Designated for breeding bird assemblages, mudflats, saltmarsh and sand dunes.
Lewis Peatlands	SAC/SPA/ RAMSAR	Approximately 4.3km west of the site boundary.	Designated as an SAC primarily for three Annex 1 habitats present on site 1) oligotrophic to mesotrophic standing waters with vegetation and Littorelletea uniflorae and/or of the Isoeta-Nanojuncetea. 2) Natural dystrophic lakes and ponds 3) Blanket Bogs. Designated as a RAMSAR site for blanket bog features, the breeding bird assemblage, and the breeding bird population of Dunlin (Calidris alpina schinzii).

No non-statutory designated sites were found within 2km of the site development.

3.1.2 Ancient woodland inventory

No ancient woodland was found within the site boundary of the proposed development, and none were found to be located within 2km of the proposed development boundary.

3.1.3 Biodiversity action plan species

Species potentially relevant to the development site and listed in the LBAP for the Western Isles are summarised in Table 3.2. The LBAP also lists various invertebrate and plant species of conservation concern.

Table 3.2: Western Isle LBAP Species

Species	LBAP	UKBAP	SBL
Common Pipistrelle Bat *Pipistrellus pipistrellus*	✓	✓	✓
Natterer's Bat *Myotis nattereri*	✓		✓
Daubenton's bat *Myotis daubentonii*	✓		✓
Otter *Lutra lutra*	✓	✓	✓

[10] SSSI-Special Site of Scientific Interest, SAC- Special Area of Conservation, SPA – Special Protected Area

3.1.4 Biodiversity Action Plan Habitats

The Western Isles LBAP identified 10 priority habitats that were deemed potentially relevant to the development site. These habitats are listed in Table 3.3.

Table 3.3: Western Isles LBAP Species

Habitat	LBAP	UKBAP	SBL
Coastal Sand Dunes	✓	✓	✓
Machair	✓	✓	✓
Coastal vegetated shingle	✓	✓	✓
Seagrass	✓	✓	
Coastal saltmarsh	✓	✓	✓
Mud in deep water	✓	✓	
Maerl beds	✓	✓	
Upland heathland	✓	✓	✓
Fens	✓	✓	
Blanket bog	✓	✓	✓

3.1.5 Phase 1 Habitat Survey

A total of six Phase 1 habitat types including buildings were recorded on the site:

- D6 Wet Heath
- G1 Standing Open Water
- H8.4 Coastal Grassland
- H1.3 Boulders / Rocks
- H1.2 Shingle/ Cobbles
- J3.6 Buildings

3.1.5.1 D6 Wet Heath

Wet heath is located along the western boundary of the site. The area is dominated by *Erica tetralix*, *Calluna vulgaris*, grasses sedges and sphagnum bog mosses.

3.1.5.2 G1 Standing Open Water

A small area of open water of Loch Airinis is located within the buffer area of the phase 1 habitat survey in the south east of the site.

3.1.5.3 H8.4 Coastal Grassland

Grassland which includes maritime species and was found on shallow slopes and level areas by the sea, and along the cliff tops. Species include*, Plantago maritima* and *Armeria maritima. Festuca rubra* was the dominant species. Other species included, *Anthyllis vulneraria*, *Lotus corniculatus*.

3.1.5.4 H1.3 Boulders / Rocks above high- tide mark

3.1.5.5 H1.2 Shingle / Cobbles above high-tide mark

3.1.5.6 J3.6 Buildings

Buildings associated with previous and existing industrial use are marked on the map.

3.1.6 Protected Species

3.1.6.1 Bats

No records of bats were received during the desk study. No bats or evidence of bats was found during the field survey. The habitats within the survey area offer negligible features on site for commuting and foraging bats. There is very little connectivity to the wider environment. The River Creed and Lewis Castle grounds are located immediately to the north west of the site boundary and would provide suitable habitat for bats including mature woodland, parkland and gardens but this area is not directly connected to the site for development.

3.2 Birds

The habitats recorded on site do not provide optimal conditions for the vast majority of bird species noted as Priority species (Table 3-4). There is the potential for the site to support small numbers of over-wintering waders such as Ringed Plover (*Charadrius hiaticula)* and Purple Sandpiper (*Calidris maritima)* where rocky foreshore habitat exists. The harbour itself could support numbers of diver and grebe species, although the Birds of the Outer Hebrides website states that the main wintering areas for these species on Lewis are Broad Bay, Valtos and Braigh, the nearest of which is approximately 3.5km from the proposed development.

Several of the species noted in Table 3.4 are qualifying species for the Lewis Peatlands SPA, which is located approximately 4.3km from the proposed development.

Table 3.4: Western Isles LBAP Priority Bird Species

Species	Scientific Name
Common Scoter	*Melanitta nigra*
Spotted Flycatcher	*Muscicapa striata*
Red-throated Diver	*Gavia stellata*
Black-throated Diver	*Gavia arctica*
Great Northern Diver	*Gavia immer*
Slavonian Grebe	*Podiceps auritus*
Storm Petrel	*Hydrobates pelagicus*
Leach's Storm Petrel	*Oceanodroma leucorhoa*
Gannet	*Morus bassanus*
Cormorant	*Phalocrocorax carbo*
Whooper Swan	*Cygnus cygnus*
Great Northern Diver	*Gavia immer*
Slavonian Grebe	*Podiceps auritus*
Greenland White-fronted Goose	*Anser albifrons flavirostris*
Greylag Goose (Scottish)	*Anser anser*
Barnacle Goose	*Branta leucopsis*
Shelduck	*Tadorna tadorna*
Wigeon	*Anas penelope*
Pintail	*Anas acuta*
Shoveler	*Anas clypeata*
Eider	*Somateria mollissima*
Merlin	*Falco columbarius*
Peregrine	*Falco peregrinus*
Ringed Plover	*Charadrius hiaticula*
Golden Plover	*Pluvialis apricaria*
Grey Plover	*Pluvialis squatarola*
Lapwing	*Vanellus vanellus*

Species	Scientific Name
Sanderling	*Calidris alba*
Purple Sandpiper	*Calidris maritima*
Dunlin	*Calidris alpina schinzii*
Bar-tailed Godwit	*Limosa lapponica*
Redshank	*Tringa totanus*
Whimbrel	*Numenius phaeopus*
Greenshank	*Tringa nebularia*
Arctic Skua	*Stercorarius parasiticus*
Common Tern	*Sterna hirundo*
Arctic Tern	*Sterna paradisaea*
Little Tern	*Sterna albifrons*
Razorbill	*Alca torda*
Short-eared Owl	*Asio flammeus*
Dipper	*Cinclus cinclus*
Twite	*Carduelis flavirostris*
Snow Bunting	*Plectrophenax nivalis*

3.3 Marine Mammals

The desk study identified two proposed marine designated sites (Table 3.5).

Table 3.5: Designated Sites

Site Name	Designation	Distance and Orientation	Comment
Inner Hebrides and Minches	Candidate SAC	1.3km west	Designated for harbour porpoise
North East Lewis	Proposed Marine Protected Area	1km north-west	Designated for Risso's Dolphin

Species potentially relevant to the development site and listed in the LBAP for the Western Isles are summarised in Table 3.6.

Table 3.6: Marine Mammal LBAP species

Common Name	Scientific Name
Harbour Porpoise*	*Phocoena phocoena*
Northern Right Whale	*Balaena glacialis*
Minke Whale*	*Balaenoptera acutorostrata*
Sei Whale	*Balaenoptera borealis*
Blue Whale	*Balaenoptera musculus*
Fin Whale	*Balaenoptera physalus*
Humpback Whale	*Megaptera novaeangilea*
Bottle-nosed Dolphin*	*Tursiops truncates*
Risso's Dolphin	*Grampus griseus*
White-beaked Dolphin*	*Lagenorhynchus albirostris*

Common Name	Scientific Name
Atlantic White-sided Dolphin*	*Lagenorhynchus acutus*
Common Dolphin	*Delphinus delphis*
Striped Dolphin	*Stenella coeruleoalba*
Northern Bottlenose Whale	*Hyperodoon ampullatus*
Cuvier's Beaked Whale	*Ziphius cavirostris*
Sowerby's Beaked Whale	*Mesoplodon bidens*
True's Beaked Whale	*Mesoplodon mirus*
Killer Whale	*Orcinus orca*
Long-finned Pilot Whale**	*Globicephala melas*
Sperm-Whale**	*Physeter macrocephalus*
*http://www.magic.gov.uk/MagicMap.aspx **http://seawatchfoundation.org.uk/legacy_tools/region.php?output_region=14	

3.4 Fish

The mouth of the River Creed is located less than 1km west of the boundary of the proposed Newton Marina. In 2017 the River Creed was classified by Marine Scotland Science (MSS) as a Grade 1 watercourse. This grading is based on data collected between 2011-2015, the data includes reported catches; estimated age composition and egg content of returning salmon; estimated stock levels; and areas of salmon habitat and the probability of achieving conservation limits (Science, 2017).

Along with the River Creed the Glen River enters Stornoway harbour approximately 1km north of the proposed development. There is currently no classification of the Glen River by MSS. The OHFT currently has a restoration program in place to improve the habitat and consequently the number of salmonids produced and returning to the river. The mouth of the Glen River at Bayhead is currently a busy marina with pleasure boats and small fishing boats moored.

4 POTENTIAL IMPACTS

It is anticipated that the development of a marina at Newton Basin will comprise activities with the potential to impact on ecology in the area. Based on existing knowledge of the proposed development it is envisaged that those activities may include:

- Direct loss of tidal and subtidal habitat over the footprint of the development;
- Visual light disturbance to intertidal and sub tidal species during the hours of darkness through the use of artificial lighting during construction and throughout the life of the port;
- Visual light disturbance to migratory routes during the hours of darkness through the use of artificial lighting during construction and throughout the life of the port;
- Temporary increase in suspended sediment and/or deposition from dredging and construction creating physical disturbance in the marine environment;
- Release of contaminants from disturbed sediments during construction;
- Environmental incidents and accidents and potential pollution from fuels, oils etc. potential source of pollution in the marine environment during construction and from boats using the Newton Basin Marina;
- Seabed excavation works during construction;
- Indirect impacts through interruption of changes to coastal processes including tidal flows, local current and sediment movement during construction and as a result of the created deep water; and
- Increased vessel numbers post construction causing disturbance in the marine environment.

5 FURTHER SURVEY AND GOOD PRACTICE RECOMMENDATIONS

5.1 Habitats

The baseline data gathered from the ecological survey and desk study provides sufficient information to place the site in context with regard to ecological and conservation value. Wet heath is an Annex 1 habitat and some areas of this habitat will be lost to the development.

5.2 Bats

No evidence of bats was recorded within the survey area and the roosting habitats are negligible.

Ecological data on protected species is considered valid for a period of 12 months. No further survey work in relation to bats is considered necessary.

5.3 Birds

Given the habitats on site, and from a review of relevant literature, it is considered that the proposed development would not result in any significant impacts on ornithology. Therefore ornithology can be scoped out of further assessment.

5.4 Marine Mammals and Fish

Underwater noise generated during the construction of the development should be highlighted as an area with the highest potential to impact the marine ecology in the area. Underwater noise can have an adverse effect on marine mammals and fish affecting movements, timing of migrations and foraging behaviours. Another area of risk to marine biodiversity is from pollution directly originating from the construction.

Following the construction work and during the life of the Newton Basin marina impacts on marine biodiversity may be seen as a result of the construction leading to changes in hydrodynamic regime in the area. It is recognised that Atlantic Salmon face a number of pressures during their life cycle that include but are not limited to predation, poor water quality, disease and parasites, barriers to migration, poor physical habitat quality, food availability, and changes in the marine environment. Atlantic Salmon are listed on Annex 5 of the Habitats Regulations 1994 which implements the species protection requirements of the Habitats Directive in Scotland.

In addition to this River Lamprey (*Lampetra fluviatilis*) and Sea Lamprey (*Petromyzon marinus*) together with the critically endangered European Eel (*Anguilla Anguilla*), are all UK BAP species and the impact of the proposed works on these species will also be considered in the EIA.

REFERENCES

Bassett, S., & Wynn, J. (2010). Otters in Scotland: How Vulnerable Are They to Disturbance? *CIEEM In Practice*, (70), 19–22. Retrieved from file:///M:/Library/_By%20author/CIEEM/In-Practice-IP70_Dec_2010.pdf

Chanin, P. (2003). *Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology* (No. 10). Peterborough: EN, CCW, EA, SEPA, SNH & SNIFFER.

CIEEM (2013). *Guidelines for Preliminary Ecological Appraisal*. Hampshire: Chartered Institute for Ecology and Environmental Management.

Collins, J. (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines*. (London The Bat Conservation Trust, Ed.) (3rd ed.).

JNCC (2010). *Handbook for Phase 1 habitat survey; a technique for environmental audit*. Peterborough: Joint Nature Conservation Committee.

APPENDICES

A SITE LOCATION

B PHASE 1 HABITAT SURVEY MAP

Technical Appendix 5.2

Stornoway Deep Water Port
Technical Appendix 5.2: Marine Mammal Protection Plan

October 2018

Stornoway Deep Water Port
Technical Appendix 5.2: Marine Mammal Protection Plan

Client:	Stornoway Port Authority
Document number:	8046
Project number:	670525
Status:	Final
Author:	Natalie Hooton
Reviewer:	Kathy Dale
Date of issue:	1 October 2018
Filename:	670525 - Stornoway Deep Water Port EIA\300 - Ecology and Ornithology\340 - Ecology

Glasgow

Craighall Business Park
8 Eagle Street
Glasgow
G4 9XA
0141 341 5040
info@envirocentre.co.uk
www.envirocentre.co.uk

Aberdeen

Banchory Business Centre
Burn O'Bennie Road
Banchory
AB31 5ZU
01330 826 596

Inverness

Alder House
Cradlehall Business Park
Inverness
IV2 5GH
01463 794 212

Edinburgh

Suite 114
Gyleview House
3 Redheughs Rigg
Edinburgh
EH12 9DQ
0131 516 9530

This report has been prepared by EnviroCentre Limited with all reasonable skill and care, within the terms of the Contract with Stornoway Port Authority ("the Client"). The report is confidential to the Client, and EnviroCentre Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced or altered without the prior written approval of EnviroCentre Limited.

Contents

1 Introduction 1
1.1 Remit 1
1.2 Project Overview 1
2 Marine Mammal Baseline 3
2.1 Cetaceans 3
2.2 Disclaimer 3
2.3 Seals 11
2.4 Basking Shark 12
3 Marine Mammal Risk Assessment 13
3.1 Activities Affecting Marine Mammals 13
3.2 Noise Modelling Results: Impacts of Underwater Noise on Cetaceans 15
3.3 Effects of Noise Producing Activities on Basking Shark and Seals 19
3.4 Effects of Increased Vessel Movement 20
3.5 Assessment of Risk 21
4 Marine Mammal Mitigation Plan 22
4.1 Marine Mammal Observation Protocol – Impact Piling 22
4.2 Acoustic Deterrent Device Protocol – Impact Piling 25
4.3 Odex Piling Mitigation Protocol 26
4.4 Dredging Mitigation Protocol 26
4.5 Vessel Movement 27
4.6 Additional Good Practice Recommendations 27
5 Marine Mammal Licensing 28

Figures

Figure 2-1: JNCC harbour porpoise distribution map 5
Figure 2-2: JNCC Risso's dolphin distribution map 6
Figure 2-3: JNCC minke whale distribution map 7
Figure 2-4: JNCC killer whale distribution map 8
Figure 2-5: JNCC common dolphin distribution map 9
Figure 2-6: JNCC bottlenose dolphin distribution map 10
Figure 2-7: JNCC humpback whale distribution map 11
Figure 3-1: Risk zones resulting from a single strike at full power, for all species 16
Figure 3-2: Risk zones for 1000 hammer strikes, for all species 17
Figure 3-3: Required swimming speeds to realise effectiveness of soft-start 17
Figure 3-4: PTS zones for one strike at full power (A), 10% power (B) and 1% power (C) 18
Figure 3-5: Odex drilling impact zones. Note PTS impact is for harbour porpoise only. LF: low frequency (minke whale) HF: high frequency (harbour porpoise) 19
Figure 5-1: EPS Licencing Procedure 29

Appendices

A Proposed Site Location and Layout
B Designated Sites Boundaries
C Marine Mammal Mitigation Zone

1 INTRODUCTION

1.1 Remit

EnviroCentre Limited was commissioned on behalf of Stornoway Port Authority (SPA) to undertake a Marine Mammal Risk Assessment (MMRA) to inform an Environmental Impact Assessment (EIA) in relation to the development of a Deep Water Port at Glumaig Bay, Arnish, approximately 1.1km south of the town of Stornoway, Isle of Lewis. The Deep Water Port will form Phase 1 of the Port of Stornoway; the design of which also includes the development of Bayhead and the Newton Marina (not considered in this assessment due to separate consenting regimes and differing timescales). Please see Appendix A: Proposed Site Location and Layout.

The MMPP is required to assess and manage the risks of causing injury or disturbance to marine mammals (cetaceans and seals) as a result of proposed piling and dredging operations in response to the scoping opinion of Comhairle nan Eilean Siar's (CnES) (September 2017); within which section 4.3 states *'SNH have advised that it is likely that the proposed development will have a significant environmental effect on harbour porpoise (within Inner Hebrides and the Minches candidate Special Area of Conservation) and other cetacean species'*. The MMRA, which will include a site/operation specific Marine Mammal Mitigation Plan (MMMP), will provide a detailed method statement in order to inform a European Protected Species (EPS) disturbance licence application. An EPS licence is required from Marine Scotland prior to the commencement of any construction works. The Marine Scotland 'Guidance for Scottish Inshore Waters: The Protection of Marine European Protected Species from injury and disturbance (2014)' was consulted to inform this document.

1.2 Project Overview

Stornoway Port is the primary port for the Western Isles and one of the busiest ports on the west coast of Scotland north of the Clyde. The Port is central to the economy of the island, facilitating the lifeline ferry service and supporting almost all economic activities from fishing and aquaculture, to construction, retail and marine leisure. The Port is run by SPA; SPA's Board is committed to supporting activities that will benefit the local community, both socially and economically, and is aware that the Port of Stornoway is crucial to the economic future of Stornoway and the Outer Hebrides. The masterplan is driven by economic opportunities for the town, and will support job creation and a sustainable community.

With water depths of around 10.5 m at lowest tide, a 430m long berth will easily accommodate a typical cruise ship size of 300m. The sea bed will be dredged to depths of -9.5 CD at the entrance to the bay and -10.5m CD at berthing locations.

In summary, the proposed development contains the following components:

- Dredging of approximately 400,000 m³ of sea bed in Glumaig Bay, Stornoway Harbour to a depth of 10.5m below Chart Datum (CD) alongside the berth and 9.5m in the remaining area of dredge[1];
- Re-using dredged material to create reclaimed land along the western shore of Glumaig Bay; the shortfall in dredged material will be made up by blasting and excavation of approximately 600,000m³ of rock;
- Rock armouring along reclamation slopes (approximately 30,000m^3) and exposed road lines;
- 250m long quay wall;

[1] The difference in dredge depths is to allow operational flexibility of the berth.

- 180m long multifunctional, double-sided finger pier;
- Linkspan;
- 10 hectare reclaimed and levelled area for port activities, industrial and storage uses;
- Cutting/filling, extraction and reshaping of the land including excavation of peat;
- Heavy lift area of 2500m²
- Freight ferry line featuring roll-on, roll-off (ro-ro) berthing to allow for a dedicated freight ferry;
- Proposed culvert over the Allt Poll A' Choire Stream;
- Proposed access road to existing Arnish Road;
- Link road along the coast to existing Arnish Industrial Estate (two options available); and
- Utility and services infrastructure (water, electricity, fuel).

The Outer Hebrides Local Development Plan (LDP) 2012 identifies Arnish as a safeguarded, first phase, site in the National Renewables Infrastructure Plan (NRIP) (Prop E1a Arnish, Lewis).

2 MARINE MAMMAL BASELINE

2.1 Cetaceans

Baseline information, to determine how marine mammals utilise the zone of influence of the proposed works, was collated from the following sources:

- The Joint Nature Conservation Committee (JNCC)[2 & 3];
- Seawatch Foundation[4];
- Scottish Natural Heritage (SNH)[5];
- Whale and Dolphin Conservation (WDC)[6]; and
- The Hebridean Whale and Dolphin Trust (HWDT) Whale Track[7].

2.2 Disclaimer

It should be noted that the baseline is limited by the reliability of third party information and the geographical availability of biological and/or ecological records and data. The absence of species from biological records cannot be taken to represent actual absence. Species distribution patterns should be interpreted with caution as they may reflect survey/reporting effort rather than actual distribution.

2.2.1 Designated Sites

Please see Appendix B: Designated Sites Boundaries

A search for designated sites was undertaken via the SNH Sitelink[8] website. Glumaig Bay is not within any statutory designated site; the nearest site featuring marine mammals is North East Lewis [proposed] Marine Protected Area (pMPA), less than 1km east of the proposed Deep Water Port, which is designated for Risso's dolphin *(Grampus griseus)*. Hundreds of Risso's dolphins have been observed in this area and it is thought some individuals stay year-round. Areas of the MPA were found to persistently support above average densities of the species (relative to wider Scottish territorial waters) over the period from 1994 to 2012[9].

Also in proximity to the proposed Deep Water Port is the Inner Hebrides and the Minches [candidate] Special Area of Conservation (cSAC), which is designated for harbour porpoise *(Phocoena phocoena)*, due to their high predicted and observed densities. The site covers important summer habitat, where the number of animals has been shown to be consistently above average. This area spans from the north west coast of Kintyre in the south to the north east of the Isle of Lewis in the north. The boundary of the SAC is approximately 1km east of the proposed Deep Water Port.

[2] 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 19/03/2018
[3] 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
[4] Seawatch Foundation Cetaceans of Western Scotland available at: http://seawatchfoundation.org.uk/wp-content/uploads/2012/07/WesternScotland.pdf last accessed 19/03/2018
[5] SNH About Scotland's Nature: Marine Mammals available at: http://www.snh.gov.uk/about-scotlands-nature/species/mammals/marine-mammals/ 06/02/2018
[6] WDC species guides available at: http://uk.whales.org/species-guide last accessed 19/03/2018
[7] HWDT sightings data available at: https://whaletrack.hwdt.org/sightings-map/ last accessed 19/03/2018
[8] SNH Sitelink website available at: https://gateway.snh.gov.uk/sitelink/searchmap.jsp last accessed 19/03/2018
[9] North East Lewis MPA Proposal – Data Confidence Assessment available at: https://www.nature.scot/sites/default/files/2017-11/Marine%20Protected%20Area%20-%20Data%20confidence%20assessment%20-%20North-east%20Lewis%20MPA%20proposal.pdf last accessed 03/09/2018

In the case of both designated sites, any individual cetaceans are protected as features whether in the site or not, thus Risso's dolphins and harbour porpoises within the zone of influence should be considered to be a part of the pMPA/cSAC.

2.2.2 Cetacean Distribution and Sightings

The cetacean fauna of western Scotland (including the Western Isles, West Highlands and South-west Scotland) is thought to be the richest in the UK and one of the most important areas in north-west Europe for cetaceans. Areas favoured by cetaceans in proximity to the proposed Deep Water Port include The Eye Peninsula (approximately 2.5km east), The Butt of Lewis (approx. 30km north) and The Old Man of Stoer (approx. 57km east)[10].

Since 1st August 2017, 412 individual cetacean sightings have been recorded via the HWDT Whale Track sightings database, which were observed within the North Minch. Of the individual animals recorded, the following species were identified: Harbour porpoise, Risso's dolphin, bottlenose dolphin *(Tursiopos truncatus)*, common dolphin *(Delphinus delphis)*, minke whale *(Balaenoptera acutorostrata),* long-finned pilot whale *(Globicephala melas)*, killer whale *(Orcinus orca),* humpback whale *(Megaptera novaeangliae),* fin whale *(Balaenoptera physalus),* sei whale *(Balaenoptera borealis)* and white-beaked dolphin *(Lagenorhynchus albirostris)*.

Several species of cetaceans occur regularly in Stornoway Harbour and its surrounds including harbour porpoise, Risso's dolphin, minke whale, killer whale, short-beaked common dolphin, bottlenose dolphin and humpback whale[11].

The most commonly recorded species within The North Minch, and more specifically the area surrounding Stornoway, is harbour porpoise. Since August 2017, 141 harbour porpoise sightings have been submitted to HWDT Whale Track, which makes up over a quarter of the total marine mammal sightings during this time. The number of harbour porpoises in Hebridean waters is amongst the highest in Europe; they are widespread throughout coastal regions and are seen year-round. Figure 2-1 shows UK harbour porpoise distribution.

[10] JNCC Coasts and Seas of the United Kingdom, Regions 15 and 16 North-west Scotland: The Western Isles and West Highland available at: http://jncc.defra.gov.uk/pdf/pubs_csuk_region16.pdf last accessed 05/03/2018
[11] Letter from SNH to Marine Scotland dated 25 January 2018: Arnish Deep Water Development, Glumaig Bay, Isle of Lewis. Scoping Request – Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2007.

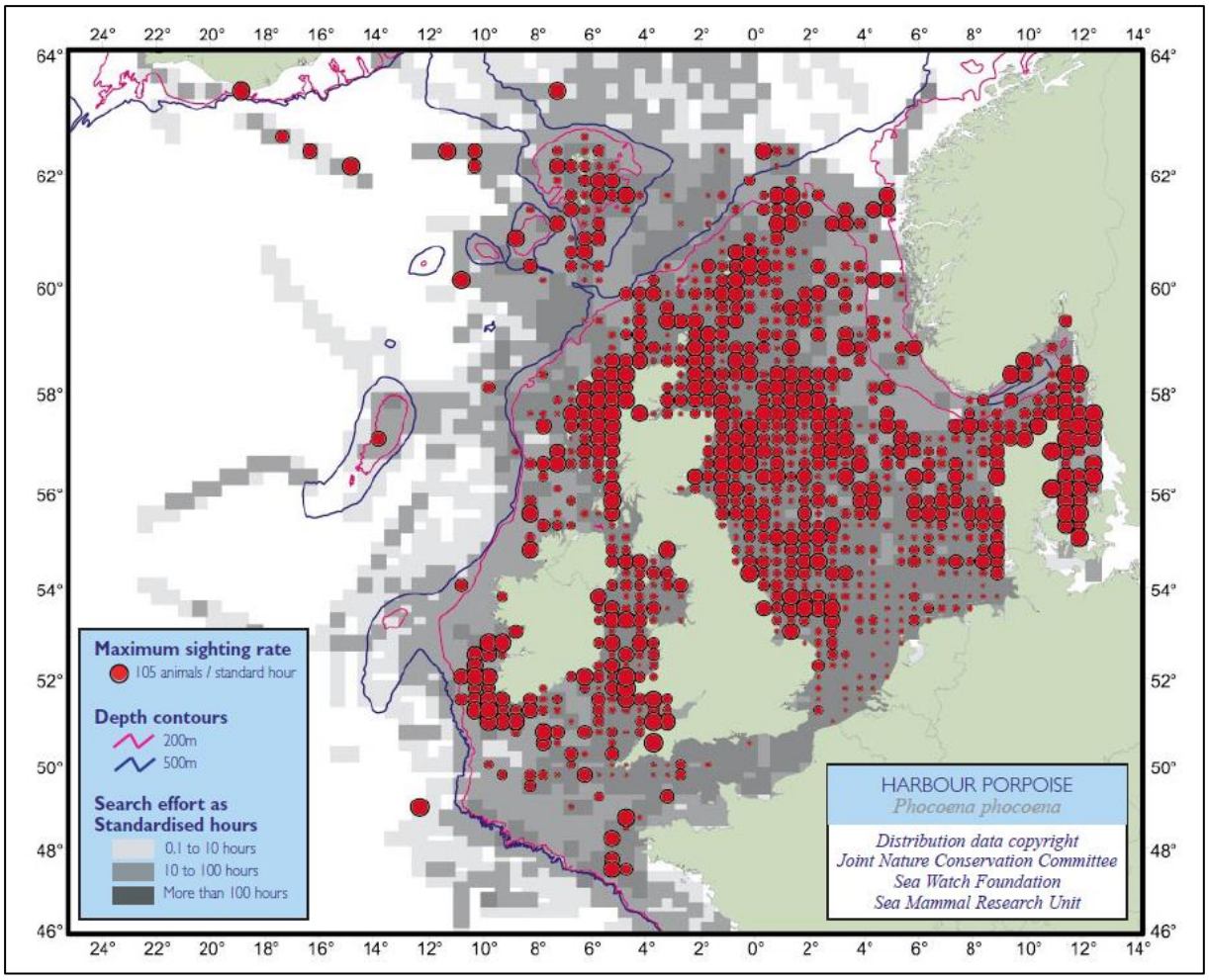


Figure 2-1: JNCC harbour porpoise distribution map

Sightings of Risso's dolphin are generally between April and September, with peak numbers in August and September, however repeated sightings of individual Risso's dolphins within the North East Lewis MPA suggest that some animals may be semi-resident. The Eye Peninsula off the east coast of Lewis is a notable location for Risso's dolphin sightings, particularly between Tiumpan Head and Chicken Rock. Since August 2017, 26 sightings of Risso's dolphin within The Minch have been submitted to the HWDC Whale Track database, the closest of which being approximately 5km offshore to the east. The majority of these sightings were during the summer months (predominantly August), however, three records show the animals to be present through the winter months; two sightings were submitted in January 2018 from around Loch Inver on the west coast of the mainland and one individual animal was recorded within 5km of the site in November 2017. Figure 2-2 shows UK Risso's dolphin distribution.

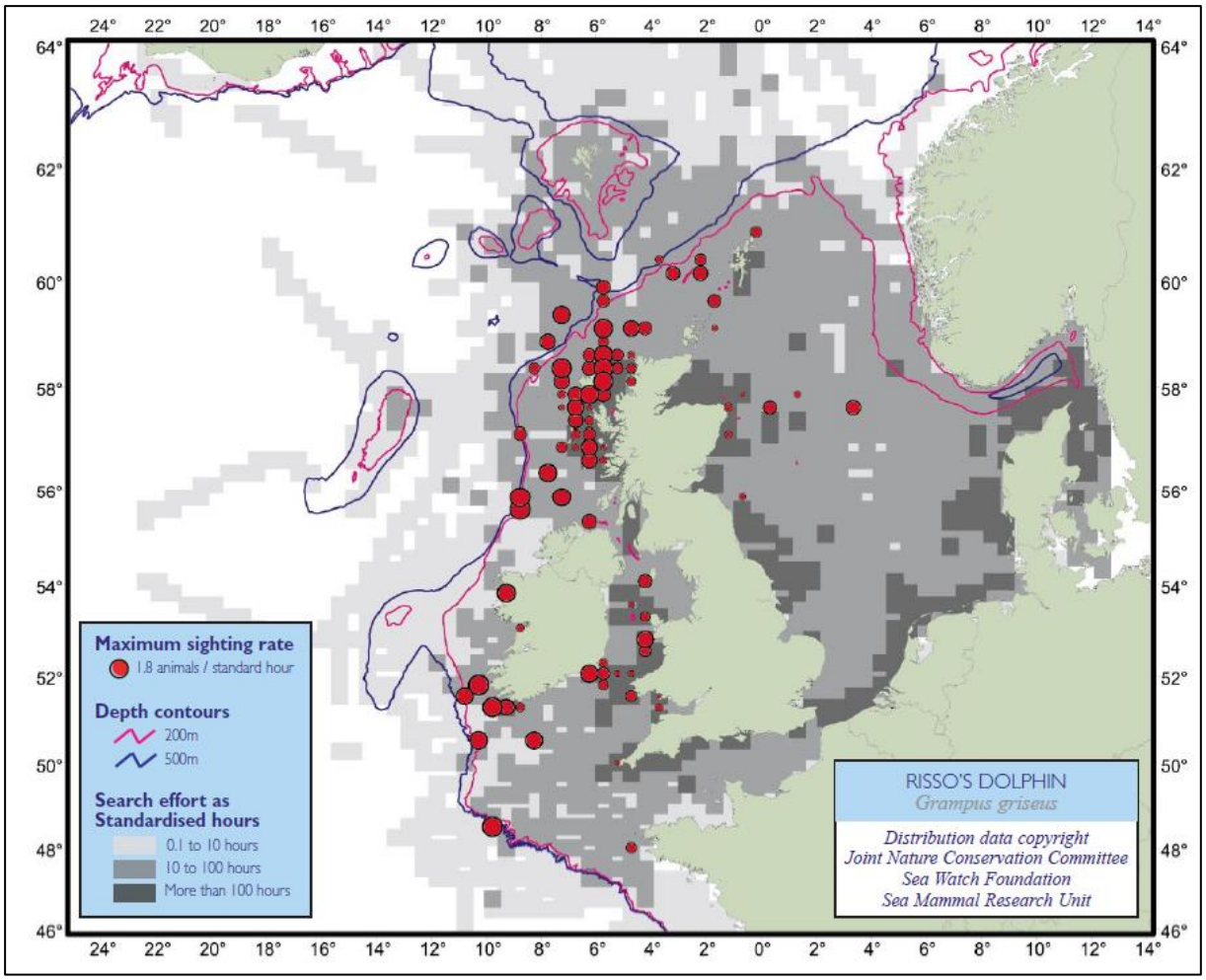


Figure 2-2: JNCC Risso's dolphin distribution map

Minke whales are frequently seen in coastal and inshore waters around the Hebrides from April to October with some studies suggesting that individuals return to the same localities year after year. Thirty-six minke whale sightings have been submitted to the HWDC Whale Track database since August 2017 within an approximate 15km radius of the proposed Deep Water Port site. The majority of sightings were in the summer months (July to September) with one sighting in January 2018 off the north of the Eye Peninsula. Figure 2-3 shows UK minke whale distribution.

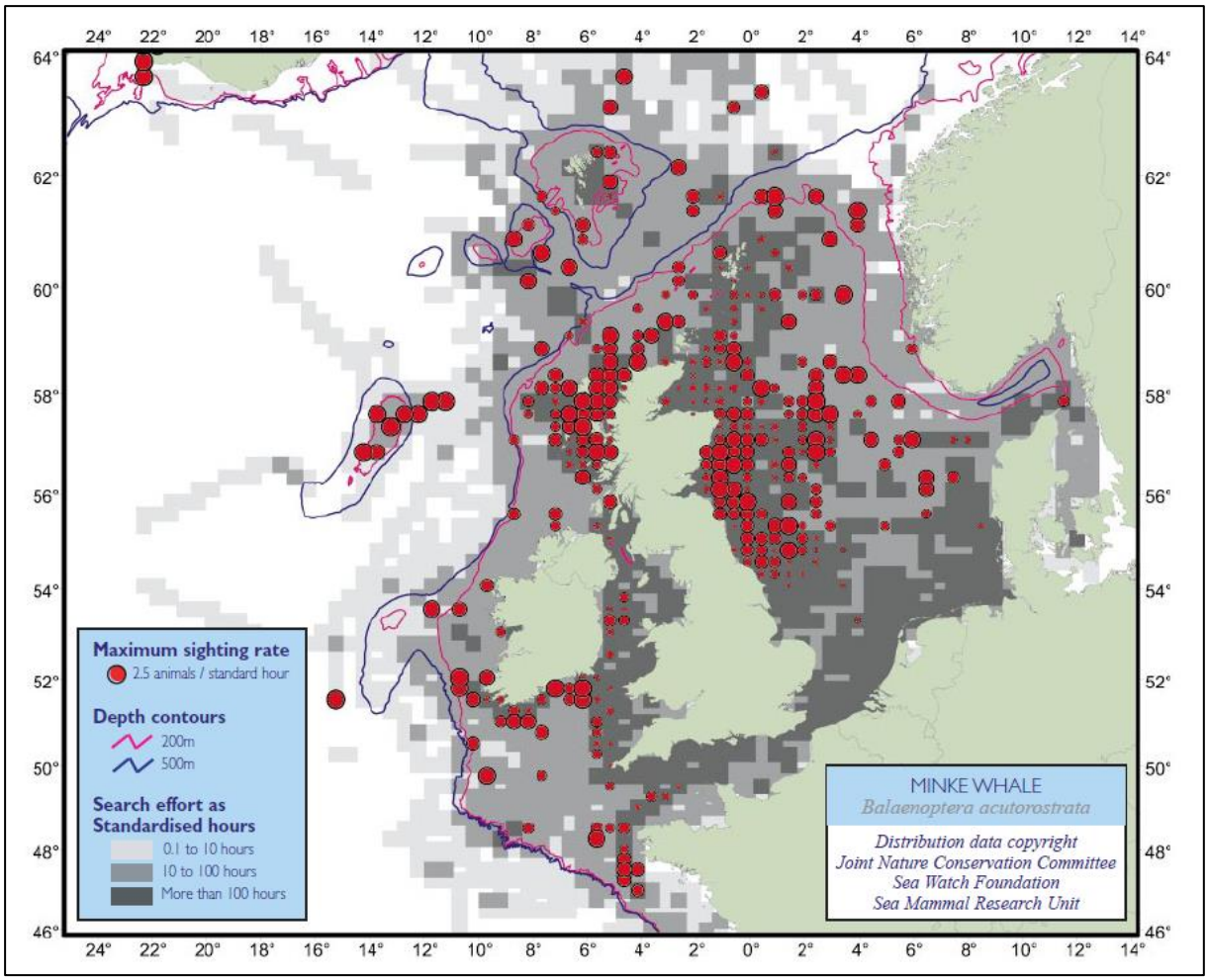


Figure 2-3: JNCC minke whale distribution map

Although killer whales are uncommon, they are widely distributed in western Scottish waters. Killer whales usually first appear in coastal waters around the Northern Isles and Outer Hebrides in May and June, singly or in groups numbering up to 14 individuals. Repeat sightings have been recorded in and around The Little Minch, east of Harris and west of Skye. Some individuals with unique markings have been repeatedly observed in particular locations for periods of over 10 years. Figure 2-4 shows UK killer whale distribution.

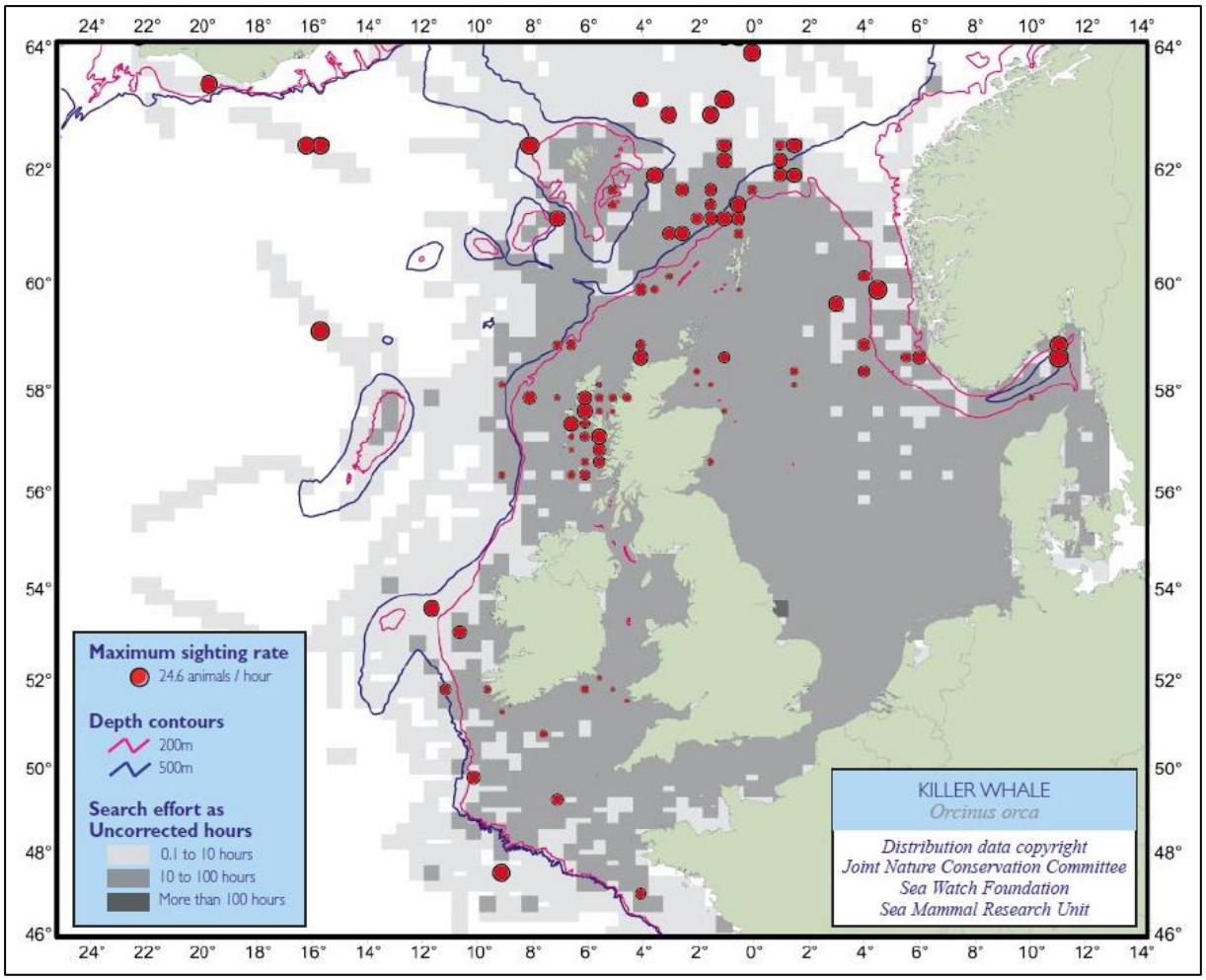


Figure 2-4: **JNCC killer whale distribution map**

In North Atlantic waters, common dolphins are predominantly found in continental shelf waters, notably in the Celtic Sea and Western Approaches to the Channel, however they can be frequently seen in the Sea if Hebrides in the Summer (June to September). In August 2017, one sighting of 20 individual common dolphins, approximately 6km east of the proposed Deep Water Port site, was submitted to the HWDT Whale Track database. In September 2017 a further sighting of 18 animals within Glumaig Bay (approximately 1.5km north) was also recorded. Figure 2-5 shows UK common dolphin distribution.

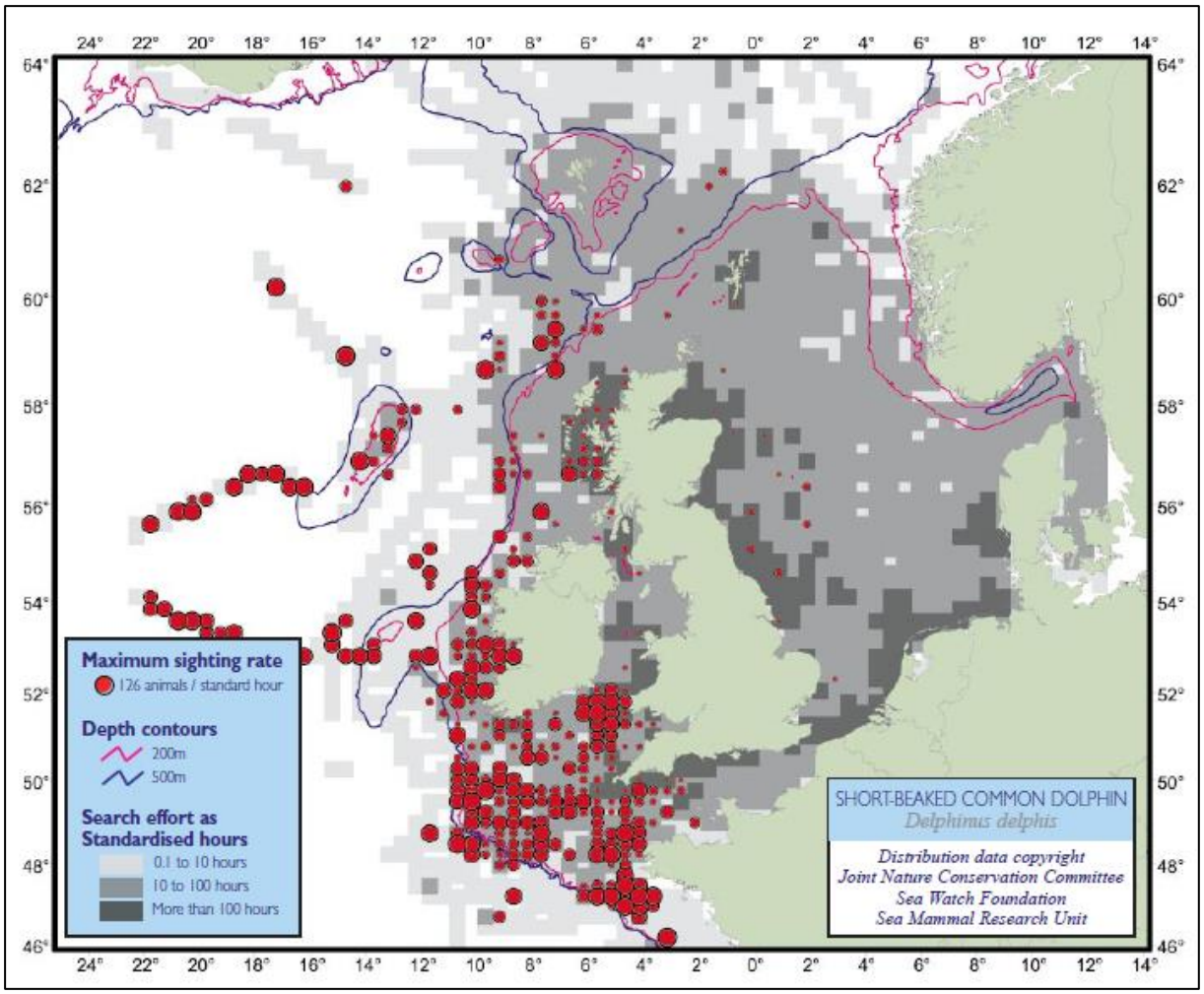


Figure 2-5: JNCC common dolphin distribution map

Although bottlenose dolphin have been noted as regularly occurring within Stornoway Harbour, larger schools of bottlenose dolphin tend to occur in deeper waters and the number of sightings in proximity to the proposed Deep Water Port is significantly lower compared to other species. Since July 2017, the closest sighting of bottlenose dolphin submitted to the HWDT Whale Track database was approximately 55km east, off the Scottish Mainland. Figure 2-6 shows UK bottlenose dolphin distribution.

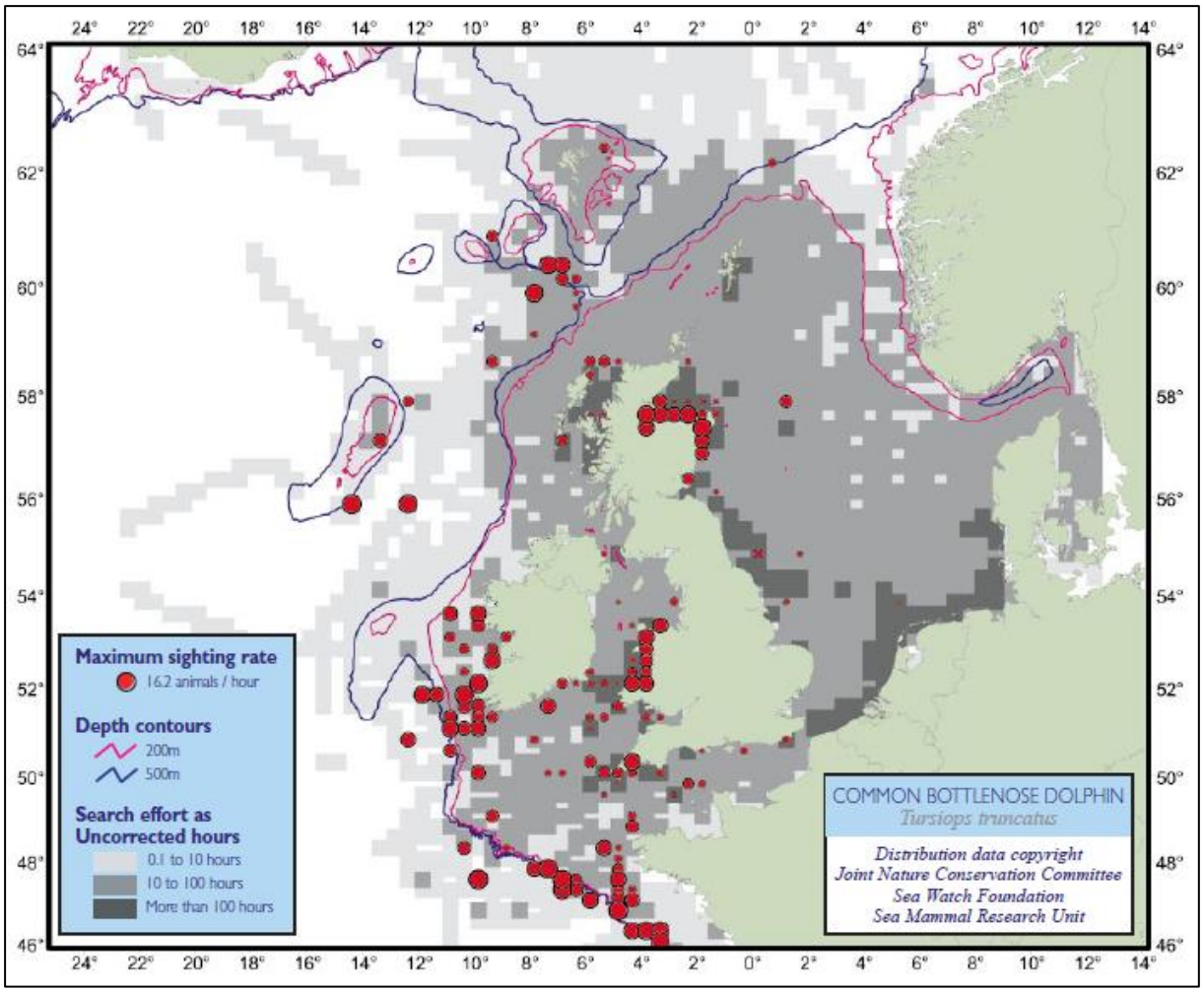


Figure 2-6: JNCC bottlenose dolphin distribution map

Humpback whales sightings off Stornoway are rare, with isolated records almost exclusively in waters deeper than 200m. Most sightings are between May and September, which is when small numbers are seen off the continental shelf west and north of Scotland. Since July 2017, one sighting of once humpback whale was recorded approximately 10km south west of the proposed development. Figure 2-7 shows UK humpback whale distribution.

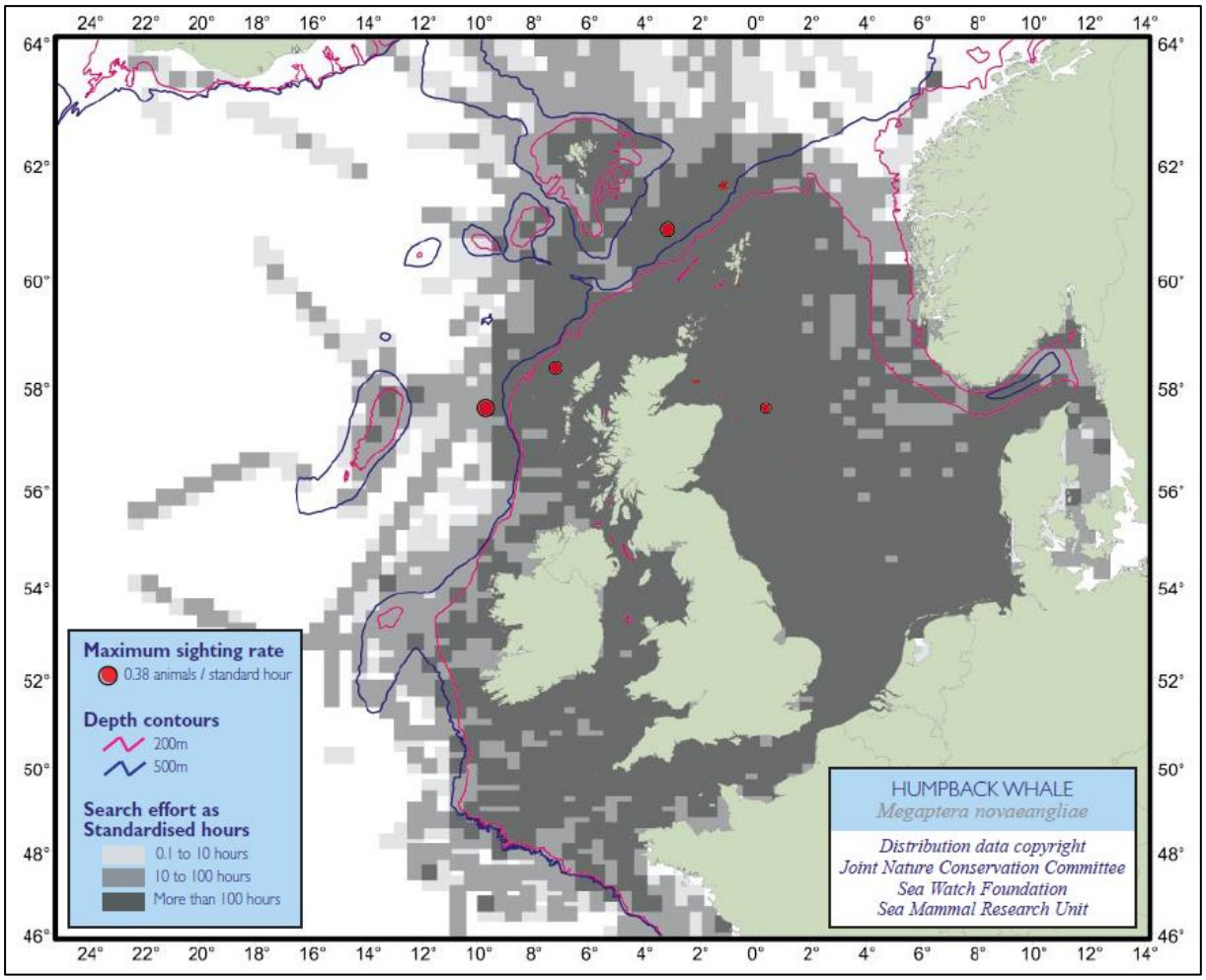


Figure 2-7: JNCC humpback whale distribution map

Based on the above information, it has been assessed that the most frequently observed species, and therefore the species considered to be of most concern within the zone of influence of the proposed Deep Water Port, are harbour porpoise, Risso's dolphin and minke whale.

2.3 Seals

Baseline information, to determine how seals utilise the zone of influence of the proposed works, was collated from the following sources:

- SNH[12]; and
- Scottish Government Designated Sites: Seal Haul out Sites[13].

Both harbour seal and grey seal can be seen all around Scotland on many of the offshore islands and along much of the west mainland coast. Because seals range widely in their search for food, single seals of either species might be spotted anywhere along the Scottish coastline.

[12] SNH Seals in Scotland available at: http://www.snh.org.uk/publications/on-line/naturallyscottish/seals/sealsinscotland.asp last accessed 19/03/2018
[13] Scottish Government seal Haul-out maps available at: http://www.gov.scot/Topics/marine/marine-environment/species/19887/20814/maps last accessed 19/03/2018

There are no statutory designated sites which feature seals within 50km of the proposed Deep Water Port. The nearest notable site for seals in proximity to the development is Broad Bay, approximately 14km to the north, which is a designated seal haul-out site.

Harbour seals *(Phoca vitulina)* routinely travel 40-50km from their haul-out sites to forage and prefer more sheltered waters, meaning harbour seals are more likely to be encountered in Glumaig Bay than grey seals *(Halichoerus grypus),* which prefer offshore feeding areas, however both species could be present.

2.4 Basking Shark

Although not a marine mammal, basking sharks *(Cetorhinus maximus)* are listed as endangered on the International Union for Conservation of Nature and Natural Resourses (IUCN) Redlist[14] and are afforded domestic and global protection; therefore have been considered in this assessment. The coast of the Isle of Skye, approximately 55km south west of Stornoway is a known basking shark hotspot[15] during the summer months, between May and October.

[14] IUCN Redlist available at: http://www.iucnredlist.org/ last accessed 30/05/18
[15] The Shark Trust basking shark sightings available at: https://www.sharktrust.org/en/basking_shark_sightings last accessed 30/05/2018

3 MARINE MAMMAL RISK ASSESSMENT

3.1 Activities Affecting Marine Mammals

3.1.1 Underwater Noise Producing Activities

Underwater noise modelling was commissioned as part of this assessment and was appraised to inform this document. Please refer to Irwin Carr Consulting report: 'Technical Appendix 5.4: Underwater Noise Report, Deep Water Port' which details the methods and findings of the underwater noise modelling.

There are a number of proposed activities which will introduce underwater noise into the marine environment. These include: pile extraction (vibratory), vessel movement, rock armour placement, drilling, vibratory piling and impact piling.

The Marine Scotland 'Guidance for Scottish Inshore Waters: The Protection of Marine European Protected Species from Injury and Disturbance' defines what disturbance means to cetaceans as:
'Changes in behaviour which may not appear detrimental in the short-term, but may have significant long-term consequences. Additionally the effects may be minor in isolation, but may become more significant in accumulation'. Disturbance may be identified via the following behaviour:

- Changes in (direction or speed of) swimming or diving behaviour;
- Bunching together or females shielding calves;
- Certain surface behaviours such as tail splashes and trumpet blows; and
- Moving out of a previously occupied area.

The following negative effects are linked to disturbance:

- Displacement from important feeding areas;
- Disruption of feeding;
- Disruption of social behaviours such as communication, calving, breeding, nursing, resting and feeding; and
- Increased risk of injury or mortality;
- Increased vulnerability of an individual or population to predators or physical stress; and
- Changes to regular migration pathways to avoid human interaction.

At this stage the exact details of the equipment to be used are not known, and will be confirmed upon appointing contractors. As a result, the data to inform the noise models has been interpolated from similar construction projects, in-house work undertaken by Irwin Carr Consulting, and a review of the literature. This means that the results are based on a presumption that the works at Stornoway Deep Water Port will be carried out using equipment that produces similar noise levels to the examples used to inform the model. The three construction methods below are considered the most significant:

1. **Impact Piling**
   Impact piling activities will likely produce the loudest noise during construction. Despite only a few strikes being required to set a pile, this type of piling has a higher chance of causing injury than other types of noise with similar energy. This is because the sound impulse has a very fast 'rise time' i.e. how quickly an acoustic impulse "rises" from the background noise. This means animals in the vicinity of the noise source have no time to react/adapt to the noise, and consequently increases the risk of acute hearing injury.
   For the most part piles will be installed into pre-drilled holes by vibration. Where sediment proves too hard for this approach impact piling will be carried out. Should the impact hammer be required to set a pile, a 2-

4 hour period of impact piling would be needed, of up to 4000 blows.

2. **Odex Drilling**
   All holes for piles will be pre-drilled. This drilling is done by the "Odex-drilling" method, that is suitable for softer sediments, as it can be used to line the drilled hole while drilling, thus avoiding soft sediment flowing into the drilled hole. Even though this is in essence an impact method, a high strike rate means that the noise is characterised as continuous (>20 strikes/second).

The following drilling and piling schedule is anticipated, works will be occurring simultaneously:

	Number of piles	Odex Drilling	Impact Piling*
Finger Pier	130	7 hours per day for 6 weeks	2 hours per day for 6 weeks
Main Quay	75 (King piles) & 300 sheet piles	7 hours per day for 8 weeks	Impact piling not anticipated
Linkspan Dolphins	24	7 hours per day for 8 weeks	2 hours per day over 2 weeks

*Impact piling only required where sediment proves too hard to set the pile via Odex drilling.

3. **Dredging**
   The removal of sediment by either suction or lifting of loose material from the seabed will be undertaken via one or both of the following methods :
   - Backhoe dredgers are diggers on barges/land based and are suitable for removing soft sediment at shallow depths.
   - Cutter suction dredging involves a cutter which can break/loosen harder sediments and remove them via suction. Cutter suction dredging is considerably noisier due to the amount of moving parts under water and the impact of the cutter with hard sediment. The noise model is based on data for the cutter suction dredger, to represent a worst-case scenario.

Cetaceans rely on their hearing for foraging, navigation and mating. The impact of noise to a population level is difficult to determine, however the expected impact on an individual animal's hearing ability and potential damage that could be caused by noisy activities during construction is assessed by modelling representative scenarios, taking into account environmental variables and the animal's hearing capabilities.

3.1.2 Increased vessel movement

During construction, there will be a small increase in vessel movement in and out of the port; the increase in vessel capacity at Stornoway Deep Water Port will also lead to an increase in vessel traffic post-construction. It is not currently known what the predicted increase in vessel movements will be as a result of the development.

The increase in the number of vessels travelling through to the Deep Water Port, both during construction and operation, would increase the risk of collision with marine mammals and/or basking sharks, potentially resulting in death or injury to individuals.

3.1.3 Cumulative Impacts

Scottish and Southern Electricity Networks Transmission are proposing to construct a High Voltage Direct Current (HVDC) connecter between the island of Lewis and the Scottish mainland. The Western Isles Connection will transmit electricity generated by renewable developments on the Western Isles to areas of demand in towns and cities across Scotland. The construction of the HVDC is expected to commence within the same timescales as Stornoway Deep Water Port. An increase in the number of vessels in the area is expected

during the construction of the HVDC. This increases the risk of collision with marine mammals and/or basking sharks.

During the operation of the port there is likely to be an increase in the number of vessels traveling through waters surrounding the development associated with the increased vessel capacity of Stornoway Deep Water Port and Newton Marina. There is already some marine traffic associated with the existing Stornoway Port. The total number of vessel movements for the previous three years was 768 in 2015, 833 in 2016 and 908 in 2017 (Stornoway Port Authority, 2017). There are a range of vessels including cruise ships, a twice daily passenger ferry from Ullapool as well as yachts, cargo ships and fishing vessels.

During the construction of Stornoway Deep Water Port, construction will also be underway to develop Newton Marina, approximately 1.5km north of the proposed Deep Water Port. Newton Marina is subject to a separate EIA, however the EIA Scoping Opinion received from Comhairle nan Eilean Siar (CnES) Planning Department requested that impacts from the Deep Water Port development be considered in-combination with impacts from the Newton Marina development. The dredging and piling work are scheduled so that piling and dredging would not occur simultaneously across both sites.

3.2 Noise Modelling Results: Impacts of Underwater Noise on Cetaceans

The way in which noise affects marine mammals is dependent on several factors, including the type of noise generated, the noise level, the species of marine mammal and the distance between the animal and the source of the noise. The National Oceanic and Atmospheric Administration (NOAA) describes how different groups of marine mammals hear and are affected by sounds, which can be found in the *'Guidance for Assesing the Effects of Anthropogenic Sound on Marine Mammal Hearing'*[16]. The effects can be described as either a Permanent Threshold Shift (PTS), where an animal experiences irreversible damage to their hearing which can in turn affect their ability to forage and reproduce and in extreme circumstances result in death; or a Temporary Threshold Shift (TTS) which an animal can recover from, but may experience 'masking' which reduces its ability to communicate with other animals and locate prey, resulting in fatigue[17].

The dredging and piling work is organised so that piling is carried out in Newton Marina while dredging is carried out in the Deep Water Port area and vice versa. The noise modelling ran the scenarios in a way that reflected this tandem operation. The impact from activity at Newton Marina has been included in the model, but for the most part is insignificant due to the containing nature of the bathymetry of the proposed Newton Marina.

3.2.1 Impact Piling

Impact piling presents the highest risk of injury and/or disturbance to cetaceans. The noise model indicates that a single strike of the impact hammer at full power would risk acute injury, and cause PTS to harbour porpoises within approximately >500m of the source of the noise. The MMO will establish that a 500m mitigation zone is free of marine mammals before piling commences; this, in conjunction with a soft-start, will prevent harbour porpoise from experiencing PTS. The PTS risk zones for all other species are no more than approximately 50m, as shown in figure 3-1 below.

[16] NOAA guidance available at: http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm last accessed 22/05/18
[17] JNCC UK Marine Noise Registry: Information Document available at: http://jncc.defra.gov.uk/pdf/MNR__Draft_InfoDoc_V1_20160808.pdf last accessed 06/06/2018

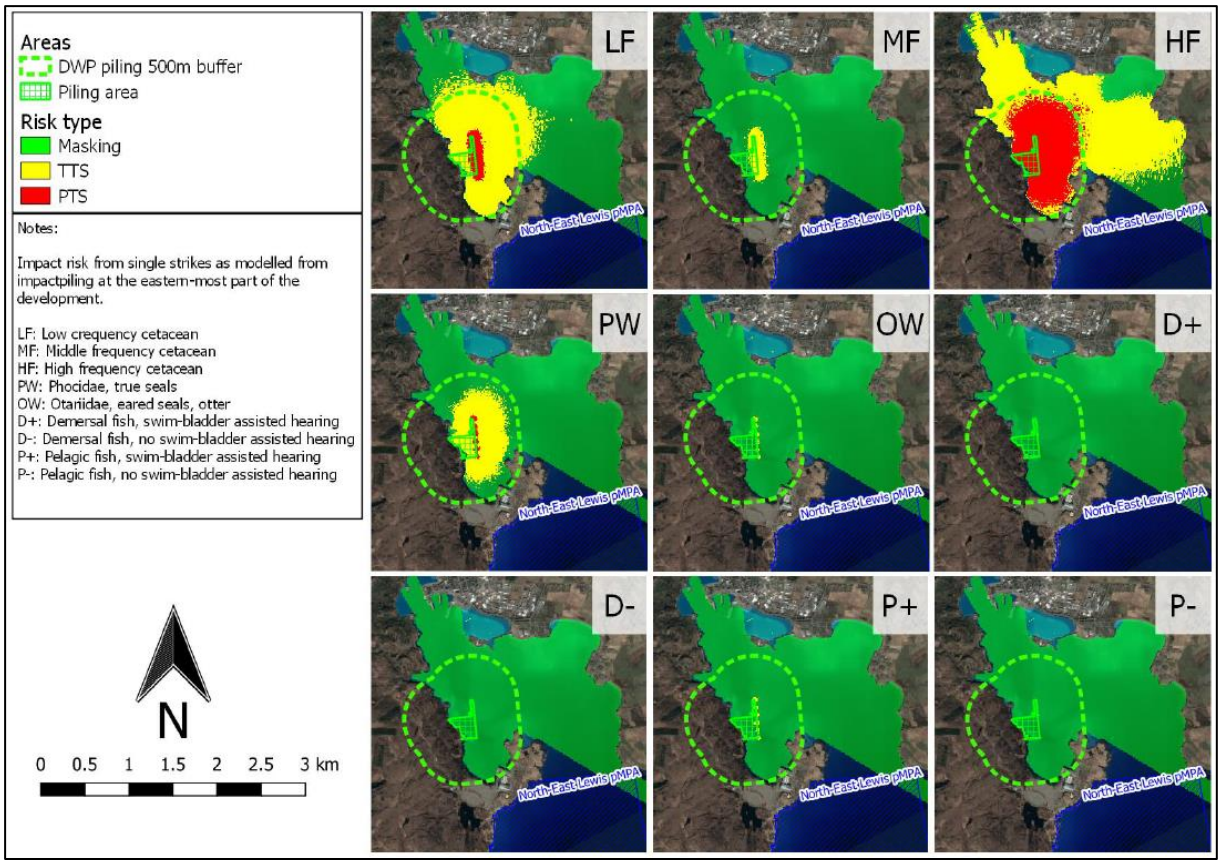


Figure 3-1: Risk zones resulting from a single strike at full power, for all species

Increasing the number of hammer strikes, increases an animals exposure and therefore it's risk of auditory injury should it fail to vacate the area. The PTS risk zone for 1000 hammer strikes, increases to approximately

2000m from the source of the noise for harbour porpoise and minke whale, approximately 1500m for seals and 600m for dolphin species as shown in Figure 3-2 below.

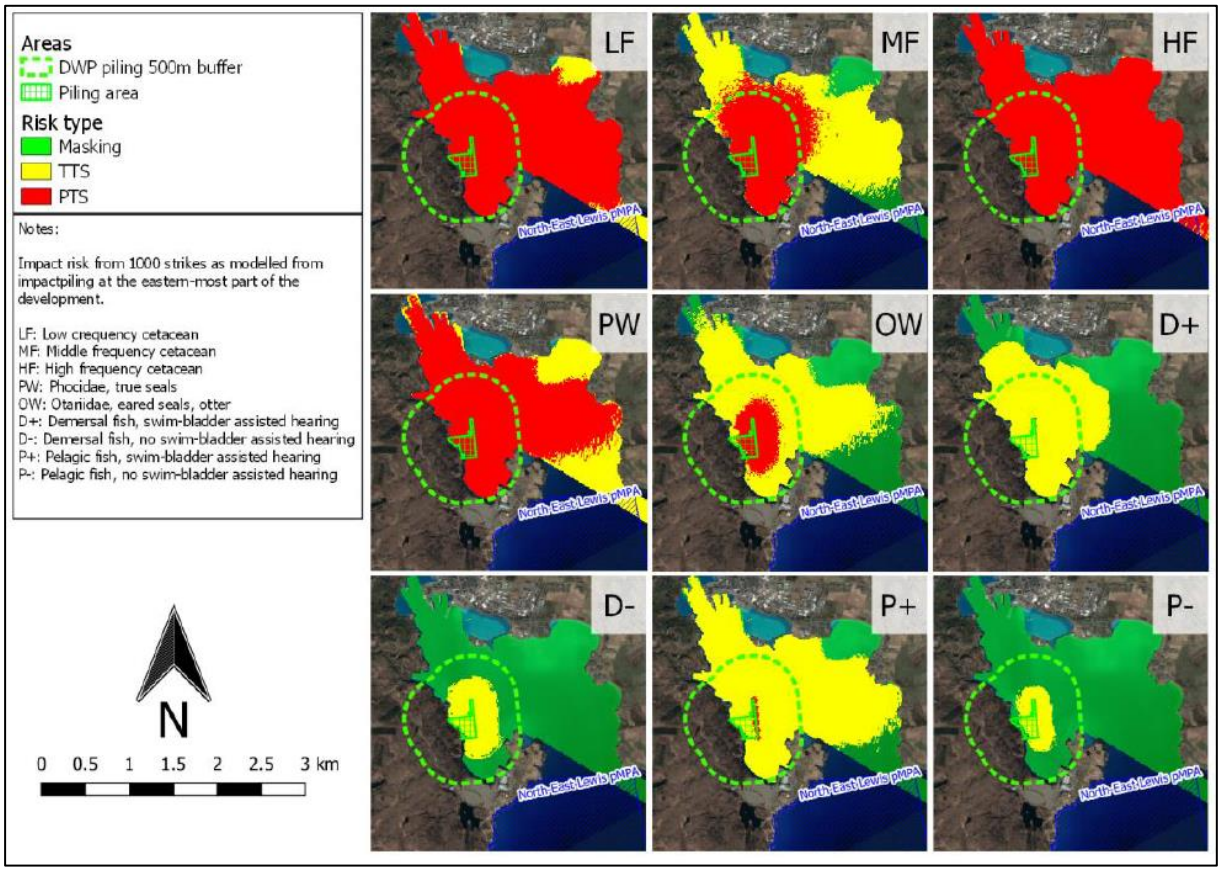


Figure 3-2: Risk zones for 1000 hammer strikes, for all species

As harbour porpoise are, again, the species most at risk; the underwater noise modelling used their swimming speed to calculate the time it would take for them to safely flee the PTS risk zone, as shown in Figure 3-3 below.

	No MMO or animal start next to pile	MMO present, no animal closer than 500 m	No MMO or animal start next to pile	MMO present, no animal closer than 500 m
Max distance to PTS limit (leave harbour)	2500 m	2000 m	2500 m	2000 m
Ramp up time for soft start	20 min / 1200 sec	20 min / 1200 sec	30 min / 1800 sec	30 min / 1800 sec
Required swimming speed	2.1 m/s	1.7 m/s	1.4 m/s	1.1 m/s
Percent of harbour porpoise cruising speed [1.2-2.0 m/s]	106-174 %	85-139 %	71-116 %	56-93%

Figure 3-3: Required swimming speeds to realise effectiveness of soft-start

By assuming the slowest swimming speed of a harbour porpoise (as a worst-case scenario) of 1.2m/s, it is estimated that it would take 30 minutes for them to safely vacate the PTS risk zone. Therefore this time is used to inform the MMO protocol and the duration of the soft-start. The soft start significantly reduces the PTS risk

zones for harbour porpoise. Figure 3-4 below shows the PTS zones for full hammer power, and reduced hammer power; highlighting the importance of the soft-start procedure.

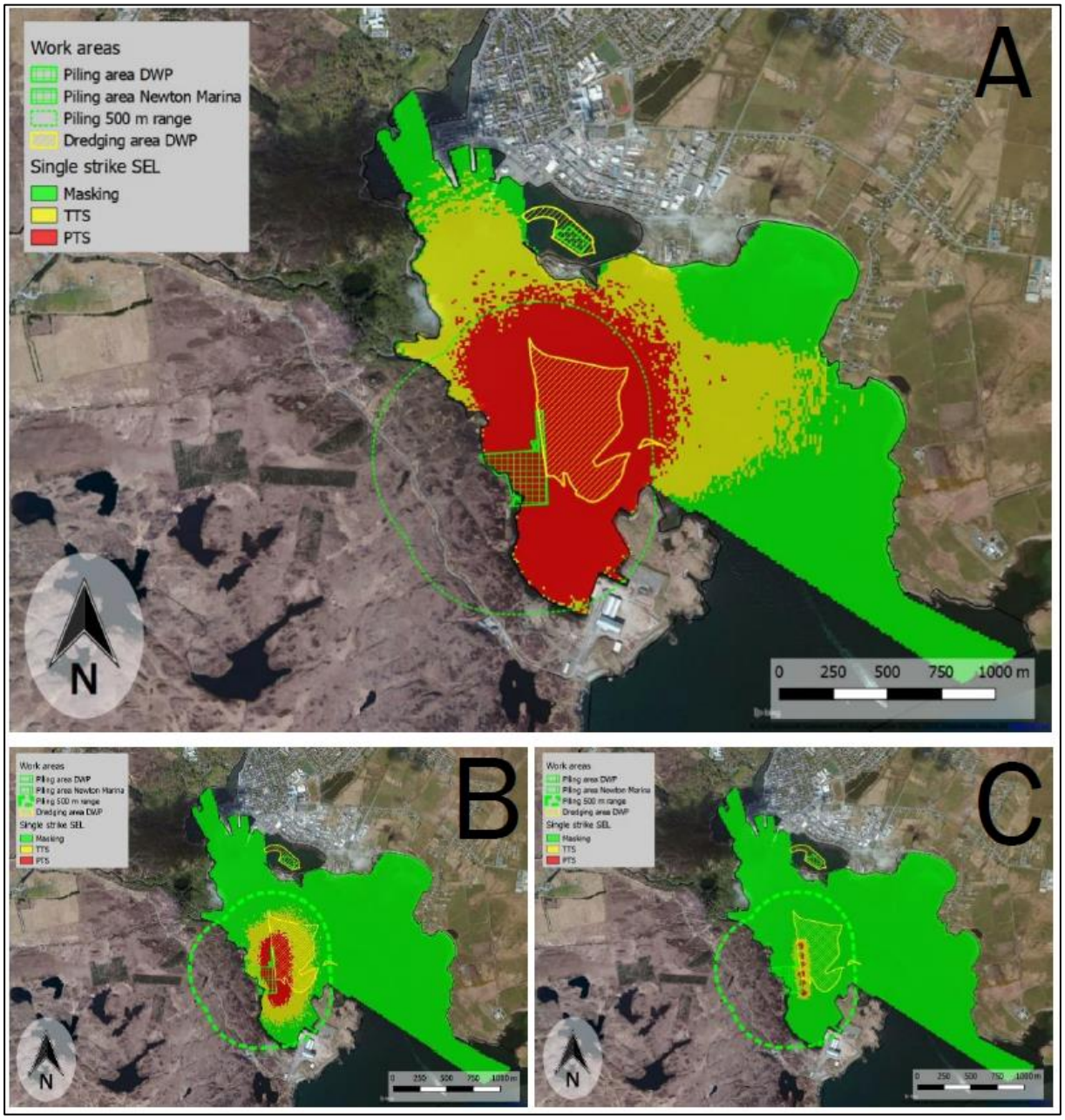


Figure 3-4: PTS zones for one strike at full power (A), 10% power (B) and 1% power (C)

TTS risk zones extend out of the bay and slightly into the MPA and SAC, however Arnish Point provides a natural barrier to the noise, therefore the areas of the MPA and SAC in which marine mammals would be affected by TTS are small.

3.2.2 Odex Drilling

There is a risk of PTS associated with Odex piling only to harbour porpoise within approximately 200m of the source of the noise. This model assumes however, that animals would stay in the area for the duration of the piling, which is highly unlikely, thus the risk would be minimal. This is displayed as the black area within Figure 3-3 below.

Harbour porpoise and minke whale are the only species displaying risks of TTS outside of the 500m mitigation zone, assuming a worst-case scenario of the animals being in proximity to the noise for a 24 hour period. Again, this is highly unlikely as both animals are likely to avoid remaining in areas where they are exposed to increased noise and will swim away. Therefore by implementing a soft-start procedure it is considered that once drilling at full power, the animals would have swam away from the disturbance; and once outside of the 500m zone, there is no acute risk of hearing impact.

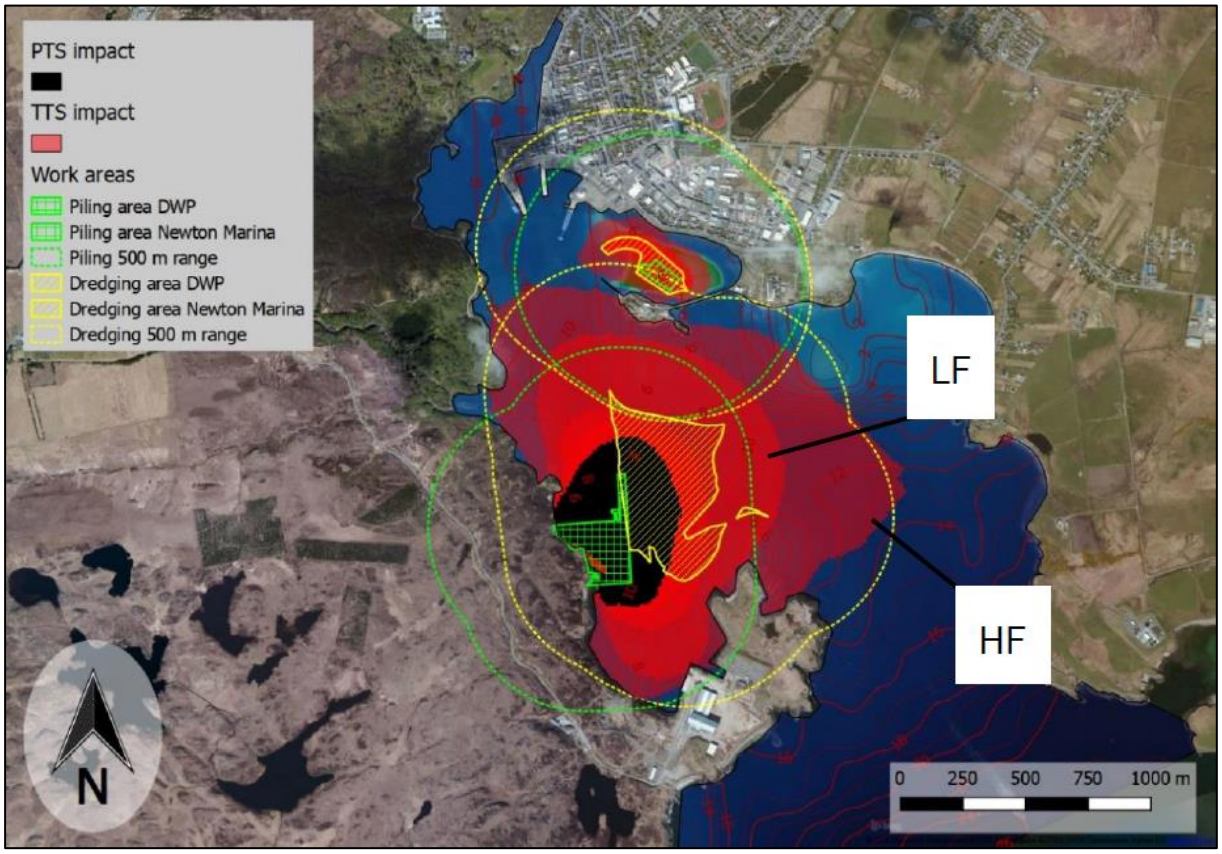


Figure 3-5: Odex drilling impact zones. Note PTS impact is for harbour porpoise only.
LF: low frequency (minke whale) HF: high frequency (harbour porpoise)

3.2.3 Dredging

Dredging activities will have the lowest acoustic impact upon cetaceans. There are no associated risks of PTS to any of the priority species. The TTS risk zone extends to approximately 200m from the dredge area only for minke whale. Any other species would have to be within 100m of the noise source to experience TTS. Minke whales are unlikely to be present within the bay for lengthy periods of time.

3.3 Effects of Noise Producing Activities on Basking Shark and Seals

Little is known about the hearing sensitivities of fish, particularly sharks, therefore the noise model gathered data from several sources to make an assessment. Although is it clear that sharks can detect sound (sharks have additional senses such as detecting pressure or particle movement), there is no evidence to suggest that sound has any effect on their population fecundity. A basking shark may suffer PTS if it were within approximately 200m of the impact hammer for the duration of 4000 strikes across a 24 hour period, which is unlikely as the water within Stornoway Harbour is relatively shallow. TTS may be experienced out to

approximately 1.2km if an animal were to stay in the area for the assumed 4000 strikes per day, however this is also extremely unlikely therefore the risk of TTS is low. A MMO exclusion zone and soft start procedure would likely prevent the low risk of PTS to basking shark.

As shown in Figure 3-1 above, the PTS risk zone for seals for a single strike is approximately 50m around impact piling activities, the TTS risk zone does not extend further than Arnish Point to the south; It is extremely unlikely that an animal would stay within this area for an extended period of time during impact piling, however. By implementing a 500m MMO exclusion zone and a soft start protocol, it is assessed there will be no risk of PTS and low risk of TTS to seals.

The results of the noise model do not indicate any impacts associated with noise producing activities on the fecundity of seals.

3.4 Effects of Increased Vessel Movement

Harbour porpoises often live in the vicinity of vessel traffic and reactions by porpoises to various types of vessel showed only short-term negative effects from speedboats and large ferries in a study by the Seawatch Foundation[18]. SNH[19] indicate that as harbour porpoise are naturally shy of boats, they will for the most part avoid them, and so for most types of marine traffic the risk of collision is minimal. There is more potential for collision with fast-moving engine-powered vessels due to their speed and ability to change direction quickly. Risso's dolphins are rarely seen approaching vessels or bow-riding, suggesting that this species may actively avoid vessel traffic. Minke whales have reportedly been killed by ship strikes in UK waters, however are observed much less frequently in the vicinity of Stornoway Harbour.

Basking sharks can often be observed with injuries to their dorsal fins, after colliding with vessels. Studies summarised by SNH[20] suggest that basking sharks show very little avoidance measures to approaching vessels, this is likely more apparent during the summer months when they are 'in a trance like state' feeding at the surface. This does not mean that risks do not exist however, rather, the risk is one of collision rather than disturbance. A vessel travelling at 6 knots (a low average cruising speed) will cover a distance of 10m in 3 seconds, at which range even a relatively aware animal would have no chance to evade a collision, nor a helmsman to avoid it. Therefore speed limits within the harbour is considered to be the soundest policy.

Disturbance caused by an increased human presence can have a negative impact on seals, seals that are on land are usually resting to conserve energy or may be nursing young, disturbing seals into the water costs them energy, creates stress and can lead to impacts on health[21]. Stampeding adults can also injure pups. As the nearest seal haul-out site is 14km to the north of the Deep Water Port, it is unlikely that seals will be negatively impacted to a population level. Individual animals foraging around Stornoway Harbour may be temporarily disturbed by an increase in vessel traffic.

[18] Seawatch Foundation: The Harbour Porpoise in UK Waters available at: http://seawatchfoundation.org.uk/wp-content/uploads/2012/07/Harbour_Porpoise.pdf
[19] Scottish Natural Heritage: Inner Hebrides and the Minches Proposed SAC: Advice to Support Management available online at: https://www.nature.scot/sites/default/files/2017-10/Consultation%20-%20Harbour%20Porpoise%20-%20Inner%20Hebrides%20and%20the%20Minches%20pSAC%20-%20Combined%20Reg%2033%20%20MOP%20-%20A1918723.pdf last accessed 13/06/2018
[20] Scottish Natural Heritage (2009) Commissioned Report 339: Basking Shark Hotspots on the West Coast of Scotland
[21] Scottish Natural Heritage: A Guide to Best Practice for Watching Marine Wildlife available online at: https://www.nature.scot/sites/default/files/2017-06/Publication%202017%20-%20A%20Guide%20to%20Best%20Practice%20for%20Watching%20Marine%20Wildlife%20SMWWC%20-%20Part%202%20-%20April%202017%20%28A2263517%29.pdf last accessed 13/06/2018

3.5 Assessment of Risk

To summarise, for all hearing groups and without mitigation, impact piling produces larger impact zones than vibratory piling. The MMO protocol, detailed below, includes a mitigation exclusion zone of 500m. The PTS and TTS thresholds for whales and dolphins do not exceed 500m, nor does the PTS threshold for harbour porpoise assuming a soft-start is implemented. With the inclusion of this 500m mitigation zone and soft-start procedure, the species' that will incur the effects of the impact piling noise will be harbour porpoise, seals and dolphins which showed thresholds for TTS within an approximate 2km radius.

Thus, the species of concern will be harbour porpoise, and it is considered that the mitigation suggested to protect them should be effective at protecting other species such as Risso's dolphin, minke whale, seals and basking shark.

It has been assessed that the primary risk from the works is to harbour porpoise; with consideration to be made for Risso's dolphin, minke whale killer whale, common dolphin, bottlenose dolphin, humpback whale and grey and harbour seal and that this will be **temporary disturbance** from underwater noise associated with the **impact piling**. The noise is not predicted to cause long term negative effects on the local populations of the aforementioned species due to its short duration and adherence to the detailed Marine Mammal Mitigation Plan (MMMP) in section 4; a JNCC report[22] providing guidance on disturbance of European protected marine mammals suggests that 2% of a harbour porpoise population would need to be impacted for disturbance to be considered significant. Given a rough population estimate of 6,500 individuals within the Inner Hebrides and Minches cSAC, approximately 128 individuals would need to be affected before the disturbance is considered significant at the population level. The report further goes on to specify that for an activity to disturb a significant number of porpoise it would have to continue for a considerably long period of time.

Given the mitigation which will be employed and the short term nature of the works producing underwater noise, the number of individuals affected will be negligible and any disturbance which may occur will not fall under the JNCC (2008) definition of significant disturbance. Therefore, it is considered that the MMMP will be sufficient to prevent short term negative effects.

Harbour porpoise and basking shark are the species' considered most at risk from an increase in vessel movement.

To reduce the risk of collision with marine mammals and basking sharks, contractors should be made aware of SPA speed restrictions.

[22] JNCC (2008) *The Deliberate Disturbance of Marine European Protected Species – Guidance for English and Welsh Territorial Waters and the UK Offshore Marine Area.* Available at: http://jncc.defra.gov.uk/PDF/consultation_epsGuidanceDisturbance_all.pdf last accessed 25/07/2018

4 MARINE MAMMAL MITIGATION PLAN

The marine mammal mitigation will comprise two protocols depending on the timings of the works carried out; A standard MMO protocol as per JNCC guidance which will be implemented during impact piling operations in optimal sea states and during times of optimal visibility, and an Acoustic Deterrent Device (ADD) protocol which will be implemented during hours of low visibility and when the sea state exceeds 2.

4.1 Marine Mammal Observation Protocol – Impact Piling

The Marine Mammal Observation Protocol (MMOP) will be implemented so that the impact piling works do not cause injury or unnecessary disturbance to marine mammals. Although not an EPS, as good practice and as they are known to be present in the general area, this will extend to pinnipeds including harbour seal and grey seal. This section has been designed with reference to current JNCC guidance 'Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise' (August 2010)[23].

4.1.1 Marine Mammal Observer

A suitably qualified Marine Mammal Observer (MMO), competent in the identification of marine mammals at sea, will be present during the impact piling. The MMO will undertake observation for marine mammals within the mitigation zone before and during impact piling and will be dedicated to that one task for the duration of any watch. The MMO will advise the contractors and crews on the implementation of the procedures set out in the agreed protocol, to ensure compliance with those procedures.

The JNCC guidance provides the following definitions of an MMO:

MMO: Individual responsible for conducting visual watches for marine mammals. It may be requested that observers are trained, dedicated and/or experienced.

Trained MMO: Has been on a JNCC recognised course.

Dedicated MMO: Trained observer whose role on board a vessel is to conduct visual watches for marine mammals.

Experienced MMO: Trained observer with three years of field experience observing for marine mammals, and practical experience of implementing the JNCC guidelines.

The MMO will be land based and will be Trained. The identity and credentials of the MMO will be agreed with Marine Scotland.

4.1.2 MMO Equipment

The MMO will be equipped with binoculars (10X42 or similar) and/or a spotting scope (20-60 zoom or equivalent), a copy of the agreed protocol and the Marine Mammal Recording Form (MMRF), which is a Microsoft Excel spreadsheet containing embedded worksheets named Cover Page, Operations, Effort and Sightings. A Microsoft Word document named Deck forms is also available, and the MMO may prefer to use this when observing before transferring the details to the Excel spreadsheets. Although these forms were

[23] It should be noted that this protocol does not document measures to mitigate disturbance effects, but has been developed to reduce to negligible levels of risk of injury or death to marine mammals in close proximity to piling operations.

developed for seismic surveys, they can be used for piling operations, although many columns will not be applicable. The ability to determine the range of marine mammals is a key skill for MMOs, therefore a hand-held rangefinder will be used to verify the range.

All MMO forms, including a guide to completing the forms; and instructions on how to make a rangefinder are available on the JNCC website: http://jncc.defra.gov.uk/marine/seismic_survey

4.1.3 Communication

The contractor will be responsible for the communication channels between those providing the mitigation service and the crews working on the piling. A formal chain of communication from the MMO to the contractor, who will start/stop piling, will be established. In order to confirm the chain of communication and command the MMO will attend any relevant pre-mobilisation meetings.

4.1.4 Mitigation Zone

The JNCC guidance defines the mitigation zone as a pre-agreed radius around the piling site prior to any piling. This is the area where a MMO keeps watch for marine mammals (and delays the start of activity should any marine mammals be detected). The extent of this zone represents the area in which a marine mammal could be exposed to sound that could cause injury and will be determined by factors such as the pile diameter, the water depth, the nature of the activities (for example whether drilling will also take place) and the effect of the substrate on noise transmission. The radius of the mitigation zone should be no less than 500 metres, and this is measured from the pile location. The MMO should be located on the most appropriate viewing platform to ensure effective coverage of the mitigation zone.

Due to the geography of Glumaig Bay, in optimum visibility and sea state conditions there is potential that from an elevated vantage point, likely from Arnish Point, the MMO will be able to visually monitor the area extending north across the whole Bay and harbour; including having the benefit of monitoring the channel to identify any cetaceans or seals travelling into the Bay from open water. This will encompass a crude 1.5km radius surrounding the proposed Deep Water Port site, however, to provide a level of mitigation appropriate to the risk and more accurate monitoring, a mitigation zone of 500m around the piling activity is proposed. This will be agreed with the regulatory authorities.

4.1.5 Impact Piling Protocol

The standard JNCC protocol is outlined below[24] (please see Section 4.2 for the Acoustic Deterrent Device (ADD) protocol to be followed during times of sea states exceeding 2 or during periods of darkness and/or low visibility i.e. fog):

1. The MMO will not initiate this protocol during periods of darkness or poor visibility (such as fog) or during periods when the sea state is not conducive to visual mitigation (above sea state 4 is considered not conducive[25]) as there is a greater risk of failing to detect the presence of marine mammals. Harbour porpoise have small dorsal fins, therefore the MMO shall take additional precautions if the sea state exceeds 2. As works are scheduled to commence during the winter period it is likely that sea state 2 will be exceeded on a regular basis. An elevated platform for the MMO to monitor from would be beneficial when the sea state is 2 or above, the impact piling works could also be scheduled on a day where the sea is expected to be calm.

[24] There is a 'variation of standard piling protocol' allowed in the guidance if required.
[25] Detection of marine mammals, particularly porpoises, decreases as sea state increases. According to the JNCC guidance ideally sea states of 2 or less are required for optimal visual detection.

2. The mitigation zone will be monitored visually by the MMO for an agreed period prior to the commencement of piling. This will be a minimum of 30 minutes.

3. The MMO will scan the waters using binoculars or a spotting scope and by making visual observations. Sightings of marine mammals will be appropriately recorded in terms of date, time, position, weather conditions, sea state, species, number, adult/juvenile, behavior, range etc. on the JNCC standard forms. Communication between the MMO and the contractor and the start/end times of the activities will also be recorded on the forms.

4. Piling will not commence if marine mammals are detected within the mitigation zone or until 20 minutes after the last visual detection. The MMO will track any marine mammals detected and ensure they are satisfied the animals have left the mitigation zone before they advise the crew to commence piling activities.

5. A soft-start will be employed, with the gradual ramping up of piling hammer power incrementally over a set time period until full operational power is achieved. The soft-start duration will be a period of not less than 20 minutes. This will allow for any marine mammals to move away from the noise source.

6. If a marine mammal enters the mitigation zone during the soft-start then, whenever possible, the piling operation will cease, or at least the power will not be further increased until the marine mammal exits the mitigation zone and there is no further detection for 20 minutes.

7. When piling at full power this will continue if a marine mammal is detected in the mitigation zone (as it is deemed to have entered voluntarily[26]).

8. If there is a pause in the piling operations for a period of greater than 10 minutes, then the pre-piling search and soft-start procedure will be repeated before piling recommences. If a watch has been kept during the piling operation, the MMO should be able to confirm the presence or absence of marine mammals, and it may be possible to commence the soft-start immediately. If there has been no watch, the complete pre-piling search and soft-start procedure will be undertaken.

To prevent the need for the pre-piling search and therefore delays to the piling operations a noise generator could be deployed, which is a metal, spring loaded hammer device which creates a continuous underwater noise, mimicking the sound of the impact hammer; which would in turn deter marine mammals from entering the mitigation zone. This should be used for no longer than 1 hour, or in exceptional circumstances 2 hours (i.e. a breakdown of machinery), after which the standard soft-start procedure will commence. All uses of the noise generator should be logged and handed to the MMO to include in the deck forms.

4.1.6 Reporting

As per the JNCC guidance, reports detailing the piling activity and marine mammal mitigation (the MMO reports) will be sent to Marine Scotland at the conclusion of piling activity. Reports will include:

- Completed MMRFs;
- Date and location of the piling activities;
- A record of all occasions when piling occurred, including details of the duration of the pre-piling search and soft-start procedures, and any occasions when piling activity was delayed or stopped due to presence of marine mammals;
- Details of watches made for marine mammals, including details of any sightings, and details of the piling activity during the watches;

[26] The guidance states that there is no scientific evidence for this voluntary hypothesis; instead it is based on a common sense approach. Factors such as food availability may result in marine mammals approaching piling operations; in particular, the availability of prey species stunned by loud underwater noise may attract seals into the vicinity.

- Details of any problems encountered during the piling activities including instances of non-compliance with the agreed piling protocols; and
- Any recommendations for amendment of the protocols.

4.2 Acoustic Deterrent Device Protocol – Impact Piling

JNCC guidance states that *'The above protocol (MMO protocol) is considered to represent current best practice for a typical piling operation. Developers may, however, feel that the protocol is unduly restrictive, particularly in respect of restrictions on night-time/low visibility piling. In such cases, the burden of proof lies with the developer to demonstrate that effective mitigation can be delivered using an amended protocol. A distinction should be made here between piling which commences during times of good visibility (and subject to the above provisions) and continues into a period of poor visibility/ night-time, and piling that commences during times of poor visibility (including night-time conditions). Assuming that the operations are continuous the first scenario would not need additional mitigation. The second, scenario would, however, require enhanced mitigation measures. Each request for variations from the protocol should be considered on its merits and, to ensure consistency across projects and other marine industries, in close liaison with JNCC and other statutory nature conservation agencies.'*

Acoustic Deterrent Devices (ADDs) are devices consisting of a control unit and a transducer (sound head). The control unit contains a pulse generator and an amplifier and transmits random burst of audio frequency signals to the transducer, where they are converted into sound. Marine mammals display avoidance reactions to these sounds.

The use of the following (ADD): http://www.lofitech.no/en/seal-scarer.html to provide piling mitigation has been reviewed by the Statutory Nature Conservation Bodies (SNCB) including Scottish Natural Heritage, Natural Resources Wales and Natural England[27]. It was concluded that:

The SNCBs consider the evidence presented to date shows that the Lofitech ADD device can elicit behavioral responses from harbour porpoise and harbour seal, displacing the majority of animals by hundreds of metres. Therefore the SNCBs consider that certain types of ADDs have the potential to be used as an alternative to the mitigation provided by MMOs and PAM for harbour porpoise, harbour seals and potentially for grey seals. SNCB advice on cases applying to use ADDs as an alternative to MMOs/PAM will be considered on a case-by-case basis.

Following this statement, further research has been undertaken[28] which highlights that the Lofitech ADD is effective at evoking a deterrence response in minke whales.

The following protocol has been designed for use when:

- Impact piling operations are to commence during hours of low visibility/night-time; and
- The sea state is 3 or above.

1. The ADD will be deployed by a pre-agreed operative(s) who will be solely responsible for the device during its use across the project, this person could also be the MMO, however a two person team may be more appropriate should works during the day and during times of low visibility overlap. MMOs and ADD operators should keep in regular contact during piling works and ensure that where possible (i.e. visibility/sea state allows) the MMO protocol is followed; reducing the time underwater noise is introduced into the environment as much as possible.

[27] Joint Statutory Nature Conservation Bodies (2016) Position Statement
[28] RPS (2017) ORJIP Project 4 Phase 2 Understanding the Effectiveness of Acoustic Deterrent Devices on Minke Whale

2. The ADD should be positioned so that the sound is not masked or blocked, i.e. off the side of a vessel facing out towards open water. Before commencing the protocol, the device should be checked by the operative to ensure it is producing a noise once placed into the water and that it has sufficient battery life/spare batteries.

3. The ADD will be deployed for a duration determined by how fast a species flees from a source of disturbance[29]: It should be activated for at least as long as it takes for a marine mammal to swim twice the distance of the injury zone at the onset of soft-start piling. Of the species of concern, harbour porpoise is considered the slowest swimming (1.4 m/s[30]) therefore will be used as standard to represent a worst-case scenario. It is realistic to assume a 10% impact hammer soft-start, and therefore noise would be generated for 14 minutes, as shown below.

Impact hammer power	Max PTS range	Minutes to travel to max PTS range	Total time running the ADD before commencement of soft start
100%	~ 500m	12	24
10%	~ 300m	7	14
1%	~ <100m	2.5	5

4. Once the time running the ADD has elapsed, the soft start for impact piling can commence, as per the soft start outlined in the MMO protocol. After which, piling can continue and the ADD turned off.

5. Should there be a pause in piling operations for a period of greater than 10 minutes, the protocol outlined in Section 4.1.5 (8) should be followed. If visibility/sea state has improved between piling operations and visual monitoring is possible; the ADD operative will inform contractors they should revert back to the MMO protocol.

6. The timings and duration of the use of the ADD will be recorded in a log and kept up to date throughout the project. It will be submitted once piling works have ceased, if required, along with the JNCC MMO Deck Forms.

4.3 Odex Piling Mitigation Protocol

The requirement of an MMO for Odex Piling is not considered necessary due to the underwater noise modelling displaying the risk of TTS for harbour porpoise only extending out to a maximum of 700m from the piling activity. A soft-start method/gradual ramp- up of power will likely deter harbour porpoise staying within, or moving into the area where Odex piling is ongoing.

4.4 Dredging Mitigation Protocol

The requirement of an MMO for dredging is not considered necessary due to the small TTS zones associated with the noise generated. Instead, contractors should be made aware that marine mammals and basking sharks may be present within the working area, and broadly work to the vessel movement mitigation suggestions in section 5.5, below and Appendix D.

[29] Herschel et al (2013) ORJIP Project 4, Phase 1 Use of Deterrent Devices and Improvements to standard Mitigation during Piling Research Summary
[30] Scottish Natural Heritage (2016) Guidance Note: Assessing Collision Risk Between Underwater Turbines and Marine Wildlife

4.5 Vessel Movement

SPA presently implement speed restrictions on vessels within Stornoway Harbour and will continue to throughout construction and operation.

4.6 Additional Good Practice Recommendations

If any dead cetacean is observed during construction or operation, it should be reported to the Scottish Marine Animal Stranding Scheme (SMASS) (www.strandings.org) and live marine mammal strandings will be reported to British Divers Marine Live Rescue (www.bdmlr.org.uk).

The MMO should keep a record of all marine mammal sightings, whether in the mitigation zone or not, to be issued to SNH. An understanding of the location of species is essential to appropriately assess the impacts of a proposed development and plan and target effective mitigation, therefore this data could be used to inform future projects. Biodiversity data are extremely important as, aside from use in planning and decision making, they are key to delivering state of environment reporting, education, modelling trends in species and habitat distribution, and research and policy making.

5 MARINE MAMMAL LICENSING

European Protected Species (EPS) are animals and plants (species listed in Annex IV of the Habitats Directive) that are afforded protection under The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and the Conservation of Offshore Marine Habitats and Species Regulations 2017. All cetacean species (whales, dolphins and porpoise) are European Protected Species. If any activity is likely to cause disturbance or injury to a European Protected Species a licence is required to undertake the activity legally.

The licensing of Marine European Protected Species in Scotland is shared between several regulators depending on the purpose and location of the activity in question. For activities taking place within 12 nautical miles of the coast (the Scottish Territorial Sea), EPS are protected under the 1994 Regulations. For commercial activities, including geophysical or seismic surveys (including those related to oil and gas), port and harbour developments and the installation of renewable energy devices Marine Scotland (on behalf of the Scottish Ministers) is the licensing authority under the 1994 Regulations: Regulation 39 (1) (a). For activities relating to scientific research or conservation, Scottish Natural Heritage is the licensing authority.

A licence may be granted to undertake such activities if certain strict criteria are met:

- There is a licensable purpose.
- There are no satisfactory alternatives.
- The actions authorised will not be detrimental to the maintenance of the population of the species concerned at favourable conservation status[31] in their natural range.

The flowchart in Figure 5-1 below shows the decision-making process for licensing, taken from the Marine Scotland guidance[32].

[31] The ultimate objective of the Habitats Directive is to ensure that the species covered reach what is called a 'Favourable Conservation Status' and that their long-term survival is deemed secure across their entire natural range within Europe. Article 1(i) of the Habitats Directive defines Favourable Conservation Status (FCS) of a species as follows:
"Conservation status of a species means the sum of the influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within its natural range.
The conservation status will be taken as 'favourable' when:
- population dynamics data on the species concerned indicates that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis."

[32] Guidance for Scottish Inshore Waters: The Protection of Marine European Protected Species from injury and disturbance. Marine Scotland 2014.

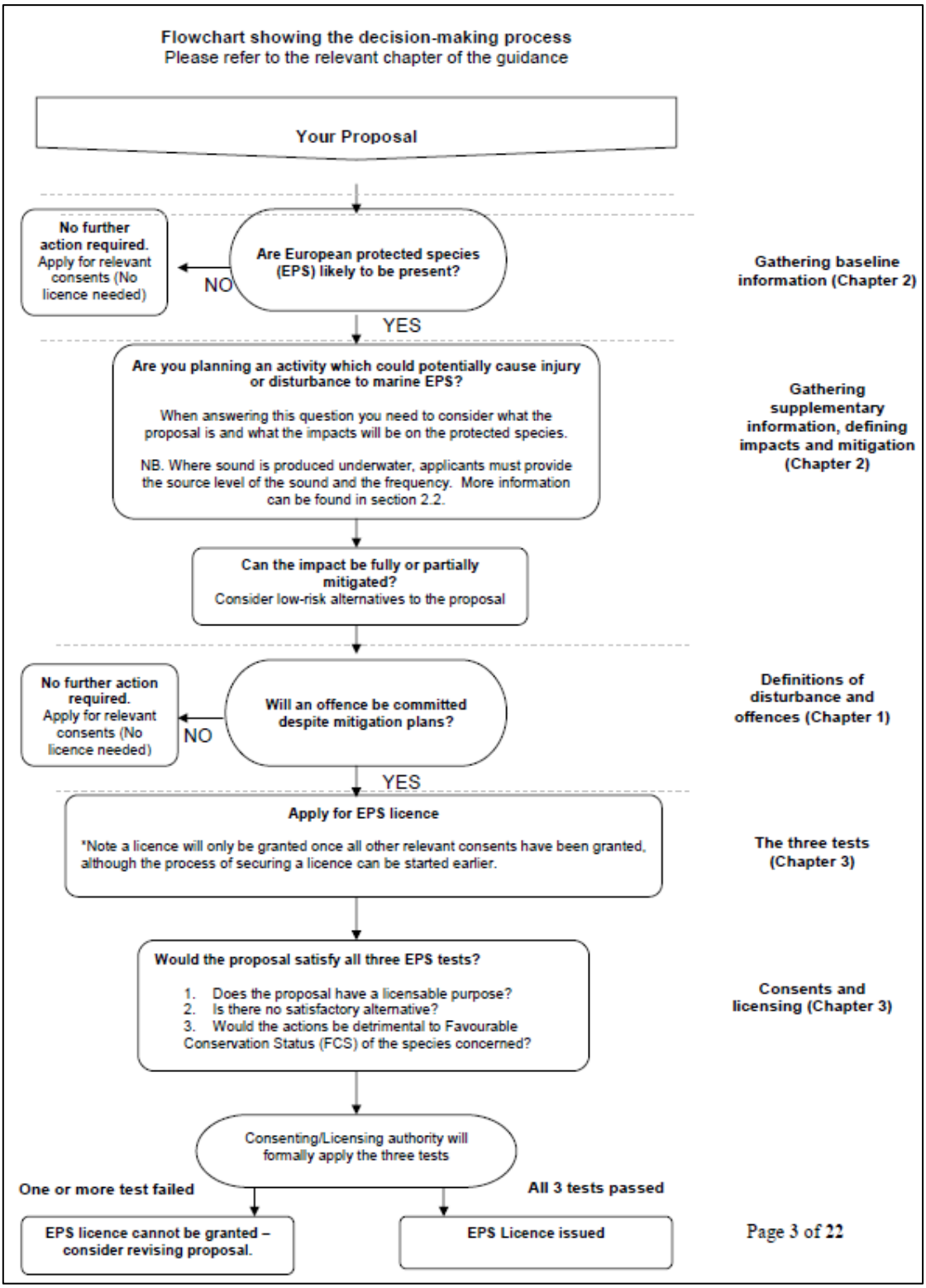


Figure 5-1: EPS Licencing Procedure

Impact piling has the potential to produce underwater noise at levels which could cause injury and disturbance to cetaceans. If the mitigation in section 5 is employed effectively, it is predicted that there will be no risk of injury, however, the mitigation measures cannot fully protect against disturbance from piling noise. As highlighted in Section 3 the risk of disturbance is greater than that of injury, with TTS (disturbance) occurring over a much wider area than PTS (injury). **Therefore an EPS licence will be required for potential disturbance from impact (hammer) piling.**

APPENDICES

A PROPOSED SITE LOCATION AND LAYOUT

B DESIGNATED SITES BOUNDARIES

C MARINE MAMMAL MITIGATION ZONE

Technical Appendix 5.3

Stornoway Deep Water Port
Technical Appendix 5.3: Habitats Regulations Appraisal

August 2018

Stornoway Deep Water Port
Technical Appendix 5.3: Habitats Regulations Appraisal

Client:	Stornoway Port Authority
Document number:	8079
Project number:	670525
Status:	Final
Author:	Mhairi MacKintosh
Reviewer:	Kate Elliott/Kathy Dale
Date of issue:	17 August 2018
Filename:	670525 - Stornoway Deep Water Port EIA\300 - Ecology and Ornithology\340 - Ecology Reporting

Glasgow	Aberdeen	Inverness	Edinburgh
Craighall Business Park 8 Eagle Street Glasgow G4 9XA 0141 341 5040 info@envirocentre.co.uk www.envirocentre.co.uk	Banchory Business Centre Burn O'Bennie Road Banchory AB31 5ZU 01330 826 596	Alder House Cradlehall Business Park Inverness IV2 5GH 01463 794 212	Suite 114 Gyleview House 3 Redheughs Rigg Edinburgh EH12 9DQ 0131 516 9530

This report has been prepared by EnviroCentre Limited with all reasonable skill and care, within the terms of the Contract with Stornoway Port Authority ("the Client"). The report is confidential to the Client, and EnviroCentre Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced or altered without the prior written approval of EnviroCentre Limited.

EXECUTIVE SUMMARY

EnviroCentre Limited has been commissioned by Stornoway Port Authority (SPA) to undertake an Environmental Impact Assessment (EIA) for the proposed development of a Deep Water Port in Glumaig Bay, Arnish, Stornoway. The proposed works would include construction of berthing and associated infrastructure for cruise ships and freight ferries. The construction would involve capital dredging, land reclamation, onshore blasting for infill material, impact and vibration piling and laying of rock armour.

Due to the proximity of works to European designated sites, a Habitats Regulations Appraisal (HRA) is required to determine the effect of the proposed development on the qualifying features of the following designated sites:

- The Inner Hebrides and The Minches candidate Special Area of Conservation (cSAC);
- Lewis Peatlands Special Protection Area (SPA); and
- Lewis Peatlands Special Area of Conservation (SAC).

It was not possible to rule out Likely Significant Effects (LSEs) for The Inner Hebrides and the Minches cSAC, the Red-throated Diver qualifying feature of the Lewis Peatlands SPA, nor the otter qualifying feature of the Lewis Peatlands SAC, during the HRA screening process. The effects on the qualifying features for these sites were therefore taken forward for further consideration in the next HRA stage, an Appropriate Assessment.

The Appropriate Assessment concluded that if mitigation described within Technical Appendix 5.2: Marine Mammal Protection Plan and Technical Appendix 5.5: Otter Report, within volume 3 of this EIA are adhered to, along with the pollution prevention mitigation described in section 9 of this report, then there will be no significant effects on the integrity of the designated sites with regard to the conservation objectives for the sites' qualifying features.

Contents

Executive Summary 1
1 Introduction 3
1.1 Terms of Reference 3
1.2 Scope of Report 3
1.3 Report Usage 3
1.4 Legislative Context 4
2 Methodology 7
2.1 The Habitats Regulations Appraisal Process 7
2.2 Screening 8
2.3 Appropriate Assessment 8
3 Description of the Proposed Development 9
3.1 Site Location 9
3.2 Development Description 9
3.3 In-Combination Effects 10
4 Screening For Appropriate Assessment 11
4.1 Designated Sites 11
4.2 Screening Assessment 13
5 Screening Conclusion 22
6 Appropriate Assessment for The Inner Hebrides and The Minches cSAC 23
6.1 Harbour Porpoise 23
6.2 Assessment of Potential Impacts on Draft Conservation Objectives 23
6.3 Appropriate Assessment Conclusion 25
7 Appropriate Assessment for Lewis Peatlands SPA 27
7.1 Red-throated Diver 27
7.2 Assessment of Potential Impacts on Conservation Objectives 27
7.3 Appropriate Assessment Conclusion 29
8 Appropriate Assesment for Lewis Peatlands SAC 30
8.1 Otter 30
8.2 Assessment of Potential Impacts on Conservation Objectives 30
8.3 Appropriate Assessment Conclusion 32
9 Mitigation Recommendations 33
References 34

Appendices

A Site Location
B Project Description

Figures

Figure 4-1 Location of The Inner Hebrides and The Minches cSAC. ..... **Error! Bookmark not defined.**
Figure 4-2 Location of Lewis Peatlands SPA ..... **Error! Bookmark not defined.**
Figure 4-3 Location of Lewis Peatlands SAC 12

Tables

Table 2-1 Key Stages in the HRA Process 7
Table 4-1 Screening Assessment for Likely Significant Effects of the Proposed Development. 13

1 INTRODUCTION

1.1 Terms of Reference

EnviroCentre Limited has been commissioned by Stornoway Port Authority (SPA) to undertake an Environmental Impact Assessment (EIA) for the proposed development of a Deep Water Port in Glumaig Bay, Arnish, Stornoway. The Scoping Opinion received from Comhairle nan Eilean Siar (CnES) (CnES, 2017) and Marine Scotland (Marine Scotland, 2018) highlighted that the proposed works could have Likely Significant Effects (LSEs) on The Inner Hebrides and The Minches candidate Special Area of Conservation (cSAC) and that a Habitats Regulations Appraisal (HRA) would be required to determine the effect of the proposal on the qualifying features of the designated site.

1.2 Scope of Report

It is the responsibility of the competent authority to conduct the HRA, however, this document aims to provide the information necessary for them to undertake the appraisal by:

- Providing an outline of the proposed works and any integral mitigation;
- Identifying European designated sites which are connected to and/or could potentially be affected by the proposed works;
- Identifying how works may impact the qualifying features of the designated site(s), the test of LSE;
- Giving consideration to other projects which may have an 'in combination' effect on European designated sites;
- Recommending sites which need to be taken forward for further assessment if LSEs to the qualifying features of the European designated site cannot be ruled out;
- Conducting an 'Appropriate Assessment' for qualifying features of sites for which LSE cannot be ruled out; and
- Propose further mitigation which would be required to avoid adverse impacts on the qualifying features of the European designated sites.

It should be noted that the proposed development would take place in four phases. Planning Permission in Principle (PPiP) is being sought for Phase 1 only. Phases 2 – 4 have been outlined within the application as the whole development will need to be consented under a Harbour Revision Order (HRO). It is not anticipated that planning permission will be sought for the additional phases for several years and there are currently no details of what works may be included within these phases. This assessment therefore only considers Phase 1 of the proposed development.

1.3 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 retain ownership of the copyright and intellectual content of this report. Any distribution of this report should be controlled to avoid

compromising the validity of the information or legal responsibilities held by both the Client and EnviroCentre Ltd (including those of third party copyright). EnviroCentre 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.

1.4 Legislative Context

The Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (hereafter called the Habitats Directive) requires 'appropriate assessment' of plans and projects that are likely to have a significant effect on European designated Natura 2000 sites.

Article 6(3) establishes the requirement for Appropriate Assessment (AA):

"Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public".

Article 6(4) goes on to discuss alternative solutions, the test of 'imperative reasons of overriding public interest' (IROPI) and compensatory measures:

"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted".

Should a decision be reached to the effect that it cannot be said with sufficient certainty that the development will not have any significant effect on the Natura site, then, as stated above, it is necessary and appropriate to carry out an Appropriate Assessment of the implications of the development for the sites in view of their conservation objectives.

The EEC (2001) guidance for Appropriate Assessment states (Section 3.2 pg. 25):

"It is the competent authority's responsibility to carry out the Appropriate Assessment. However, the assessment process will include the gathering and consideration of information from many stakeholders, including the project or plan proponents, national, regional and local nature conservation authorities and relevant NGOs. As with the EIA process, the Appropriate Assessment will usually involve the submission of information by the project or plan proponent for consideration by the competent authority. The authority may use that information as the basis of consultation with internal and external experts and other stakeholders. The competent authority may also need to commission its own reports to ensure that the final assessment is as comprehensive and objective as possible.

In this stage, the impact of the project or plan (either alone or in combination with other projects or plans) on the integrity of the Natura 2000 site is considered with respect to the conservation objectives of the site and to its structure and function."

1.4.1 Special Areas of Conservation (SACs)

SACs are designated under Article 3 of the Habitats Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, as part of the Natura 2000 network. It is transposed into Scottish law through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). This network comprises Annex I habitats, *"natural habitat types of community interest whose conservation requires the designation of Special Areas of Conservation"* and the habitats of Annex II species - *"animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation"*. Candidate SACs (cSACs) are sites that have been submitted to the European Commission, but not yet formally adopted. They are given the same level of protection as SACs.

1.4.2 Special Protection Areas (SPAs)

SPAs are designated under Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (the Birds Directive), transposed into Scottish law through the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended). Under the Directive, Scotland is obliged to protect the habitats of birds which are vulnerable to habitat change or due to their low population numbers i.e. rarity, especially species on Annexe 1 of the Directive. Aspects of habitat protection are in the context of pollution, deterioration of habitat and disturbance. SPAs, together with SACs form what is known as the "*Natura 2000 Network*".

1.4.3 Conservation Objectives

The overriding objective of the Habitats Directive is to ensure that the habitats and species covered achieve 'Favourable Conservation Status' and that their long-term survival is secured across their entire natural range within the European Union (EU). In its broadest sense, favourable conservation status means that an ecological feature is being maintained in a satisfactory condition, and that this status is likely to continue into the future. Definitions as per the EU Habitats Directive are given below.

<u>Favourable Conservation Status as defined by Articles 1 (e) and 1(i) of the Habitats Directive</u>

The conservation status of a natural habitat is the sum of the influences acting on it and its typical species that may affect its long-term natural distribution, structure and functions as well as the long-term survival of its typical species. The conservation status of a natural habitat will be taken as favourable when:

- its natural range and areas it covers within that range are stable or increasing; and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- the conservation status of its typical species is favourable'.

The conservation status of a species is the sum of the influences acting on the species that may affect the long-term distribution and abundance of its populations. The conservation status will be taken as 'favourable' when:

- the 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
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Site-specific conservation objectives define the desired condition or range of conditions that a habitat or species should be in, in order for these selected features within the site to be judged as favourable. At site level, this state is termed 'favourable conservation condition.' Site conservation objectives also contribute to

the achievement of the wider goal of biodiversity conservation at other geographic scales, and to the achievement of favourable conservation status at national level and across the Natura 2000 network.

2 METHODOLOGY

2.1 The Habitats Regulations Appraisal Process

The Habitats Regulations Appraisal is a four-stage process with specific issues and tests outlined at each stage. An important aspect of the process is that the outcome at each successive stage determines whether a further stage in the process is required. The stages are summarised in Table 2-1.

Table 2-1 Key Stages in the HRA Process

Stage 1	
Screening for Likely Significant Effect (LSE)	- Identify international sites in and around the project area. - Examine conservation objectives of the interest feature(s) (where available). - Review plan policies and proposals and consider potential effects on Natura 2000 sites (magnitude, duration, location, extent). - Examine other plans and programmes that could contribute to 'in combination' effects.
	- If no effects likely – report no likely significant effect. - If effects are judged likely or uncertainty exists – the precautionary principle applies, proceed to Stage 2. - If following screening the project is reviewed and includes integral mitigation which will ensure no likely significant effects, then no further Appropriate Assessment needed.
Stage 2	
Appropriate Assessment (AA)	- Complete additional scoping work including the collation of further information on sites as necessary to evaluate impact in light of conservation objectives. - Agree scope and method of AA with the competent authority. - Consider how the project 'in combination' with other projects will interact when implemented (the Appropriate Assessment). - Consider how effects on integrity of the site could be avoided by changes to the project and the consideration of alternatives. - Develop mitigation measures (including timescale and mechanisms). - Report outcomes of AA including mitigation measures.
	- If the project will not adversely affect European site integrity proceed with plan. - If effects or uncertainty remain following the consideration of alternatives and development of mitigation proceed to Stage 3.
Stage 3	
Alternative Solutions	- Consider alternative solutions, delete from project or modify. - Consider if priority species/habitats affected - identify 'imperative reasons of overriding public interest' (IROPI), economic, social, environmental, human health, public safety (only applicable in highly exceptional circumstances).
Stage 4	
Imperative Reasons of Overriding Public Interest (IROPI)	- Stage 4 is the main derogation process of Article 6(4) which examines whether there are imperative reasons of overriding public interest (IROPI) for allowing a plan or project that will have adverse effects on the integrity of a Natura 2000 site to proceed in cases where it has been established that no less damaging alternative solution exists. - The extra protection measures for Annex I priority habitats come into effect when making the IROPI case. Compensatory measures must be proposed and assessed. The Commission must be informed of the compensatory measures. Compensatory measures must be practical, implementable, likely to succeed, proportionate and enforceable, and they must be approved by the Minister.

2.2 Screening

With reference to the SNH Guidance (2015) the screening stage determines whether Appropriate Assessment is required, by:

- Determining whether a project (or plan) is directly connected with or necessary to the conservation management of any European sites;
- Describing the details of the project (or plan) proposals and other projects that may cumulatively affect any European sites;
- Describing the characteristics of relevant European sites; and
- Appraising likely significant effects of the proposed project on relevant European sites.

The guidance (SNH, 2015) gives the following definition of LSE:

"The test of significance is where a plan or project could undermine the site's conservation objectives. The assessment of that risk (of 'significance') must be made in the light, amongst other things, of the characteristics and specific environmental conditions of the site concerned."

*"A likely effect is one that cannot be ruled out on the basis of objective information. The test is a 'likelihood' of effects rather than a 'certainty' of effects. Although some dictionary definitions define 'likely' as 'probable' or 'well might happen', in the Waddenzee case the European Court of Justice ruled that a project should be subject to Appropriate Assessment "**if it cannot be excluded, on the basis of objective information, that it will have a significant effect on the site, either individually or in combination with other plans and projects**". Therefore, 'likely', in this context, should not simply be interpreted as 'probable' or 'more likely than not', but rather whether a significant effect can objectively be ruled out."*

2.3 Appropriate Assessment

The Appropriate Assessment establishes whether or not a project's LSE identified during the screening stage will have an adverse effect on the integrity of the affected site with regard to its conservation objectives. Based on the guidance provided by SNH (2015) the effects of the proposal on the designated sites' qualifying features will determined by:

- Gathering information required to assess impacts (from site documents, scientific literature, EU and UK guidance on impact assessment and impact assessments from similar projects);
- Predicting the type and nature of impacts e.g. direct or indirect, short or long term;
- Assessing whether there will be adverse effects on the integrity of the site as defined by the conservation objectives and the status of the site. The precautionary principle must be applied at this stage. If it cannot be demonstrated with supporting evidence that there will be no adverse effects then adverse effects will be assumed; and
- Ascertaining if it is possible to mitigate adverse effects.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Site Location

The proposed deep water port is situated in Glumaig Bay, Arnish (National Grid Reference: NB 42542 30639), on the north east coast of the Isle of Lewis. The development is situated approximately 2km south of Stornoway harbour. The location of the proposed development is shown in Appendix X.

3.2 Development Description

The project is not considered to be directly connected with or necessary to the conservation management of any European sites. The outline project description provided by Stornoway Port Authority states that:

"*Phase 1 of the proposals provides 430m of quay with 10m water depth at lowest tide; a new freight ferry berth, 150m long at eight metres water depth, and marshalling area; a heavy lift area; and 10ha of laydown, storage and development land behind the quay.*

The main quay will consist of 250m of solid quay wall, with a 180m finger pier extending to the north. The finger pier will be 20m wide, supported on steel tube piles, and will accommodate the freight ferry on its western face, leaving the 430m main quay free for cruise liners and other activities. The proposals also incorporate a 25m wide access corridor around the south side of Glumaig Bay, connecting Arnish Yard to the new quay.

The proposals are designed to provide the following:

- *Alongside berthing for cruise liners of all sizes.*
- *Waiting and turning area for buses serving cruise liner passengers.*
- *Freight ferry berth, linkspan and marshalling area (freeing up the current car ferry to provide an additional daily sailing).*
- *Extensive laydown and storage area with dedicated heavy lift area – to service renewables and decommissioning projects.*
- *Berthing and unloading gantries for oil delivery vessels, with pipelines to new storage tanks nearby (moving oil storage out of Stornoway town).*
- *Dedicated area for leisure activities buildings and rock climbing wall.*

The project also provides improvements to the current access road to Arnish Yard from the main Stornoway/Tarbert road (A859), with a direct access road to the Deep Water Port.

Phases 2, 3 and 4 will be installed in the future to increase the berthing length and laydown area."

With water depths of around 10.5 m at lowest tide, a 430m long berth will easily accommodate a typical cruise ship size of 300m. The sea bed will be dredged to depths of -9.5 CD at the entrance to the bay and -10.5m CD at berthing locations.

In summary, the proposed development contains the following components:

- Dredging of approximately 400,000 m³ of sea bed in Glumaig Bay, Stornoway Harbour to a depth of 10.5m below Chart Datum (CD) alongside the berth and 9.5m in the remaining area of dredge[1];

[1] The difference in dredge depths is to allow operational flexibility of the berth.

- Re-using dredged material to create reclaimed land along the western shore of Glumaig Bay; the shortfall in dredged material will be made up by blasting and excavation of approximately 600,000m³ of rock;
- Rock armouring along reclamation slopes (approximately 30,000m[3]) and exposed road lines;
- 250m long quay wall;
- 180m long multifunctional, double-sided finger pier;
- Linkspan;
- 10 hectare reclaimed and levelled area for port activities, industrial and storage uses;
- Cutting/filling, extraction and reshaping of the land including excavation of peat;
- Heavy lift area of 2500m[2]
- Freight ferry line featuring roll-on, roll-off (ro-ro) berthing to allow for a dedicated freight ferry;
- Proposed culvert over the Allt Poll A' Choire Stream;
- Proposed access road to existing Arnish Road;
- Link road along the coast to existing Arnish Industrial Estate (two options available); and
- Utility and services infrastructure (water, electricity, fuel).

3.3 In-Combination Effects

The EIA Scoping Opinion received from CnES requested that impacts from the proposed development be considered in-combination with impacts from the Newton Basin Marina proposed development. At the time of writing, the Newton Basin Marina proposed development is also at the EIA stage and has yet to be consented. The proposed development is located approximately 2km north of the proposed Deep Water Port at Goat Island, to the east of the existing Stornoway Harbour. Both developments are part of SPAs Masterplan[2]. The marina would provide berthings for an additional 75 vessels. Works would involve dredging, land reclamation (infilled with dredged material as far as possible), Odex or vibration piling with limited impact piling and the installation of floating pontoon berths.

Although not yet at the planning stage Scottish and Southern Energy (SSE) are currently consulting on a Western Isles network connection. This would consist of a subsea cable running from Arnish Point on Lewis to the Scottish mainland, with a converter station at Arnish Point, to the south of the proposed Deep Water Port[3]. As details of the proposed works are not yet known in-combination effects are difficult to quantify but in general the environmental impacts of subsea cable installation and operation may include; seabed disturbance, an increase in suspended sediment concentrations and deposition, potential contaminant release from sediment, electromagnetic fields, thermal radiation, and underwater noise and disturbance from vessel and installation activity (NIRAS, 2015).

The further stages of the Deep Water Port will not be considered in the in-combination effects as they are unlikely to reach the planning stage at any time in the near future and too little detail is known to make an assessment of potential impacts.

[2] http://www.stornowayportauthority.com/wp-content/uploads/2014/12/Stornoway-Port-Authority-Port-Masterplan.pdf
[3] https://www.ssen-transmission.co.uk/media/1240/1445_4579-sse-western-isles-panels_final.pdf

4 SCREENING FOR APPROPRIATE ASSESSMENT

For LSE to arise there must be a risk enabled by having a 'source' (e.g. construction works at a proposed development site), a 'receptor' (e.g. a European site or its qualifying interests), and a pathway between the source and the receptor (e.g. mobile species travelling between the proposed development site and a European site). The identification of a pathway does not automatically mean that LSE will arise. The likelihood of LSE will depend upon the characteristics of the source (e.g. duration of construction works), the characteristics of the pathway (e.g. what species and the number individuals travelling between the two sites) and the characteristics of the receptor (e.g. the sensitivities of the European site and its qualifying interests).

SNH (2015) guidance states that sites with mobile species should be considered within the screening process where there is a significant ecological link between the designated site and the proposed development site. It also states that for developments which could increase recreational pressures on designated sites, all sites within reasonable travel distance of the development should be considered for screening. It is also necessary to consider sites which are part of the same coastal ecosystem where the proposed development may affect coastal processes.

The following sites were identified in the EIA Scoping Report (EnviroCentre, 2017) as being present within proximity of the development site and have therefore been considered within the screening for Appropriate Assessment. The location of the designated sites in relation to the proposed development is shown in Appendix A.

4.1 Designated Sites

4.1.1 The Inner Hebrides and The Minches cSAC

The Inner Hebrides and The Minches cSAC comprises an area of 13,500 km^2. It is situated to the east of the Outer Hebrides and encompasses the sea between the Outer Hebrides and the west coast of the Scottish mainland. It spans from Jura in the south east to Tolsta Head, on the Isle of Lewis, in the north west. The site supports approximately 30% of the harbour porpoises (*Phonoena phocoena*) within the West Scotland management unit. Harbour porpoises are present within the site throughout the year.

4.1.2 Lewis Peatlands SPA

The Lewis Peatlands SPA encompasses much of the upland interior of the Isle of Lewis and covers an area of 59,000 ha (Figure 4-2). The habitat largely consists of blanket bog, heath and freshwater lochans. The site is designated as it supports nationally important breeding populations of five Annex 1 bird species. There are also important breeding populations of two migratory bird species. It should be noted that birds have been scoped out of the EIA as the effects on birds within the SPA were considered to be not significant. This approach was agreed by CnES (CnES, 2017). Due to the mobile nature of the qualifying species and the presence of suitable habitat for birds that are qualifying features within and in close proximity the proposed development site it is necessary to consider the SPA within the HRA, in line with SNH (2015) guidance.

4.1.3 Lewis Peatlands SAC

The Lewis Peatlands SAC covers an area of 27,955 ha and overlaps with the Lewis Peatlands SPA (Figure 4-3). The site is designated for its freshwater and upland habitats, which support many of the bird species the SPA is designated for, as well as otter (*Lutra lutra*). Similar to the Lewis Peatlands SPA, the qualifying features of the

SAC have not been considered within the EIA. The scoping report (EnviroCentre, 2017) ruled out significant effects on otter and the habitats within the SAC due to the distance between the designated site and the proposed development site. The SAC has been considered within the HRA due to the mobile nature of the species which are qualifying features of the site, in line with SNH (2015) guidance.

4.2 Screening Assessment

The screening assessments for likely significant effects of the proposed development on the qualifying features of the sites are shown in Table 4-1 below.

Table 4-1 Screening Assessment for Likely Significant Effects of the Proposed Development

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
The Inner Hebrides and The Minches cSAC Approximately 2km east	(Draft Conservation Objectives) To maintain site integrity and ensure the site continues to make a contribution to harbour porpoise remaining at favourable conservation status in UK waters. To avoid significant killing, injury, or disturbance of harbour porpoise. To maintain the habitat and prey of harbour porpoise in favourable condition.	Harbour porpoise (*Phocoena phocoena*)	Pathway identified. During the construction phase of the proposed development, harbour porpoise may be impacted by underwater noise as a result of vibration and impact piling, rock armour placement, vessel movements and dredging. The possible effects of underwater noise on harbour porpoise include temporary or permanent threshold shifts in hearing, disturbance (masking and/or habitat avoidance) and in extreme cases intense noises can lead to injury or death of individuals. These impacts may increase in magnitude and/or duration when considered in-combination with the proposed development at Newton Marina and the proposed SSE subsea cable installation. During the construction and operation phases pollutants released into the water (as a result of dredged sediments, spilled material from vessels and spillage from onshore storage of fuel and chemicals) could have temporary impacts on harbour porpoise either directly, or indirectly, if prey items are affected. Toxic pollutants could result in habitat avoidance, injury or death of individuals and/or reduced prey availability leading to loss of condition. An increased number of vessels travelling through the cSAC, both during construction and once the port is in operation, could increase the risk of collision, resulting in death or injury to individuals. This impact may increase in magnitude and duration when the in-combination effects from the proposed Newton Marina and the proposed SSE subsea cable are considered.	Screened in

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
			An increase in the number of vessels could also lead to an increase in continuous low level underwater noise throughout the operational life of the proposed development. This is unlikely to result in physical trauma but could lead to habitat displacement if individuals avoid areas with higher noise levels. An increase in continuous low level noise could also affect harbour porpoise indirectly if their prey are affected. The effects of these impacts may increase in magnitude when in-combination effects of the proposed Newton Marina are considered. There are unlikely to be increased vessels associated with the proposed SSE subsea cable once it is installed. Habitat for harbour porpoise and their prey within the cSAC is not predicted to be impacted by the works during construction or operation due to the distance between the proposed development and the cSAC. LSE cannot be ruled out for harbour porpoise within the cSAC.	
Lewis Peatlands SPA Approximately 4.5km north and south west	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and To ensure for the qualifying species that the following are maintained in	Black-throated Diver (*Gavia arctica*), breeding	Pathway identified. No potential impacts to Black-throated Diver or their habitat within the SPA are predicted due to the distance between the SPA and the proposed development. According to Pendlebury *et al.* (2011) Black-throated Diver can range up to 10 km from their nests during the breeding season. The report also states that foraging "mainly occurs on the breeding loch, occasionally on surrounding lochs and exceptionally at nearby coastal sites". Whilst the proposed development site is within the foraging range of Black-throated Diver within the SPA, it is not considered to be a key foraging habitat. No LSE is predicted.	Screened out

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	the long term: • Population of the species as a viable component of the site; • Distribution of the species within site; • Distribution and extent of habitats supporting the species; • Structure, function and supporting processes of habitats supporting the species; and • No significant disturbance of the species.	Dunlin (*Calidris alpina schinzii*), breeding	Pathway not identified. No potential impacts to Dunlin or their on habitat within the SPA are predicted due to the distance between the SPA and the proposed development. Pendlebury *et al.* (2011) state that the maximum foraging range from nests during the breeding season is 3km for Dunlin. It is therefore considered unlikely that birds breeding within the SPA will be present within the development site. No LSE is predicted.	Screened out
		Golden Eagle (*Aquila chrysaetos*), breeding	Pathway identified. No potential impacts to Golden Eagle or their on habitat within the SPA are predicted due to the distance between the SPA and the proposed development. Pendlebury *et al.* (2011) state that the maximum foraging range from nests during the breeding season is 9km for Golden Eagle, although the core range is 2-3km. The development site is therefore within the foraging range of Golden Eagle present within the SPA. However, the low lying rocky coastal habitat is considered to be sub-optimal for Golden Eagle, which generally hunt for prey items such as rabbits and hares, or scavenge deer and sheep carcases, on open moorland (Whitfield, 2000). No LSE is predicted.	Screened out
		Golden Plover (*Pluvialis apricaria*), breeding	Pathway identified.	Screened out

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
			No potential impacts to Golden Plover or their on habitat within the SPA are predicted due to the distance between the SPA and the proposed development. Pendlebury *et al.* (2011) state that the maximum foraging range from nests during the breeding season is 11km for Golden Plover, although the core range is 3km. It is possible that birds breeding within the SPA could be present within the proposed development site, however the habitat is considered to be sub-optimal for foraging. No LSE is predicted.	
		Greenshank (*Tringa nebularia*), breeding	Pathway not identified. No potential impacts to Greenshank or their on habitat within the SPA are predicted due to the distance between the SPA and the proposed development. Pendlebury *et al.* (2011) state that the maximum foraging range from nests during the breeding season is 3km for Greenshank. It is therefore considered unlikely that birds breeding within the SPA will be present within the proposed development site. No LSE is predicted.	Screened out
		Merlin (*Falco columbarius*), breeding	Pathway identified. No potential impacts to Merlin or their on habitat within the SPA are predicted due to the distance between the SPA and the proposed development.	Screened out

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
			Pendlebury *et al.* (2011) state that the maximum foraging range from nests during the breeding season is 5km for Merlin. It is possible that birds breeding within the SPA could be present within the proposed development site. However, the lowland rocky coastal habitat is considered to be sub-optimal for breeding birds present within the SPA. No LSE is predicted.	
		Red-throated Diver (*Gavia stellata*), breeding	Pathway identified. No potential impacts to Red-throated Diver or their habitat within the SPA are predicted due to the distance between the SPA and the proposed development. Pendlebury *et al.* (2011) state that the maximum foraging range from nests during the breeding season is generally 8km for Red-throated Diver but can be up to 13.5km in the Western Isles. It is possible that birds breeding within the SPA could utilise the water within the proposed harbour area for foraging. Black *et al* (2015) identified the water surrounding the proposed development site as a potentially important marine area for Red-throated Divers during the breeding season. During the construction phase of the proposed development foraging Red-throated Divers could be impacted temporarily by noise from onshore blasting, impact piling, dredging and vessel and onshore vehicle movements. This could result in displacement from the habitat and a reduction in overall foraging habitat. This impact could increase in magnitude and/or duration when considered in-combination with the proposed Newton Marina and the proposed SSE subsea cable developments.	Screened in

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
			During the construction and operation phases pollutants released into the water (as a result of sediments from dredging, spilled material from vessels and spillage from onshore storage of fuel and chemicals) could have temporary impacts on Red-throated Diver either directly, or indirectly, if prey items are effected. Toxic pollutants could result in habitat avoidance, injury or death of individuals and/or reduced prey availability leading to loss of condition. This impact may increase in magnitude and/or duration when considered in-combination with the proposed Newton Marina and the proposed SSE subsea cable developments. Increased numbers of vessels in the water once the port is in operation could also lead to displacement from the habitat in the longer term due to visual and noise disturbance. The magnitude of this impact is likely to increase when in-combination effects from the proposed Newton Marina are considered. No increase in vessel movements associated with the proposed SSE subsea cable are anticipated once it is operational. LSE cannot be ruled out for Red-throated Diver within the SPA.	
Lewis Peatlands SAC approximately 8km north and south west	To avoid deterioration of the qualifying habitats thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and	Habitats include: • Acid peat-stained lakes and ponds • Blanket bog • Clear-water lakes or lochs with aquatic vegetation and poor to	Pathway not identified. There is c.8km distance between the designated site and the proposed development site. No impacts are anticipated to terrestrial habitats outside of the proposed development footprint and therefore no LSE is predicted.	Screened out

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	To ensure for the qualifying habitats that the following are maintained in the long term: • Extent of the habitat on site; • Distribution of the habitat within site; • Structure and function of the habitat; • Processes supporting the habitat; • Distribution of typical species of the habitat; • Viability of typical species as components of the habitat; and • No significant disturbance of typical species of the habitat.	moderate nutrient levels • Depressions on peat substrates • Wet heathland with cross-leaved heath		

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying features; and To ensure for the qualifying species that the following are maintained in the long term: • Population of the species a viable component of the site; • Distribution of the species within site; • Distribution and extent of habitats	Otter	Pathway identified. Otters are mobile animals and can range over 50km (Chanin, 2003). It is feasible that otters within the SAC could utilise the habitats within and adjacent to the proposed development for foraging, commuting and resting. During the construction phase of the proposed development otters could be impacted temporarily by noise from onshore blasting, impact piling, dredging and vessel and onshore vehicle movements. This could result in displacement and a temporary reduction in the availability of habitat outside of the SAC. These impacts could increase in magnitude and/or duration when considered in-combination with the proposed Newton Marina and the proposed SSE subsea cable developments. During the construction and operation phases pollutants released into the water or on land (as a result of sediments released during dredging, spilled material from vessels and spillage from onshore storage of fuel and chemicals) could have temporary impacts on otter either directly, or indirectly, if prey items are affected. Toxic pollutants could result in avoidance of supporting habitat outwith the SAC, injury or death of individuals and/or reduced prey availability outside of the SAC, leading to loss of condition. This impact may increase in magnitude and/or duration when considered in-combination with the proposed Newton Marina and the proposed SSE subsea cable developments. Increased traffic on land and in the water once the port is in operation could also lead to displacement from habitat outwith the SAC in the longer term due to visual and noise disturbance. The magnitude of this impact is likely to increase when in-combination effects from the proposed Newton Marina are	Screened in

Site Name and Distance to Proposed Development	Conservation Objectives	Qualifying Features	Likely Significant Effect (LSE)	Screening Assessment
	supporting the species; • Structure, function and supporting processes of habitats supporting the species; and • No significant disturbance of the species.		considered. No increase in vessel movements associated with the proposed SSE subsea cable are anticipated once it is operational. Increased onshore traffic during both the construction and operational phases of the development could result in an increased risk of vehicle collision to individuals foraging and commuting outside of the SAC in both the short and long term resulting in death or injury of individuals. No impacts on the structure, function or supporting processes of habitats within the SAC are predicted due to the distance between the proposed development and the designated site. LSE cannot be ruled out for otter within the SAC.	

4.3 Screening Conclusion

The outcome of screening for Appropriate Assessment is to reach one of the following determinations:

a) A stage 2 AA of the proposed development is required if it is concluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will have a significant effect on a European site.
b) A stage two AA of the proposed development is not required if it can be concluded, on the basis of objective information, that the proposed development, individually or in combination with other plans or projects, will not have a significant effect on a European site.

Following an examination, analysis and evaluation of the relevant information including, in particular, the nature of the proposed development and the likelihood of significant effects on The Inner Hebrides and The Minches cSAC, Lewis Peatlands SPA, Lewis Peatlands SAC and applying the precautionary principle, it is the professional opinion of the authors that at present there is insufficient information to rule out likely (or possible) significant effects to one or more of the qualifying features within all of the designated sites. An AA for the proposed project will therefore be required to ascertain whether or not the proposed works will adversely impact on the integrity of The Inner Hebrides and The Minches cSAC, Lewis Peatlands SPA and Lewis Peatlands SAC qualifying features. For the Lewis Peatlands SPA, an AA is only required for the Red-throated Diver qualifying feature as there is either no connection and/or no LSE arising from the proposed development on the other qualifying features. Similarly, an AA is only required for the otter qualifying feature of the Lewis Peatlands SAC as there is no pathway for LSE identified for the other features.

5 APPROPRIATE ASSESSMENT FOR THE INNER HEBRIDES AND THE MINCHES CSAC

5.1 Harbour Porpoise

The harbour porpoise is a small cetacean that lives predominantly in coastal waters. Its diet consists of small pelagic fish such as whiting and sand eel, as well as squid and octopus. Harbour porpoises mate and rear young during the summer months, May to August, and typically live in small family groups of two to three animals but may form groups of between 10 and 20. They are present within The Inner Hebrides and The Minches cSAC throughout the year.

The Inner Hebrides and The Minches cSAC sits within the Western Management Unit (MU) for harbour porpoise. The total population within the MU is 21,462 (JNCC, 2015), of which the cSAC supports about 30%%, equating to c. 6,500 individuals. The main sensitivities for harbour porpoise as identified in the site designation consultation document (SNH, no date) are as follows:

- Removal of non-target and target species (i.e. entanglement of harbour porpoises in fishing gear and removal of their prey species);
- Contaminants (e.g. through effects on water quality and bioaccumulation of contaminants that in turn affect the survival and productivity rates of harbour porpoises);
- Underwater noise (e.g. from acoustic surveys); and
- Death or injury by collision (predominantly in relation to collision with various types of fast moving vessels from commercial shipping to personal leisure craft and potentially from tidal turbines).

Due to recognised declines and threats to the species within the North and Celtic seas all harbour porpoise are European Protected Species (EPS), protected under the Conservation (Natural Habitats, &c.) Regulations 1994.

5.2 Assessment of Potential Impacts on Draft Conservation Objectives

Conservation Objective 1 - To maintain site integrity and ensure the site continues to make a contribution to harbour porpoise remaining at favourable conservation status in UK waters.

The proposed works are approximately 2km outside The Inner Hebrides and The Minches cSAC boundary. The majority of the potential impacts listed in table 4.2 are therefore not expected to impact on harbour porpoise nor the habitat supporting them within the designated site.

With regards to the main sensitivities for harbour porpoise within the designated site identified in SNH (no date), the proposed development is not predicted to result in alterations to fishing activity in the site or surrounding area and therefore will not affect the removal of harbour porpoise or their prey as target or non-target species. Contaminants, underwater noise and death or injury as a result of collision are considered in full under Conservation Objective 2 but are not predicated to affect the integrity of the site or its contribution to maintaining the favourable conservation status of harbour porpoise in UK waters.

Conservation Objective 2 - To avoid significant killing, injury, or disturbance of harbour porpoise.

There is the potential for harbour porpoise to be disturbed, injured or, in extreme circumstances, killed as a result of underwater noise generated during impact piling and dredging, increased vessel movements both during the construction and operational phases of the proposed development and in the case of a pollution event. There is the potential for in-combination effects with both the proposed Newton Marina and SSE connection developments.

Marine Scotland (2014) defines disturbance as:

'*Changes in behaviour which may not appear detrimental in the short-term, but may have significant long-term consequences. Additionally the effects may be minor in isolation, but may become more significant in accumulation*'.

Disturbance may be identified via the following behaviour:

- Changes in (direction or speed of) swimming or diving behaviour;
- Bunching together or females shielding calves;
- Certain surface behaviours such as tail splashes and trumpet blows; and
- Moving out of a previously occupied area.

The following negative effects are linked to disturbance:

- Displacement from important feeding areas;
- Disruption of feeding;
- Disruption of social behaviours such as communication, calving, breeding, nursing, resting and feeding; and
- Increased risk of injury or mortality;
- Increased vulnerability of an individual or population to predators or physical stress; and
- Changes to regular migration pathways to avoid human interaction.

A JNCC report (2008) providing guidance on disturbance of European protected marine mammals suggests that 2% of the estimated harbour porpoise would need to be impacted for disturbance to be considered significant. Given a rough population estimate of 6,500 individuals within the Inner Hebrides and Minches cSAC, approximately 128 individuals would need to be affected before the disturbance is considered significant at the population level. The report further goes on to specify that for an activity to disturb a significant number of porpoise it would have to continue for a considerably long period of time.

The underwater noise modelling detailed in Technical Appendix 5.4: Underwater Noise Study, presented in volume 3 of the EIA, considered the impacts of dredging and impact piling on marine mammals. For harbour porpoise, the report concluded that a single impact piling strike (the highest impact noise activity) could result in injury to harbour porpoise present within 2km of the piling site. Dredging was found to have the lowest acoustic impact with individuals required to be within 100m of the dredging vessel before there is a risk of temporary injury. The employment of a soft start methodology coupled with a 500m mitigation zone would allow harbour porpoise to leave the area before noise levels reach the point that injury could occur. Full details of the proposed mitigation in relation to underwater noise is provided in Technical Appendix 5.2: Marine Mammal Protection Plan, presented in volume 3 of the EIA.

In-combination affects with piling as part of the proposed Newton Marina are possible, however work is currently scheduled so that piling is not carried out concurrently. Works at the two sites are scheduled so that whilst piling is occurring at Newton Marina, dredging will occur at the proposed Deep Water Port and vice versa. The noise modelling detailed in Technical Appendix 5.4: Underwater Noise Study, presented in Volume 3 of the EIAR was carried out on this assumption.

Given the mitigation which will be employed and the short term nature of the works producing underwater noise, the number of individuals affected is predicted to be negligible and any disturbance which may occur would not fall under the JNCC (2008) definition of significant disturbance.

Increased vessel movements during the construction and operational phases may lead to increased levels of disturbance and increased risk of injury or death as a result of collision. Vessel movements during construction will predominantly be outwith the cSAC and temporary so are not predicted to result in significant injury or

disturbance. During the operation of the Deep Water Port there may be an increase in the number of vessels traveling through The Inner Hebrides and The Minches cSAC as well as the waters within and adjacent to the proposed development. There may be an in-combination effect arising from increased vessel capacity as part of the proposed Newton Marina development. The total number of vessel movements for Stornoway Harbour in the last three years was 768 in 2015, 833 in 2016 and 908 in 2017 (Stornoway Port Authority, 2017). There is a range of vessels utilising the existing harbour including cruise ships, a twice daily passenger ferry from Ullapool, as well as yachts, cargo ships and fishing vessels. The proposed Newton Marina development would provide berthing for a further 75 boats, which would double the capacity for small boats and yachts within Stornoway Harbour. It is not currently known what the predicted increase in vessel movements would be as a result of the proposed Deep Water Port development.

JNCC (2015) state that numbers of harbour porpoise corpses recovered with injuries consistent with ship strikes are low (5 out of 1041 necropsies over a 10 year period). SNH (no date) indicate that as harbour porpoise are naturally shy of boats, they will for the most part avoid them, and so for most types of marine traffic the risk of collision is minimal. There is more potential for collision with fast-moving engine-powered vessels due to their speed and ability to change direction quickly. If a wildlife code of conduct is promoted by SPA and adhered to by Marina users, the risk of injury or death via ship collision would be negligible and would not have population level effects for harbour porpoise within the cSAC. Full details of the mitigation relating to marine traffic can be found in Technical Appendix 5.2: Marine Mammal Protection Plan, presented in Volume 3 of the EIAR.

The risk of death or injury to individuals as a result of a pollution event (due to dredging, spilled material from vessels and spillage from onshore storage of fuel and chemicals) would be minimised to negligible if the mitigation outlined in section 8 is adhered to.

The significant killing, injury or disturbance of harbour porpoise as a result of the proposed development is therefore not predicted.

<u>Conservation Objective 3 - To maintain the habitat and prey of harbour porpoise in favourable condition.</u>

There is the potential for the habitat and prey of harbour porpoise within the cSAC to be impacted by the proposed development if sediments released during dredging, or chemical pollutants are released into the water (as a result of dredging, spilled material from vessels or spillage from onshore storage of fuel and chemicals). In-combination effects from the proposed Newton Marina and SSE connection developments are possible.

The results from the hydraulic modelling of dredging for both the proposed Newton Marina and Deep Water Port developments concluded that the sediment loading of the water outside of the dredged areas would be minimal and that neither would impact on coastal processes within the area. Full details of the modelling results can be found in Technical Appendix 8.2: Hydraulic Assessment, in Volume 3 of the EIAR. Sediments released during dredging are therefore not predicted to have impacts on harbour porpoise habitats or prey within the cSAC.

Adherence to the pollution prevention mitigation outlined in section 8 will minimise the risk of a pollution event occurring either during construction or whilst the proposed marina is in operation.

No effects on the habitat or prey of harbour porpoise within The Inner Hebrides and The Minches cSAC are predicted from the proposed development and they will be maintained in favourable condition.

5.3 Appropriate Assessment Conclusion

If the mitigation described in Technical Appendix 5.2: Marine Mammal Protection Plan, presented in Volume 3 of the EIAR and in section 8 of this report are adhered to then no significant effects on the integrity of The Inner Hebrides and The Minches cSAC are predicted in relation to the conservation objectives for harbour porpoise.

6 APPROPRIATE ASSESSMENT FOR LEWIS PEATLANDS SPA

6.1 Red-throated Diver

Red-throated Diver breed on fresh water lochs which can range from small upland lochans in moorland to large lowland lochs. Nests are usually close to the water's edge or on islands within the water body. Adults continue to forage at sea during the breeding season and bring fish (predominantly sand eel) back for the chicks. Foraging habitat at sea during the breeding season typically includes shallow and sheltered bays, sea lochs and sounds (Black *et al*. 2015). During winter the birds are almost exclusively maritime, favouring coastal waters with some shelter and soft substrate. Whilst breeding sites are predominantly in the north and west of Scotland, the east coast of Scotland is favoured in the winter months. Forrester *et al.* (2012) state that there are no large wintering numbers in the Outer Hebrides.

The total estimated UK population is 17,000 individuals (Stroud *et al.* 2016) with an estimated 935 – 1500 breeding pairs in Scotland and approximately 2270 over wintering birds (Forrester *et al.* 2012). Stroud *et al.* (2016) state that the short term population trend, 1999/2000 – 2010/11, increased by 20%. The Lewis Peatlands SPA citation document (SNH, 2000) estimates that there are 80 breeding pairs present within the SPA. The population within the SPA is currently assessed as being in unfavourable declining condition (SNH, 2018). There is currently no data available on the numbers of Red-throated Diver which may utilise the habitats within Glumaig Bay, however, the surrounding area has been identified as a potentially important marine area for foraging breeding birds (Black *et al*, 2015)

Red-throated Diver are listed under Schedule 1 of the Wildlife and Countryside Act, which recognises their rarity as a breeding species in the UK and affords them extra protection during the nesting period. They are also an Annex I migratory species under the EU Birds Directive (2009/147/EC).

6.2 Assessment of Potential Impacts on Conservation Objectives

Conservation Objective 1: To ensure for the qualifying species that the following is maintained in the long term; population of the species as a viable component of the site.

No potential impacts to Red-throated Diver breeding sites within the SPA have been identified. The potential impacts identified in Table 4-1 are all related to breeding birds foraging in Glumaig Bay and the surrounding waters. The majority of the potential impacts are of a temporary nature and will not affect population numbers in the long term. The only long-term potential impact identified is displacement from the foraging habitat within the proposed development area and the surrounding waters due to noise and visual disturbance. There will be an in-combination effect with the Newton Marina development which will increase the capacity for visiting boats. It is possible that any Red-throated Divers utilising this habitat will become habituated to the increased vessel movements in time. If this is not the case it is considered that there is sufficient alternative foraging habitat for the breeding birds such that there will be no loss in individual condition, breeding success or long term population viability as a result of displacement.

Conservation Objective 2: To ensure for the qualifying species that the following is maintained in the long term; distribution of the species within the site.

Due to the distance between the proposed development and the SPA (c. 4.5km) there are no potential impacts to Red-throated Diver within the designated site. The distribution of species within the site is therefore not predicted to change as a result of the works.

Conservation Objective 3: To ensure for the qualifying species that the following is maintained in the long term; distribution and extent of habitats supporting the species.

No changes to the distribution or extent of habitats supporting Red-throated Diver within or outwith the SPA are predicted as a result of the proposed development.

Conservation Objective 4: To ensure for the qualifying species that the following is maintained in the long term; structure, function and supporting processes of habitats supporting the species.

No impacts to the structure, function and processes of habitats supporting Red-throated Diver are predicted within the designated site.

During construction and operation of the proposed development there is potential for chemical pollutants to be released into the water. This could have temporary impacts on function and supporting processes of Red-throated Diver foraging habitat outwith the SPA which could lead to reduced prey availability in the short term. It is predicted that the risk of such an event occurring will be minimal if the mitigation and relevant Guidance for Pollution Prevention (GPP), detailed in section 8 of this report, is adhered to.

An area comprising c.200,000 m^2 of the sea bed adjacent to the new quay will require dredging (Wallace Stone, 2018). The material on the sea bed comprises a mixture of silt (5%), sands (26%) and gravels (69%) (RPS, 2018). Removal of this material will result in a long term structural change to part of the habitat supporting Red-throated Diver prey such as sand eels. Hydraulic modelling presented in Technical Appendix 8.2: Hydraulic Assessment, presented in volume 3 of the EIA, has shown that there will be "*no significant detrimental impacts on any of the coastal process within Stornoway Harbour away from the area of proposed development".* It is therefore considered that the structural change to the proposed dredging area would have negligible impact on the habitat for Red-throated Diver prey.

Dredging will also form part of the proposed Newton Marina development, however, no significant impacts to coastal processes are predicted as a result (RPS, 2018) and so no in-combination effects are anticipated.

No significant long term alterations to the structure, function or supporting processes for Red-throated Diver habitat outside of the designated site are therefore predicted.

Conservation Objective 5: To ensure for the qualifying species that the following is maintained in the long term; no significant disturbance of the species.

Red-throated Diver are particularly sensitive to disturbance in comparison to other seabirds and may display signs of disturbance when encountering vessels at a distance of 1km (MacArthur Green, 2012). Activities such as onshore blasting, impact piling, movement of rock armour, increased vessel and onshore vehicle movements and increased presence of humans in and around the bay may result in disturbance short term disturbance during the construction phase of the project. Due to the temporary nature these activities are not predicted to result in significant disturbance in the long term.

Longer term disturbance may occur due to increased vessel movements once the proposed development is in operation. There is likely to be an in-combination effect with the proposed Newton Marina development which will increase capacity for visiting boats, which may increase the magnitude of impact to Red-throated-Diver. However, there is already a variety of marine traffic associated with the existing harbour, as detailed in section 5.2 of this report. It is not currently known what the predicted vessel movements will be once the proposed Deep Water Port and Newton Marina developments are operational, but it is likely that if any Red-throated Diver are currently utilising the habitats around Glumaig Bay and the current shipping lanes, they will be at least partly habituated to the presence of vessels. It is also considered that there is considerable alternative foraging habitat available around the Lewis coastline. No long term significant disturbance is therefore anticipated as a result of increased vessel movements in the area.

6.3 Appropriate Assessment Conclusion

Due to the availability of alternative foraging habitats, pollution prevention mitigation outlined in section 8 and the likelihood that any individuals utilising the habitat will be somewhat accustomed to vessel movements, no significant effects on the integrity of the Lewis Peatlands SPA are predicted with regard to the conservation objectives for Red-throated Diver.

7 APPROPRIATE ASSESMENT FOR LEWIS PEATLANDS SAC

7.1 Otter

Otters are semi-aquatic solitary mammals. They hold large territories which can cover up to 50km in range (Chanin, 2003), with males tending to have larger territories than females. They are predominantly active at dusk and dawn. Otters have a varied diet which consists mainly of fish but also amphibians, crabs, small birds and mammals. Their varied diet is reflected in the diverse habitats in which they can be found including freshwater streams, rivers and lochs, scrub, moorland and coastal areas.

The otter population within the Lewis Peatlands SAC is assessed as being in favourable condition (SNH, 2018). There are good habitat connections between the SAC and the proposed development site including a network of small lochans and the River Creed. Otter surveys have been carried out within the proposed development site and the surrounding area which established that suitable habitat for otter is present. No evidence of otter activity or resting places were identified, however there were anecdotal otter sightings in close proximity, outside the proposed development site boundary. Further details of the otter survey methodology and results can be found in Technical Appendix 5.5: Otter Report, presented in volume 3 of the EIA.

The otter is an EPS.

7.2 Assessment of Potential Impacts on Conservation Objectives

Conservation Objective 1: To ensure for the qualifying species that the following is maintained in the long term; population of the species as a viable component of the site.

No potential impacts to otter within the SAC have been identified. The potential impacts listed in Table 4-1 may affect otter foraging or commuting outside the SAC, within or near the proposed development area. The survey results detailed in Technical Appendix 5.5: Otter Report, presented in volume 3 of the EIA, states that whilst the proposed development site is suitable for use by otters, no evidence of activity was identified and importance of the site for otter is considered to be low. If the pollution prevention guidance outlined in section 8 of this report and the mitigation specific to otter detailed in Technical Appendix 5.5: Otter Report, presented in volume 3 of the EIA, are adhered to, then there is not predicted to be any effect on the long term viability of otter within the Lewis and Peatlands SAC.

Conservation Objective 2: To ensure for the qualifying species that the following is maintained in the long term; distribution of the species within the site.

No impacts are predicted on otter or their habitats within the Lewis Peatlands SAC as a result of the proposed development due to the distance between the two sites. No alterations to the long term distribution of the species within the site are therefore anticipated.

Conservation Objective 3: To ensure for the qualifying species that the following is maintained in the long term; distribution and extent of habitats supporting the species.

No changes to the distribution or extent of habitats supporting otter within or outwith the SAC are predicted as a result of the proposed development.

Conservation Objective 4: To ensure for the qualifying species that the following is maintained in the long term; structure, function and supporting processes of habitats supporting the species.

No impacts to the structure, function and processes of habitats supporting otter are predicted within the Lewis Peatlands SAC.

During construction and operation of the proposed development there is the potential for chemical pollutants to be released into the water. This could have temporary impacts on the function and supporting processes of a small area of otter foraging habitat outwith the SAC which could lead to reduced prey availability in the short term. It is predicted that the risk of such an event occurring will be minimal if the mitigation and relevant Guidance for Pollution Prevention (GPP), detailed in section 8 of this report, is adhered to.

An area comprising c.200,000 m^2 of the sea bed adjacent to the new quay will require dredging (Wallace Stone, 2018). The material on the sea bed comprises a mixture of silt (5%), sands (26%) and gravels (69%) (RPS, 2018). Removal of this material will result in a long term structural change to relatively small part of the habitat supporting otter prey items such as small fish. Hydraulic modelling of the project has shown that there will be "*no significant detrimental impacts on any of the coastal process within Stornoway Harbour away from the area of proposed development"* (RPS, 2018). It is therefore considered that the structural change to the proposed dredging area would have no impacts on otter, their prey availability or the overall functionality of the habitat.

Dredging will also form part of the proposed Newton Marina development, however, modelling has also determined that the proposed work will not affect coastal processes (RPS, 2018) and so no in-combination effects are anticipated.

No significant long term alterations to the structure, function or supporting processes for otter habitat outside the designated site are therefore predicted.

Conservation Objective 5: To ensure for the qualifying species that the following is maintained in the long term; no significant disturbance of the species.

There is the potential for otter utilising the habitats within and adjacent to the proposed development site to experience disturbance during both the construction and operational phases. The disturbance arising from onshore blasting, impact piling, dredging and vessel and onshore vehicle movements during construction will be temporary and therefore will not result in long term disturbance. Disturbance during construction will also be minimised by adherence to the mitigation outlined in Technical Appendix 5-5: Otter Report, presented in volume 3 of the EIA.

There is also the potential for disturbance to occur in the longer term as a result of increased traffic on land and in the water once the port is in operation. Otters habituate to human activity and their presence within densely inhabited areas such as towns and cities as well as ports has been well documented (Chanin, 2003). There is anecdotal evidence of otter using the land surrounding the current industrial buildings at Arnish Point.

There is the potential for additional disturbance to arise from both the proposed Newton Marina and the SSE connection during the construction phases and during the operation of the Newton Marina, however, due to the short term nature of the construction phases and the predicted noise habituation by otters in the longer term; no in-combination effects are anticipated.

No significant disturbance to otter in the long term is therefore predicted as a result of the proposed development.

7.3 Appropriate Assessment Conclusion

Due to the availability of alternative habitats, the employment of the pollution prevention mitigation outlined in section 8, otter specific mitigation outlined in Technical Appendix 5.5: Otter Report, presented in volume 3 of the EIA, and the likelihood that any individuals utilising the habitat will become habituated to increased human activity, no significant effects on the integrity of the Lewis Peatlands SAC are predicted with regard to the conservation objectives for otter.

8 MITIGATION

The following mitigation will be employed to avoid and minimise the risk of a pollution event occurring both during the construction and operational phases of the proposed development:

- A Construction Method Statement (CMS) detailing pollution prevention measures will be agreed with the regulatory authority prior to works commencing;
- The following good practice guidelines will be adhered to and incorporated into the CMS:
    - GGP5: 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;
    - GPP21: Pollution and incident response planning; and
    - PPG22: Incident response – dealing with spills.
- An Ecological Clerk of Works (ECoW) will be employed throughout the construction phase to audit adherence to the mitigation outlined in the CMS.

The mitigation measures specific to harbour porpoise and otter are detailed in Technical Appendix 5.5: Otter Report and Technical Appendix 5.2: Marine Mammal Protection Plan, both presented in volume 3 of the EIA, respectively.

REFERENCES

Black, J., Dean B.J., Webb A., Lewis, M., Okill D. and Reid J.B. (2015) *Identification of important marine areas in the UK for red-throated divers (Gavia stellata) during the breeding season*. JNCC Report No 541

Channin, P. (2003) *Ecology of the European Otter.* Conserving Natura 2000 Rivers Ecology Series No 10. English Nature, Peterborough.

CNeS (2017) *Environmental Impact Assessment – Scoping Opinion.* Comhaile Nan Eilean Siar. Application reference 17/00453.

Envirocentre (2017) St*ornoway Port Authority Deep Water Port at Arnish EIA Scoping Report.* Envirocentre Report No. 7777.

Forrester, R.W., Andrews, I/J., McInerny, C.J., Murray, R.D., McGowan, R.Y., Zonfrillo, B., Betts, M.W., Jardine, D.C. and Grundy, D.S. (eds) (2012) *The Digital Birds of Scotland*. The Scottish Ornithologists' Club, Aberlady.

JNCC (2015) Management Units for Cetaceans in UK Waters. Joint Nature Conservation Committee, Peterborough. Report Number: 547. Accessed online at: [http://jncc.defra.gov.uk/pdf/Report_547_webv2.pdf] on 10/05/2018.

MacArthur Green (2012) *Vulnerability of Scottish Seabirds to offshore Wind Turbines.*

Marine Scotland (2018) *Marine Scotland – Licensing Operations Team Scoping Opinion*. Marine Scotland.

NIRAS (2015) *Subsea Cable Interactions with the Marine Environment, Expert Review and Recommendations Review*. NIRAS Consulting. Cambridge Accessed online [https://renewables-grid.eu/fileadmin/user_upload/Files_RGI/RGI_Publications/RGI_Subsea_cables_report.pdf] on 03/03/2018.

Pendlebury, C., Zisman, S., Walls, R., Sweeney, J., McLoughlin, E., Robinson, C., Turner, L. & Loughrey, J. (2011). *Literature review to assess bird species connectivity to Special Protection Areas*. Scottish Natural Heritage Commissioned Report No. 390

RPS (2018) *Newton Basin Stornoway Marina Development – Hydraulic Modelling Report.*

Scottish Natural Heritage (2000) *EC Directive 79/409 on the Conservation of Wild Birds. Citation for Special Protection Area (SPA) The Lewis Peatlands, Western Isles (UK9001571)*. Accessed online [http://www.snh.org.uk/pdfs/strategy/GEConsult/4.5.1-LEWISPEATLANDS-B440413.pdf] on 09/02/2018.

Scottish Natural Heritage (2015) *Habitat Regulations Appraisal of Plans. Guidance for Plan Making Bodies in Scotland. V3.0.* Accessed online [https://www.nature.scot/sites/default/files/2017-06/A1500925%20-%20Habitats%20Regulations%20Appraisal%20of%20Plans%20-%20Guidance%20for%20plan-making%20bodies%20in%20Scotland%20-%20Jan%202015.pdf] on 26/03/2018.

Scottish Natural Heritage (2018) *Sitelink, Site Details for Lewis Peatlands SPA*. Published online 02/05/2018. Accessed online at: [http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8524] on 29/05/2018.

Scottish Natural Heritage (2018) *Sitelink, Site Details for Lewis Peatlands SAC.* Published online 02/05/2018. Accessed online at: [http://gateway.snh.gov.uk/sitelink/siteinfo.jsp?pa_code=8289] on 29/05/2018.

Scottish Natural Heritage (No date) *Inner Hebrides and the Minches Proposed SAC Advice to Support Management.* Available online at: [https://www.nature.scot/sites/default/files/2017-10/Consultation%20-

%20Harbour%20Porpoise%20-%20Inner%20Hebrides%20and%20the%20Minches%20pSAC%20-%20Combined%20Reg%2033%20%20MOP%20-%20A1918723.pdf] on 10/05/2018.

Stornoway Port Authority (2017) Annual Report 2017. Available Online at: [http://www.stornowayportauthority.com/wp-content/uploads/2014/12/2017-ANNUAL-REPORT.pdf] on 29/05/2018

Stroud, D.A., Bainbridge, I.P., Maddock, A., Anthony, S., Baker, H., Buxton, N., Chambers, D., Enlander, I., Hearn, R.D., Jennings, K.R, Mavor, R., Whitehead, S. & Wilson, J.D. - on behalf of the UK SPA & Ramsar Scientific Working Group (eds.) (2016). *The status of UK SPAs in the 2000s: the Third Network Review*. JNCC, Peterborough.

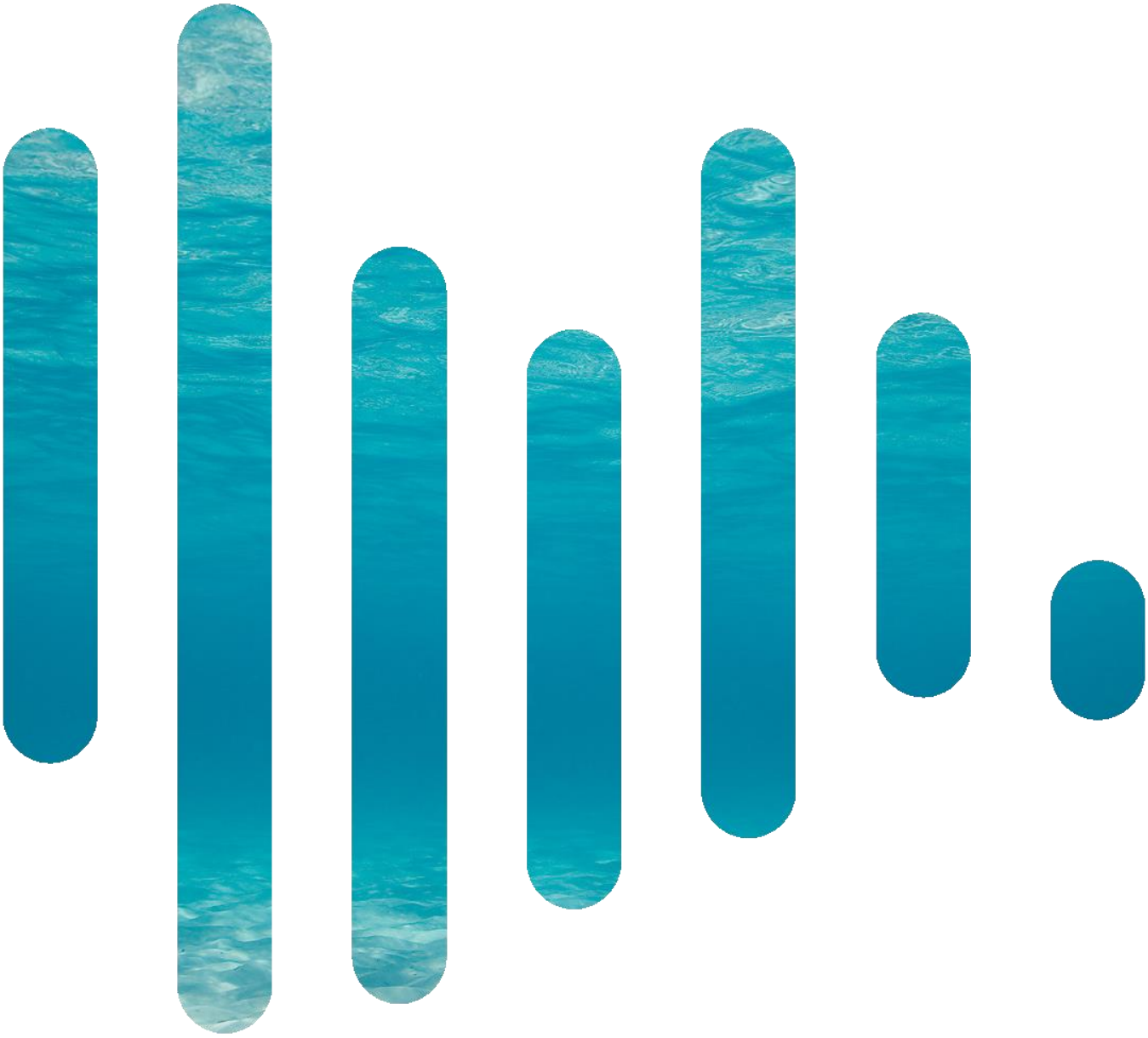
Wallace Stone (2018) *Stornoway Port Authority, Proposed Deep Water Port, Outline Description (Rev B)*.

Whitfield, P. (2000) *Golden Eagle Aquila chrysaetos Ecology and Conservation Issues.* Scottish Natural Heritage Review No 132.

APPENDICES

Technical Appendix 5.5

IRWIN CARR
CONSULTING



Technical Appendix 5.4: Underwater Noise Report

Rp004 2018062 (Technical Appendix 5.4: Underwater Noise Report)

29 August 2018

PROJECT: TECHNICAL APPENDIX 5.4: UNDERWATER NOISE REPORT, DEEP WATER PORT

PREPARED FOR: ENVIROCENTRE LTD.
CRAIGHALL BUSINESS PARK
8 EAGLE STREET
GLASGOW G4 9XA.

ATTENTION: ENVIROCENTRE LTD.

REPORT NO.: Rp 004 2018062

Disclaimer

This report is provided for the stated purposes and for the sole use of the named Client. Irwin Carr Ltd accepts responsibility to the Client alone that the report has been prepared with the skill, care and diligence of a competent engineer, but accepts no responsibility whatsoever to any parties other than the Client. Any such parties rely upon the report at their own risk.

Copyright

The concepts and information contained in this document are the property of Irwin Carr Ltd. Use or copying of this document in whole or in part without the written permission of Irwin Carr Ltd constitutes an infringement of copyright. Information shall not be assigned to a third party without prior consent.

Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Final	4.0		29 August 2018	Rasmus Sloth Pedersen [Redacted]	Shane Carr

Table of Contents

1 INTRODUCTION 4
1.1 Underwater noise 4
1.2 Assessment Criteria for underwater noise 5
1.2.1 Units 6
1.2.2 Mammals 7
1.2.3 Fish 8
1.2.4 Application of hearing thresholds 9
2 Modelling of noise 10
2.1 Noise source 10
2.1.1 Impact Piling 10
2.1.2 Odex Piling 11
2.1.3 Dredging 12
2.2 Modelling Software 13
2.3 Work Schedule 13
3 Results 14
3.1 General Comments 14
3.2 Impact Maps 15
3.2.1 Piling 15
3.2.2 Dredging 22
3.3 Long Term Impacts 22
4 Conclusion 24
5 References 25

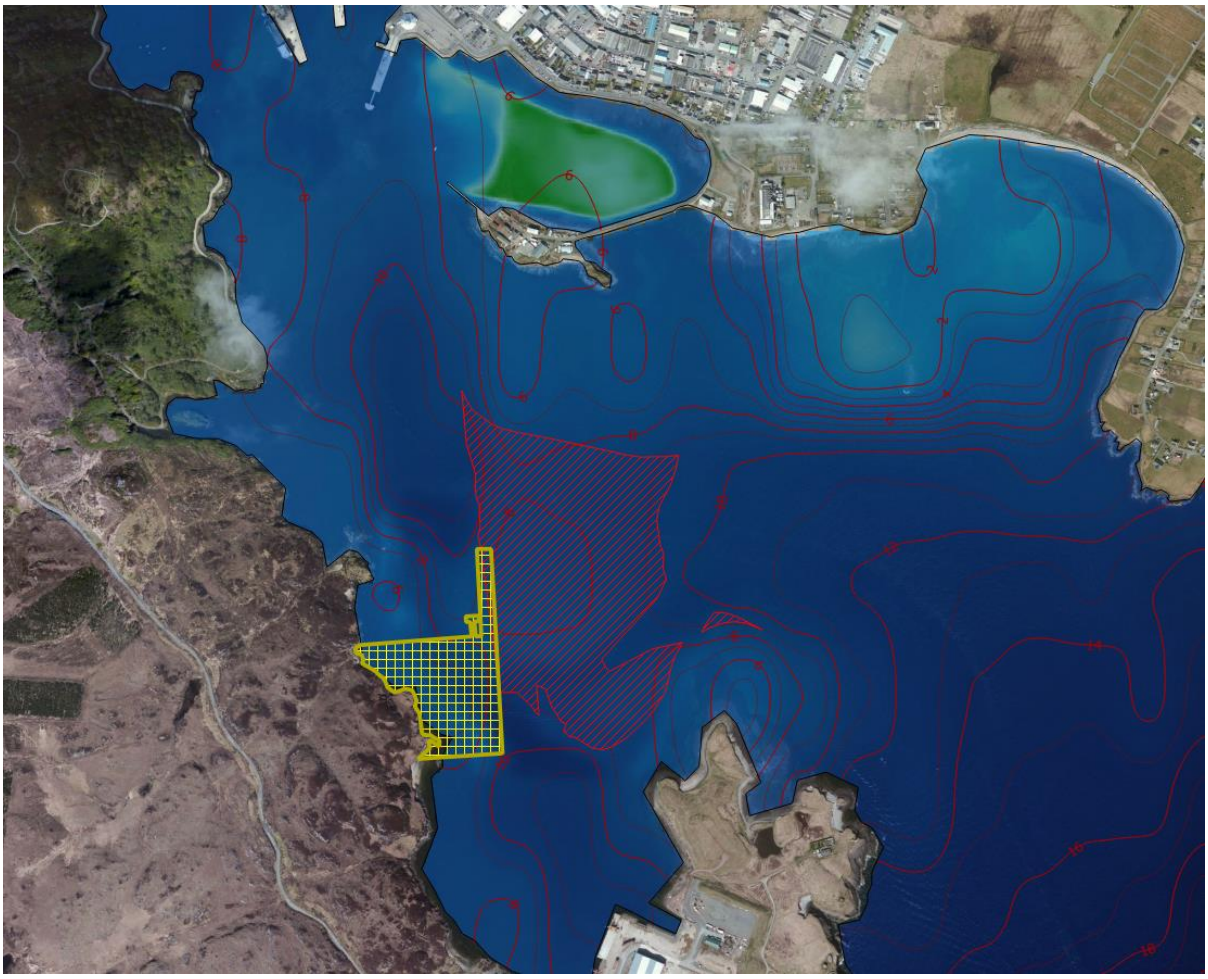
1 INTRODUCTION

Irwin Carr Ltd. have been commissioned to undertake underwater noise modelling as part of an impact assessment for EnviroCentre Ltd. regarding the construction of a pier, a quay and dredging for the proposed Stornoway Deep Water Port.

As part of an impact assessment the noise generated by both vibratory and impact piling and dredging will be of concern considering the marine life in the area. To better assess the potential impact of construction noise on the marine animals it is useful to model representative scenarios taking into account environmental variables and animals' hearing capabilities.

During the operations in the Deep Water Port, similar activities will take place in Newton Marina, the noise from these activities are included here where relevant.

Figure 1. Overview of Stornoway harbour. Depth is coded in shades of blue, darker is deeper, lighter is shallower. Map data from (UKHO , 2018; Google Inc., 2000-2018; Bing Maps, 2018). Yellow area indicates limit of piling activity, red area indicates area to be dredged.



1.1 Underwater noise

Several activities will contribute to elevated noise level during the construction, with the three below identified as the most significant:

1. Dredging.
   The removal of sediment either by suction or lifting of loose material from the seabed. One or both of the following methods might be used:
   Backhoe dredgers that are basically diggers on barges and are suitable for removing soft sediment at shallow depths.
   Cutter suction dredging that involves a cutter which can break/loosen harder sediments and remove them via suction.
   Cutter suction dredging is considerably noisier due to the amount of moving parts under water and the impact of the cutter with hard sediment.

2. Drilling.
   All holes for piles will be pre-drilled. This drilling is done by the "Odex-drilling" method, that is suitable for softer sediments, as it can be used to line the drilled hole while drilling, thus avoiding soft sediment flowing into the drilled hole. Even though this is in essence an impact method, a high strike rate means that the noise is characterised as continuous (>20 strikes/second).
3. Piledriving.
   For the most part piles will be installed into pre-drilled holes by vibration. Where sediment proves too hard for this approach some impact piling will be carried out. Also impact piling will be required for 2-4 hours to complete each bent/section of the structure. This piling is estimated to take place every 4-7 days.

1.2 Assessment Criteria for underwater noise

A number of species of concern either occur regularly at the site or the habitat is suitable for them. While the population impact of noise can be very hard to estimate, we can assess the expected impact on hearing abilities, as well as possible damage due to noisy activities.

Aside from hearing impact, underwater noise can also impact a population by either masking important sounds or by inducing behavioural changes to individuals or groups, potentially affecting the fecundity of the population.

When assessing impacts of underwater noise knowledge of protected and important sites should be included and considered. For the activity related to the deep water port, the closest designated protection area ("Inner Hebrides and the Minches") lies 1.4 km south-east of the most eastern dredged area (Figure 2, below). A proposed Marine Protected Area (North-East Lewis pMPS) lies 900 m to south south-east.

Figure 2. The "Inner Hebrides and the Minches" SPA/OSPAR protected area lies 1.4 km SE of the closest point of activity (dredging at the Deep Water Port) and North-East Lewis pMPA (proposed MPA) 900 m SSE.

1.2.1 UNITS

All references to sound pressure levels, peak pressure levels and sound exposure levels refer to a logarithmic ratio between a pressure/exposure and a reference pressure/exposure.
As an example, a level of 220 $dB_{z\text{-}p}$ is equal to a peak pressure of 100,000 Pascals (Pa) over ambient pressure, while 120 $dB_{z\text{-}p}$ is equal to 1 Pa over ambient pressure. To avoid dealing with these large numbers as pascals, they are converted to a decibel ratio (Table 1). Besides compressing large numbers to smaller ratio this also corresponds better to how animals perceive sound. Animals in general perceive sound as relative steps, meaing that an increase from 1 to 2 pascals sounds like the same increase as from 100 to 200 Pa, even though the first step was only 1 Pa, while the second was 100 Pa. This is better reflected in a logarithmic scale where both steps are equal, here 6 dB.

However, while dB *are* practical, they can be hard to compare between studies due to vague definitions, and so we have adopted the standards set by ISO 18405-2017.

For ease of reference please see following overview for unit definition.

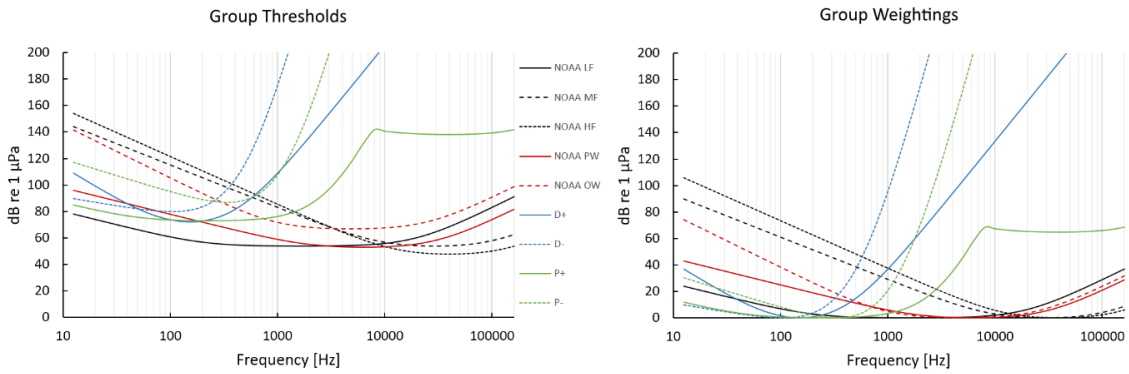
Table 1: Definitions

Unit	Definition	Comments
dB_{RMS} ISO 18405-2017: 3.2.1.1	$dB_{RMS} = 10 \cdot Log_{10}\left(\frac{\frac{1}{t_2 - t_1} \cdot \int_{t_1}^{t_2} p(t)^2 dt}{1 \cdot 10^{-12} Pa}\right)$	Functionally equivalent to deprecated $20 \cdot Log_{10}\left(\frac{RMS}{1 \cdot 10^{-6} Pa}\right)$
$dB_{z\text{-}p}$ ISO 18405-2017: 3.2.2.1	$dB_{z-p} = 20 \cdot Log_{10}\left(\frac{Pa_{max}}{1 \cdot 10^{-6} Pa}\right)$	This assumes that Pa_{max} is equal or greater than $\sqrt{Pa_{min}}^2$
$dB_{p\text{-}p}$ ISO 18405-2017: 3.1.2.8	$dB_{p-p} = 20 \cdot Log_{10}\left(\frac{Pa_{max} - Pa_{min}}{1 \cdot 10^{-6} Pa}\right)$	Often[1] equivalent to $dB_{z-p} + 6.02\ dB$
dB_{SEL} ISO 18405-2017: 3.2.1.5	$dB_{SEL} = 10 \cdot Log_{10}\left(\frac{\int_{t_1}^{t_2} p(t)^2 dt}{1 \cdot 10^{-12} Pa}\right)$	For continuous sound this is equivalent to $dB_{RMS} + 10 \cdot Log_{10}(t_2 - t_1)$

Unless otherwise stated dB_{RMS} has an averaging period of 1 second, and dB_{SEL} for the duration of the specified event, sometimes indicated as $dB_{SEL\text{-}"time"}$.

For estimating exposure levels, SEL, the noise levels are weighted according to a generalised hearing sensitivity profile for 9 different hearing groups. Further explanation in sections below.

Figure 3. Generalised hearing thresholds (left) for the specified hearing groups are converted into weightings (right). For exposure evaluation the weightings are subtracted from the noise level to give the weighted noise level (similar to dB(A) or dB(C)-weighted noise for humans).



[1] If maximum pulse pressure is below ambient pressure and compression and rarefaction phases are of equal size.

1.2.2 MAMMALS

A number of marine/aquatic mammals are known to use the area around Stornoway Harbour. All of them have good hearing and this sense is vital to their fecundity, either directly for foraging or for navigation and mating.

For the marine/aquatic mammals present we will adhere to the approach described in "Guidance for Assesing the Effects of Anthropogenic Sound on Marine Mammal Hearing (NOAA, 2018), which determines impact from an assessment of area wherein the noise will induce either "Temporary Threshold Shift" (TTS) or "Permanent Threshold Shift" (PTS)[2] as judged by the weighted SEL level (dB_{SEL-24}) over a typical 24-hour period or by dB_{z-p} levels, for different "hearing groups"

These hearing groups are specified by collating all available information on marine mammal hearing available and generalising their hearing sensitivity into representative groups. This grouping represents a significant research effort and are reviewed by the leading experts (academic, industrial and conservation) on the topic. Because of the large amount of work represented, the thresholds and the methodology associated, have become de-facto standards for assessing noise impact on marine mammals and represent best available knowledge and practise.

Along with weighting curves, similar in function to the human dB(C) curves, a set of impact thresholds for hearing impact and injury is associated with the framework and allows for assessments to be made on the basis of best available evidence.

All marine mammal species are covered by the hearing groups and a full list of species in the different groups can be found in the "Guidance for Assesing the Effects of Anthropogenic Sound on Marine Mammal Hearing" (NOAA, 2018), but in general the groups cover the following species:

- LF (Low Frequency): All baleen whales, e.g. Fin whale and minke whale.
- MF (Middle Frequency): Sperm whales, most dolphins (incl. risso's dolphin), beaked whales and killer whales.
- HF (High Frequency): Porpoises, a sperm whale sub-species and few high frequency specialist dolphins.
- PW (Phocidae, under water): True seals, e.g. harbour seal and grey seal.
- OW (Otariidae, under water): Walruses, leopard seals, fur seals and remaining amphibious mammals[3].

Table 2. Summary of NOAA[4] thresholds and groups for each of the prioritised species.

NOAA Hearing group	Species examples	Non-impulsive TTS/PTS threshold [dB_{SEL-24}]	Impulsive TTS/PTS threshold [dB_{SEL-24}]	Impulsive TTS/PTS threshold [dB_{z-p}]
PW	Harbour seal, grey seal	181/201	170/185	212/218
OW	Eurasian otter	199/219	188/203	226/232
LF	Minke whale, humpback whale	179/199	168/183	213/219
MF	Common dolphin, killer whale, risso's dolphin, bottlenose dolphin	178/198	170/185	224/230
HF	Harbour Porpoise	153/173	140/155	196/202

[2] TTS/PTS. A temporary/permanent change in hearing sensitivity caused by acoustic stimuli.

[3] The current framework does not include otter and polar bear, but research shows that the threshold associated with this group is applicable to these.

[4] National Oceanic and Atmospheric Administration, US Department of Commerce.

1.2.2.1 *Threshold meaning and interpretation*

The three thresholds refer to different ways that noise can affect the hearing of a marine animal and are *important to keep in mind* when evaluating the results of this report:

- **Non-impulsive dB_{SEL-24}**
  The threshold over which an effect (TTS/PTS) occurs, taking into account *continuous*[5] noise received by the animal over a typical 24-hour period as noise exposure level, SEL.
  When presented as an impact zone, this refers to the area, within which, an animal would suffer the effect, if it stayed there for 24 hours. We thus identify areas given by this limit as areas of TTS-risk or PTS-risk respectively, i.e. and animal within the area has a risk of suffering from either TTS or PTS within this zone.
  Weightings are applied for non-impulsive dB_{SEL}.

- **Impulsive dB_{SEL-24}**
  The threshold over which an effect (TTS/PTS) occurs, taking into account *impulsive* noise received by the animal over a typical 24-hour period as noise exposure level, SEL.
  When presented as an impact zone, this refers to the area, within which, an animal would suffer the effect, if it stayed there for 24 hours. We thus identify areas given by this limit as areas of TTS-risk or PTS-risk respectively, i.e. an animal within the area has a risk of suffering from either TTS or PTS within this zone.
  - **Impulsive dB_{SEL} "Single-impulse"**
    It is sometimes useful to assess the impact of a single impulse. When we do this, we will refer to it as "Single-impulse SEL" or "single-strike SEL".
    Like for the dB_{z-p}, when single-impulse SEL is presented as an impact zone, this refers to the area, within which, an animal would suffer the effect acutely/instantly.

  Weightings are applied for Impulsive dB_{SEL}.

- **Impulsive dB_{z-p}**
  The threshold over which an effect (TTS/PTS) occurs, taking into account *impulsive* noise received by the animal at any instant as maximal peak pressure.
  When presented as an impact zone, this refers to the area, within which, an animal would suffer the effect acutely/instantly.
  No weightings are applied for Impulsive dB_{z-p}.

1.2.3 FISH

The basking shark (*Cetorhinus maximus*) is protected under UK law (Nature Conservation (Scotland) Act , 2004) and has been included for assessment as this species has been observed close to the site (Hebridian Whale and Dolphin Trust, 2018). Due to local importance and interest, Atlantic salmon (*Salmo salar*) and European brown trout (*Salmo trutta*), have also been included.

While the hearing capabilities for the *Salmo* species are from experiments, the hearing of the basking shark is inferred from other elasmobranch species that are possible to keep in a tank for tests.

There is very little information available on the acoustic sensitivity of fish (and even less so for sharks), this is true for both accurate audiograms as well as noise impact on behaviour and physical impact. We use a composite hearing threshold as well as information on TTS and PTS from a range of studies (Ketten, 1995; Mann, et al., 2001; Subacoustec, 2004; DFO Canada, 2006; Brandon M. Casper, 2007; Southall, et al., 2007; Carlson, et al., 2007)

While it is clear that all of the species can detect sound (either by detecting pressure or particle motion), there is no evidence to suggest that sound is especially important for their population fecundity.

As there is a lack of systematic reviews to establish exposure thresholds for fish, we have used thresholds based principally on three large reviews (DFO Canada, 2006; Carlson, et al., 2007; Southall, et al., 2007) and the method from "Guidance for Assesing the Effects of Anthropogenic Sound on Marine Mammal Hearing" (NOAA, 2018) to generate the proposed TTS and PTS

[5] Please see (NOAA, 2018) for definitions of "non-impulsive" and "impulsive". For quick reference, if a noise is shorter than 1 second and is clearly intermittent in nature, it is impulsive.

thresholds for fish as per Table 3, p. 9. In summary, this entailed collating information from exposure experiments and categorising it according to observed effects (i.e. death, injury, PTS, TTS, behavioural change and no observed effect) and use this to model exposure functions (as in Figure 3, p. 6) and exposure limits (Table 3, p. 9.).

Table 3. Summary of thresholds used for fish[6]. Note that Impulsive thresholds are equal for all groups. This was an effect of limited available data, making separation infeasible.

Species	Hearing group	Non-impulsive TTS/PTS threshold [dB_{SEL-24}]	Impulsive TTS/PTS threshold [dB_{SEL-24}]	Impulsive TTS/PTS threshold [dB_{z-p}]
Demersal, swim-bladder assisted hearing. (e.g. Cod, haddock)	D+	185/213	185/213	197/206
Demersal, no swim-bladder assisted hearing. (e.g. Plaice, sole)	D-	192/220	192/220	197/206
Pelagic, swim-bladder assisted hearing (e.g. Herring, sprat)	P+	186/214	186/214	197/206
Pelagic, no swim-bladder assisted hearing (e.g. *Salmo*, sharks)	P-	200/228	200/228	197/206

1.2.4 APPLICATION OF HEARING THRESHOLDS

For the impulsive noise of impact piledriving no consideration is given to the hearing capabilities as is standard for this type of noise (NOAA, 2018), meaning that no weightings are applied. For the vibratory piling and dredging, which are more continuous noise sources and therefore less acutely dangerous to the hearing, weightings[7] dependent on the hearing capabilities of the species are considered, as the mechanism of injury is auditory stress and fatigue, rather than acute trauma.

There are in principle six different exclusion zones for each hearing group, each relating to a particular limit. These limits are given in Table 2, p.7. and Table 3, p.9.

We will not present all these (54) zones in the results section as some zones will be too small to meaningfully be represented on a map or will be fully within impact zones of other common species in the area.

[6] Note that we adopt these thresholds in the absence of a widely accepted threshold framework for fish. The thresholds thus do not reflect a peer-reviewed process, but rather a summary of available information.

[7] Weightings are not equivalent to the presented thresholds in that same way that A-weighting for humans is not the same as the human hearing threshold. Rather they are based on the same shape, and most sensitive regions. See (NOAA, 2018) for details.

2 MODELLING OF NOISE

2.1 Noise source

At this stage we have no site-specific recordings of the noise from the equipment being used for the construction. As a result, we have interpolated source levels from similar construction projects. Data for this interpolation is partly from reviews (Washinton State Department of Transportation, n.d.; Reine, et al., 2012; Reine, et al., 2014; Robinson, 2015; Santos-Dominguez, et al., 2015; Wittekind, 2014) and earlier in-house work. This means that all results are based on a presumption that the work will be carried out with equipment of similar noise levels.

2.1.1 IMPACT PILING

This type of piling will likely be the loudest activity to take place during the construction. Impact piling has a higher chance of causing injury than other noise types of similar energy due to the very fast "rise time" for the sound impulse[8]. This leaves no time for the animal to react/adapt and consequently increases the risk of acute injury to the species' hearing.

Figure 4. Graphic representation of data used to characterise the impact piling. dB_{z-p} for a single strike in this scenario is 231.6 dB re 1 µPa (203.2 dB_{SEL}). Bold solid line is modelled interpolation. Grey area is 95 % confidence interval (± 1.38 dB) of the linear model. Residuals of model included to show lack of systematic error. The bottom right graph is the timeseries used as representative for calculations of single strike dB_{SEL}.

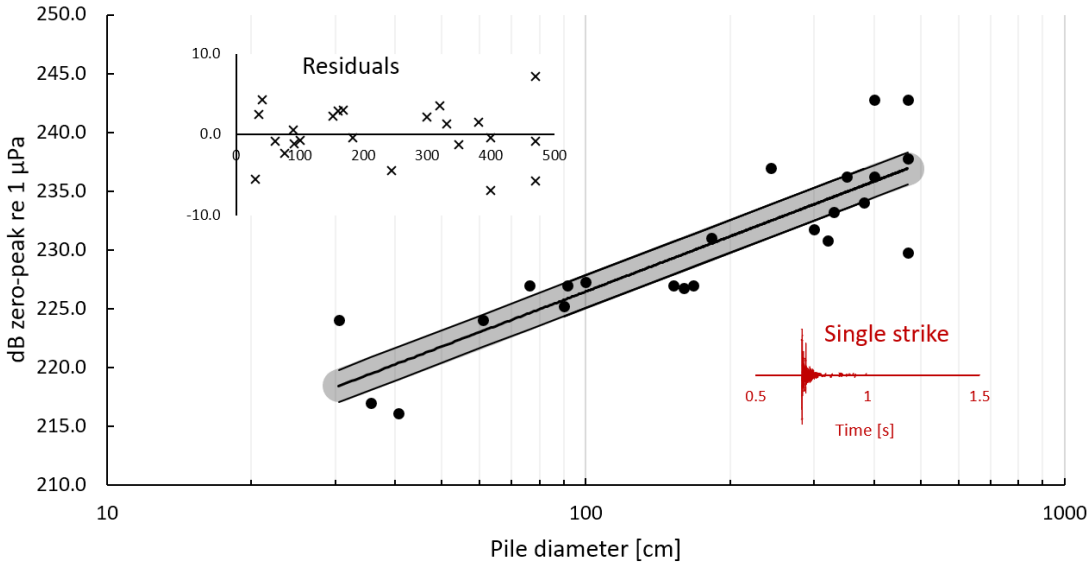


Table 4. Source levels for piling. Levels are upper 95 % confidence interval levels.

	Impact piling		Vibratory piling	
Pile diameter [cm]	Single strike dB_{z-p}	Single strike dB_{SEL}	dB_{z-p}	dB_{RMS}
220	231.6	203.2	217.7	204.8

As per information provided to us by EnviroCentre Ltd, impact piling will be carried out if hard substrate is encountered and for "setting" piles, while vibratory piling will be the main method for fitting the piles. The contractor has informed us that up to 4000 strikes will happen over 2-4 hours

[8] "Rise-time" is a measure of how quickly an acoustic impulse "rises" from the background noise. A fast rise-time means that a high intensity is reached very quickly and without a slow increase in amplitude.

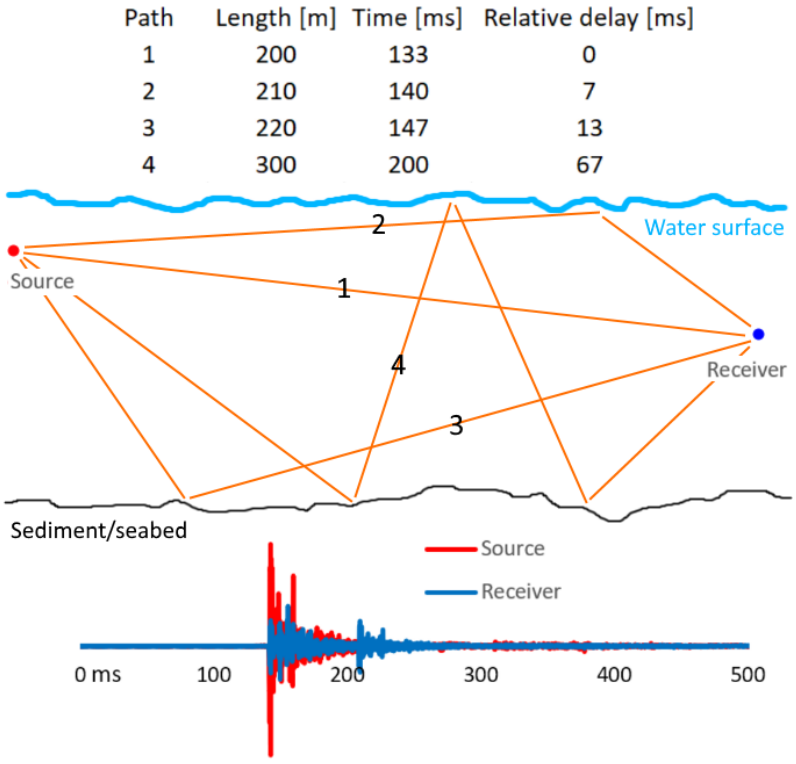
every 4-7 days during construction of the pier. We thus assume 4000 strikes from impact piling per 24 hours as a reasonable worst-case scenario.

A soft start (JNCC, 2010) for impact piling is assumed and will give animals a chance to vacate the area before the highest noise levels are reached.

2.1.2 ODEX PILING

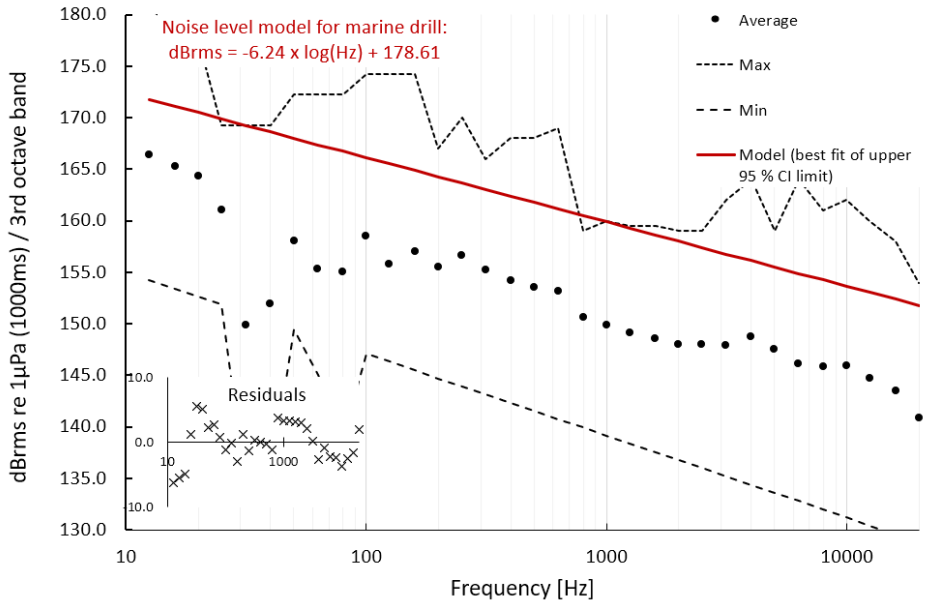
The majority of the piling noise will be from "Odex" piling, a pneumatic impact drilling method suitable for softer sediment as it allows for simultaneous lining and drilling, to mitigate loose sediment filling the hole as it's made. While Odex piling is in fact a series of impacts, the impact rate is over 1200/min (20/sec), meaning that the noise is better described as continuous. This is especially true as the distance from the source increases, and the noise will have bounced off several surfaces and thus be "smeared out", to become more continuous in nature (Figure 5 below). This effect is more pronounced in shallower scenarios due to the increased number of surface interactions.

Figure 5. Example of "smearing out" of an impulsive noise because of repeated boundary reflections and resulting multipath, with each path having different timing attenuation and phase.



For the Odex piling we collected noise examples from several marine drilling operations of similar size. Due to scarcity of good data we have chosen to use the upper 95 % confidence interval boundary as a reasonable worst-case scenario for the noise of the Odex piling machinery.

Figure 6. The red line indicates the band levels model we chose as representative for the Odex piling. The model is a result of the average (black dots) of similar marine drills and the associated upper limit for the 95 % confidence interval for those. The dashed lines are the highest and lowest values found for similar marine drilling equipment. Residuals of model in lower left corner.

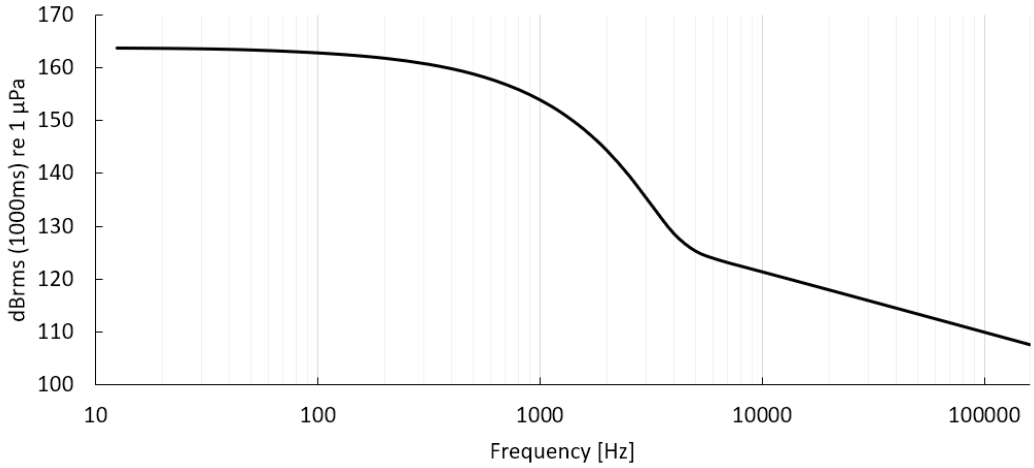


2.1.3 DREDGING

Two types of dredging are proposed to be potentially used, cutter suction and backhoe dredging. Of the two, cutter suction dredging is the noisiest, and as we cannot know in advance the actual dredging pattern (as this will be fully determined upon appointment of the contractor, post-consent), we will here only deal with the cutter suction dredger, to represent a worst-case scenario.

The noise from the dredger proved hard to estimate as only one published recording of a cutter suction dredger could be found (Reine, et al., 2012), and this did not include a spectrum, but rather broad band levels only. Our approach was to generate a noise spectrum for similar vessel types based on earlier modelling work (Wittekind, 2014) and recordings from similar vessels, and then adjust the level to correspond to the broadband levels given by (Reine, et al., 2012). We justify this approach based on the lack of available information and the presumption that the continuous noise from a cutter section dredger conforms to general spectra for vessels of this type.

Figure 7. Spectrum of representative vessel used as noise level for the cutter suction dredging. Broadband level is 175 dB_{RMS} (1000 ms) re 1 µPa.



2.2 Modelling Software

We use the software package "dBSea[9]" for underwater noise propagation modelling. We have included sediment (British Geological Survey, 2018) as well as bathymetry. A combination of three modelling methods were combined for this scenario:

- **dBSea Ray**: A ray tracing method that is especially suited to calculation of impulsive sources as it can accurately calculate the interference patterns important for estimation of $dB_{z\text{-}p}$ values.
- **dBSeaModes:** A normal modes approach suited especially to lower frequencies and shallower scenarios.
- **dBseaPE**: Based on a wide-angle adaptation of the parabolic equation method, this method excels in most conditions, and is especially suited for lower frequencies.

2.3 Work Schedule

The dredging and piling work is organised so that piling is carried out in Newton Marina while dredging is carried out in the Deep Water Port area and vice versa. In an effort to characterise this in the noise modelling we have run the scenarios in a way that reflect this tandem operation.

Table 5. Overview of dredging and piling works as estimated at project start.

Year	Month	Newton Marina		Deep Water Port	
		Dredging	Odex piling	Dredging	Odex piling
2018	November				
	December				
2019	January				
	February				
	March				
	April				
	May				
	June				
	July				
	August				
	September				
	October				
	November				

[9] A simpler version of this software can be obtained for free from www.dBSea.co.uk/download

3 RESULTS

Note that all results are only valid for piledriving with piles of diameter 220 cm and for methods as described in section 2.1, p.10.

Models are representative of the mean to high tide (CD + 2.7 m to 5.4 m), with lower tide levels leading to smaller risk zones.

3.1 General Comments

The impact area maps below are showing acute impacts or short-term impacts. Exceeding the limits means that there is either a risk to *temporarily* worsen the hearing of the relevant animal (TTS-limits), or a risk to *permanently* worsen the hearing of an animal (PTS-limits).

Please ensure that you keep the points from section 1.2.2.1 *Threshold meaning and interpretation* (p.8) fresh in memory when evaluating the results.

Temporarily worsening the hearing of an animal has the potential to limit its reproductive success, by inhibiting navigation, foraging, mating, communication and evasion of threats – generally longer-term impacts that have to be assessed in a population-wide view.

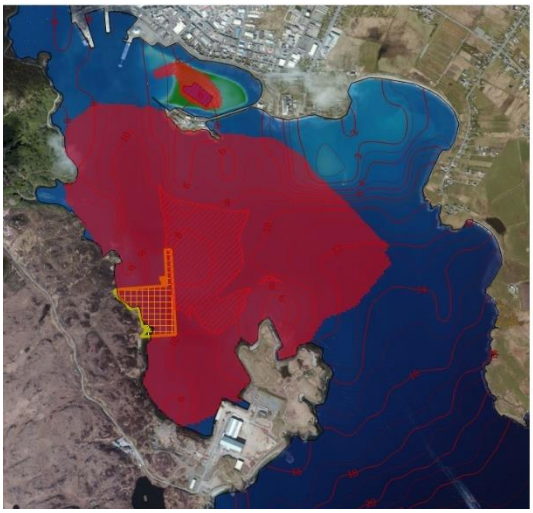
Permanently worsening an animals' hearing is a hearing *injury* and risks having lethal consequences for the individual in the short term.

Noise not exceeding the limits can still have an impact on local populations if it displaces significant numbers over significant time from important areas, either directly (noise overlaps important area), indirectly (noise "blocks" access to important area) or disperses prey. Other effects include masking, where the noise limits the effective range of acoustic cues for the animal, making communication, foraging, evasion and navigation harder. These effects are much harder to estimate the impact of, but the vibratory piling will arguably cause more masking than the impact piling, due to the continuous noise from this source. Masking effects are thought to have its greatest impact in increasing the risk of separation of mother-offspring pairs, especially in murky waters or during night time where vision cannot be used for navigation. This means that during critical periods where the offspring is not yet sufficiently adept at surviving alone (Table 7, p.23) even masking can have a significant short-term impact on reproduction.

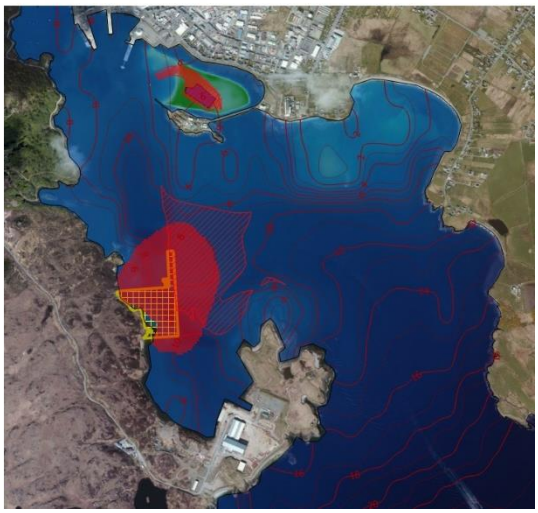
We have not shown all impact areas, but rather focussed on species groups that determine the impact zone size. E.g. as harbour porpoise and harbour seal both are present, but as harbour porpoise is far more sensitive to noise than harbour seal, the impact zone is determined by the harbour porpoise limit (Figure 8, p.14).

Figure 8. Due to the higher sensitivity of the harbour porpoise the impact zone associated with its TTS limit for continuous noise, is larger than that of harbour seal. As both species are present, we will only present/focus on the larger impact zone.

Harbour porpoise



Harbour seal



For rarer species, such as minke whale, belonging to the LF (low frequency group), we will not use its impact zone alone, even if it's the largest, as it would not be representative of the impact of the activity. This means than even though the LF group has the largest impact zone for dredging (owing

to the high levels at low frequencies), this group alone will not form the basis of the acoustic impact assessment for the dredging activities (also, we do not expect minke whale in Newton Marina).
We ask the reader to remember that dB_{SEL-24} is a limit that assumes that the animal is exposed to the whole event or 24 hours and stays within the area. Animals can be exposed to higher levels for shorter periods with the same cumulative effect if they are not within the area for the total duration. In practise the animals are assumed to swim away from areas of loud noise, limiting their exposure significantly (JNCC, 2010).

3.2 Impact Maps

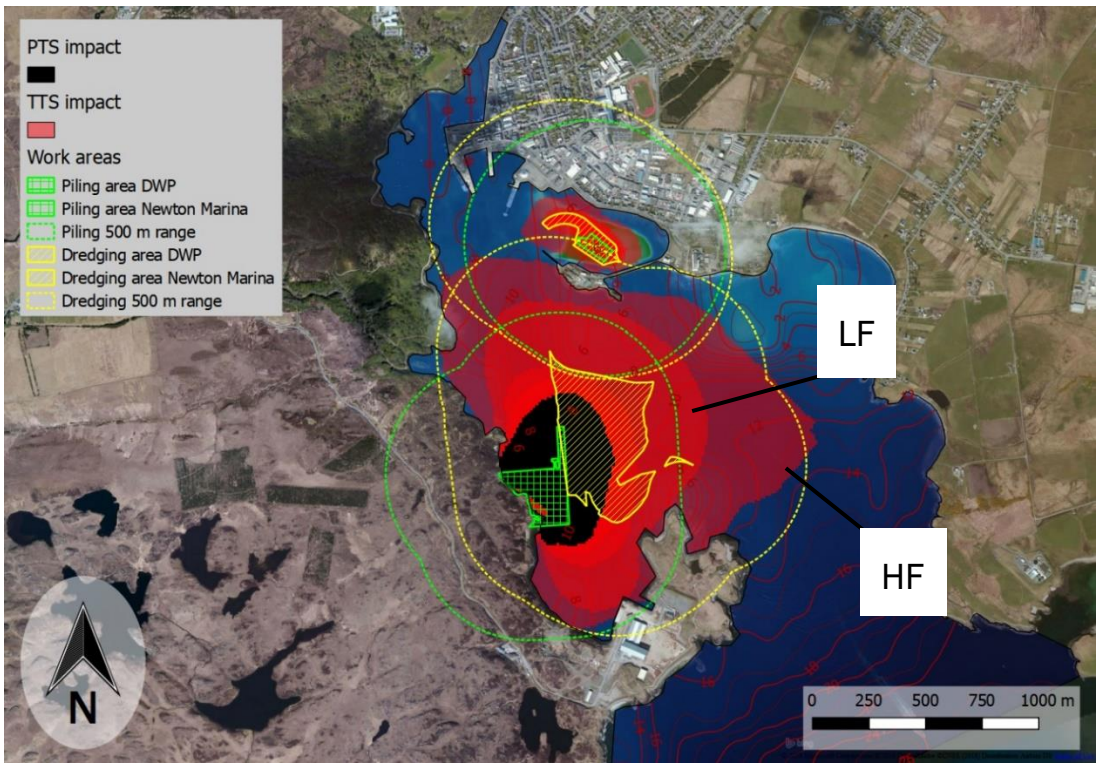
Impact maps are split into sets in three categories, based on the activity they are representing. Notice that the impact from activity in Newton Marina are included, but for the most part is insignificant, due to the containing nature of the bathymetry.

3.2.1 PILING

The piling causes the largest impact to the local fauna, with the impact piling being associated with substantially more risk than the Odex piling. The larger impact of the impact piling is a product of lower thresholds for this type of noise[10], higher source levels and the fact that there is risk of acute injury with little chance for the animal to evade the noise.

3.2.1.1 Odex piling

Figure 9. Odex piling with no impact piling. Red areas are all hearing groups' TTS risk zones, while the black area is the harbour porpoise PTS risk zone. Dashed lines are 500 m buffer zones, with colours correpsonding to activity. This map is based on impact if the animal *stays* within the area. Notice that LF and HF groups have TTS risk zones extending beyond the 500 m range. All other hearing groups' TTS risk zones are wholly within the 500 m range.



The Odex piling presents some risk, but notice that only the LF and HF group (baleen whales and porpoises) have their TTS risk zones extending beyond the 500 m range, so if they remain within this area for 24 hours, they would suffer TTS. There is no acute risk of hearing impact for animals outside the 500 m range, meaning that, under the assumption that the animals will swim away from the area of work, their exposure will be well below limits for hearing impact (TTS/PTS).

[10] Impulsive noise has been shown to cause more impact than continuous noise with the same energy.

There is risk of permanent damage to the hearing of harbour porpoises hearing only if an individual stays within 200 metres of the activity for long durations. Given the shy nature of porpoises this is thought to be very unlikely.

3.2.1.2 *Impact Piling*

Impact piling carried the greatest risk of causing injury, with the risk of PTS extending to ~500 meters for the High Frequency hearing group (harbour porpoise) for a single strike, but with the remaining hearing groups having only small or insignificant risk zones with few strikes.

Note that these maps are given for strikes at full power. A soft start will result in smaller risk zones and allow animals more time to vacate the area. As a rough guideline, halving the strike energy will reduce the noise by 3dB, leading the impact range to be reduced by up to 50 %.

Figure 10. Overview of risk zone for impact piling with a single strike (full power). Note that especially the HF hearing group is highly sensitive to impulsive noise (top right & Figure 11).

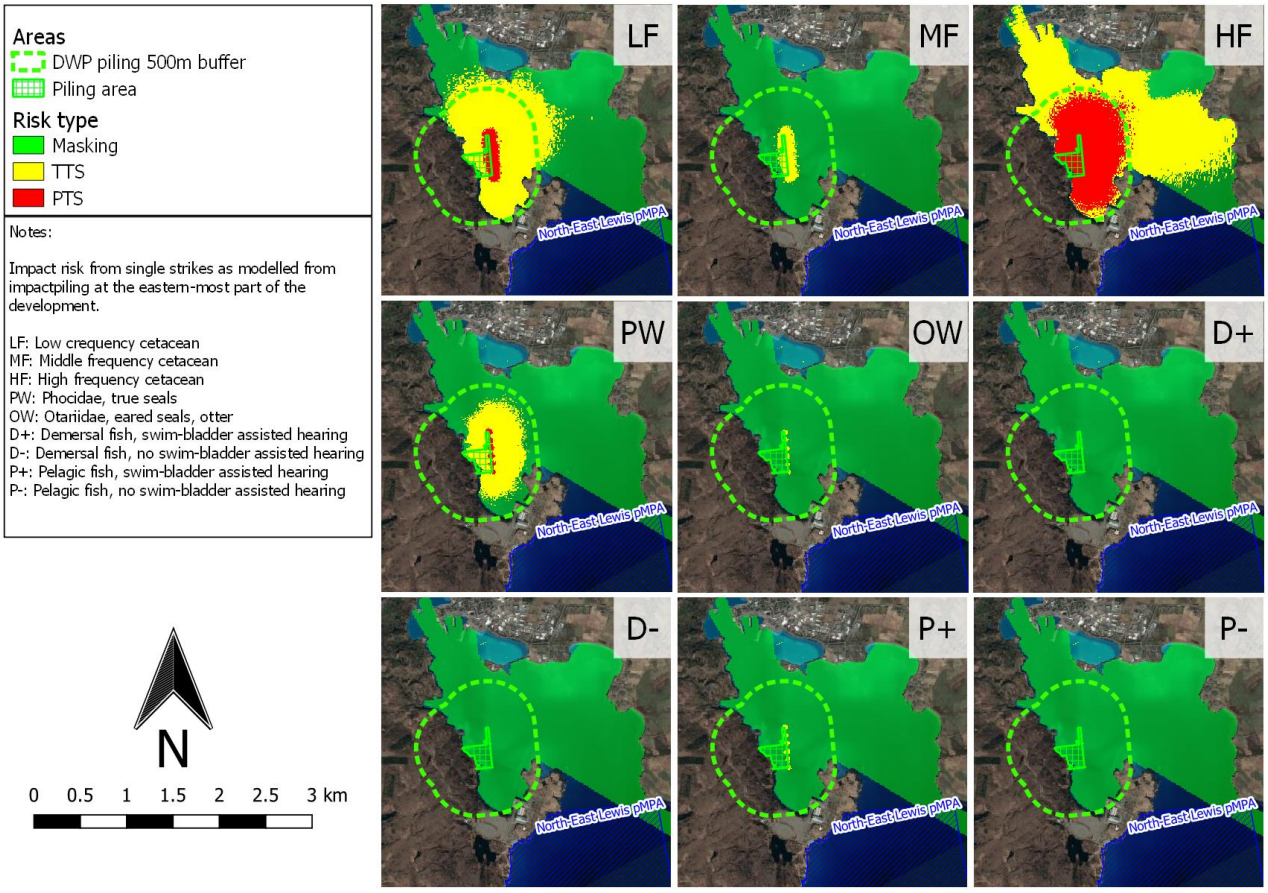
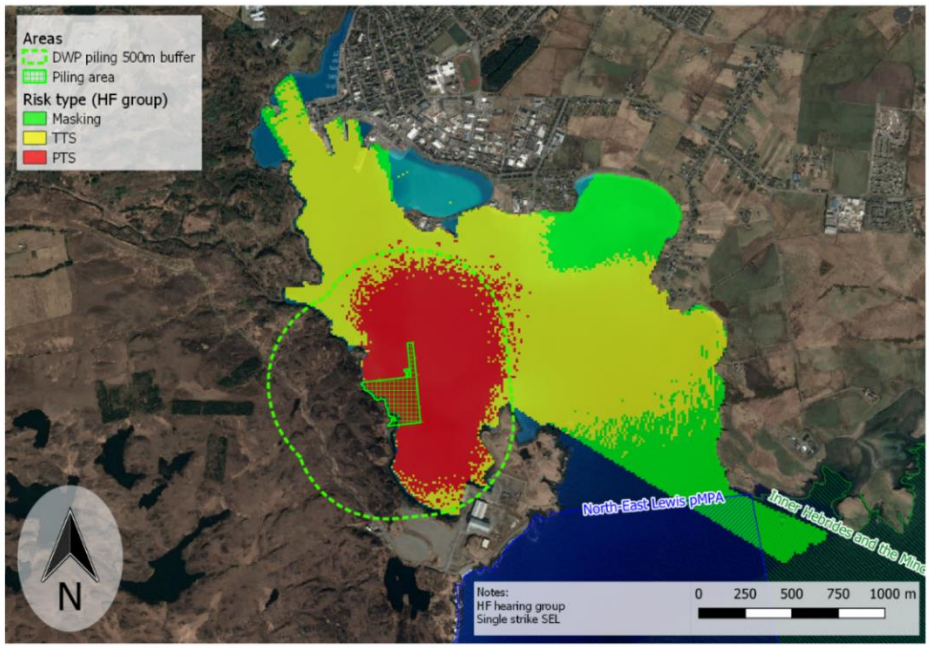


Figure 11. Risk zones for a single strike (full power) during pile driving for the HF hearing group. If a 500-meter zone is assumed free of marine mammals, acute injury from a single strike is unlikely.



With increasing strike numbers comes increased exposure and therefore increased risk of auditory injury to animals that fail to vacate the area. Note that this means that for the HF hearing group some care has to be taken to mitigate against hearing injury, *even if* the animal swims away from the site. Figure 12 below shows how the risk zone increases in size with repeated strikes at full power. By the 10th strike, if a harbour porpoise is still within the red (PTS) risk zone (Figure 12, 10), there is a high risk of auditory injury.

Figure 12. Change in risk zones with increased number of piling strikes for the HF hearing group. Number of strikes in upper right corner.

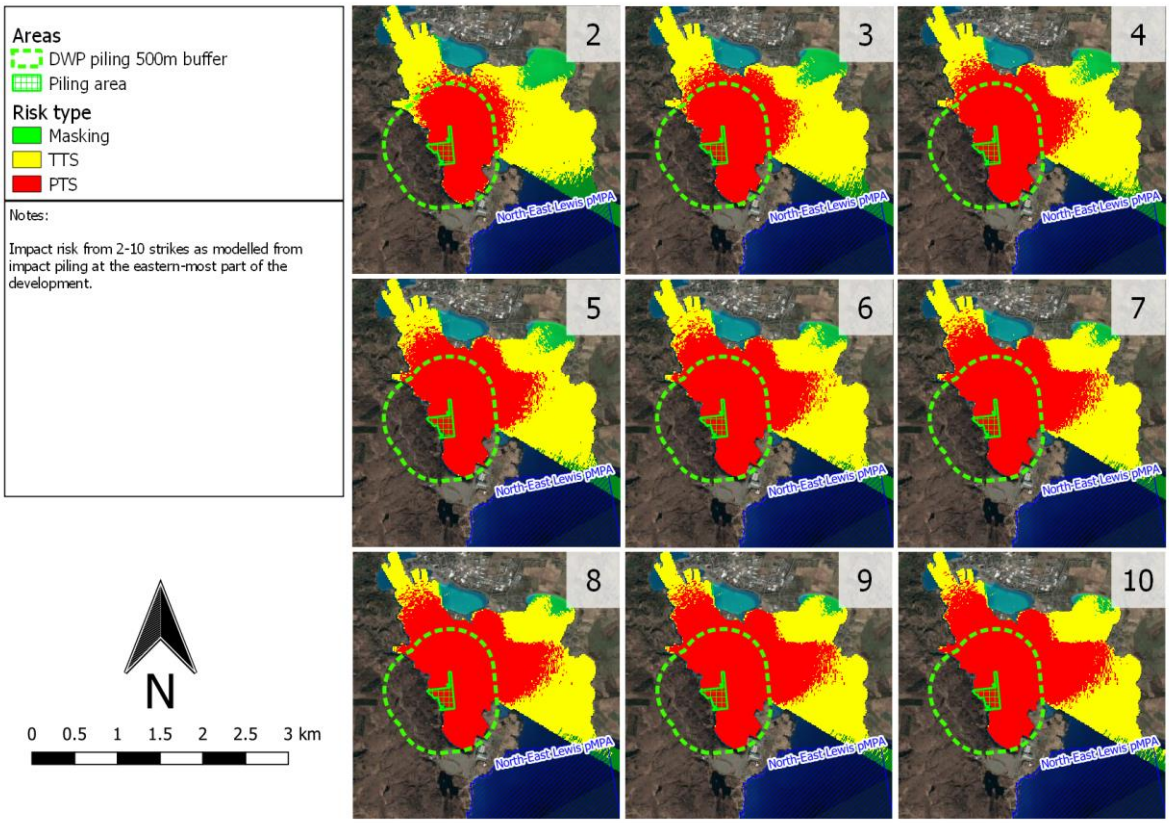


Figure 13. Impact piling for all hearing groups, 10 strikes. Risk zones are smaller for animals moving away from the source after first strike.

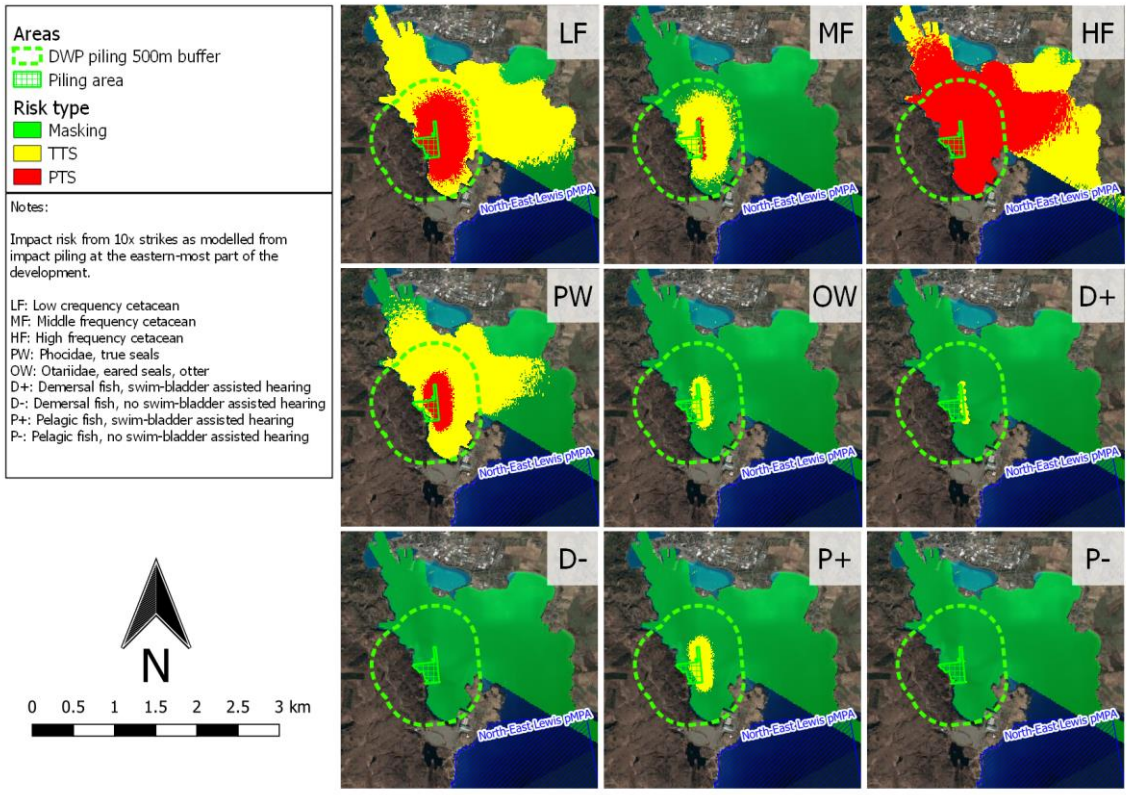
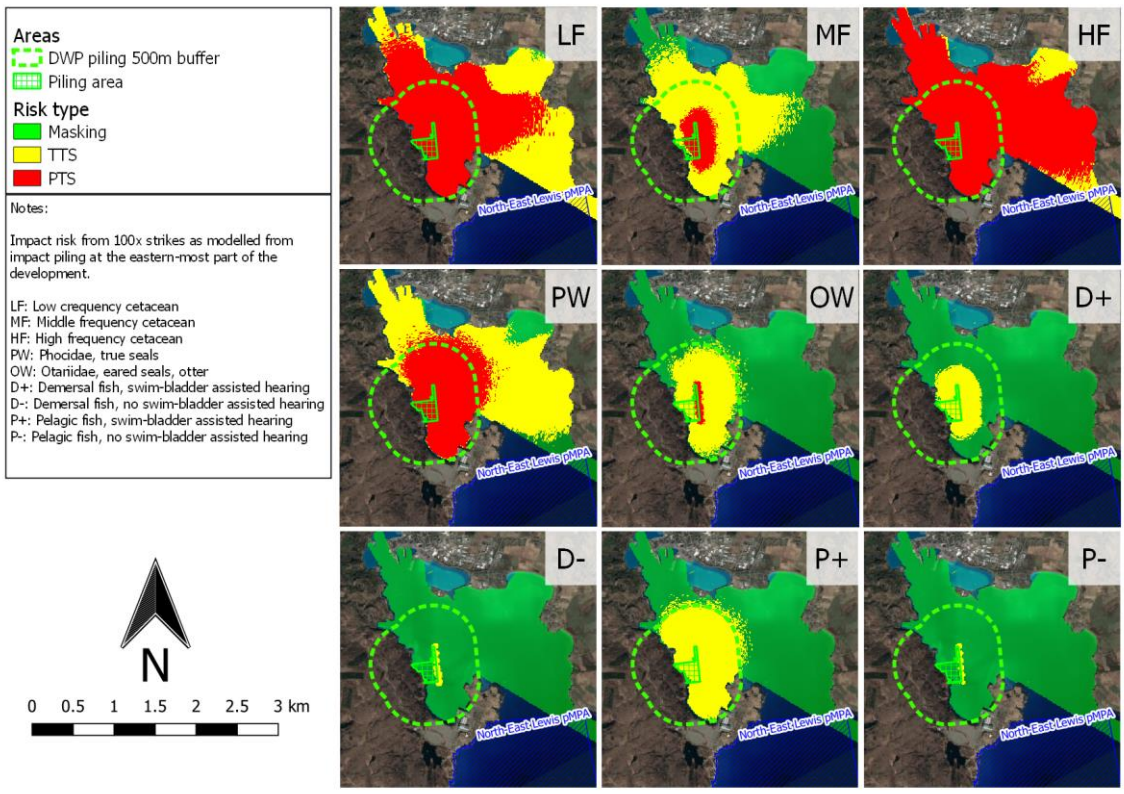


Figure 14. Impact piling for all hearing groups, 100 strikes. Risk zones are smaller for animals moving away from the source after first strike. Note that the HF group will need to have left the harbour completely before the 100th strike to avoid likely auditory injury.



At 100-1000 strikes most marine mammals still present in the harbour inlet will have a high risk of auditory injury, and some disturbance outside the natural confined harbour (into the nearby MPA) cannot be excluded, but are not predicted to be directly injurious. Non-injurious impacts could be e.g. masking of important signals or behavioural changes. Technical Appendix 5.2 which accompanies this Environmental Impact Assessment Report discusses marine mammal protocol, and Chapter 5 of Volume 1 discusses Marine Ecology.

Figure 15. Impact piling for all hearing groups, 1000 strikes. Risk zones are smaller for animals moving away from the source after first strike. Note that the LF, HF & PW group will need to have left the harbour completely well before the 1000th strike to avoid auditory injury.

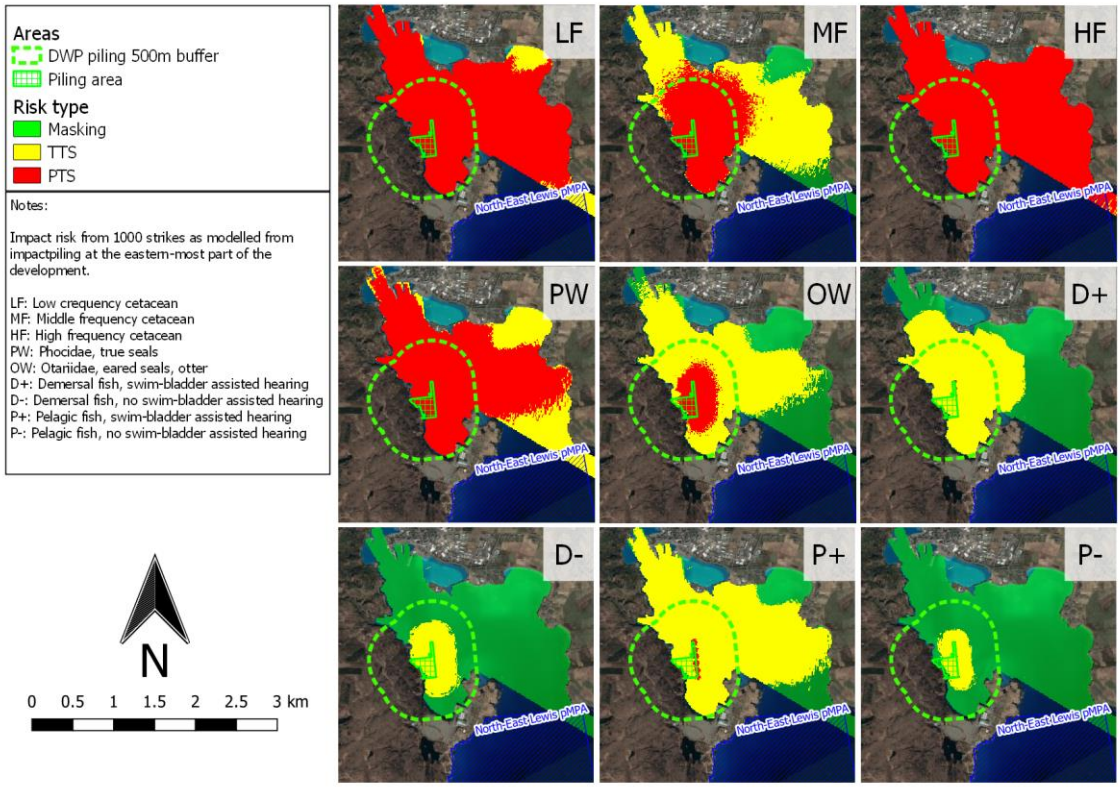


Table 6. Overview of required swimming speed to realise effectiveness of soft start (animal leaves harbour) and/or MMO effort. Swimming speeds from (Kastelein, et al., 2018; Otani, et al., 2002).

	No MMO or animal start next to pile	MMO present, no animal closer than 500 m	No MMO or animal start next to pile	MMO present, no animal closer than 500 m
Max distance to PTS limit (leave harbour)	2500 m	2000 m	2500 m	2000 m
Ramp up time for soft start	20 min / 1200 sec	20 min / 1200 sec	30 min / 1800 sec	30 min / 1800 sec
Required swimming speed	2.1 m/s	1.7 m/s	1.4 m/s	1.1 m/s
Percent of harbour porpoise cruising speed [1.2-2.0 m/s]	106-174 %	85-139 %	71-116 %	56-93%

The LF hearing group (Low frequency - baleen whales) also has some risk associated with the impact piling, but are predicted to have more time to vacate the area prior to reaching high risk of auditory injury (Figure 13 & Figure 14).

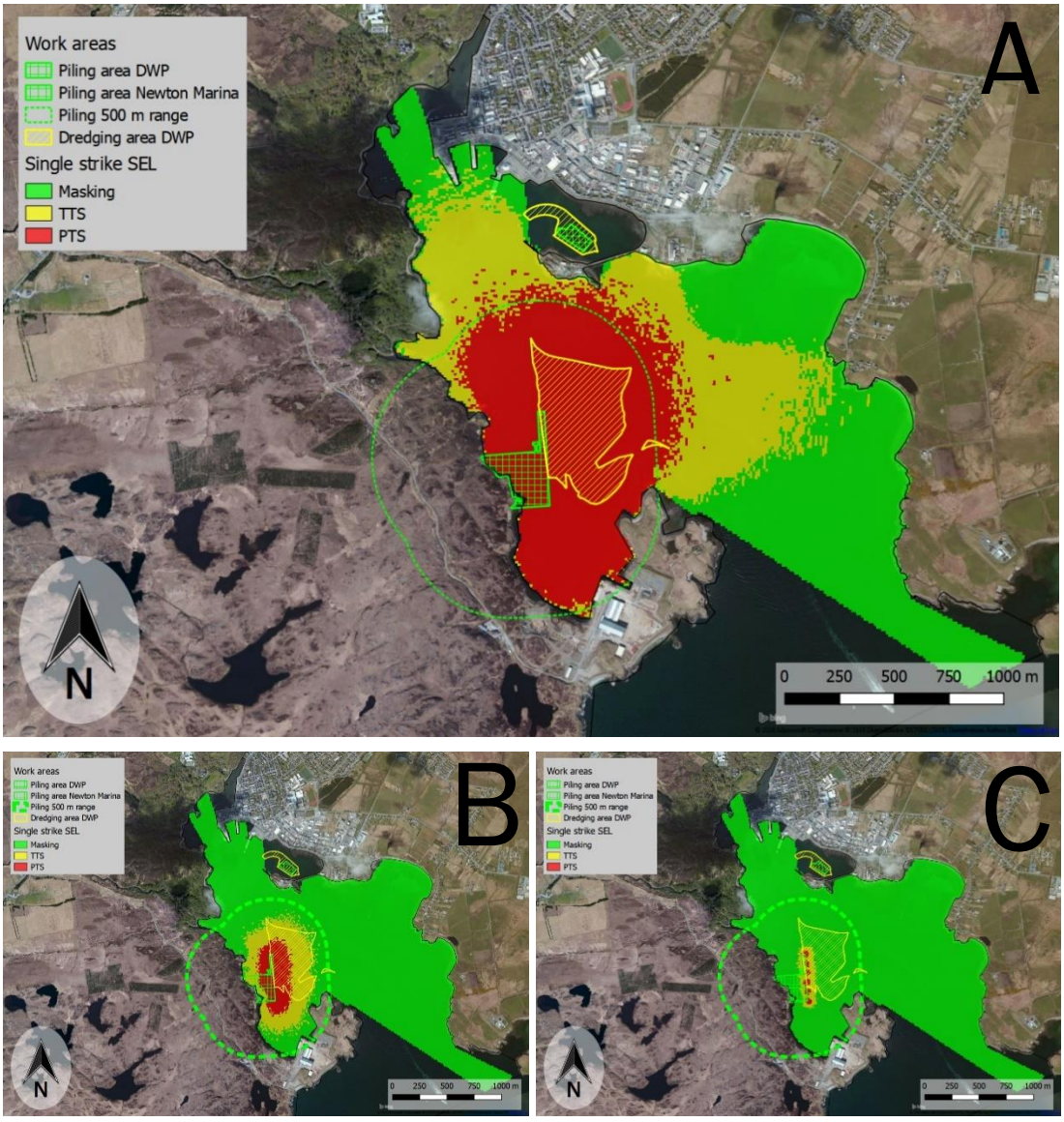
Other mammalian hearing groups aside from the LF & HF group (dolphins, seals and otters) have no risk, or a very limited risk of hearing impact from the impact piling given a soft start procedure,

as they will have more time to vacate the area and can do so even at moderate swimming speeds. None of the fish groups have PTS risk associated with the impact piling given a soft start procedure and assuming a mild fleeing response. Even if the fish stay within the harbour, and 4000 strikes at full power are realised per 24 hours, the effect will be a temporary threshold shift.

Impulsive, zero-to-peak - $dB_{z\text{-}p}$

We also assessed the effect of impact piling peak pressures ($dB_{z\text{-}p}$) on all hearing groups. Like for the dB_{SEL} single strike it is the HF group (harbour porpoise) that is the most sensitive and will therefore be the one focussed on. The PTS impact area for full energy impact strikes for harbour porpoise extends to < 700 m from the site, once more underlining the importance of a soft start to allow the animals to vacate the area. Note that the limits for $dB_{z\text{-}p}$ for the fish groups (Table 3, p.9) are only slightly higher than for the harbour porpoise, and so their impact maps are similar, but as limits are higher, impact is lower (smaller impacted areas). This metric is not accumulative, so repeated exposures will not change the risk zones.

Figure 16. Harbour porpoises are especially sensitive to impulsive noises (limit 202 dB_{z-p}), meaning that there is risk of injury from a single full power impact strike during piling. This emphasises the need for soft starts, to let the animal vacate the area, prior to full power impact strike. Map "A" is full strike power, map "B" 10 % power & map "C" 1 % power[11].

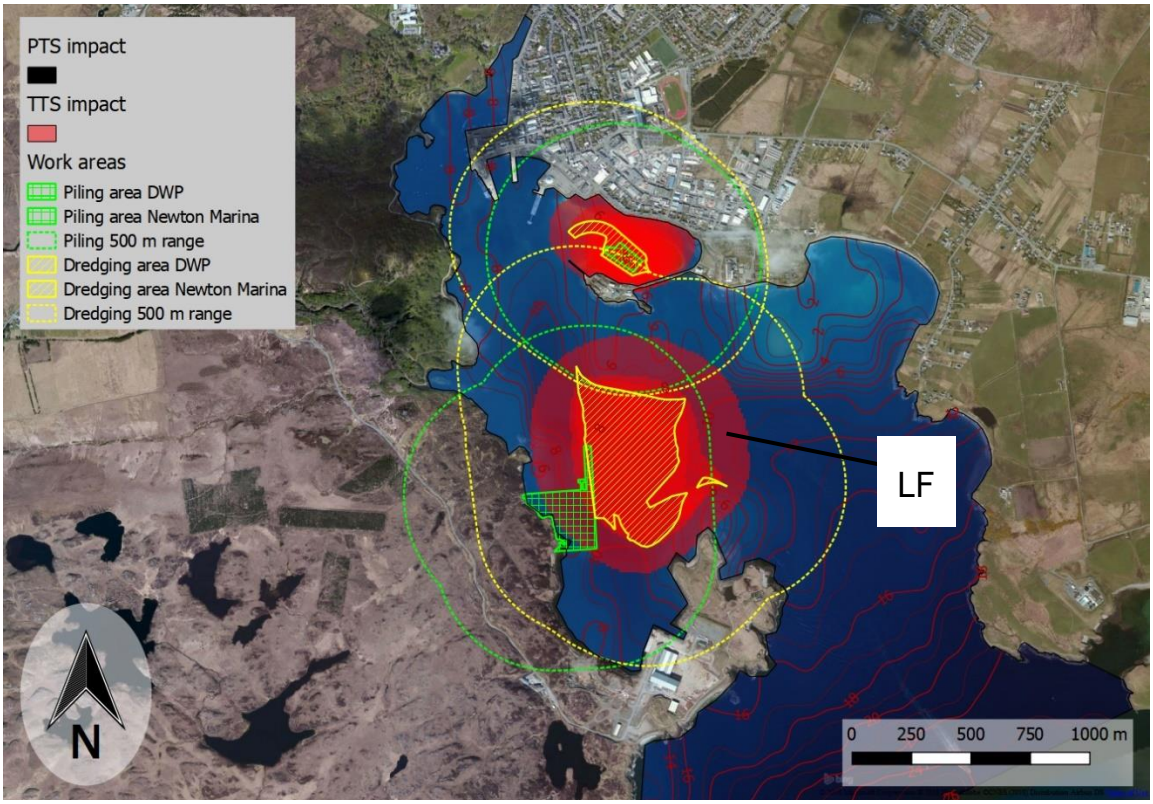


[11] These percentages assume that only hammer energy changes.

3.2.2 DREDGING

The dredging activity will have the lowest acoustic impact of the two activities with the TTS risk zone extending out to approx. 200 metres from the vessel, and this only for the low frequency group (LF), here represented by the minke whale. All remaining species groups will have to be within approx. 100 m of the vessel during operation, to have a risk of developing TTS.

Figure 17. Overview of impact zone for the dredging activities at the Deep Water Port. Red areas are all hearing groups' TTS impact areas. Dashed lines are 500 m buffer zones, with colours correpsonding to activity. The LF group has the greatest sensitivity to the dredging disturbance.



3.3 Long Term Impacts

The activities here assessed are projected to run over ten months (Jan – Oct 2019, Table 5, p.13). The summer and autumn months especially overlap with breeding times for at least three local species (Table 7, p.23). While the area of Stornoway Harbour is not itself designated as a protected area, we have no reason to doubt that the habitat is suitable for general foraging for most of the species of concern here. From the information we could find there are no breeding colonies of seals, nor is the area important as nursery grounds for cetaceans. While there are frequent sightings outside the harbour, they are infrequent[12] within the harbour (Hebridian Whale and Dolphin Trust, 2018). Given the presence of an MMO and listening equipment we therefore do not see any significant risk to the local population of marine mammals from the noise from this activity.

Given the low acoustic sensitivity of the *Salmo* species and basking shark (hearing group "P-"), the noise from the activities will have very little or no effect on this group (**Error! Reference source not found.**, p.**Error! Bookmark not defined.**).

[12] Over the last year there was 2 sightings in the harbour and 40 within 5 km outside the harbour.

Table 7. Breeding and/or important time periods for some of the local fauna. Only selected species presented here, according to perceived threat, based on presence information (sea watch foundation, 2018; The Mammal Society, 2018; Scottish National Heritage, 2018) & local NGOs.

Species		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Harbour seal (Phoca vitulina)	Birth												
	Lactation												
	Weaning												
Grey seal (Halichoerus grypus)	Birth												
	Lactation												
	Weaning												
Harbour porpoise (Phocoena phocoena)	Birth												
	Lactation												
	Weaning												
Atlantic salmon	Migration upriver												
	Migration to sea (smolt)												
European trout	Migration upriver												
	Migration to sea (smolt)												
Basking Shark	Presence												

4 CONCLUSION

We find no reason to conclude that the noise from the proposed activities, as described to Irwin Carr Consulting Ltd., will have a significant negative impact on the local population of any of the prioritised species, given the proposed mitigation measures (impact piling soft start).

We base this assessment on the combination of four factors:

1. The Stornoway Harbour represents an acoustically confined area, leading to a comparably small area being impacted for the associated noise level. We note that the North-East Lewis pMPA is designated for Risso's Dolphin (part of the MF hearing group), and that there is no danger of hearing loss in this area due to noise from the modelled activities (Figure 15, p. 19).

2. The modelling shows that the implementation of a soft start (JNCC, 2010) with a qualified Marine Mammal Observer, and the enforcement of the 500-metre exclusion zone during impact piling, will allow the animals to vacate the area and avoid significant negative impact (auditory injury).

3. The Stornoway Harbour has a low density of cetaceans, no seal colonies and is not designated as a protected site and therefore not thought to be a high-importance site for the animals. This means that a temporary dispersal away from the area has very little risk of having population impacts.

4. The three fish species of focus; salmon, trout and basking shark have comparably poor hearing and while they will likely sense the activity, there is little or no risk of any impact from the noise on these species.

5 REFERENCES

Bing Maps, 2018. *bing maps.* [Online]
Available at: https://www.bing.com/maps/aerial
[Accessed 27 March 2018].

BOEM, 2012. *Auditory Sensitivity in Sea Otters (Enhydra lutris),* Santa Cruz: BOEM.

Brandon M. Casper, D. A. M., 2007. Dipole hearing measurements in elasmobranch fishes. *Journal of Experimental Biology,* pp. 75-81.

British Geological Survey, 2018. *Geology of Britain Viewer.* [Online]
Available at: http://mapapps.bgs.ac.uk/geologyofbritain/home.html

Carlson, T., Hastings, M. & Popper, A., 2007. *Update on recommendations for revised interim sound exposure criteria for fish during pile driving activities,* Olympia: Washington Department of Transportation.

DFO Canada, 2006. *Effects of Seismic Energy on Fish: A Literature Review,* Dartmouth: Department of Fisheries and Oceans.

Google Inc., 2000-2018. *Google Maps.* [Online]
Available at: https://www.google.ie/maps

Graham, I. et al., 2017. Responses of bottlenose dolphins and harbor porpoises to impactand vibration piling noise during harbor construction. *Ecosphere,* pp. 0-16.

Hebridian Whale and Dolphin Trust, 2018. *Hebridian Whale and Dolphin Trust.* [Online]
Available at: https://whaletrack.hwdt.org/sightings-map/

JNCC, 2010. *Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise,* Aberdeen: http://jncc.defra.gov.uk/page-4274.

Kastelein, R. A., Voorde, S. V. d. & Jennings, N., 2018. Swimming Speed of a Harbor Porpoise (Phocoena phocoena) During Playbacks of Offshore Pile Driving Sounds. *Aquatic Mammals,* pp. 92-99.

Ketten, D. R., 1995. Estimates of blast injury and acoustic trauma zones for marine mammals from underwater explosions. *Sensory Systems of Aquatic Mammals,* pp. 391-407.

Mann, D. et al., 2001. Ultrasound detection by clupeiform fishes. *Journal of the Acoustical society of America,* pp. 3048-3054.

Marine Management Organisation, 2015. *Gov.uk.* [Online]
Available at:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/486651/Underwater_noise_source_literature_review_references_and_value_table_for_anthropogenic_sources__MMO_1097_.csv/preview

Nature Conservation (Scotland) Act , 2004. *Nature Conservation (Scotland) Act 2004,* s.l.: Scottish Government.

NOAA, 2016. *Guidance for Assesing the Effects of Anthropogenic Sound on Marine Mammal Hearing,* s.l.: National Oceanic and Atmospheric Administration.

NOAA, 2018. *NOAA Fisheries.* [Online]
Available at:
http://www.westcoast.fisheries.noaa.gov/protected_species/marine_mammals/threshold_guidance.html

Otani, S., Naito, Y., Kato, A. & Kawamura, A., 2002. Oxygen consumption and swim speed of the harbor porpoise Phocoena phocoena. *Fisheries Science,* pp. 894-898.

Reine, K. J., Clarke, D. & Dickenson, C., 2012. *Characterization of Underwater Sounds Produced by a Hydraulic Cutterhead Dredge Fracturing Limestone Rock,* New York: US Army Corps of Engineers.

Reine, K. J., Clarke, D. & Dickerson, C., 2014. Characterization of underwater sounds produced by hydraulic and mechanical dredging operations. *The Journal of the Acoustical Society of America,* pp. 3280-3294.

Robinson, S. P., 2015. *Dredging Sound Measurements.* Paris(France): National Physics Laboratory.

Santos-Dominguez, D., Torres-Guijarro, S. & Pena-Gimenez, A., 2015. Analyis of Dredger Noise Based on Experimental and Simulated Source Level Calculation.

Scottish National Heritage, 2018. *Scottish National Heritage.* [Online]
Available at: https://www.nature.scot/plants-and-animals/fish/freshwater-fish/

sea watch foundation, 2018. *sea watch foundation.* [Online]
Available at: http://seawatchfoundation.org.uk

Smith, M. E., Kane, A. S. & Popper, A. N., 2004. Acoustical stress and hearing sensitivity in fishes: does the linear threshold shift hypothesis hold water?. *The Journal of Experimental Biology,* pp. 3591-3602.

Southall, B. L. et al., 2007. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. *Aquatic Mammals,* pp. i-509.

Subacoustec, 2004. *Fish and Marine Mammal Audiograms: A summary of available information,* Hampshire: Subacoustech Ltd.

The Mammal Society, 2018. *The Mammal Society.* [Online]
Available at: http://www.mammal.org.uk/

UKHO , 2018. *United Kingdom Hydrographic Office INSPIRE Portal & Bathymetry DAC.* [Online]
Available at: http://aws2.caris.com/ukho/mapViewer/map.action

Washinton State Department of Transportation, n.d. *Washinton State Department of Transportation.* [Online]
Available at: https://www.wsdot.wa.gov/NR/rdonlyres/AF4933DD-46D6-4B8A-8644-487D45B19F6E/0/ImpactPileNoise7_12.pdf

Wittekind, D. K., 2014. A Simple Model for the Underwater Noise Source Level of Ships. *Journal of Ship Production and Design,* pp. 1-8.

Technical Appendix 5.5

Deep Water Port
Appendix 5.5: Otter Survey

March 2018

Deep Water Port
Appendix 5.5: Otter Survey

Client:	Stornoway Port Authority
Document number:	8394
Project number:	670526
Status:	Final
Author:	Various
Reviewer:	Matthew Heeps/Kate Elliott
Date of issue:	29 March 2018

Glasgow

Craighall Business Park
8 Eagle Street
Glasgow
G4 9XA
0141 341 5040
info@envirocentre.co.uk
www.envirocentre.co.uk

Aberdeen

Banchory Business Centre
Burn O'Bennie Road
Banchory
AB31 5ZU
01330 826 596

Inverness

Alder House
Cradlehall Business Park
Inverness
IV2 5GH
01463 794 212

Edinburgh

Suite 114
Gyleview House
3 Redheughs Rigg
Edinburgh
EH12 9DQ
0131 516 9530

This report has been prepared by EnviroCentre Limited with all reasonable skill and care, within the terms of the Contract with Stornoway Port Authority ("the Client"). The report is confidential to the Client, and EnviroCentre Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced or altered without the prior written approval of EnviroCentre Limited.

EXECUTIVE SUMMARY

EnviroCentre Limited was commissioned, on behalf of Stornoway Port Authority (SPA), to undertake otter (*Lutra lutra*) surveys to inform an Environmental Impact Assessment (EIA) in relation to the proposed Deep Water Port, near Stornoway, Isle of Lewis. The survey was requested to inform a Planning Permission in Principle application with an associated marine licence and Harbour Revision Order.

The European otter is the only native UK otter species. It is a European protected species (EPS) and is also fully protected in Scotland under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and under Schedule 5 of the Wildlife and Countryside Act 1981.

Otter surveys were conducted in May 2017 and February 2018 extending within and around the perimeter of the site and from within a boat circumnavigating the site boundary.

No direct evidence of otter was noted during the field survey and no otter resting sites were identified during the survey. Based on habitat types and desk study results for the wider area it is likely that otter are active within the area, utilising the coastal habitats.

Based on the results of this study, no EPS licensing, in relation to otter, is required to proceed with the project. Good practice recommendations regarding works in proximity to otter, should this species frequent the site during works, occurrences of otter frequenting the site in the future have been included in this report.

Contents

Executive Summary i
1 Introduction 1
1.1 Remit 1
1.2 Site Description and Project Overview 1
1.3 Legal Status: Otter 2
1.4 Report Usage 3
2 Method 4
2.1 Desk Study 4
2.2 Otter Survey 4
2.3 Survey Limitations 5
3 Results 6
3.1 Desk Study 6
3.2 Field Survey 6
4 Further survey and Licensing 7
5 Good Practice Mitigation 8

Appendices

A Site Boundary and Otter Survey Area
B Photographs

Tables

Table 2.1: Guidance for Assigning Status of Otter Resting Sites 5

1 INTRODUCTION

1.1 Remit

EnviroCentre Limited was commissioned, on behalf of Stornoway Port Authority (SPA), to undertake otter (*Lutra lutra*) surveys to inform an Environmental Impact Assessment (EIA) in relation to the proposed Deep Water Port, near Stornoway, Isle of Lewis.

The Deep Water Port 'site' is demarcated by the red line boundary as shown in Appendix A. The 'survey area' is shown in as a purple dashed line in the same document.

1.2 Site Description and Project Overview

The Deep Water Port site is located in the existing Cala Ghlumaig bay which is a north facing sheltered area with existing jetty, piers and land-based industrial unit complex. The site is approximately 2km south of the town of Stornoway, on the eastern coast of the Isle of Lewis. The site boundary comprises the marine environment, the rocky shore rising to vegetated habitats approximately 60m above sea level, including the fresh water burn known as Poll a' Choire and woodland in the north west. Immediately south of the site boundary is Loch Arnish, and immediately north west is the confluence of the River Creed (Allt Chlisgro) with upstream habitats comprising riparian woodland until passing beneath the A859 road. To the east the rocky shore continues to form a peninsula of reef rock.

The wider landscape the rocky shore habitats are continuous to the south, also to the north until meeting the port of Stornoway, and abundant elsewhere in the locale. Inland and to the west of the site, numerous lochs and interconnecting burns are present as well as woodland, agricultural, moorland and bog habitats.

Stornoway Port is the primary port for the Western Isles and one of the busiest ports on the west coast of Scotland north of the Clyde. The Port is central to the economy of the island, facilitating the lifeline ferry service and supporting almost all economic activities from fishing and aquaculture, to construction, retail and marine leisure. The Port is run by SPA; SPA's Board is committed to supporting activities that will benefit the local community, both socially and economically, and is aware that the Port of Stornoway is crucial to the economic future of Stornoway and the Outer Hebrides. The masterplan is driven by economic opportunities for the town, and will support job creation and a sustainable community.

With water depths of around 10.5 m at lowest tide, a 430m long berth will easily accommodate a typical cruise ship size of 300m. The sea bed will be dredged to depths of -9.5 CD at the entrance to the bay and -10.5m CD at berthing locations.

In summary, the proposed development contains the following components:

- Dredging of approximately 400,000 m³ of sea bed in Glumaig Bay, Stornoway Harbour to a depth of 10.5m below Chart Datum (CD) alongside the berth and 9.5m in the remaining area of dredge[1];
- Re-using dredged material to create reclaimed land along the western shore of Glumaig Bay; the shortfall in dredged material will be made up by blasting and excavation of approximately 600,000m³ of rock;
- Rock armouring along reclamation slopes (approximately 30,000m[3]) and exposed road lines;
- 250m long quay wall;

[1] The difference in dredge depths is to allow operational flexibility of the berth.

- 180m long multifunctional, double-sided finger pier;
- Linkspan;
- 10 hectare reclaimed and levelled area for port activities, industrial and storage uses;
- Cutting/filling, extraction and reshaping of the land including excavation of peat;
- Heavy lift area of 2500m^2
- Freight ferry line featuring roll-on, roll-off (ro-ro) berthing to allow for a dedicated freight ferry;
- Proposed culvert over the Allt Poll A' Choire Stream;
- Proposed access road to existing Arnish Road;
- Link road along the coast to existing Arnish Industrial Estate (two options available); and
- Utility and services infrastructure (water, electricity, fuel).

1.3 Legal Status: Otter

The European otter (*Lutra lutra*) is the only native UK otter species. It is a European protected species (EPS) and is also fully protected in Scotland under the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) and under Schedule 5 of the Wildlife and Countryside Act 1981.

It is a breach of legislation to:

- capture, kill, disturb or injure otters (on purpose or by not taking enough care)
- damage or destroy a breeding or resting place (deliberately or by not taking enough care)
- obstruct access to their resting or sheltering places (deliberately or by not taking enough care)
- possess, sell, control or transport live or dead otters, or parts of otters[2]

[2] https://www.gov.uk/guidance/otters-protection-surveys-and-licences

1.4 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 retain ownership of the copyright and intellectual content of this report. Any distribution of this report should be controlled to avoid compromising the validity of the information or legal responsibilities held by both the Client and EnviroCentre Ltd (including those of third party copyright). EnviroCentre 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.

2 METHOD

2.1 Desk Study

A search for pre-existing information on otter from the Outer Hebrides Biological Records[3] data set was included in a desk based study conducted for a 5km radius of the site.

2.2 Otter Survey

Survey for otter was conducted on two occasions, by suitable qualified and experienced ecologists:

- 5th of May 2017 by Elizabeth Clements MSc MCIEEM; and
- 27th of February 2018 by Matthew Heeps MSc.

The otter survey was conducted along the coastline of the site and from within a boat circumnavigating the site boundary and the coastline. Additionally the survey was conducted inland surrounding the immediate site boundary where access allowed and extended upstream along the River Creed to beyond the A859. The survey also encapsulated Poll a' Choire, a small bay with a minor fresh water source in the north of the site boundary. The survey area is depicted in Appendix A.

The survey followed standard guidelines[4, 5] and aimed to identify suitable otter habitat and field signs, including:

- Spraints (otter faeces/droppings used as territorial signposts. Often located in prominent positions and can be placed on deliberate piles of soil or sand). Three categories are used for describing otter spraint: Dried fragmented (Df); Dried intact (Di); and Not fully dry (Nd);
- Footprints;
- Feeding remains (can often be a useful indication of otter presence);
- Paths/slides (otter can often leave a distinctive path from and into the watercourse);
- Holts (underground shelter) are generally found:
    - Within trees roots at the edge of the bank of a river;
    - Within hollowed out trees;
    - In naturally formed holes in the river banks (or shoreline) that can be easily extended;
    - Or preferably in ready-made holes created by other large mammals such as badger setts, rabbit burrows or outlet pipes; and
- Couches/lay-ups (couches or lay-ups are places for lying up above ground are usually located near a watercourse, between rocks or boulders, under dense vegetation).

In order to assess their importance, and thus determine the likely impact of any proposed development, the status of otter resting sites was assigned from Low to High according to Table 2.1 below[6].

[3] Outer Hebrides Biological Records. Available at: https://www.ohbr.org.uk/
[4] Chanin, P. (2003). Monitoring the Otter *Lutra Lutra*. Conserving Natura 2000 Rivers, Monitoring Series (No. 10). Peterborough: EN, CCW, EA, SEPA, SNH & SNIFFER. Available from: http://www.snh.gov.uk/docs/B359156.pdf
[5] SNH Otter survey guidance. Available from: http://www.snh.gov.uk/about-scotlands-nature/wildlife-and-you/otters/assessing/
[6] Bassett, S., & Wynn, J. (2010). Otters in Scotland: How Vulnerable Are They to Disturbance? *CIEEM In Practice*, (70), 19–22. Retrieved from file:///M:/Library/_By%20author/CIEEM/In-Practice-IP70_Dec_2010.pdf

Table 2.1: Guidance for Assigning Status of Otter Resting Sites

Resting Site Status	Definition
Low	Feature with limited evidence of otter activity – low number of spraints, not all age classes present. Insufficient seclusion to be a breeding site or key resting site, unlikely to have links to the key otter requirements. Most likely to provide a temporary 'stop off' for otters when moving through their territory. Loss/disturbance of such a feature is unlikely to be significant in terms of the individual or population.
Moderate	Feature containing sprainting with a range of age classes, but not in significant quantities. Availability may be limited by season, tides or flow. Unlikely to be suitable as a breeding/natal site but will be a key resting site and may be linked to other important features within the territory. The impact arising from a loss or disturbance of such a feature will be determined by the availability of more suitable or well used sites within the otter's territory.
High	Feature has a high level of otter activity, including an abundance of sprainting of all age classes, large spraint mounds, well used grooming hollows, paths and slides. Affords a high degree of cover and is linked to key features such as fresh water and abundance of prey. May be suitable as a breeding area (spraints may be absent from natal holts). The site is usually available at all times of year and at high and low tide/flow. The loss/ disturbance of such as feature will often be considered significant in terms of the individual or population.

2.3 Survey Limitations

The survey findings represent a snapshot of field evidence and potential observations on the given survey dates in May 2017 and February 2018. Tidal action can regularly remove field evidence such as spraints and foot prints. Therefore coastal survey is usually reliant on obvious signs above the high water mark, or direct observations.

3 RESULTS

3.1 Desk Study

A total of 17 records of otter within 5km of the site were returned from the biological records data set over a period dating back to the early 20th Century.

Three recent records (2010 onwards) indicate sightings of single adult otters approximately 4km to the north, east and west of the site. There is an additional record of a single adult otter located on Eilean Ghrodia, at the confluence of the River Creed, approximately 500m north of the site.

Anecdotally, otter were observed in 2017 to the south of the site by the Outer Hebrides Fisheries Trust Biologist, Paul Hopper, and this has been shown In Appendix A as Target Note 1.

From this desk study it can be deduced that otter have been present in nearby habitats and the wider landscape for a number of years.

3.2 Field Survey

No direct evidence of otter (sightings, spraint, prints etc.) was noted during the field survey and no otter resting sites were identified during the survey of the area surrounding the Deep Water Port site.

Otter, utilising marine environments, require a source of fresh water in order to maintain good fur condition. The Deep Water Port site boundary contains one fresh water source in the north at Poll a' choire; and Loch Airnis and the confluence of the River Creed (both with anecdotal otter sightings as described in Section 3.1) are situated immediately adjacent to the site. It is considered that otter will be present at these features either regularly, or at certain points during the year.

Otter could utilise features along the coastline particularly; isolated rock pools, rocky outcrops, the boulder-heavy shoreline and natural alcoves in the rocks for resting, foraging and commuting through the landscape. A general perspective of the coastal habitat can be understood from the photographic record in Appendix B.

It is likely that otter are active within the area regularly and utilise the coastal habitats in a range of ways. The marine environment constitutes a typical hunting area and is likely to provide a reliable range of prey items from crustaceans to small and medium sized fish. Coastal bird's eggs may also feature in their diet. It is likely that adolescent otters will use the marine environment to socialise and hone their hunting skills.

Otter are most active between dusk and dawn. However, in this habitat, they are likely to adapt their behaviour to maximise the benefits of hunting during optimal tide times, including the shoreline. Otter can become accustomed to regular human behaviour, therefore sightings may be recorded at locations often visited by people, such as is evident from anecdotal sightings south of the industrial units associated with the site.

4 FURTHER SURVEY AND LICENSING

As no resting sites for otter have been discovered and no direct evidence of otter observed within survey area during this study, it is considered that no European Protected Species licensing for otter is required to proceed with the project.

Ecological data is generally valid for a 12 month period from the date of field survey. It is suggested that the baseline data for otter is updated, including a search for any new data records, at least annually in order to maintain validity.

Prior to works commencing, a pre-works check in the form of a site-walkover to search for any newly created resting sites, should be undertaken. On site monitoring, in conjunction with other ecological monitoring (e.g. Ecological Clerk of Works/ Marine Mammal Observations) will inform construction activities as to any otherwise unforeseen ecological constraints relating to otter habitat.

Should future survey or monitoring highlight a constraint posed by otter in relation to this site, then the need for species licensing should be reviewed.

5 GOOD PRACTICE MITIGATION

Despite no field signs or direct observations of otter during the field surveys, it is assumed that otter are present in the near landscape. Therefore the following good practice is recommended in order to minimise effects on otter which may frequent the area:

- Regular update of baseline otter data in the form of searches for field evidence and monitoring should be undertaken in order to ascertain the presence of any otter resting sites posing a constraint to the project at the earliest possible convenience;
- There is anecdotal evidence of otter activity near to the site boundary, and assuming this activity would continue in the future, should be included in tool box talks and site induction for staff operating in this area;
- Works associated with land above the high water mark should be preceded by a pre-works check for otter resting sites as described in Section 4;
- If an otter is observed within the proposed working areas, seek guidance from an Ecological Clerk of Works (ECOW) regarding any mitigation or licensing requirements and do not commence works until the otter has dispersed;
- Should an otter resting site be discovered, prior to or during works, said works should be assessed with regards to the need for additional mitigation species disturbance licensing;
- Monitoring for otter activity within the marine environment could be encapsulated within ECoW or Marine Mammal Observations (MMO) prior to such operations as coastline ground works, dredging, piling, works with associated noise and vibration considerations; Artificial lighting should be directed towards the working areas only in order to minimise the effects on otter which can be more active between dusk and dawn;
- Pollution of the marine environment should be prevented in order to safeguard water quality and marine life which otter rely on within these habitats;
- Particular attention should be paid to the potential presence of otter when planning works in proximity to Loch Airnis, Poll a' Choire and the confluence of the River Creed. Task specific mitigation for otter is suggested in these areas;
- A 20mph speed limit for site vehicles and warning signage for drivers will reduce the risk of otter injury/fatality from road traffic collisions.

APPENDICES

A SITE BOUNDARY AND OTTER SURVEY AREA

B PHOTOGRAPHIC RECORD

Photo 1: Coastal Otter habitat adjacent to the Deep Water Port development (Stornoway).

Photo 2: Coastal habitat around the Deep Water Port development

Technical Appendix 5.6

Stornoway Deep Water Port Development
Technical Appendix 5.6: Fisheries Baseline Report

March 2018

Stornoway Deep Water Port Development
Technical Appendix 5.6: Fisheries Baseline Report

Client:	Stornoway Port Authority
Document number:	8109
Project number:	670525
Status:	Final
Author:	Matthew Heeps
Reviewer:	Kate Elliott/Kathy Dale
Date of issue:	27 March 2018
Filename:	Stornoway Deep Water Port Baseline Fisheries Report (Final)

Glasgow

Craighall Business Park
8 Eagle Street
Glasgow
G4 9XA
0141 341 5040
info@envirocentre.co.uk
www.envirocentre.co.uk

Aberdeen

Banchory Business Centre
Burn O'Bennie Road
Banchory
AB31 5ZU
01330 826 596

Inverness

Alder House
Cradlehall Business Park
Inverness
IV2 5GH
01463 794 212

Edinburgh

Suite 114
Gyleview House
3 Redheughs Rigg
Edinburgh
EH12 9DQ
0131 516 9530

This report has been prepared by EnviroCentre Limited with all reasonable skill and care, within the terms of the Contract with Stornoway Port Authority ("the Client"). The report is confidential to the Client, and EnviroCentre Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced or altered without the prior written approval of EnviroCentre Limited.

EXECUTIVE SUMMARY

The Fisheries Baseline Report for the proposed Stornoway Deep Water Port Development (hereafter referred to as the "proposed development") covers baseline conditions of the anadromous populations of Atlantic Salmon (*Salmo salar*) that return annually to the River Creed (the migratory path to which lies in direct line through the proposed development area) and Sea Trout (*Salmo trutta*) that return annually to both the River Creed and nearby Glen River. In addition, this report also includes full consideration of baseline conditions of the other migratory species shown to populate the development area, the European Eel (*Anguilla anguilla*). Site visits to Stornoway were made in both May 2017 and February 2018 to verify baseline conditions and liaise with the Outer Hebrides Fisheries Trust (OHFT), Stornoway Angling Association (SAA) and Stornoway Port Authority (SPA). Desk study information was used to support the existing data.

The River Creed catchment has a high substrate percentage of good spawning gravels, suitable for use by both Salmon and Sea Trout. Similar substrate can also be found in the lower reaches of the Glen River. The primary limiting factors to access of spawning gravels within the River Creed catchment is the impassable weir downstream of Loch an Ois and the obstruction at Hatchery Pool. Similarly, on the Glen River, the 2011 Habitat Survey, commissioned by the OHFT, identifies the presence of several pipes and a fence line that crossed the Glen River, accumulating waste build-up during high water conditions and forming unnatural obstacles to fish passage.

According to the most recent available fully-quantitative electro-fishing survey data, the River Creed supports large numbers of both juvenile Salmon and Trout. The same data set also showed juvenile Trout populations on the Glen River, no juvenile Salmon were found on the Glen River. Juvenile Salmon from the River Creed that have undergone Smoltification will migrate to sea between May and August.

Both the River Creed and the Glen River support populations of European Eel and 3-Spined Sticklebacks. The 2010 electro-fishing survey report showed the most overwhelmingly significant numbers of European Eel were found in the lower River Creed.

Prior to the introduction of the initial Conservation of Salmon (Scotland) Regulations in 2016, the River Creed held a Category 1 conservation status. The River Creed has now seen its conservation status fall from Category 1 in 2017 to Category 2 in 2018. It is anticipated that the downgrading of the River Creed Conservation Status will result in reduced angling pressure and an inevitable reduction in revenue generated from angling within the local economy. With no known Salmon population within it, the Glen River is not affected by the aforementioned Regulations and therefore is uncategorised.

The overwhelming majority of Salmon and Sea Trout run into the River Creed between July and August, with the majority of the angling catch from the Creed occurring between July and October. Sea Trout will also migrate into the Glen River during July and August, however there is no recorded angling catch from the Glen River as this water is not recreationally fished.

Contents

Executive Summary i
1 introduction 1
1.1 Remit 1
1.2 Aims and Objectives 1
1.3 Project Overview 1
1.4 Policy, Legislation and Guidance 2
1.5 Assessment Limitations 3
2 Methodology 4
2.1 Desk Study 4
2.2 Importance of Key Species 4
2.3 Fisheries Habitat 4
2.4 Juvenile Salmonid and Trout Density 4
2.5 Conservation Status Assessment 5
2.6 Angling Pressure and Catch Returns 6
3 Baseline Conditions 7
3.1 River Creed 7
3.2 Glen River 10
3.3 Conservation Status Assessment 12
3.4 Angling Pressure and Catch Returns 13
References 15

Appendices

A Site Location Plan
B Catch return figures for Salmon and Sea Trout on the River Creed (2013 – 2017)
C Locations of Electro-Fishing survey sites for the River Creed and Glen River

Figures

Figure 1: Impassable Weir (River Creed Catchment) at Loch an Ois (Upstream View) 7
Figure 2: Impassable Weir (River Creed Catchment) at Loch an Ois (Downstream View) 8
Figure 3: Weir (River Creed) at Hatchery Pool (Upstream View) 8
Figure 4: Pipes (Left and Right Images) Across the lower Glen River 11
Figure 5: Catch Return Figures for Salmon and Sea Trout (River Creed) 2001 - 2017 14

Tables

Table 2.1: Juvenile Salmonid Classification System 5
Table 2.2: Categorisation Ranges for Juvenile Salmonids in the Outer Hebrides (per 100m^2) as Determined by the SFCC (2006). 5
Table 2.3: Conservation Status Categories (Conservation of Salmon (Amendment) Scotland Regulations (2018). 6
Table 3.1: Baseline Fisheries Report (2010) Electro-Fishing Survey Results (River Creed). 9

1 INTRODUCTION

1.1 Remit

EnviroCentre Limited was commissioned on behalf of Stornoway Port Authority (SPA) to undertake a Baseline Report for Fish to inform an Environmental Impact Assessment (EIA) in relation to the proposed development of the Deep Water Port, Stornoway, Isle of Lewis. The survey was requested to inform a Planning Permission in Principle (PPiP) application with an associated marine licence and Harbour Revision Order (HRO).

The 'site' is defined as the area demarcated by the red line boundary as shown in Appendix A. The 'study area' constitutes the area of the 'site' plus appropriate buffer zones (shown in blue).

1.2 Aims and Objectives

The aim of this report is to provide an ecological baseline of migratory fish populations to be referred to in terms of the proposed development. The main objectives were as follows:

- Identify and describe the baseline existing migratory fish populations;
- Identify and describe the baseline habitats of existing migratory fish populations;
- Identify and describe the baseline juvenile Salmonid conditions of those populations residing within watercourses; and
- Identify and describe any existing obstacles to fish migration within watercourses.
- Identify and describe, where applicable, the Conservation Status of any watercourses potentially impacted upon by the proposed development.
- Identify and describe current angling pressure on all water courses potentially impacted upon by the proposed development.

1.3 Project Overview

Stornoway Port is the primary port for the Western Isles and one of the busiest ports on the west coast of Scotland north of the Clyde. The Port is central to the economy of the island, facilitating the lifeline ferry service and supporting almost all economic activities from fishing and aquaculture, to construction, retail and marine leisure. The Port is run by SPA; SPA's Board is committed to supporting activities that will benefit the local community, both socially and economically, and is aware that the Port of Stornoway is crucial to the economic future of Stornoway and the Outer Hebrides. The masterplan is driven by economic opportunities for the town, and will support job creation and a sustainable community. Phase 1 of the proposals provides 430m of quay, a new 150m long freight ferry berth, a heavy lifting area and 10ha of laydown, storage and development land behind the quay.

With water depths of around 10.5 m at lowest tide, a 430m long berth will easily accommodate a typical cruise ship size of 300m. The sea bed will be dredged to depths of -9.5 CD at the entrance to the bay and -10.5m CD at berthing locations.

In summary, the proposed development contains the following components:

- Dredging of approximately 400,000 m³ of sea bed in Glumaig Bay, Stornoway Harbour to a depth of 10.5m below Chart Datum (CD) alongside the berth and 9.5m in the remaining area of dredge[1];
- Re-using dredged material to create reclaimed land along the western shore of Glumaig Bay; the shortfall in dredged material will be made up by blasting and excavation of approximately 600,000m³ of rock;
- Rock armouring along reclamation slopes (approximately 30,000m³) and exposed road lines;
- 250m long quay wall;
- 180m long multifunctional, double-sided finger pier;
- Linkspan;
- 10 hectare reclaimed and levelled area for port activities, industrial and storage uses;
- Cutting/filling, extraction and reshaping of the land including excavation of peat;
- Heavy lift area of 2500m²
- Freight ferry line featuring roll-on, roll-off (ro-ro) berthing to allow for a dedicated freight ferry;
- Proposed culvert over the Allt Poll A' Choire Stream;
- Proposed access road to existing Arnish Road;
- Link road along the coast to existing Arnish Industrial Estate (two options available); and
- Utility and services infrastructure (water, electricity, fuel).

The Outer Hebrides Local Development Plan (LDP) 2012 identifies Arnish as a safeguarded, first phase, site in the National Renewables Infrastructure Plan (NRIP) (Prop E1a Arnish, Lewis).

1.4 Policy, Legislation and Guidance

The compilation of this chapter has taken cognisance of the following Policy, Legislation and Guidance:

- WFD111 Phase 2a Coarse Resolution Rapid-assessment Methodology to Assess Obstacles to Fish Migration 2010;
- United Kingdom Technical Advisory Group (UKTAG) River Assessment Method River Continuity Barrier to Fish Migration Method (Scotland) WFD-UKTAG 2015;
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (The Habitats Directive);
- The Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;
- The Wildlife and Countryside Act 1981 (as amended) (WCA);
- The Nature Conservation (Scotland) Act 2004 (NCA);
- The Conservation of Salmon (Amendment) Scotland Regulations 2018;
- The Wildlife and Natural Environment (Scotland) Act 2011 (WANE);
- The Conservation (Natural Habitats, &c.) Amendments (Scotland) Regulations 2007 (The Habitats Regulations);
- The Water Environment (Controlled Activities) (Scotland) Regulations 2005 (CAR);
- The Salmon (Fish Passes and Screens) (Scotland) Regulations 1994;
- The Outer Hebrides Local Development Plan (2012);
- The Highland-wide Local Development Plan (HwLDP) (April 2012);
- The West Highlands and Islands Local Plan, as continued in force (April 2012);
- The Outer Hebrides Local Development Plan 2 (Under Examination by Scottish Ministers);
- River Crossings and Migratory Fish: Design Guidance by the Scottish Executive (2000);
- Guidance for Pollution Prevention (GPPs) 2017 by Scottish Environmental Protection Agency (SEPA).

[1] The difference in dredge depths is to allow operational flexibility of the berth.

1.5 Assessment Limitations

Understandably, having availability of electro-fishing survey data more recent than 2010 would have been preferable from a perspective of ensuring the total validity of the conclusions drawn. However, such was the quality of both the methodology and reporting from the Stornoway Wind Farm (2010) Fisheries Baseline Survey Report, it is considered that the slight age of the data is not enough of a limitation to this report to be of sufficient need to undertake a full raft of new surveys. It is unfortunate that the 2017 semi-quantitative Glen River electro-fishing surveys were not undertaken to the same methodology as the fully quantitative 2010 surveys, making their results less conclusive and essentially incomparable to the prior study.

Some historic angling catch data was unavailable, however this is not considered a major limitation to this report, with the provision of five years' worth of catch returns from the OHFT. It goes without saying though that the larger the data set that would have been available, the more accurate the long term averages relating to returns of Salmon and Sea Trout would have been.

2 METHODOLOGY

2.1 Desk Study

A detailed desk study was undertaken in order to gather any relevant existing information pertaining to the natural fish populations and fishing interests within the study area. As part of this data collation exercise the following sources of information were used:

- 2010 electro-fishing survey data from the River Creed and Glen River;
- 2011 Glen River Catchment Action Plan;
- http://syangling.com/ (accessed March 2018);
- Records from the OHFT http://www.outerhebridesfisheriestrust.org.uk/ (accessed February 2018);
- UK Biodiversity Action Plan (UKBAP) http://jncc.defra.gov.uk/page-5164 (accessed March 2018); and
- International Union for Conservation of Nature (IUCN) Red List of Threatened Species http://www.iucnredlist.org/details/60344/0 (accessed March 2018).
- https://www.nature.scot/plants-animals-and-fungi/fish/freshwater-fish/european-eel (accessed March 2018).

2.2 Importance of Key Species

The Atlantic Salmon is listed as a priority species under the UK Biodiversity Action Plan (BAP) and is therefore of National (UK) Importance. Similarly, Sea Trout are listed as priority species under the UK BAP and, as a result, their populations of both the River Creed and Glen River are also of National (UK) Importance. The European Eel is classified as both a UK BAP priority species and Critically Endangered on the International Union for the Conservation of Nature (IUCN) Red List, making the populations of these fish in both of the aforementioned watercourses of International importance.

With regard to the watercourses potentially impacted upon by the proposed development, the River Creed and the Glen River, there are currently no designations applied to any of the above mentioned species.

2.3 Fisheries Habitat

Envirocentre ecologists made site visits to the proposed development, the River Creed, Glen River and surrounding area in May 2017 and February 2018. As part of those visits, meetings were held with representatives of the OHFT, Stornoway Angling Association (SAA) and SPA, to discuss their collective concerns and collect all available relevant data to contribute towards the desk study elements of this report. Specific site visits were made to both the River Creed, Glen River and adjacent coastline around the proposed development to observe and identify the habitat of those fish species potentially impacted.

In 2011, the OHFT commissioned a full Habitat Survey as part of the Glen River Catchment Action Plan. This report was made available to Envirocentre and reviewed as part of the desk study. The current status of the findings and recommendations of the report were then verified during the February 2018 site meeting with OHFT biologist, Paul Hopper and OHFT Angling Promotion Officer, Donnie MacIver.

2.4 Juvenile Salmonid and Trout Density

In order to obtain baseline data on the status of fish populations in watercourses within the area potentially affected by the proposed development, the juvenile salmonid population surveys undertaken in the summer of

2010 for the Stornoway Wind Farm development, that used fully quantitative electro-fishing techniques, were reviewed. These surveys were carried out in accordance with Scottish Fisheries Coordination Centre (SFCC) standards, by a team of accredited staff from the OHFT. Further electro-fishing surveys of the Glen River, undertaken to the same SFCC standards by the same accredited OHFT staff, were undertaken in 2017, as part of a three year review of the health of the Glen River, which is due to end in 2019. Due to time constraints on OHFT staff however, these surveys were undertaken on a quantitative (one run) basis as opposed to the fully quantitative (three run depletion) method utilised in 2010. As such, the results from the 2017 surveys cannot reliably be compared to those from 2010 and have been omitted from the study.

For the purposes of assessment via electro-fishing, juvenile salmonids are classified under four headings. Table 2.1 (below) outlines this classification system.

Table 2.1: Juvenile Salmonid Classification System

Juvenile Salmonid	Age	Definition
Salmon Fry	0+	Young Salmon, <1 year old
Salmon Parr	1+ and older, known as 1++ fish	Young Salmon >1 year old (Inc. 2+ and 3+ year old fish)
Trout Fry	0+	Young Trout, <1 year old
Trout Parr	1+ and older, known as 1++ fish	Young Trout, >1 year old (Inc. 2+ and 3+ year old fish)

In order to put the 2010 survey results into context, the data was divided into categories, which have had their parameters set by historic local fish population information, gathered by the SFCC between 1997 and 2002. The categories, explained in Table 2.2, were inevitably subject to regional conditions at the time of data collection so, with this in mind, confidence in their robustness from which to draw accurate conclusions cannot be absolute, however they do provide as strong a relative guide as is available at this time. It is also important to note that the differentiation between juvenile Fry and Parr stages of Brown Trout and Sea Trout is, in practical terms, impossible. Where both Brown Trout and Sea Trout populate a watercourse, as is the case in the River Creed and Glen River, the assessment of 0+ and 1++ numbers of Trout is therefore undertaken on the assumption that the surveyed population is of a potentially mixed reproductive background.

Table 2.2: Categorisation Ranges for Juvenile Salmonids in the Outer Hebrides (per 100m^2) as Determined by the SFCC (2006).

Fish Density Quintile	Salmon 0+	Salmon 1++	Trout 0+	Trout 1++
Minimum (Very Low)	0.50	0.71	0.16	0.17
20th Percentile (Low)	2.86	2.37	1.74	1.00
40th Percentile (Moderate)	5.58	5.33	3.22	2.14
60th Percentile (High)	9.53	9.26	6.55	3.75
80th Percentile (Very High)	15.55	14.15	11.89	7.07

2.5 Conservation Status Assessment

The Conservation of Salmon (Scotland) Regulations 2016 outlined for the first time a system whereby the killing of Atlantic Salmon within inland waters is managed on an annual basis by categorising the conservation status of their stocks. In general terms, these Regulations achieve the following;

- Prohibit the retention of Salmon caught in coastal waters;
- Permit the killing of Salmon within those inland waters in which the stocks are identified as above a defined conservation limit (i.e. those designated as Category 1 or 2 status for the fishing season); and

- A requirement for mandatory catch and release of Salmon from within inland waters which fell below their defined conservation limit following the stock assessment (i.e. those rivers designated as Category 3 status for the fishing season).

The Scottish Government have recently completed an updated assessment of the conservation status of Salmon and have now made Regulations to set out detailed provisions to control the retention of Salmon for the 2018 fishing season. Under the Regulations, the conservation status of any given watercourse is defined by the probability of the stock meeting its conservation limit over a five year period. Based upon its stocks, a watercourse is then allocated one of the three grades that can be seen in Table 2.3 (below), with accompanying appropriate management actions.

Table 2.3: Conservation Status Categories (Conservation of Salmon (Amendment) Scotland Regulations (2018).

Category	Probability of Meeting Conservation Limit	Management Advice
1	At Least 80%	Exploitation is sustainable therefore no additional management action is currently required. This recognises the effectiveness of existing non-statutory local management interventions.
2	60-80%	Management action is necessary to reduce exploitation; mandatory catch and release will not be required in the first instance, but this will be reviewed annually.
3	<60%	Exploitation is unsustainable therefore management actions required to reduce exploitation for 1 year i.e. mandatory catch and release (all methods).

2.6 Angling Pressure and Catch Returns

According to the SAA, angling on the River Creed commences each spring on the 1st of April, with the season running through until the 15th of October annually. As is law in Scotland, fishing is permissible for six days each week, with no angling occurring on Sundays. Fishing rights on the Creed are managed by the SAA, who have a membership system for local residents of Harris and Lewis, and then offer additional fishing to visitors on a day ticket basis. During meetings with the OHFT and the SAA, it was stated that fishing pressure on the river varies annually and is primarily dependent on the conservation status of the Creed at that time. It is an established fact within Scottish angling that a large percentage of travelling recreational rod and line Salmon anglers prefer to target Category 1 Rivers, from which they are more likely to be able to take a fish home for personal consumption, as opposed to Category 2 and 3 Rivers, which will likely to be subject to strict conservation (catch and release) measures.

The annual catch returns for the River Creed are logged by the SAA, who hold records going back over several decades. Data relating to catches of Salmon and Sea Trout from the River Creed for the last five years has been made available for the purposes of this report, and is presented in Appendix B. No rod and line angling occurs on the Glen River.

3 BASELINE CONDITIONS

3.1 River Creed

3.1.1 Existing Information on Migratory Fish Populations

The River Creed (Abhainn Ghrìoda) is the primary watercourse within the area of potential impact from the proposed development. The Creed is known to support populations of both the Atlantic Salmon and Sea Trout, as well as European Eel (*Anguilla anguilla*). Electro-fishing data from the OHFT provides no evidence to suggest that there are any known populations of River Lamprey (*Lampetra fluviatilis*) or Sea Lamprey (*Petromyzon marinus*) within the river. General fisheries management of the River Creed falls under the care of the OHFT, with angling permits on the river issued by the SAA. Historic SAA records clearly illustrate that the majority of the Salmon, Grilse and Sea Trout that run into the Creed annually do so between the months of July and August, with then-resident fish being caught right up until the end of the season in October.

3.1.2 Fisheries Habitat

As is apparent from the electro-fishing results and the broad geographical spread of sites holding high numbers of juvenile salmonids within the system, the River Creed catchment is broadly characterised by good spawning gravels, suitable for use by both Salmon and Sea Trout. The availability of spawning substrate can certainly not be described as a limiting factor to all species of salmonids in the River Creed. As the system sits, the OHFT identify that the largest limiting factor to increased availability of spawning gravels within the Creed is the impassable weir downstream of Loch an Ois. This weir has an existing pool and drop style chamber fish pass engineered on to it, however errors were made during the engineering and construction of the fish pass which, as a result, have left the upstream edge of the pass too high to allow suitable water flow into it to ensure correct functionality, as can be seen in the photos below.

Figure 1: Impassable Weir (River Creed Catchment) at Loch an Ois (Upstream View)

Figure 2: Impassable Weir (River Creed Catchment) at Loch an Ois (Downstream View)

A second obstacle exists within the River Creed catchment, in the form of a partially impassable dam at the Hatchery Pool (SO405325). As can be seen in Figure 3, the dam is passable at regular flow rates and, although it is not known to dry up, it becomes more of an obstruction to upstream migration during low flow conditions. As with the dam below Loch an Ois, the potential for migratory salmonids to access additional spawning gravels would only be increased by easement or removal of these obstructions.

Figure 3: Weir (River Creed) at Hatchery Pool (Upstream View)

3.1.3 Existing Information on Juvenile Salmond Density

For the Stornoway Wind Farm Baseline Fisheries Assessment, a total of 11 sites were subject to electro-fishing survey on the River Creed between 30th June and 30th September 2010. The results of these surveys are shown in Table 3.1, classified accordingly as per the ranges detailed in Table 2.2. The locations of the sites are provided in Appendix C.

Table 3.1: Baseline Fisheries Report (2010) Electro-Fishing Survey Results (River Creed).

Catchment Name	Site NGR	Site Code	Juvenile Salmon Density (per 100m²)		Juvenile Trout Density (per 100m²)		Non-Salmonid Species Present
			0+	1++	0+	1++	
River Creed	140250 932480	CRE01	44.68 ± 2.53 (V.High)	24.68 ± 1.07 (V.High)	>0.20 (Low)	>0.39 (Low)	Eel, 3-Spine Stickleback
River Creed	138730 932260	CRE03	109.27 ± 15.91 (V.High)	16.27 ± 11.69 (V.High)	0	0	Eel, 3-Spine Stickleback
River Creed	136800 932135	CRE05	144.14 ± 6.26 (V.High)	25.17 ± 1.25 (V.High)	0	>0.60 (V.Low)	Eel
River Creed	136170 932170	CRE06	13.58 ± 1.14 (High)	10.56 ± 0.46 (High)	>5.60 (Mod)	4.10 ± 2.93 (High)	N/A
River Creed	135600 931250	CRE08	0	0	>0.69 (Low)	>2.75 (Mod)	Eel, 3-Spine Stickleback
River Creed	137560 931470	CRE09	28.80 ± 4.18 (V.High)	>4.20 (Low)	55.66 ± 3.30 (V.High)	15.06 ± 5.77 (V.High)	Eel, 3-Spine Stickleback
River Creed	137625 931140	CRE10	55.13 ± 11.15 (V.High)	7.20 ± 3.73 (Mod)	33.28 ± 6.99 (V.High)	3.64 ± 0.44 (Mod)	Eel, 3-Spine Stickleback
River Creed	136800 930900	CRE13	21.08 ± 0.43 (V.High)	5.75 ± 1.46 (Mod)	285.61 ± 3.73 (V.High)	4.69 ± 0.24 (High)	N/A
River Creed	137565 930805	CRE14	247.54 ± 9.4 (V.High)	8.70 ± 0.91 (Mod)	47.53 ± 13.06 (V.High)	>1.71 (Low)	Eel
River Creed	135450 930605	CRE16	>7.72 (Mod)	8.41 ± 2.56 (Mod)	22.97 ± 4.68 (V.High)	>0.77 (V.Low)	N/A
River Creed	137525 930220	CRE17	>0.76 (V.Low)	>0.76 (V.Low)	31.32 ± 2.19 (V.High)	4.58 ± 0.24 (V.High)	Eel, 3-Spine Stickleback

3.1.4 Interpretation of the 2010 Juvenile Salmonid Population Assessments

Of the 11 sites surveyed on the River Creed in 2010, a total of eight showed densities of juvenile 0+ Salmon (Fry), 1++ (Parr) or both categorised as either “High” or “Very High”. Of the remaining three sites, one exhibited

a density of both Fry and Parr categorized as “Moderate”, one held densities of both Fry and Parr noted as “Very Low” and results from one final site (CRE08) showed a total absence of juvenile Salmon. Notes made during the surveys however indicated that CRE08 had poor in-stream habitat for juvenile Salmonid development, being essentially a deep peat-lined ditch.

The results of the surveys in relation to the presence/absence of juvenile Trout were almost as positive, with seven of the 11 sites recording a rating of “High” or “Very High” for either 0+, 1++, or both. Of the remaining four sites, one (CRE08) exhibited a mixed density of 0+ (Low) and 1++ (Moderate), one (CRE01) exhibited a density categorisation of Low for both 0+ and 1++ Trout. Juvenile 0+ Trout were absent at CRE05, which also held a “Low” rating for 1++ fish, and at one final site (CRE03) both 0+ and 1++ Trout were noted as absent.

3-Spine Sticklebacks were also found in significant numbers at six sites during the course of the surveys.

3.1.5 European Eel (River Creed)

European Eel were found at a total of seven of the surveyed sites on the River Creed, being present in the most significant numbers at the closest survey site to the coast (CRE01), where counts reached a total of 147 individuals. Numbers at the other six sites varied between 1 and 11 individuals.

Comparatively little is known with regard to the reproductive cycle of the European Eel. It is however widely accepted that mature adult Eels migrate to the Sargasso Sea to reproduce, with the juvenile Elvers returning to mature within UK Rivers between the months of April and May annually. Unlike in some rivers of southern England, the Elvers of the River Creed are not commercially fished for, and there is no evidence of any targeted recreational angling for the species occurring.

3.2 Glen River

3.2.1 Existing Information on Migratory Fish Populations

The Glen River (Abhainn á Ghlinn Mhōir) is the second watercourse within the area of the proposed development that has the potential to be impacted upon from a fisheries perspective. The Glen River is known to support a population of Sea Trout, as well as European Eel. Electro-fishing data from the OHFT provides no evidence to suggest that there are any known populations of River Lamprey (*Lampetra fluviatilis*) or Sea Lamprey (*Petromyzon marinus*) within the river. General fisheries management of the Glen River falls under the care of the OHFT. No rod and line angling is permitted on the Glen River.

3.2.2 Fisheries Habitat

In 2011 the OHFT undertook a detailed Habitat Survey as part of the Glen River Catchment Action Plan, with the aim of detailing the current status of the instream and riparian habitat, and identifying any issues that may have been impacting on environmental quality. The survey found that the catchment held a variety of substrate types, with the lower reaches being dominated by gravels and pebbles, with boulder and bedrock becoming more prevalent further upstream. The survey also identified that good areas of spawning gravels, potentially suitable for use by both Salmon and Trout are present throughout the catchment. As with the River Creed, it is the ability of fish to be able to access these gravels that may be limited by various obstacles present throughout the catchment.

The 2011 Habitat Survey identified the presence of several pipes that crossed the Glen River, accumulating waste build-up during high water conditions and forming unnatural obstacles to fish passage. The report recommended that the functionality of these pipes be established and, where appropriate, steps be taken

towards their possible removal. The site visit to the Glen River by Envirocentre, accompanied by a representative of the OHFT on 27th February 2018, confirmed that these pipes remained as they were in 2011 (see images in Figure 4, overleaf), with functionality still not fully established, and no further action taken towards their removal.

Figure 4: Pipes (Left and Right Images) across the lower Glen River

The report went further, identifying two locations within the catchment where the fence line had been taken across the Glen River, without the appropriate installation of a water gate. At time of writing, one of the fence lines has since been removed, however the other remains and does not permit the correct function of the river, accumulating debris and impeding fish passage.

The Glen River also has a higher propensity to accumulate natural debris than other Outer Hebridean rivers, as it flows directly through an area of woodland. This, historically, has led to formation of natural debris dams. Under the right circumstances, fallen trees and large woodland debris can be beneficial to the system, providing natural shelter and habitat to fish and invertebrates. In the wrong scenario however, these can also accumulate unnatural debris and impede fish passage.

There are two man made dams on the Glen River, one at the waterwheel within the grounds of Stornoway Castle, and an associated boulder dam immediately downstream of it. Both the waterwheel dam and the boulder dam have been modified in recent years, to ensure they do not impede fish passage either upstream or downstream. The second man made structure is a small croft dam below Loch Airigh na Lic, which has been identified as a potential obstruction to fish passage at certain flows. The 2011 report recommended the identification of the purpose of this dam and, if possible, its modification or removal. At time of writing, no change to this structure has been made by the OHFT.

3.2.3 Existing Information on Juvenile Salmond Density

For the Stornoway Wind Farm Baseline Fisheries Assessment, a total of three sites were subject to electro-fishing survey on the Glen River between 30th June and 30th September 2010. The results of these surveys are shown in Table 3.2, classified accordingly as per the ranges detailed in Table 2.2. The locations of the sites are provided in Appendix C.

Table 3.2: Baseline Fisheries Report (2010) Electro-Fishing Survey Results (Glen River).

Catchment Name	Site NGR	Site Code	Juvenile Salmon Density (per 100m²)		Juvenile Trout Density (per 100m²)		Non-Salmond Species Present
			0+	1++	0+	1++	
Glen River	139265 933925	GLE01	0	0	55.00 ± 11.4 (V.High)	9.14 ± 1.03 (V.High)	Eel, 3-Spine Stickleback
Glen River	136050 933805	GLE02	0	0	10.48 ± 5.05 (High)	>9.62 (V.High)	N/A
Glen River	140520 934305	GLE03	0	0	22.14 ± 3.22 (V.High)	6.20 ± 3.98 (High)	Eel, 3-Spine Stickleback

3.2.4 Interpretation of the 2010 Juvenile Salmonid Population Assessments

None of the three sites surveyed on the Glen River in 2010 exhibited any presence of juvenile Salmon 0+ Fry or 1++ Parr.

Juvenile Trout populations, in contrast to Salmon, were categorised as “Very High” or “High” across all three sites for both 0+ and 1++ Trout.

3-Spine Sticklebacks were also found at two of the three sites, GLE01 and GLE03.

3.2.5 European Eels

European Eel were found at two of the surveyed sites on the Glen River, being present at GLE01 (5 individuals) and GLE03 (6 individuals).

The Elvers of the River Creed are not commercially fished for, and there is no evidence of any targeted recreational angling for the species occurring.

3.3 Conservation Status Assessment

The River Creed has seen its conservation status fall from Category 1 in 2017 to Category 2 in 2018. Prior to the introduction of the initial Conservation of Salmon (Scotland) Regulations in 2016, the River Creed held a Category 1 conservation status. For the 2016 fishing season however, this was downgraded and the Creed became a Category 3 river. It is common for a downgraded water course to experience an accompanying reduction in fishing pressure, as many anglers will choose to concentrate their efforts on rivers maintaining Category 1 conservation status that as such, offer them the opportunity to retain a fish to eat, should they so wish. Reduced angling pressure brings with it an inevitable reduction in revenue generated from angling within the local economy. In 2016, the OHFT, who issue the angling permits to fish the River Creed, reported a 40% reduction in income generated from sales of permits for that year. The SAA currently enforce the following conservation policy upon its members and all those who fish the River Creed on a day ticket basis;

- Spring season (1st April – 31st May inclusive) – Strictly “catch and release” for all Salmon, Grilse and Sea Trout;

- Summer season (1st June – 15th September inclusive) – one Salmon or Grilse and two Sea Trout per angler/per day may be retained, with a maximum limit of three Salmon or Grilse per season/per angler; and
- Autumn season – (15th September – 15th October inclusive) - Strictly "catch and release" for all Salmon, Grilse and Sea Trout.

Having no population of migratory Salmon within it, the Glen River is not affected by the Regulations and as such, remains uncategorised. The Scottish Government however are currently giving further consideration to the potential assessment of Sea Trout stocks to inform a decision on whether similar conservation measures to those introduced for Salmon may be necessary in the future.

3.4 Angling Pressure and Catch Returns

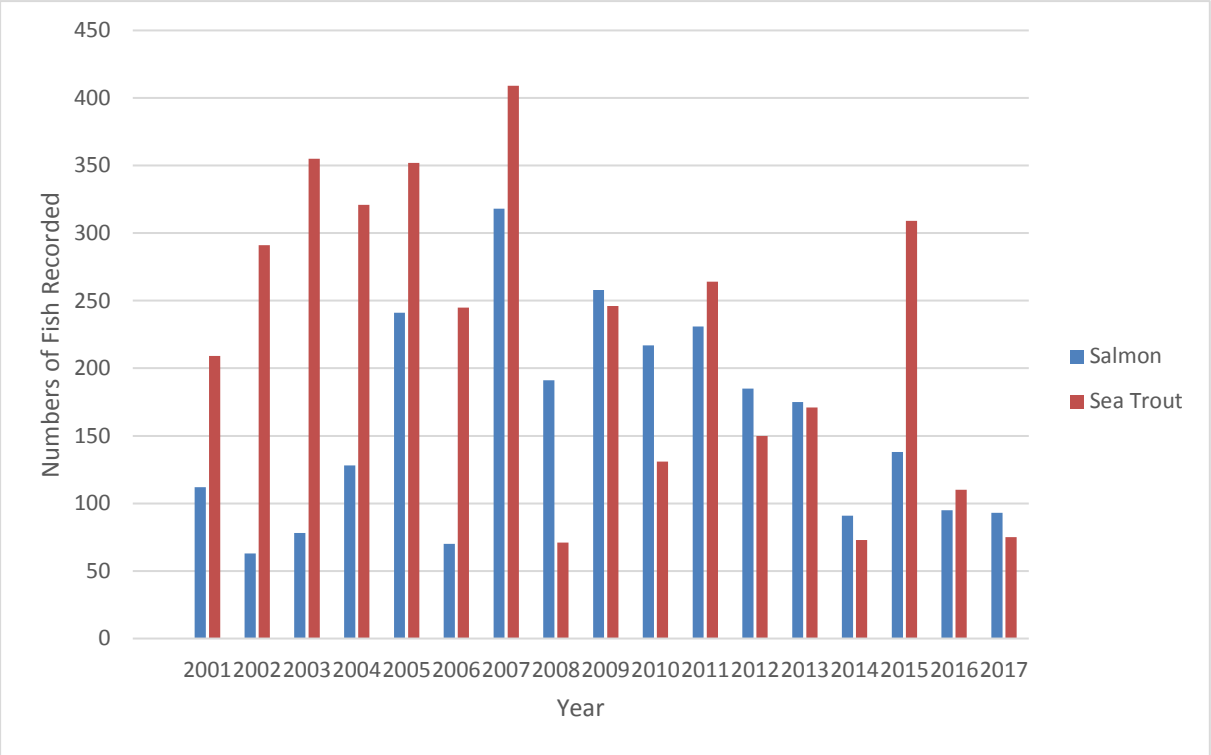
Angling catch return data from the OHFT shows conclusively that the majority of the Salmon caught on the River Creed annually are taken between the months of July and October. Due to the nature and timing of Salmon runs however, the vast majority of fresh Salmon will only migrate into the river during a smaller window of time within this period, with between July and Mid-August being the accepted normality. After this time, virtually all Salmon catches made within the River Creed system will be of fish that have been resident in the river for an extended period of time.

Likewise, it is a very similar situation for catches of Sea Trout on the River Creed. Data provided by the OHFT shows an almost identical timing of the catches of Sea Trout to those of Salmon and again, the vast majority of fish captured after late August will have been resident for a period of time as opposed to freshly migrating fish into the Creed system. Catch Return figures for both Salmon and Sea Trout from the OHFT for the period (2013 – 2017) are presented in Appendix B.

In terms of total numbers of fish caught annually, 2017 saw a total of 93 Salmon recorded as captured from the River Creed, with a further 75 Sea Trout being landed. These figures are substantially below the River Creed's average annual catch return for both species for the period from 2001 – 2016, which stand at 162 p/a for Salmon and 232 p/a for Sea Trout. Annual catch return figures for the River Creed for both Salmon and Sea Trout for the period from 2001 – 2017 are presented in Figure 5 below.

Due to the River Creed being designated Category 2 status for 2018, the expectation of the SAA is that this will result in a subsequent reduction in angling pressure, as was seen during the 2016 season when a Category 3 status led to a 40% reduction in day permits issued for the Creed in comparison to the previous year.

Figure 5: Catch Return Figures for Salmon and Sea Trout (River Creed) 2001 - 2017



REFERENCES

APPENDICES

A SITE LOCATION PLAN

B CATCH RETURN FIGURES FOR SALMON AND SEA TROUT ON THE RIVER CREED (2013 – 2017)

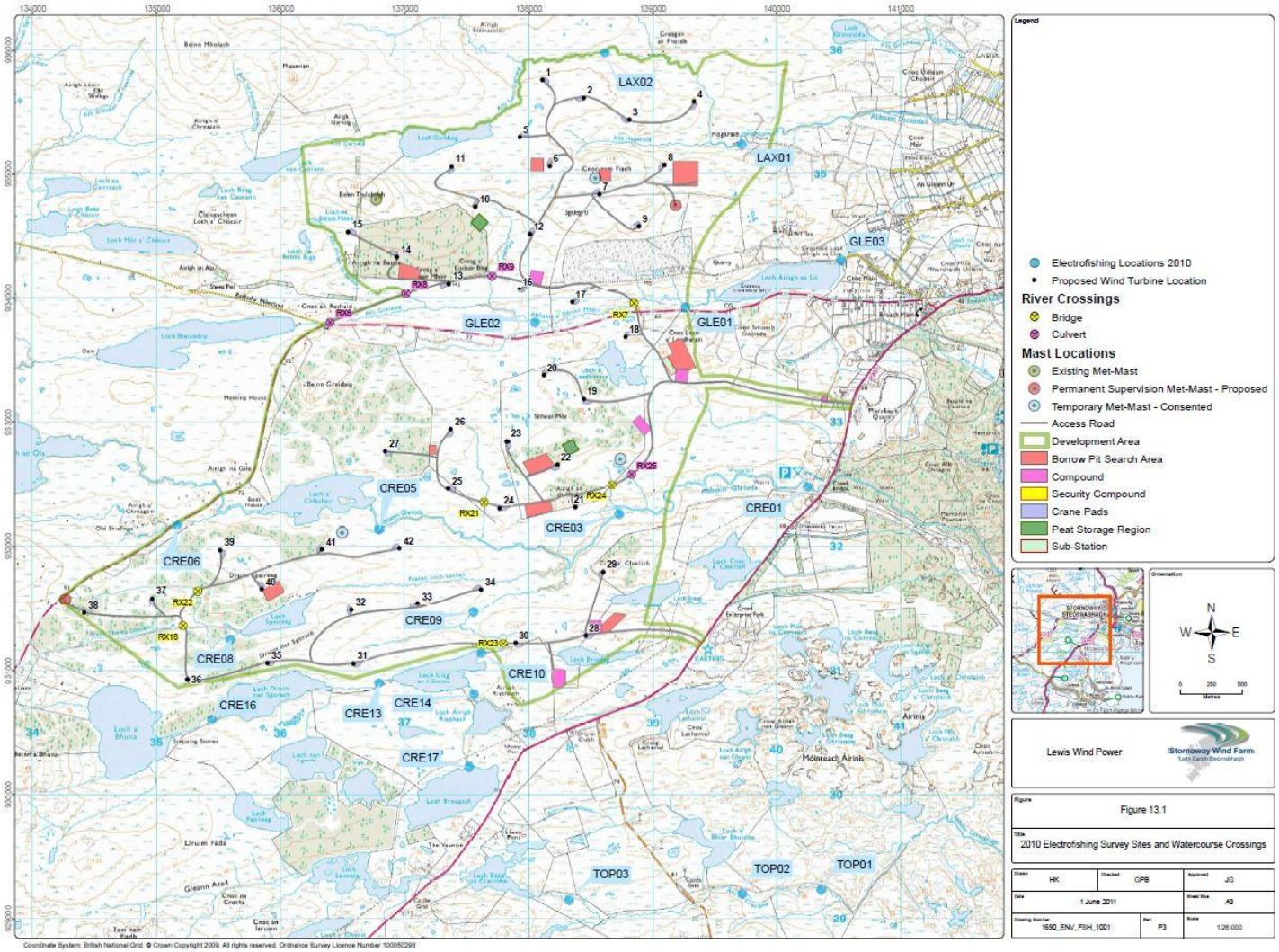
Salmon Catches (River Creed) 2013 – 2017.

Year	'13	'14	'15	'16	'17	Avg
Jan	0	0	0	0	0	0.0
Feb	0	0	0	0	0	0.0
Mar	0	0	0	0	0	0.0
Apr	1	0	0	0	0	0.2
May	0	0	1	1	0	0.4
Jun	0	0	3	1	2	1.2
Jul	2	12	45	45	9	22.6
Aug	84	49	58	22	30	48.6
Sep	53	8	21	20	17	23.8
Oct	35	22	10	6	35	21.6
Nov	0	0	0	0	0	0.0
Dec	0	0	0	0	0	0.0
Total	175	91	138	95	93	118.4

Sea Trout Catches (River Creed) 2013 – 2017.

Year	'13	'14	'15	'16	'17	Avg
Jan	0	0	0	0	0	0.0
Feb	0	0	0	0	0	0.0
Mar	0	0	0	0	0	0.0
Apr	1	4	4	3	0	2.4
May	0	0	8	2	0	2.0
Jun	4	3	2	3	0	2.4
Jul	17	8	54	39	13	26.2
Aug	87	39	138	20	34	63.6
Sep	43	16	69	31	4	32.6
Oct	19	3	34	12	24	18.4
Nov	0	0	0	0	0	0.0
Dec	0	0	0	0	0	0.0
Total	171	73	309	110	75	147.6

C LOCATIONS OF ELECTRO-FISHING SURVEY SITES FOR THE RIVER CREED AND GLEN RIVER



Technical Appendix 6.1

TECHNICAL APPENDIX 6.1

Archaeological and historical overview of the Inner Study Area

Previous investigations

The CneS HER does not record any previous archaeological investigations within the ISA, but there have been a number of marine surveys within Ghlumaig Bay. Both the HER and the Canmore database record details of dives by RAF Brize Norton Sub Aqua Club in 1976, undertaken in order to confirm the locations, condition and extent of a number of known wrecks within the bay. In the 1980s, the University of Sheffield also undertook a number of walkover surveys in the Western Isles, one of these surveys took place on Lewis and included some of the shoreline of Arnish Point.

Other recent investigations undertaken within the ISA, but not yet recorded on the HER, comprise walkover surveys associated with the proposed Western Isles Grid Connection (Headland Archaeology, 2015) and the Arnish Switching Stations Headland Archaeology, 2016). Neither survey identified any previously unrecorded archaeological features or deposits within the ISA.

Geology and geomorphology

According to BGS data, solid geology in the majority of the ISA comprises Lewisian Gneiss, it can be seen as exposed outcrops across the western half of the ISA. In the east and centre of the ISA, a band of protocataclastite of the Outer Hebrides thrust zone runs north/south across the ISA. In the ISA the bedrock is largely exposed, and only partially covered with superficial deposits of peat-rich topsoil.

Prehistoric evidence

There are no known Prehistoric remains in the ISA. In the OSA the earliest known remains are those of a probable Neolithic chambered cairn, Cnoc Na Croich (SM6550). In Loch Arnish to the south west of the Inner Study Area is Loch Arnish Dun (SM5397), the remains of an apparently artificial island or crannog. The site is probably of Iron Age to early medieval date. However, in the Outer Hebrides there is a tradition of crannogs being used throughout the medieval period and even into the post-medieval period (Armit 1996, 218).

Medieval to Post Medieval

There are no Medieval to Post Medieval assets in the Inner Study Area, but the shelter offered by the various coves and bays in the OSA was known to the Vikings. The name 'Stornoway' derives from the Norse 'Stjornavagr', meaning 'Steering Bay', and indicates the bay's importance as a safe haven on Scotland's west coast. The towns development can be traced on historical maps, extracts of some of which are included as Technical Appendix 6.2 in this Volume.

Arnish Point in the medieval to post-medieval period appears likely to have been transformed from a wild landscape to agricultural land. Historic aerial photographs show areas of lazy bed cultivation across Arnish Point and the HER records two areas of post- medieval field systems (MWE142511 & MWE142512). Examination of Google Earth images confirms that areas of post-medieval field systems only survive in the area surrounding Arnish Point Lighthouse and gun emplacements to the north and east of the Fabrication Yard.

By 1607, Stornoway's importance as a commercial port was recognised as it was created a Burgh of Barony, and in 1610 James VI granted Lewis to the Earls of Seaforth. A 'castle' is depicted on seventeenth century maps of the OSA (Technical Appendix 6.2a). The earls' investment, and the new burgh status, allowed Stornoway to develop into a prosperous fishing port, and by the early nineteenth century a thriving town had developed along the shore (Technical Appendix 6.2b and 6.2d).

In 1746 following defeat at Culloden, Charles Edward Stuart (Bonnie Prince Charlie) fled to the Outer Hebrides. Arnish Point is amongst the places he is recorded as having spent a night. He is recorded as having found shelter at Kildun House (Technical Appendix 6.2e) on Arnish Point on the 5th May 1746 before moving on the following day. Arnish Monument (LB13329) was built around 1860 in commemoration of this event.

Modern

In 1844 Lewis was bought by the Matheson family, and another round of investments and development began. The harbour was expanded and improved with the addition of a number of new piers and associated buildings. Stornoway became a vital port to the herring industry, and the town continued to grow.

Arnish Point lighthouse (LB13328) was built in the 1850s to mark the entrance to Stornoway Bay (Technical Appendix 6.2f). It was manned until 1963 when it was automated (http://www.stornowaytrust.org.uk/downloads/Arnish_Lighthouse.pdf, viewed 27/3/18).

The Second World War saw Arnish Point become the front line in the defence of the island and an important defensive point in the control of the Minch with the building of the gun emplacements and associated buildings (SM5347).

In the 1970s the construction of the Fabrication Yard at Arnish saw large-scale ground clearance and levelling over much of Arnish Point. This included the removal of Kildun House.

Maritime

As a long-established fishing town, as well as the main transport and freight port for Lewis, Stornoway harbour has been a busy shipping port for hundreds of years. The CneS HER and Canmore database record over 50 known wrecks within the OSA, most of these are of named vessels which sank in the nineteenth and twentieth centuries. Most of the wrecks are along the northern edge of Stornoway Bay, where a number of reefs and rocks ensure a hazardous entrance to the harbour.

Gazetteer of Heritage Assets within the ISA

Ref.	Name/Location	Description/Date	Easting	Northing
MWE142507	Dyke, Arnish	Earth and stone dyke defining two sides of a sub-rectangular area of approximately 8Ha. North-eastern side of the area defined by the shoreline, and the south-east side has been lost with construction of Arnish yard. Undated	142312	930585
MWE142511	Field System, Arnish	Cultivation ridges representing the remains of rig & furrow and/or lazy beds are visible in aerial photography of the headland on the eastern side of Ghlumaig Bay. Field boundary banks are also discernible, Post Medieval	142850	930976
W1	Alabama: Seid Rocks, Stornoway, Lewis, North Minch (Cas.)	The steamship was on passage from Copenhagen to Baltimore and was driven into Stornoway seeking shelter. She sank there, possibly after a fire. The wreck is extensive and confused, showing every sign of dispersal by explosives. The recognition of objects was difficult due to the damage and poor visibility. The wreck is covered in a fine layer of silt. The highest obstruction is believed to be a cargo boom which was at a recorded depth of 6 metres. The bulk of the wreck lies between 10.6 - 15.2 metres or the bottom (RAF Brize Norton Sub-Aqua Club (BNSAC), survey 1976), 20th Century	142380	931550
W2	Andalina: Seid Rocks, Cala Ghlumaig, Lewis, North Minch (Wrk.)	Wooden Hulk, with cargo of coal: date of loss cited as 11 December 1931, vessel sank at anchor in Ghlumaig Bay. Stern and boiler seen to be intact, 1976 (BNSAC), 20th Century	142786	931111
W3	Arnish: Cala Ghlumaig, Lewis, North Minch (Wrk.)	Classified as steel steamship: no cargo specified, but date of loss cited as 1 October 1923, vessel sank at anchor in Ghlumaig Bay 20th Century	142642	930735

Ref.	Name/Location	Description/Date	Easting	Northing
W4	Bjorn: Arnish Point, Lewis, North Minch (Wrk.)	Classified as coal hulk: no cargo specified, but date of loss cited as 1921, 20th Century	142813	931043
W5	Bloom: Stornoway Harbour, Lewis, North Minch (Cas.)	Fishing vessel lost in a collision on 23rd November 1957, RCAHMS reports that the location cited for this stranding is essentially tentative. It is unclear whether its cited location of loss within Stornoway harbour refers to the constructed (inner) harbour or to the broader area of Cala Steornabhaigh. The latter appears the more probable 20th Century	142548	931492
W6	Comrade: Stornoway, Lewis, North Minch (Arbitrary Location) (Cas.)	Steam Drifter, date of loss as 17 September 1947, this vessel blew up at Stornoway. The location assigned to this record is essentially tentative. The loss of this vessel may have occurred within Cala Steornabhaigh, which forms the extensive outer harbour at Stornoway	142000	931000
W7	Fisher Lassies: Stornoway Harbour, Lewis, North Minch (Arbitrary Location) (Cas.)	Wooden lugger, in ballast, date of loss cited as 13 January 1894, this vessel was stranded and wrecked while lying at Stornoway Harbour. The location assigned to this record is essentially tentative. The loss of this vessel may have occurred within Cala Steornabhaigh, which forms the extensive outer harbour at Stornoway, 19th Century	142000	931000
W8	Jane Nicholson: Stornoway Harbour Entrance, Lewis, North Minch (Arbitrary Location) (Cas.)	No classification or cargo specified: date of loss cited as 8 February 1826, this vessel was wrecked at the entrance to Stornoway. The location assigned to this record is essentially tentative. Cala Steornabhaigh forms the extensive outer harbour at Stornoway. It remains unclear whether this vessel stranded or foundered; the former appears the more probable, 19th Century	142900	931300
W9	Laurel: Stornoway Harbour Entrance, Lewis, North Minch (Arbitrary Location) (Cas.)	No classification or cargo specified: date of loss cited as 29 January 1849, this vessel was wrecked at the entrance to Stornoway. The location assigned to this record is essentially tentative.	142900	931300
W10	Marjory: Arnish Point, Stornoway, Lewis, North Minch (Wrk.)	Wooden motor fishing vessel, date of loss cited as 8 June 1948, this vessel was in collision and sank in Stornoway harbour, 20th Century	142549	931119
W11	Portugal: Arnish Point, Stornoway, Lewis, North Minch (Wrk.)	Coal hulk, sank in ?1953 The wreck now appears to be broken up.	142723	931580
W12	Rap: Stornoway, Lewis, North Minch (Arbitrary Location) (Cas.)	Steamship: no cargo specified, but date of loss cited as October 1909, this vessel stranded at Stornoway. Maybe all gone. The location assigned to this record is essentially tentative. Cala Steornabhaigh forms the extensive outer harbour at Stornoway. 20th Century	142000	931000

Ref.	Name/Location	Description/Date	Easting	Northing
W13	Unknown: Stornoway Harbour Entrance, Lewis, North Minch (Arbitrary Location) (Cas.)	Wooden yawl, date of loss unknown, but 20th Century	142900	931300
W14	Unknown: Stornoway, Lewis, North Minch (Obs.)	The wreck was located in the above position. It consists of iron ribs with a small amount of timber attached suggesting a composite construction. The wreckage is 20 metres long and dries completely at low water neaps (BNSAC)	142323	930836

REFERENCES

Bibliographic references

Armit, I, 1996, *The Archaeology of Skye and the Western Isles*

Headland Archaeology, 2015, *Proposed converter station and substation, Arnish: Environmental Appraisal Chapter 10 Archaeology and cultural heritage*, unpublished client report

Headland Archaeology, 2016, *Western Isles Connection and Lewis Infrastructure Site Selection Report: Lewis Switching Station Sites,* unpublished client report

Macdonald, D, 1990. *Lewis: A History of the Island*

Historic maps

Blaeu, J, 1662 *Harris and Lewis*

Chapman, J and Johnson, W, 1807 *Plan of the island of Lewis reduced from Mr Chapman's survey*

Wood J, 1821, *Plan of the Town and harbour of Stornoway, Island of Lewis, from actual survey*

Thomson, J, 1822 *Western Isles*

Hydrographic Office of the Admiralty, 1846, *Stornoway Harbour*

Ordnance Survey, 1851, *Ross-shire (Island of Lewis), Sheet 27*, 6-inch

Ordnance Survey, 1958, *Ross and Cromarty Isle of Lewis, Sheet 27*, 6-inch

Technical Appendix 6.2

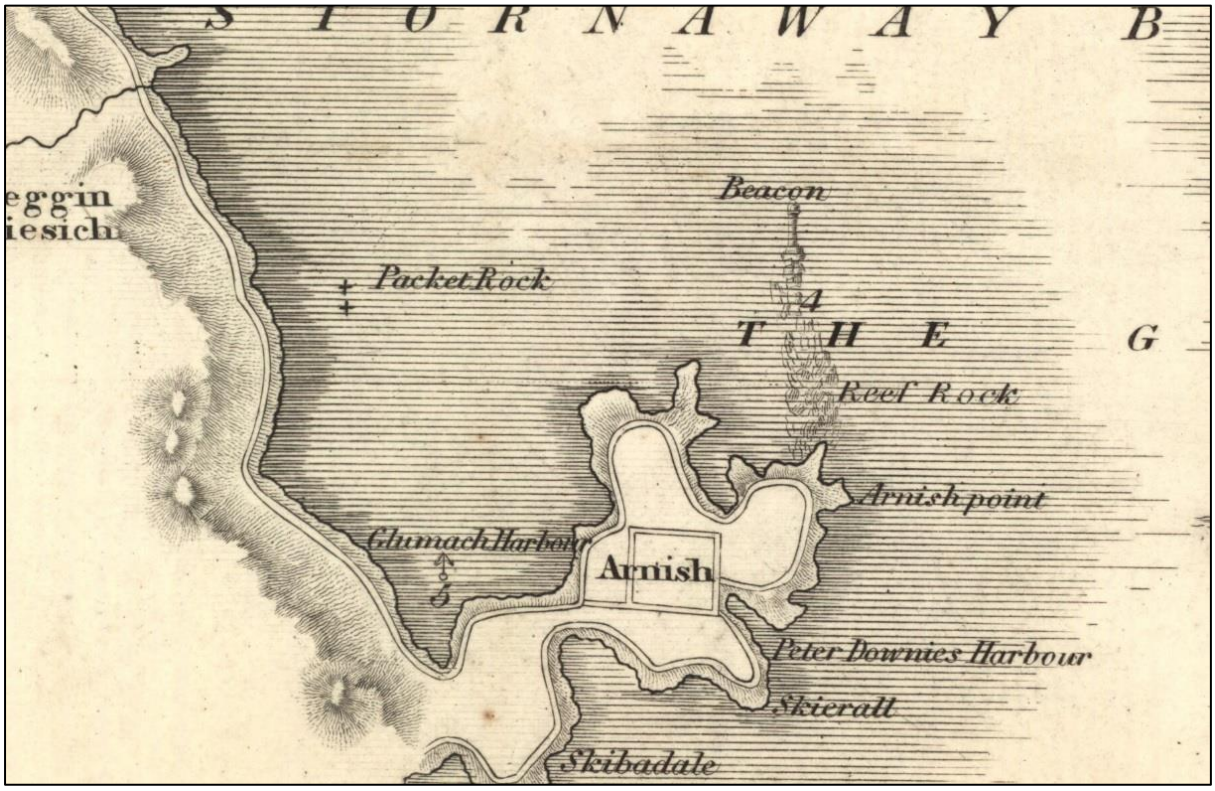
TECHNICAL APPENDIX 6.2

Historical Maps of the Inner Study Area

6.2a Joan Blaeu, 1662 (extract)

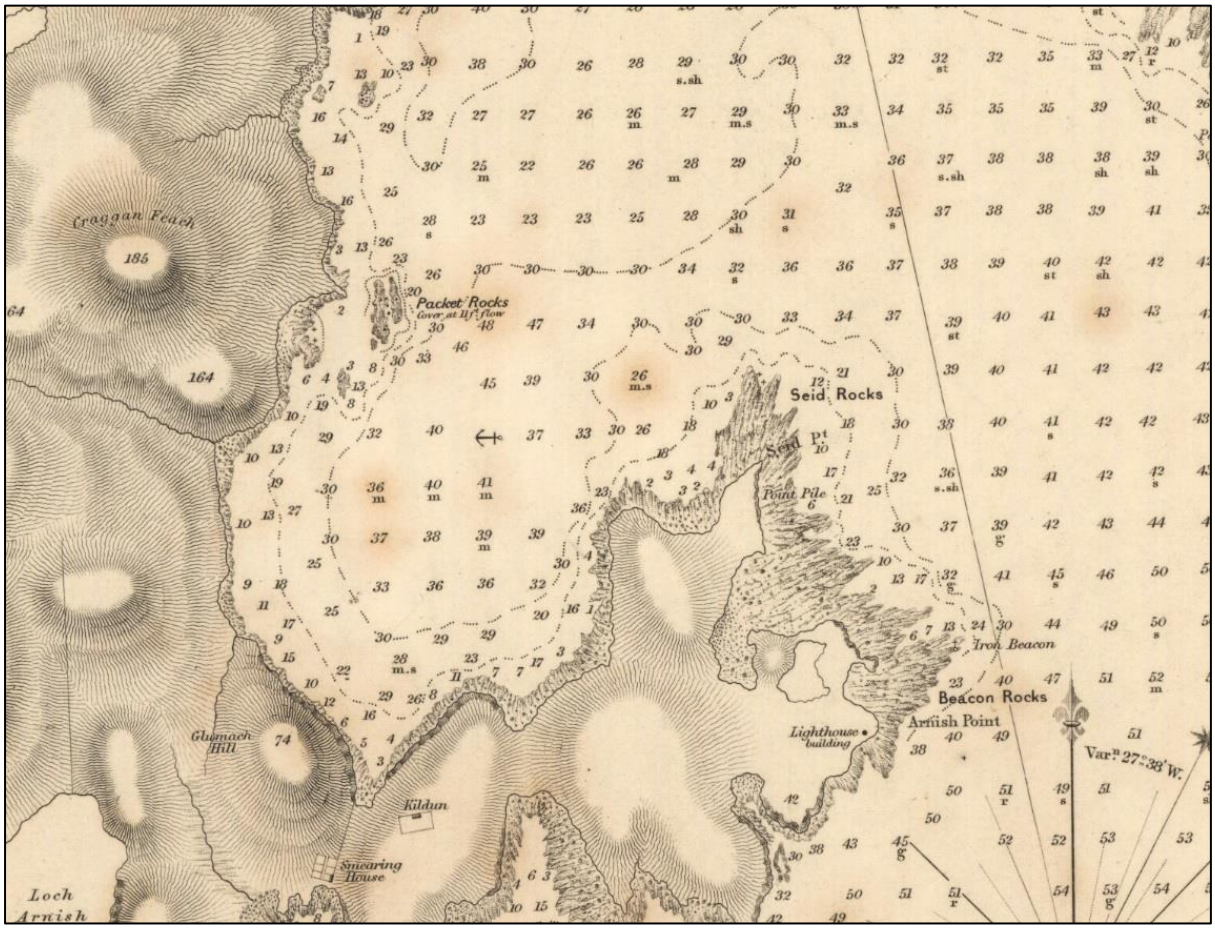
6.2b Chapman & Johnson, 1807 (extract)

6.2b Wood, 1821 (extract)

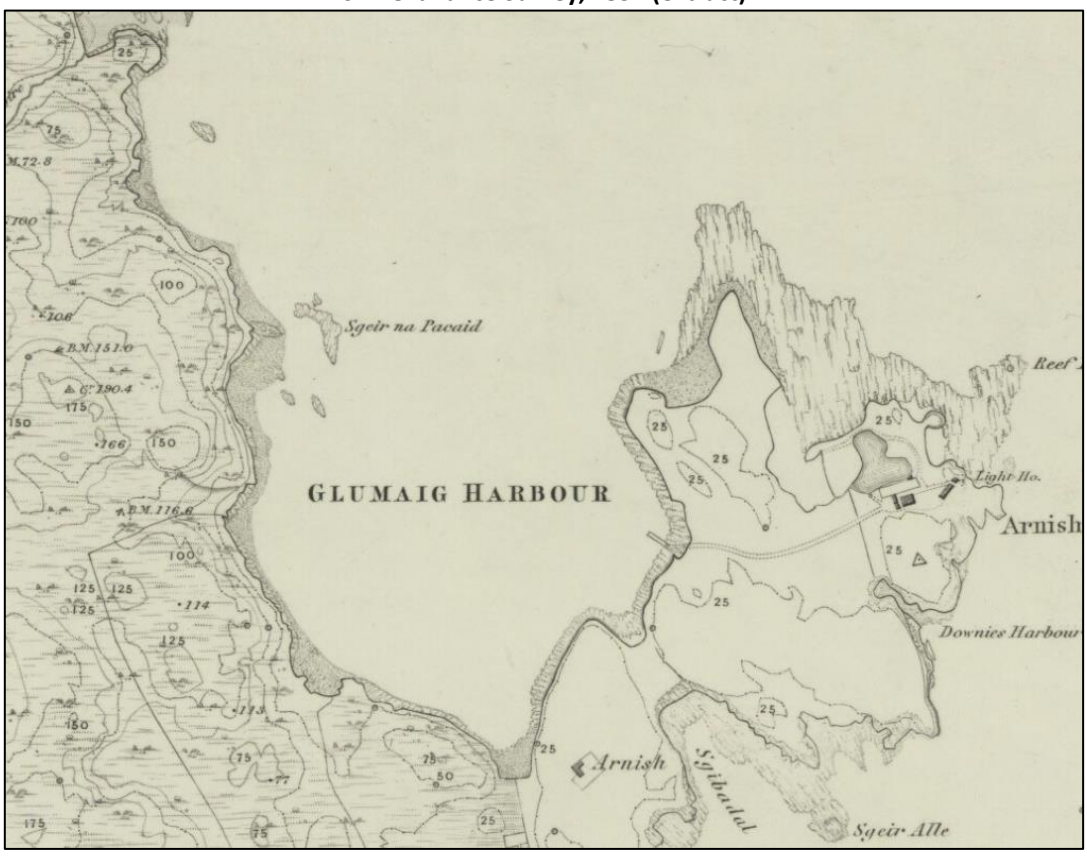


6.2d Thomson, 1822 (extract)

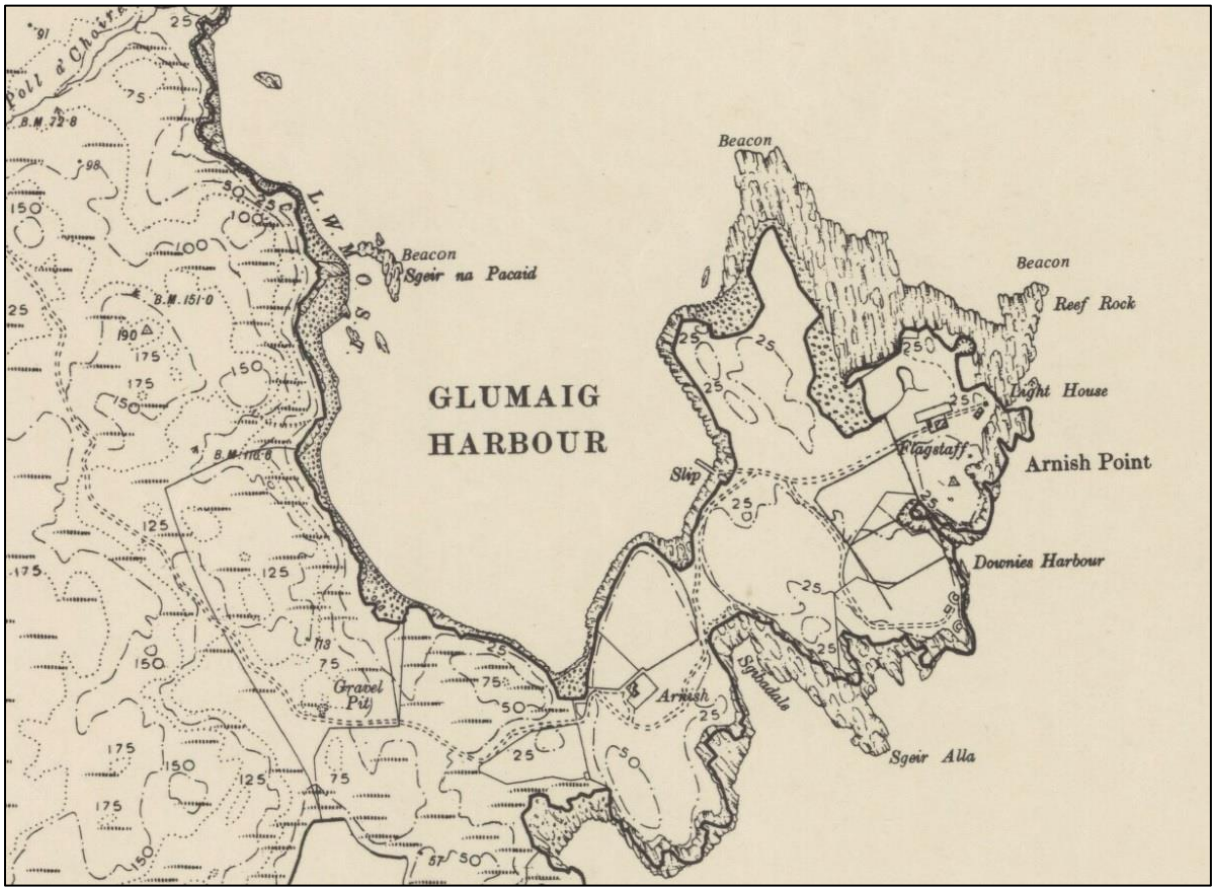
6.2e Admiralty Chart, 1846 (extract)



6.2f Ordnance Survey, 1851 (extract)



6.2g Ordnance Survey, 1958 (extract)



All map images are reproduced with the permission of the National Library of Scotland

https://maps.nls.uk/index.html

Technical Appendix 7.1

Deep Water Port
Technical Appendix 7.1: Noise Assessment

September 2018

Deep Water Port
Technical Appendix 7.1: Noise Assessment

Client:	Stornoway Port Authority
Document number:	8249
Project number:	670525
Status:	Final
Author:	Craig Cloy
Reviewer:	Ann Jobson
Date of issue:	12 September 2018
Filename:	670525 Deep Water Port, Technical Appendix 7.1, Noise Assessment

Glasgow

Craighall Business Park
8 Eagle Street
Glasgow
G4 9XA
0141 341 5040
info@envirocentre.co.uk
www.envirocentre.co.uk

Aberdeen

Banchory Business Centre
Burn O'Bennie Road
Banchory
AB31 5ZU
01330 826 596

Inverness

Alder House
Cradlehall Business Park
Inverness
IV2 5GH
01463 794 212

Edinburgh

Suite 114
Gyleview House
3 Redheughs Rigg
Edinburgh
EH12 9DQ
0131 516 9530

This report has been prepared by EnviroCentre Limited with all reasonable skill and care, within the terms of the Contract with Stornoway Port Authority ("the Client"). The report is confidential to the Client, and EnviroCentre Limited accepts no responsibility of whatever nature to third parties to whom this report may be made known.

No part of this document may be reproduced or altered without the prior written approval of EnviroCentre Limited.

Contents

1 Introduction 1
1.1 Remit 1
1.2 Site Description 1
1.3 Report Usage 1
1.4 Potential Impacts 1
1.5 Consultation 2
2 Noise Assessment Methodology 4
2.1 Noise Guidance 4
2.2 Noise Assessment Criteria 5
2.3 Noise Definitions 8
3 Baseline Noise Monitoring 9
3.1 Noise Monitoring Locations 9
3.2 Noise Monitoring Details 9
3.3 Observations 10
3.4 Results 12
4 Noise Model input Parameters 14
4.1 Noise Sensitive Receptors 14
4.2 Construction Noise Model Input Parameters 14
4.3 Operational Noise Model Input Parameters 19
5 Construction Noise Model Results and Assessment 21
5.1 Discussion of Results 29
6 Cumulative Construction Noise Impact 31
6.1 Construction Noise Mitigation 32
7 Operational Noise Model Results and Assessment 34
7.2 Operational Road Traffic Noise Assessment 37
8 Conclusions 39
8.1 Construction Noise 39
8.2 Operational Noise 39
References 41

Appendices

A Drawings
B ABC Category Thresholds
C Construction Noise Model Data
D Operational Noise Model Data

Tables

Table 1-1: Summary of Consultation Responses 2
Table 2-1: Threshold of Significant Effect at Dwellings 6
Table 2-2: Significance Criteria for the Assessment of Construction Noise 6
Table 2-3: Significance of Effects; Operational Industrial Noise 7
Table 2-4: Classification of Magnitude of Noise Impacts; Operational Road Traffic Noise 8
Table 3-1: Noise Monitoring Locations 9
Table 3-2: Investigative Equipment Utilised and Technical Details 9
Table 3-3: Monitoring Periods and Weather Conditions 9
Table 3-4: Noise Monitoring Results 12
Table 3-5: Octave Band Noise Monitoring Results 12
Table 4-1: Noise Sensitive Receptor Locations; Construction and Industrial Noise 14

Table 4-2: Noise Sensitive Receptor Locations; Operational Road Traffic Noise 14
Table 4-3: Deep Water Port, Proposed Construction Schedule 15
Table 4-4: Modelled Scenarios 15
Table 4-5: Modelled Scenarios; Operational Noise 19
Table 5-1: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 1 21
Table 5-2: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 2 22
Table 5-3: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 3 23
Table 5-4: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 4 24
Table 5-5: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 5 26
Table 5-6: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 6 27
Table 6-1: Greatest Noise Generating Concurrent Construction Stages; Newton Marina and Deep Water Port 31
Table 6-2: Worst Case Cumulative Impact; Daytime 32
Table 6-3: Worst Case Cumulative Impact; Evening 32
Table 7-1: Noise Model Results and TAN 1/2011 Assessment; Daytime, Receptor Height 1.5m. 34
Table 7-2: Noise Model Results and TAN 1/2011 Assessment; Night-time, Receptor Height 4m. 35
Table 7-3: Noise Model Results and TAN 1/2011 Assessment; Daytime, Receptor Height 1.5m. 36
Table 7-4: Noise Model Results and TAN 1/2011 Assessment; Night-time, Receptor Height 4m. 37
Table 7-6: Comparison of Daytime Noise Levels With vs Without Development; 1.5m Receptor Height. 38
Table 7-7: Comparison of Night-time Noise Levels With vs Without Development; 4m Receptor Height 38

1 INTRODUCTION

1.1 Remit

EnviroCentre Ltd have been appointed by Stornoway Port Authority to undertake a noise assessment at the site of a proposed development at Deep Water Port (DWP), Stornoway (see Drawing No. 670525-006) for site location.

This report presents the results of the noise assessment for the proposed development. The noise assessment will consider the construction and operational noise impacts at existing sensitive receptors surrounding the Site.

1.2 Site Description

The Deep Water Port site is located in the existing Cala Ghlumaig bay which is a north facing sheltered area with existing jetty, piers and land-based industrial unit complex. The site is approximately 2km south of the town of Stornoway, on the eastern coast of the Isle of Lewis.

1.3 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 retain ownership of the copyright and intellectual content of this report. Any distribution of this report should be controlled to avoid compromising the validity of the information or legal responsibilities held by both the Client and EnviroCentre Ltd (including those of third party copyright). EnviroCentre 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.

1.4 Potential Impacts

1.4.1 Construction Noise

Due to the proximity of the site to existing residential properties within Stornoway there is the potential for noise from activities carried out during the construction phase of the development to impact upon existing residents.

1.4.2 Operational Noise

During the operational stage, there is the potential for noise generated by the increase in road traffic associated with DWP operations to impact upon existing residential receptors. There is also the potential for noise from cargo ships loading/unloading to impact upon existing residents. The berthing of cruise ships is not considered likely to generate noise levels significant enough to impact on existing residential receptors within Stornoway due to the large distances between source and receivers, and shall therefore not be considered further within this report.

During Phases 2, 3 & 4 of operations at the DWP, there is the potential for noise from proposed decommissioning activities to impact on existing residential receptors.

1.5 Consultation

A summary of the relevant responses to the Scoping Report submitted by EnviroCentre for the Site, along with further email consultation carried out with Comhairle nan Eilean Siar's (CnES) Environmental Health Department is shown in Table 1-1.

Table 1-1: Summary of Consultation Responses

Organisation	Consultation Response	How and where addressed
CnES EHO	Within the Scoping Opinion dated 07/11/2017, Environmental Health Department has confirmed there are nearby receptors which will be affected during the construction and operational phases. It is agreed that construction and operational noise impacts should be addressed within the EIA.	Construction and operational noise is scoped into the EIA.
	Within the Scoping Opinion dated 07/11/2017, details of the proposed phasing of other port masterplan projects should be included in the EIA. This will inform the extent to which cumulative assessment with other projects is required to be addressed within any particular EIA report.	The noise assessment considers cumulative impact from the Newton Marina development, and is addressed within Section 6 of this noise assessment.
	Within the Scoping Opinion dated 07/11/2017, it was confirmed that the EIA reports should include information on the main alternatives studied, and an indication of the main reasons for choosing the selected option, with reference to environmental effects.	Where relevant to both the construction and operational noise assessment, the alternatives studied, along with the reasons for their selection have been discussed.

Organisation	Consultation Response	How and where addressed
	CnES Environmental Health Department issued a consultation response on 29th January 2018 based on an initial request by EnviroCentre on 25 January 2018 to establish the methodology for noise assessment. This included baseline monitoring, construction noise assessment methodology / noise criteria. CnES Environmental Health Department confirmed within their email of 25th January 2018 that this approach was acceptable and therefore the methodology, as fully explained in section 2 was taken forward.	The methodology and noise criteria proposed by EnviroCentre was accepted by CnES Environmental Health Department and is fully explained within Section 2 of this noise assessment.

2 NOISE ASSESSMENT METHODOLOGY

The noise assessment was undertaken to establish the impact of construction activities on noise sensitive receptors surrounding the Site. The assessment involved the following stages;

- Consultation with CnES Environmental Health Department to agree assessment methodology and noise criteria (refer to Section 1.5);
- Measurement of existing baseline noise environment at a sample of 3 areas representative of the most exposed noise sensitive receptors surrounding the DWP and Newton Marina sites; the location of the monitoring locations are shown in Drawing No. 670525-027, Appendix A.
- 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. 3D computer noise modelling using CadnaA software has been used in the calculation of construction noise at sensitive receptors.
- Review of operational activities, locations and noise data;
- Prediction of operational noise using CadnaA software at location of most exposed sensitive receptors;
- PAN 1/2011 assessment of operational noise, using principles defined in BS4142:2014;
- Calculation of increase in road traffic noise at existing sensitive receptors as a result of operations at the DWP using CadnaA software; and
- PAN 1/2011 assessment of increase in road traffic noise at existing sensitive receptors.

2.1 Noise Guidance

2.1.1 The Outer Hebrides Local Development Plan (2018), CnES.

The Outer Hebrides Local Development Plan (LDP2, 2018) sets out a vision and spatial strategy for the development of land in the Outer Hebrides over the next 10 to 20 years. Guidance within the currently adopted LDP relevant to noise impact in the context of the proposed development is *Policy DP1: Design and Placemaking*, which states the following;

e) NEIGHBOUR AMENITY siting, design, landscaping and boundary treatments should ensure reasonable neighbourhood amenity is retained. Development will not be supported where it will result in a significant detrimental impact on the appearance of the existing building or the character and amenity of the surrounding area and neighbours.

2.1.2 BS5228-1:2009+A1:2014; Code of Practice for Noise and Vibration Control on Construction and Open Sites.

Methods for calculating noise and vibration produced by construction and open sites are provided in BS5228-1:2009+A1:2014. Annexes C and D of Part 1 provide generic source data for different types of noise source, as well as methods for calculating noise from stationary and mobile plant. Specific advice on noise from sources such as piling is provided.

2.1.3 PAN 1/2011 Planning and Noise

Advice on the role of the planning system in helping to prevent and limit the adverse effects of noise is provided in *Planning Advice Note (PAN) 1/2011 'Planning and Noise'* (The Scottish Government, 2011a). The associated *Technical Advice Note (TAN) 1/2011 'Assessment of Noise*' (The Scottish Government, 2011b) provides guidance on noise impact assessment methods.

The methodology provided in Technical Advice Note (TAN) 1/2011 *'Assessment of Noise'* (The Scottish Government, 2011b) is used to assess the impact of noise on residential properties.

2.1.4 BS4142:2014, Methods for rating and assessing industrial and commercial sound

BS4142:2014 provides methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

a) Sound from industrial and manufacturing processes;
b) Sound from fixed installations which comprise mechanical and electrical plant and equipment;
c) Sound from loading and unloading of goods and materials at industrial and/or commercial premises; and
d) Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements in or around an industrial and/or commercial site.

The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

The standard is applicable to the determination of the following levels at outdoor locations:

a) Rating levels for sources of sound of an industrial and/or commercial nature;
b) Ambient, background and residual sound levels;
c) Investigating complaints;
d) Assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and /or commercial nature; and
e) Assessing sound at proposed new dwellings or premises used for residential purposes.

2.2 Noise Assessment Criteria

2.2.1 BS5228-1:2009+A1: 2014 – Methodology (ABC Method)

The assessment of construction noise is carried out in accordance with guidance provided in BS 5228-1:2009+A1:2014 'Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise'. The standard describes methods for evaluating the potential significant effects of construction noise, one of which is the 'ABC' method which is based on exceedance of fixed noise limits. The ABC method, as detailed within Annex E.3.2 has been used within this noise assessment.

The ABC method considers that a potential significant effect occurs when the total noise level at a dwelling, including construction activity, exceeds the appropriate category values shown in Table 2-1. The table is used as follows;

- The ambient noise is determined and rounded to the nearest 5dB;

- The rounded ambient noise level is then compared with the total noise level, including construction. A significant effect at a noise sensitive receptor is considered to occur when the total noise, including construction activity exceeds the appropriate category values, shown in Table 2-1.
- The ABC method of BS5228-1:2009+A1:2014 does not provide specific guidance on determining the magnitude and significance of noise impacts above the threshold values shown in Table 2-1. In order to determine the level of significance, guidance provided in the Technical Advice Note (TAN) 1/2011 has been used. The significance criteria adopted within this noise assessment are shown in Table 2-2.

Table 2-1: Threshold of Significant Effect at Dwellings

Period	Threshold Value, in decibels (dB)		
	Category A	Category B	Category C
Night-time (23:00 to 07:00)	45	50	55
Evenings weekday (19:00-23:00), Saturdays (13:00-23:00) and Sundays (07:00-23:00)	55	60	65
Daytime weekday (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75
Note 1: A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level. Note 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total L_{Aeq}, T noise level for the period increases by more than 3 dB due to site noise. Note 3: Applied to residential receptors only.			
Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			

Table 2-2: Significance Criteria for the Assessment of Construction Noise

Significance	Level Above Threshold Value dB(A)	Definition
Neutral	< 0	No effect, not significant, noise need not be considered as a determining factor in the decision making process.
Slight adverse	≤ 0 to < 3	These effects may be raised but are unlikely to be of importance in the decision making process.
Moderate adverse	≤ 3 to < 5	These effects, if adverse, while important, are not likely to be key decision making issues.
Large adverse	≤ 5.0 to < 10	The effects are likely to be important considerations but where mitigation may be effectively employed such that resultant adverse effects are likely to have a moderate or slight significance.
Very large adverse	≥ 10	These effects represent key factors in the decision making

Significance	Level Above Threshold Value dB(A)	Definition
		process. They are generally, but not exclusively, associated with impacts where mitigation is not practical or would be ineffective.

2.2.2 PAN 1/2011 Assessment Methodology

Proposed activities from the operations within the DWP are assessed following guidance provided in PAN 1/2011 (as the associated document TAN 1/2011 'Technical Assessment of Noise'), using principles defined in BS4142:2014.

The noise criteria to be applied to operational industrial noise is summarised in Table 2-3. The table is used as follows;

- Calculate the difference between the rated operational noise level ($L_{Ar,T}$) and the background noise ($L_{A90,T}$) at each noise sensitive receptor, following principles defined in BS4142:2014. This difference in levels is used to define the Sensitivity of Receptor, as shown in Table 2-3.
- Calculate the total noise at each noise sensitive receptor, including operational activity ($L_{Aeq,T}$). The difference between the total noise including operational activity, and that before development at each sensitive receptor is used to define the Magnitude of Impact, as shown in Table 2-3.
- The Significance of Impact is then defined, as shown in Table 2-3.

Table 2-3: Significance of Effects; Operational Industrial Noise

Magnitude of Impact (After – Before) L_{AeqT} dB	Sensitivity of Receptor based on likelihood of complaint X = (Rating ($L_{Ar,Tr}$) – Background ($L_{A90,T}$)) dB		
	Low (x < 5)	Medium (5 ≤ x < 10)	High (x ≥ 10)
Major (≥ 5)	Slight / Moderate	Moderate / Large	Large / Very Large
Moderate (3 to 4.9)	Slight	Moderate	Moderate / Large
Minor (1 to 2.9)	Neutral	Slight	Slight / Moderate
Negligible (0.1 to 0.9)	Neutral / Slight	Neutral / Slight	Slight
No Change (0)	Neutral	Neutral	Neutral

With regards to operational road traffic noise, the magnitude of impact is defined by assessing the change in road traffic as a result of development generated traffic during the day and night-time periods at existing noise sensitive receptors. The classification of the magnitude of impacts used in this assessment is shown in Table 2-4.

Table 2-4: Classification of Magnitude of Noise Impacts; Operational Road Traffic Noise

Change in Noise Level, x $L_{Aeq,T}$ dB	Magnitude of Impact
x ≥ 5	Major adverse
3 ≤ x < 5	Moderate adverse
1 ≤ x < 3	Minor adverse
0 < x < 1	Negligible adverse
x = 0	No change
-1 < x < 0	Negligible beneficial
-3 < x ≤ -1	Minor beneficial
-5 < x ≤ -3	Moderate beneficial
x ≤ - 5	Major beneficial

2.3 Noise Definitions

The following definitions relating to noise are used in this report:-

$L_{Aeq,T}$: Equivalent continuous A-weighted sound pressure level. This is the single number that represents the average sound energy over that time period. It is the sound level of a notionally steady sound that has the same energy as a sound that fluctuates over a specified measurement period.

$L_{A90,T}$: The noise level exceeded for 90% of the measurement period.

$L_{A10,T}$: The noise level exceeded for 10% of the measurement period.

$L_{AF,max}$: The A-weighted maximum sound pressure level over the measurement period. The measurement is taken using the fast time weighting of the sound level meter.

Free-field: As sound propagates from the source it may do so freely, or it may be obstructed in some way by a wall, a fence, building, earth bund, etc. The former is known as free-field propagation.

Ambient Sound Level, L_a: As defined in BS4142:2014; equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.

Façade Effect: When sound is reflected back towards its source, off a surface, such a wall, the reflected and incident sound waves interfere constructively, causing what is known as façade effect, or pressure doubling. This increases the noise, compared to that which exists in free-field, by approximately 2.5 dB(A).

Octave: A range of frequencies whose upper frequency limit is twice that of its lower frequency limit.

Octave Band: Sound pressure level is often measured in octave bands, the centre frequencies of the bands are defined by ISO – 31.5Hz, 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz, 16kHz to divide the audio spectrum into 10 equal parts. The sound pressure level of sound that has been passed through an octave band pass filter is termed the octave band sound pressure level.

3 BASELINE NOISE MONITORING

A noise survey was carried out in the area surrounding the proposed development site during the day and night-time periods on Tuesday 27th and Wednesday 28th February 2018. The purpose of the survey was to establish day and night-time background noise levels at areas representative of the most exposed properties on Newton Street, South Beach and Builnacraig Street. The noise monitoring locations and methodology were agreed with CnES Environmental Health department through consultation.

3.1 Noise Monitoring Locations

The noise monitoring locations are described in Table 3-1, and shown in Drawing No. 67052-027, Appendix A.

Table 3-1: Noise Monitoring Locations

No.	Grid Reference	Location
01	E 142138 N 932703	On pavement adjacent to entrance of Stornoway Harbour car park.
02	E 142717 N 932460	On grassy area across the road from houses on Newton Street.
03	E 143300 N 932135	At southern end of Builnacraig Street, on pavement.

3.2 Noise Monitoring Details

A fully calibrated Type 1 sound level meter was used to undertake all the noise monitoring events as detailed in Table 3-2. The sound level meter was calibrated both before and after measurements were taken and no significant drift was noted.

Table 3-2: Investigative Equipment Utilised and Technical Details

Time Intervals:	Daytime = 1 x 1hr intervals at each of the three noise monitoring locations, repeated over two separate days. Night time = 1 x 30 minute intervals at each of the three noise monitoring locations, repeated over two separate days.
Monitoring Periods:	05:17hrs – 07:00hrs on 27/02/2018; 12:04hrs – 17:42hrs on 27/02/2018; 23:12hrs – 01:04hrs on 27/02/2018 to 28/02/2018; and 10:19hrs – 14:40hrs on 28/02/2018.
Instrument:	Norsonic 140 sound analyser
Calibration:	At the start and finish of each monitoring event calibration was completed using a Norsonic NOR-1251 Sound Calibrator
Measurement Settings:	Environmental logging mode: A-weighted sound pressure level with time weighting F
Measurement Positions:	Measurements were taken between 1.2m and 1.5m above the ground.

The weather conditions during the monitoring events were recorded and are summarised in Table 3-3.

Table 3-3: Monitoring Periods and Weather Conditions

Monitoring period/ event	Date	Weather Conditions
Weekday Early Morning	27/02/ 2018	Between 0-1°C, dry, light cloud, wind speeds < 3.5 m/s.

Monitoring period/ event	Date	Weather Conditions
Weekday Day	27/02/2018	Between 4 and 7^{o}C, partly cloudy, wind speeds between 3.5 and 8 m/s, gusting at 9 m/s.
Weekday Night	27/02/2018 & 28/02/2018	Between 1 and 2°C, mostly dry, intermittent snow shower, moderate cloud. Wind speeds between 4 and 6 m/s.
Weekday Day	28/02/2018	Between -0.5 and 2.5°C, mostly dry, 5 mins of light hail, moderate cloud. Wind speeds between 3 and 10 m/s.

3.3 Observations

Notes of noise sources characterising the background noise environment at each of the monitoring locations for the monitoring periods were recorded and are summarised below in order of dominance (greatest first).

Position No. 1

Daytime noise sources for each of the monitoring periods included;

27/02/2018;

- Cars entering and exiting the car park at Stornoway Harbour;
- Power washer within Stornoway Harbour (intermittent for 15 to 20 mins);
- General harbour noise such as vehicle movements/reversing beeps; and
- Road traffic within the surrounding area.

28/02/2018;

- Gulls cawing;
- Mid frequency whine from the port;
- Cars entering and exiting the car park at Stornoway Harbour;
- Road traffic within the surrounding area; and
- Cans rattling along the ground within carpark (intermittent).

Early morning / night-time noise sources included.

27/02/2018; Early Morning

- Tug boats passing within Stornoway Harbour;
- Road traffic within the surrounding area;
- Gulls cawing; and
- Port loading/unloading activity within Stornoway Harbour.

27/02/2018; Night-time

- Cars entering and exiting the car park at Stornoway Harbour;
- Wave noise on shore;
- Trawlers/ boats passing along within Stornoway Harbour; and
- People talking in car park.

Position No. 2

Daytime noise sources included;

27/02/2018;

- Road traffic on Newton Street;

- Frequent indistinct industrial activity on platform located within the bay between the measurement position and Goat Island;
- Low frequency drone from direction of Builnacraig Street; and
- Intermittent sawing/cutting/grinding noise on Goat Island.

28/02/2018;

- Road traffic on Newton Street;
- Frequent indistinct industrial works on goat island; and
- Infrequent indistinct industrial activity on platform located within the bay between the measurement position and Goat Island;

Early morning / night time-noise sources included.

27/02/2018; Early Morning

- Generator / intermittent indistinct industrial activity on Goat Island;
- Infrequent road traffic on Newton Street;
- Tug boats in Stornoway Harbour; and
- Road traffic within ferry area of Stornoway Harbour.

27 & 28/02/2018; Night-time

- Generator / intermittent indistinct industrial activity on Goat Island;
- Waves on shore; and
- Infrequent road traffic on Newton Street.

Position No. 3

Daytime noise sources included;

27/02/2018;

- Low frequency drone from power plant to the west;
- Waves on shore; and
- Birds chirping.

28/02/2018;

- Waves on shore;
- Low frequency drone from power plant to the west;
- Gulls cawing; and
- Infrequent distant air traffic.

Early morning / night-time noise sources included;

27/02/2018; Early Morning

- Distant road traffic; and
- Gulls and crows cawing.

27/02/2018; Night-time

- Low/mid frequency drone from the east;
- Gulls and crows cawing; and
- Waves on shore.

3.4 Results

A summary of the noise monitoring results can be found in Table 3-4 and Table 3-5.

Table 3-4: Noise Monitoring Results

Date	Period	Noise Monitoring Location	Start time/ Duration (hrs:mins)	L_{Aeq} (dB_A)	L_{AFmax} (dB_A)	L_{A90} (dB_A)
27/02/2018	Early Morning	01	05:17 / 00:30	48.1	64.6	36.3
		02	05:55 / 00:30	52.0	73.2	41.6
		03	06:30 / 00:30	39.2	65.3	32.5
27/02/2018	Daytime	01	12:04 / 01:00	57.7	72.1	51.3
		02	15:33 / 01:00	60.3	84.0	48.0
		03	16:42 / 01:00	50.3	67.5	47.2
27/02/2018	Night-time	01	23:12 / 00:30	50.0	69.1	35.6
		02	23:54 / 00:30	43.2	63.9	37.5
28/02/2018		03	00:34 / 00:30	36.2	61.6	30.9
28/02/2018	Daytime	01	10:19 / 01:00	55.4	78.8	49.5
		02	12:30 / 01:00	60	84.4	49.3
		03	13:40 / 01:00	49.9	73.9	44.8

Table 3-5: Octave Band Noise Monitoring Results

Period	Start Time (hrs:mins)	Noise Monitoring Location	Octave Band Centre Frequency (Hz)									A
			31.5	63	125	250	500	1000	2000	4000	8000	
27/02/2018												
Early Morning	05:17	01	69.9	63.3	61.0	47.3	43.8	41.0	35.2	28.7	15.2	48.1
	05:55	02	62.3	58.1	57.5	48.6	46.6	48.8	44.1	36.5	27.1	52.0
	06:30	03	51.0	45.4	38.2	31.3	33.0	36.1	32.5	25.8	17.3	39.2
Daytime	12:04	01	75.5	74.0	62.6	55.3	52.5	52.5	50.0	47.1	43.0	57.7
	15:33	02	69.0	69.9	65.9	61.6	55.8	55.4	52.0	46.2	40.8	60.3
	16:42	03	77.7	65.9	58.3	43.2	43.0	45.5	41.8	36.9	31.5	50.3
Night-time	23:12	01	65.4	61.2	56.7	49.1	45.7	45.5	41.4	35.0	30.4	50.0
	23:54	02	66.5	59.1	48.4	43.9	38.6	38.8	31.9	26.5	22.9	43.2

Period	Start Time (hrs:mins)	Noise Monitoring Location	Octave Band Centre Frequency (Hz)									A
			31.5	63	125	250	500	1000	2000	4000	8000	
28/02/2018												
Night-time	00:34	03	63.6	54.4	42.9	38.1	32.7	28.8	26.2	19.1	16.8	36.2
Daytime	10:19	01	76.7	70.3	61.3	54.6	51.8	50.7	46.0	40.3	37.7	55.4
	12:30	02	80.2	74.4	65.1	58.3	55.0	55.5	52.0	45.0	41.5	60.0
	13:40	03	76.5	71.2	60.9	49.6	43.7	41.9	38.2	32.2	29.1	49.9

4 NOISE MODEL INPUT PARAMETERS

4.1 Noise Sensitive Receptors

4.1.1 Construction and Operational Industrial Noise

A sample of six noise sensitive receptors have been chosen as being representative of those most exposed to noise from construction and operational activities at the proposed DWP. These are described in Table 4-1, and shown in Drawing No. 670525-028, Appendix A.

Table 4-1: Noise Sensitive Receptor Locations; Construction and Industrial Noise

NSR ID	Location	Grid Reference
1	South Beach	142170 / 932730
2	Newton Street	142638 / 932548
3		142805 / 932437
4		142948 / 932393
5	Seaview Terrace	143096 / 932312
6	Builnacriag Street	143275 / 932138

4.1.2 Operational Road Traffic Noise

A sample of six noise sensitive receptors have been chosen as being representative of those most exposed to noise from the increase in road traffic generated by at the proposed DWP. These are described in Table 4-2, and shown in Drawing No. 670525-034, Appendix A.

Table 4-2: Noise Sensitive Receptor Locations; Operational Road Traffic Noise

NSR ID	Location	Grid Reference
1	House by Macaulay Farm	140148 / 932192
2	House at Marybank	140144 / 932604
3	Perceval Road South; West of A857	142455 / 933965
4	A857/ Macaulay Road; North of Perceval Road South	142512 / 934095
5	Perceval Road South; East of A857	142616 / 933970
6	A857/ Macaulay Road; South of Perceval Road South	142519 / 933935

4.2 Construction Noise Model Input Parameters

4.2.1 Construction Schedule and Modelled Scenarios

Details of the proposed construction schedule at the Site have been supplied by Wallace Stone. A summary of the proposed construction schedule is shown in Table 4-3.

Table 4-3: Deep Water Port, Proposed Construction Schedule

Ref	Construction Stage	Start Month	Finish Month
1	Approach road	1	3
2	Remove and stockpile overburden from rock excavation area	1	2
3	Install sheet pile wall	2	6
4	Excavate rock and infill reclamation	6	10
5	Dredge and infill reclamation	7	8
6	Linkspan Support Dolphin	7	10
7	Foundations for caissons	10	12
8	Rock armouring to side slopes	11	14
9	Placing concrete caissons	13	13
10	Rock fill to caissons	14	14
11	Concrete deck to caissons	15	16
12	Concrete slab to quay	15	16
13	Fendering to quay walls	15	17
14	Installation of Linkspan	16	17
15	Services and oil pipes	16	18
16	Surfacing	17	18

As can be seen in Table 4-3, in many cases more than one stage of construction will to occur during the same months. Noise modelling scenarios have been set up to account for the cumulative impact of the concurrent stages. The scenarios have been set up to model the worst-case potential combination of construction activities for each set of months considered. It has been assumed that the construction activities will commence at the start and finish at the end of each considered month. A summary of the months, associated combined construction stages and relevant assessment periods for each of the modelled scenarios is shown in Table 4-4.

Table 4-4: Modelled Scenarios

Modelled Scenario	Months	Modelled Combination of Construction Stages (Worst Case)	Relevant Assessment Periods
1	1, 2 & 3	Approach Road	Day, Evening
		Remove stockpile and overburden	
		Install sheet pile wall	
2	4, 5 & 6	Install sheet pile wall	Day
		Excavate rock and infill reclamation	
3A	7, 8 & 9	Excavate rock and infill reclamation	Day, Evening, Night
		Dredge (cutter suction) and infill reclamation	
		Linkspan Support Dolphin	
3B	7, 8 & 9	Excavate rock and infill reclamation	Day, Evening, Night
		Dredge (backhoe) and infill reclamation	
		Linkspan Support Dolphin	
4	10	Excavate rock and infill reclamation	Day, Evening
		Linkspan Support Dolphin	
		Foundations for caissons	
5	11 & 12	Foundations for caissons	Day, Evening
		Rock armouring to side slopes	
6	13	Rock armouring to side slopes	Day, Evening, Night
		Placing concrete caissons	
7	14	Rock armouring to side slopes, Arnish access road	Day, Evening

Modelled Scenario	Months	Modelled Combination of Construction Stages (Worst Case)	Relevant Assessment Periods
		Rock fill to caissons	
8	15 & 16	Concrete deck to caissons	Day, Evening
		Concrete slab to quay	
		Fendering to quay walls	
		Installation of Linkspan	
		Services and oil pipes	
9	17 & 18	Fendering to quay walls	Day, Evening
		Installation of Linkspan	
		Services and oil pipes	
		Surfacing	

4.2.2 Night-time Construction Noise

Potential construction activities that may be carried out at night are dredging (both cutter suction and backhoe options) and placing of the concrete caissons.

4.2.3 Piling

Piling shall be carried out during daytime hours only at Deep Water Port as part of the installation of the sheet pile wall (Ref 3, Table 4-3), and the Linkspan Support Dolphin (Ref 6, Table 4-3).

To install the sheet pile wall, it is intended to use a combination of 25m long king piles with intermediary sheet piles, being driven into place using a combination of vibratory and impact piling. The majority of pile driving will be carried out by vibratory hammer, with an impact hammer being used to drive each pile into its' final position. Impact piling typically generates higher noise levels than vibratory piling, the maximum period that impact piling is predicted to be used in any one daytime period is 35% of the construction site operating hours, with vibratory methods being used for the remaining 65%. The noise modelling of piling carried out at the proposed development contains this assumption.

To install the Linkspan Support Dolphins, it is intended to use a combination of vibratory and impact piling. Up to two Dolphins may be installed, each requiring around 12 piles to be driven, taking around three to four days to install all piles per Dolphin. The majority of pile driving will be carried out by vibratory hammer, with an impact hammer being used to drive each pile into its' final position. Impact piling typically generates higher noise levels than vibratory piling. On the days that piling shall be carried out, it is predicted to occur for two to three hours per day. As a worst case scenario, the maximum period that impact piling may be used in any one daytime period has been assumed within the assessment to be 50% of the construction site operating hours, with vibratory methods being used for the remaining 50%.

4.2.4 Dredging

Dredging shall be carried out to deepen a large area of sea bed adjacent to the new quay (Ref 5, Table 4-3), much of the material dredged shall be used in the construction of the land reclamation area. The preferred and most likely method of dredging intended to be carried out is cutter suction dredging. The material dredged shall be pumped directly through a pipeline into the land reclamation area.

If the material proves not to be suitable for cutter suction dredging and pumping ashore, it is intended to use a large backhoe dredger located on a spud leg barge, feeding self-propelled hopper barges, which would move inshore for loading into the reclamation area.

Both cutter suction and backhoe dredging options are likely to be carried out continuously over a 24 hour period. Backhoe dredging typically generates higher noise levels than cutter suction dredging. In order to consider the worst case scenario, both potential dredging methods have been modelled and assessed (Scenarios 3A & 3B, Table 4-3).

4.2.5 Rock Blasting

As part of the DWP construction peat shall be stripped from the proposed rock excavation area before rock blasting is intended to be carried out. The proposed method is to use three crawler rock drills to create the blasting holes, blasting to break out rock to useable sizes, before loading with excavators to dump trucks for transportation to the reclamation area. The proposed area of rock excavation at the DWP benefits from being circa 1.3km from the nearest residential noise sensitive receptors, therefore blasting emissions shall be significantly attenuated by distance.

The noise assessment considers the impact of the crawler rock drills, and associated plant involved in transportation and land reclamation using the blasted rock.

The scope of BS5228-1:2009+A1:2014 does not cover the assessment of noise from rock blasting, however in relation to surface coal and mineral extraction sites, it states that good blasting practices will reduce the inherent and associated impulsive noise. Part 2 of the standard provides good practice guidelines in relation to controlling vibration emissions from surface coal and mineral extraction sites. The good practice guidance includes the following;

- Restriction of blasting as far as practicable to regular daytime periods, not on Sundays and away from public holidays;
- Good community relations; where relevant, informing nearby noise/vibration sensitive receptors ahead of periods of blasting;
- The choice of appropriate drilling rigs; and
- Designing blasts to maximize efficiency and reduce the transmission of noise/vibration.

4.2.6 Construction Noise Model Data

3D computer noise modelling of the various stages of construction activity at the DWP has been carried out using CadnaA software. Details on worst case construction activities, durations, operating times, and associated items of noise generating plant for each stage of construction used within the noise models have been supplied by Wallace Stone.

Calculations were carried out using noise data and guidance provided in BS5228:2009+A1:2014, to derive predicted noise levels at noise sensitive receptors. Where data was not available within BS5228 it has been sourced from the Environmental Protection Department of Hong Kong's Technical Memorandum on Noise from Construction Work. Noise data for cutter suction dredging was taken from Royal Haskoning DHV, Memo on Swansea Channel Noise Impact Assessment, dated 25th June 2014. The noise data for backhoe dredging was taken from Waterman, Aberdeen Harbour Expansion Project, Volume 3, Appendix 20-C: Construction Noise Assessment, dated November 2015.

In summary, noise data has been sourced from the following publications;

- BS5228;1-2009+A1:2014, *Code of Practice for Noise on Construction and Open Sites*;
- Environmental Protection Department of Hong Kong; *Technical Memorandum on Noise from Construction Work other than Percussive Piling,* 1989.
- Royal Haskoning DHV, *Swansea Channel Noise Impact Assessment, Memo,* 25th June 2014.

- Waterman, *Aberdeen Harbour Expansion Project, Volume 3, Appendix 20-C, Construction Noise Assessment*, dated November 2015.

Full details of the items of modelled construction plant, noise data (including data source), operating times, durations and source heights for each of the considered scenarios is shown in Appendix C.

4.2.7 Construction Noise Model Assumptions

A number of assumptions have been established during the CadnaA modelling exercise, as detailed below:

- The ground model uses Lidar 1m resolution terrain height data for the Deep Water Port, Stornoway and the majority of the surrounding area. The remaining areas use Ordnance Survey 5m resolution terrain data;
- The heights of buildings have been estimated from photographs;
- A façade correction of +3dB(A) has been applied to free-field noise levels externally at buildings;
- Ground absorption has been set to 0.5 for mixed soft/hard ground, areas of water have been set to 1 for reflective surface;
- Evening noise levels generated by construction activities have been assumed to be the same as those generated during daytime hours;
- The noise model assumes locations of plant based on descriptions of construction activities provided by Wallace Stone;
- Worst case scenario combinations of construction activities likely to occur in any one day during the considered assessment periods have been assumed;
- Daytime noise levels have been calculated at ground floor level (i.e lounges/kitchens), which have been taken as being 1.5m above ground level;
- Night-time noise levels have been calculated at first floor level (i.e bedrooms), which have been taken as being 4m above ground level;
- Articulated dump truck and HGV deliveries have been assumed to take 2 mins to arrive within the site, and 2 mins to depart;
- Articulated dump truck deliveries have been assumed to take 1 minute to tip;
- In the case of installation of the sheet pile wall, both king and sheet piles shall be driven, as a worst case scenario the louder of the two types (i.e driving of sheet piles) has been assumed.
- Spud-leg barges on which piling equipment is intended to be located have been assumed to have a height of 2m above sea level. The height of equipment located on the barges (eg piling excavators) has been assumed as relative to the height of the barge (eg a 1m high noise source height located on the 2m high barge, has a total height of 3m);
- The following sources have been modelled as line sources within CadnaA;
    - Heavy goods vehicles (HGVs) and dump trucks;
    - Concrete trucks;
    - Moving construction plant;
    - Tugs / work boats.
- All remaining sources (not outlined above) have been modelled within CadnaA as point sources.

4.2.8 ABC Category Thresholds

The appropriate ABC category thresholds above which there is considered to be a noise impact from construction noise have been calculated following guidance provided in BS5228-1:2009+A1:2014 (refer to Section 2.2.1). Details of the calculations are shown in Appendix B.

4.3 Operational Noise Model Input Parameters

4.3.1 Modelled Scenarios

As discussed in Section 1.3.2, during the operational stage, there is the potential for noise generated by the increase in road traffic associated with DWP operations to impact upon existing residential receptors. There is also the potential for noise from cargo ships loading/unloading to impact upon existing residents.

During Phases 2, 3 & 4 of operations at the DWP, there is the potential for noise from decommissioning activities to impact on existing residential receptors.

The following operational scenarios have been modelled using CadnaA software;

Table 4-5: Modelled Scenarios; Operational Noise

Scenario	Description	Relevant Assessment Periods
10	Cargo ship loading/unloading	Day, Night
11	Decommissioning activities	Day
12	Cargo ship loading/unloading and Decommissioning activities occurring concurrently	Day
13	Road traffic noise; 2021; baseline (without development)	Day, Night
14	Road traffic noise; 2021 (with development)	Day, Night

4.3.2 Cargo Ship Loading / Unloading Activities

It is considered likely that cargo ship loading unloading activities will happen during both the day and night-time periods, the noise modelling exercise contains this assumption. The operational noise assessment considers the noise of cargo being moved to/from cargo ships using a large crane, as well as the movement of goods to and from the storage area within the DWP.

4.3.3 Decommissioning Activities

There is the potential that decommissioning activities of large marine structures may be carried out as part of the operations of proposed future phases of development at the DWP (i.e Phases, 2, 3 & 4). As a worst case scenario, it has been assumed that decommissioning activities shall be carried out within the closest proposed development phase of the DWP to noise sensitive receptors; Phase 4.

EnviroCentre has experience of carrying out noise assessments for decommissioning of large marine structures at similar sites within Scotland, which has been used to inform the noise data and assumptions used within the noise assessment.

4.3.4 Operational Noise Data

3D computer noise modelling of the various stages of operational activity at the DWP has been carried out using CadnaA software.

Calculations were carried out using noise data provided in BS5228:2009+A1:2014, to derive predicted noise levels at noise sensitive receptors. Noise data for cargo ship loading/unloading was taken from Waterman, Aberdeen Harbour Expansion Project, *Volume 2, Environmental Statement* (Nov 2015).

In summary, noise data has been sourced from the following publications;

- BS5228;1-2009+A1:2014, *Code of Practice for Noise on Construction and Open Sites*;
- EnviroCentre historical data on decommissioning;
- Waterman, *Aberdeen Harbour Expansion Project, Volume 2, Environmental Statement*, dated November 2015.

Full details of the items of modelled operational plant, noise data (including data source), operating times, durations and source heights for each of the considered scenarios are shown in Appendix D.

4.3.5 Operational Traffic Data

Traffic data in the form of 18 hour Annual Average Weekday Traffic (AAWT) flows, for the future year of development completion (2021) with and without development scenarios have been provided by Systra. The data contains worst case operational traffic flows from both the proposed DWP and Newton Marina.

4.3.6 Operational Noise Model Assumptions

A number of assumptions have been established during the CadnaA modelling exercise, as detailed below:

- The ground model uses Lidar 1m resolution terrain height data for the Deep Water Port, Stornoway and the majority of the surrounding area. The remaining areas use Ordnance Survey 5m resolution terrain data;
- The heights of buildings have been estimated from photographs or scaled from the architect's drawings;
- A façade correction of +3dB(A) has been applied to free-field noise levels externally at buildings;
- Ground absorption has been set to 0.5 for mixed soft/hard ground, areas of water have been set to 1 for reflective surface;
- Worst case scenario combinations of operational activities likely to occur in any one day during the considered assessment periods have been assumed;
- Daytime noise levels have been calculated at ground floor level (i.e lounges/kitchens), which have been taken as being 1.5m above ground level;
- Night-time noise levels have been calculated at first floor level (i.e bedrooms), which have been taken as being 4m above ground level;
- Decommissioning activities have been assumed to occur during the daytime only;
- Cargo loading/unloading activities have been assumed to occur during both the day and night-time periods;
- Items of moving plant have been modelled as line sources within CadnaA. All remaining operational plant has been modelled as point sources;
- Traffic data (refer to Section 4.3.4) has been used within CadnaA to model future year with and without development scenarios.

5 CONSTRUCTION NOISE MODEL RESULTS AND ASSESSMENT

The noise model results for each modelled scenario of construction activity, along with the BS5228 assessment at each of the considered noise sensitive receptors are summarised in Table 5-1 to Table 5-6. The predicted level within the tables is defined as the total construction and ambient noise level at each receptor location.

Table 5-1: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 1

NSR 01		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
1	Approach Road Remove stockpile and overburden Install sheet pile wall	65	57.4	Neutral	60	55.5	Neutral	N/A	N/A	N/A
2	Install sheet pile wall Excavate rock and infill reclamation	65	58.9	Neutral	N/A	N/A	N/A	N/A	N/A	N/A
3A	Excavate rock and infill reclamation Dredge (cutter suction) and infill reclamation Linkspan Support Dolphin	65	58.6	Neutral	60	57.3	Neutral	55	49.9	Neutral
3B	Excavate rock and infill reclamation Dredge (backhoe) and infill reclamation Linkspan Support Dolphin	65	59.0	Neutral	60	57.8	Neutral	55	51.5	Neutral
4	Excavate rock and infill reclamation Linkspan Support Dolphin Foundations for caissons	65	58.4	Neutral	60	57.0	Neutral	N/A	N/A	N/A
5	Foundations for caissons Rock armouring to side slopes	65	56.9	Neutral	60	54.7	Neutral	N/A	N/A	N/A
6	Rock armouring to side slopes Placing concrete caissons	65	56.9	Neutral	60	54.7	Neutral	55	49.7	Neutral
7	Rock armouring to side slopes Rock fill to caissons	65	56.9	Neutral	60	54.7	Neutral	N/A	N/A	N/A
8	Concrete deck to caissons									

NSR 01		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
	Concrete slab to quay	65	56.7	Neutral	60	54.5	Neutral	N/A	N/A	N/A
	Fendering to quay walls									
	Installation of Linkspan									
	Services and oil pipes									
9	Fendering to quay walls	65	56.9	Neutral	60	54.8	Neutral	N/A	N/A	N/A
	Installation of Linkspan									
	Services and oil pipes									
	Surfacing									

Table 5-2: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 2

NSR 02		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
1	Approach Road	65	60.4	Neutral	65	57.9	Neutral	N/A	N/A	N/A
	Remove stockpile and overburden									
	Install sheet pile wall									
2	Install sheet pile wall	65	60.7	Neutral	N/A	N/A	N/A	N/A	N/A	N/A
	Excavate rock and infill reclamation									
3A	Excavate rock and infill reclamation	65	61.1	Neutral	65	59.3	Neutral	55	49.6	Neutral
	Dredge (cutter suction) and infill reclamation									
	Linkspan Support Dolphin									
3B	Excavate rock and infill reclamation	65	61.3	Neutral	65	59.3	Neutral	55	50.0	Neutral
	Dredge (backhoe) and infill reclamation									
	Linkspan Support Dolphin									
4	Excavate rock and infill reclamation	65	61.0	Neutral	65	59.0	Neutral	N/A	N/A	N/A
	Linkspan Support Dolphin									
	Foundations for caissons									
5	Foundations for caissons									

NSR 02		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
	Rock armouring to side slopes	65	60.3	Neutral	65	57.6	Neutral	N/A	N/A	N/A
6	Rock armouring to side slopes Placing concrete caissons	65	60.3	Neutral	65	57.7	Neutral	55	49.6	Neutral
7	Rock armouring to side slopes Rock fill to caissons	65	60.3	Neutral	65	57.7	Neutral	N/A	N/A	N/A
8	Concrete deck to caissons Concrete slab to quay Fendering to quay walls Installation of Linkspan Services and oil pipes	65	60.2	Neutral	65	57.5	Neutral	N/A	N/A	N/A
9	Fendering to quay walls Installation of Linkspan Services and oil pipes Surfacing	65	60.4	Neutral	65	57.9	Neutral	N/A	N/A	N/A

Table 5-3: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 3

NSR 03		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
1	Approach Road Remove stockpile and overburden Install sheet pile wall	65	60.4	Neutral	65	57.8	Neutral	N/A	N/A	N/A
2	Install sheet pile wall Excavate rock and infill reclamation	65	60.7	Neutral	N/A	N/A	N/A	N/A	N/A	N/A
3A	Excavate rock and infill reclamation Dredge (cutter suction) and infill reclamation Linkspan Support Dolphin	65	61.1	Neutral	65	59.0	Neutral	55	50.1	Neutral
3B	Excavate rock and infill reclamation									

NSR 03		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
	Dredge (backhoe) and infill reclamation	65	61.3	Neutral	65	59.4	Neutral	55	51.7	Neutral
	Linkspan Support Dolphin									
4	Excavate rock and infill reclamation	65	61.0	Neutral	65	59.0	Neutral	N/A	N/A	N/A
	Linkspan Support Dolphin									
	Foundations for caissons									
5	Foundations for caissons	65	60.3	Neutral	65	57.6	Neutral	N/A	N/A	N/A
	Rock armouring to side slopes									
6	Rock armouring to side slopes	65	60.3	Neutral	65	57.6	Neutral	55	49.6	Neutral
	Placing concrete caissons									
7	Rock armouring to side slopes	65	60.3	Neutral	65	57.7	Neutral	N/A	N/A	N/A
	Rock fill to caissons									
8	Concrete deck to caissons	65	60.2	Neutral	65	57.5	Neutral	N/A	N/A	N/A
	Concrete slab to quay									
	Fendering to quay walls									
	Installation of Linkspan									
	Services and oil pipes									
9	Fendering to quay walls	65	60.3	Neutral	65	57.8	Neutral	N/A	N/A	N/A
	Installation of Linkspan									
	Services and oil pipes									
	Surfacing									

Table 5-4: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 4

NSR 04		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
1	Approach Road	65	60.4	Neutral	65	57.9	Neutral	N/A	N/A	N/A
	Remove stockpile and overburden									
	Install sheet pile wall									
2	Install sheet pile wall	65	60.8	Neutral	N/A	N/A	N/A	N/A	N/A	N/A
	Excavate rock and infill reclamation									

NSR 04		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
3A	Excavate rock and infill reclamation Dredge (cutter suction) and infill reclamation Linkspan Support Dolphin	65	61.4	Neutral	65	59.5	Neutral	55	50.7	Neutral
3B	Excavate rock and infill reclamation Dredge (backhoe) and infill reclamation Linkspan Support Dolphin	65	61.7	Neutral	65	60.0	Neutral	55	53.0	Neutral
4	Excavate rock and infill reclamation Linkspan Support Dolphin Foundations for caissons	65	61.2	Neutral	65	59.2	Neutral	N/A	N/A	N/A
5	Foundations for caissons Rock armouring to side slopes	65	60.3	Neutral	65	57.7	Neutral	N/A	N/A	N/A
6	Rock armouring to side slopes Placing concrete caissons	65	60.3	Neutral	65	57.7	Neutral	55	49.8	Neutral
7	Rock armouring to side slopes Rock fill to caissons	65	60.3	Neutral	65	57.7	Neutral	N/A	N/A	N/A
8	Concrete deck to caissons Concrete slab to quay Fendering to quay walls Installation of Linkspan Services and oil pipes	65	60.2	Neutral	65	57.5	Neutral	N/A	N/A	N/A
9	Fendering to quay walls Installation of Linkspan Services and oil pipes Surfacing	65	60.3	Neutral	65	57.8	Neutral	N/A	N/A	N/A

Table 5-5: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 5

NSR 05		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
1	Approach Road Remove stockpile and overburden Install sheet pile wall	65	60.4	Neutral	65	57.9	Neutral	N/A	N/A	N/A
2	Install sheet pile wall Excavate rock and infill reclamation	65	60.9	Neutral	N/A	N/A	N/A	N/A	N/A	N/A
3A	Excavate rock and infill reclamation Dredge (cutter suction) and infill reclamation Linkspan Support Dolphin	65	61.3	Neutral	65	59.4	Neutral	55	50.4	Neutral
3B	Excavate rock and infill reclamation Dredge (backhoe) and infill reclamation Linkspan Support Dolphin	65	61.6	Neutral	65	59.8	Neutral	55	52.5	Neutral
4	Excavate rock and infill reclamation Linkspan Support Dolphin Foundations for caissons	65	61.0	Neutral	65	59.9	Neutral	N/A	N/A	N/A
5	Foundations for caissons Rock armouring to side slopes	65	60.3	Neutral	65	57.7	Neutral	N/A	N/A	N/A
6	Rock armouring to side slopes Placing concrete caissons	65	60.3	Neutral	65	57.6	Neutral	55	49.6	Neutral
7	Rock armouring to side slopes Rock fill to caissons	65	60.3	Neutral	65	57.7	Neutral	N/A	N/A	N/A
8	Concrete deck to caissons Concrete slab to quay Fendering to quay walls Installation of Linkspan Services and oil pipes	65	60.2	Neutral	65	57.6	Neutral	N/A	N/A	N/A
9	Fendering to quay walls Installation of Linkspan Services and oil pipes Surfacing	65	60.3	Neutral	65	58.3	Neutral	N/A	N/A	N/A

Table 5-6: Noise Model Results and BS5228 Assessment; Noise Sensitive Receptor No. 6

NSR 06		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
1	Approach Road Remove stockpile and overburden Install sheet pile wall	65	53.0	Neutral	55	51.8	Neutral	N/A	N/A	N/A
2	Install sheet pile wall Excavate rock and infill reclamation	65	57.3	Neutral	N/A	N/A	N/A	N/A	N/A	N/A
3A	Excavate rock and infill reclamation Dredge (cutter suction) and infill reclamation Linkspan Support Dolphin	65	57.6	Neutral	55	57.3	Slight	45	46.3	Slight
3B	Excavate rock and infill reclamation Dredge (backhoe) and infill reclamation Linkspan Support Dolphin	65	58.7	Neutral	55	58.4	Moderate	45	51.9	Major
4	Excavate rock and infill reclamation Linkspan Support Dolphin Foundations for caissons	65	55.7	Neutral	55	55.1	Slight	N/A	N/A	N/A
5	Foundations for caissons Rock armouring to side slopes	65	51.6	Neutral	55	49.9	Neutral	N/A	N/A	N/A
6	Rock armouring to side slopes Placing concrete caissons	65	52.2	Neutral	55	50.8	Neutral	45	43.5	Neutral
7	Rock armouring to side slopes Rock fill to caissons	65	52.3	Neutral	55	50.8	Neutral	N/A	N/A	N/A
8	Concrete deck to caissons Concrete slab to quay Fendering to quay walls Installation of Linkspan Services and oil pipes	65	51.2	Neutral	55	49.3	Neutral	N/A	N/A	N/A
9	Fendering to quay walls									

NSR 06		Daytime			Evening			Night-time		
Scenario	**Combined Construction Stages**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**	**Threshold Level dB(A)**	**Predicted Level dB(A)**	**Significance**
	Installation of Linkspan	65	54.5	Neutral	55	53.7	Neutral	N/A	N/A	N/A
	Services and oil pipes									
	Surfacing									

5.1 Discussion of Results

The worst case noise impacts for each of the modelled scenarios on concurrent construction stages and relevant assessment periods are summarised below (refer to Table 4-4).

Scenario 1 (Months 1, 2 & 3); The combined construction stages of construction of the approach road, removal of stockpile and overburden and installation of the sheet pile wall, are predicted to result in noise impacts of Neutral significance at all noise sensitive receptors during the daytime and evening.

Scenario 2 (Months 4, 5 & 6); The combined construction stages of installation of the sheet pile wall, and excavate rock and infill reclamation, are predicted to result in noise impacts of Neutral significance at all noise sensitive receptors during the daytime.

Scenario 3A (Months 7, 8 & 9); The combined construction stages of excavate rock and infill reclamation, dredging (cutter suction) and infill reclamation, and construction of the linkspan support dolphin, are predicted to result in noise impacts of Neutral significance during the daytime. During the evening and night-time there is an impact of Slight significance at NSR 06 (Builnacraig Street). The significance of all other impacts is predicted to be Neutral during the evening and night-time.

Scenario 3B (Months 7, 8 & 9); The combined construction stages of excavate rock and infill reclamation, dredging (backhoe) and infill reclamation, and construction of the linkspan support dolphin, are predicted to result in noise impacts of Neutral significance during the daytime. During the evening there is an impact of Moderate significance at NSR 06 (Builnacraig Street). At night there is an impact of Major significance at NSR 06 (Builnacraig Street). The significance of all other impacts is predicted to be Neutral during the evening and night-time.

Scenario 4 (Month 10); The combined construction stages of excavate rock and infill reclamation, construction of the Linkspan Support Dolphin and foundations for caissons, are predicted to result in impacts of Neutral significance during the daytime. During the evening there is an impact of Slight significance at NSR 06 (Builnacraig Street). The significance of all other impacts is predicted to be Neutral during the evening.

Scenario 5 (Months 11 & 12); The combined construction stages of foundations for caissons and rock armouring to side slopes are predicted to result in impacts of Neutral significance at all receptors during the day and evening.

Scenario 6 (Month 13); The combined construction stages of construction of rock armouring to side slopes and placing concrete caissons, are predicted to result in impacts of Neutral significance at all receptors during the day, evening and night-time.

Scenario 7 (Month 14); The combined construction stages of rock armouring to side slopes and rock fill to caissons, are predicted to result in impacts of Neutral significance at all receptors during the day and evening.

Scenario 8 (Months 15 & 16); The combined construction stages of concrete deck to caissons, concrete slab to quay, fendering to quay walls, installation of linkspan, services and oil pipes, are predicted to result in impacts of Neutral significance at all receptors during the day and evening.

Scenario 9 (Months 17 & 18); The combined construction stages of fendering to quay walls, installation of linkspan, services, oil pipes and surfacing, are predicted to result in impacts of Neutral significance at all receptors during the day and evening.

5.1.1 Greatest Daytime and Evening Noise Impacts

The greatest noise generating activities during the daytime and evening are predicted to be from the combined construction stages of excavate rock and infill reclamation, backhoe dredging and infill reclamation, and construction of the linkspan support dolphin (Scenario 3B; Months 7, 8 & 9). The worst case impacts from these construction activities at the DWP and are predicted to be of Neutral significance during the daytime, and Moderate significance at NSR 06 (Builnacraig Street) during the evening.

5.1.2 Greatest Night-time Noise Impacts

The greatest noise generating activities during the night-time are predicted to be from backhoe dredging (Scenario 3B; Months 7, 8 & 9). The worst case night-time impacts from this construction activity at the DWP are predicted to be of Major significance at NSRs 06 (Builnacraig Street), and Neutral significance at all other receptors. The maximum duration that backhoe dredging may be carried out at night is three months.

.

6 CUMULATIVE CONSTRUCTION NOISE IMPACT

There is the potential for cumulative noise from concurrent construction activities at the DWP and the proposed Newton Marina to impact on existing residential receptors. At the time of writing, the proposed construction commencement date for Newton Marina is December 2018, with construction at the DWP anticipated to commence in November 2019. There is also the potential for cumulative noise from the proposed construction of a fish processing factory on Goat Island, which is scheduled to occur between January and December 2019 to impact on existing residential receptors.

The cumulative impact assessment of noise generated by construction activities from Newton Marina and the DWP takes into account the proposed 11 month gap between construction commencement dates. Within the 13 month period that construction activities are proposed to occur at Newton Marina and the DWP concurrently it is understood that exact construction timings may change from those proposed at the moment. In order to assess the worst case scenario of cumulative impact during the concurrent period, the greatest predicted noise generating activities at Newton Marina and the DWP during the period when both sites are operating concurrently have therefore been assumed to occur at the same time.

Full details of the proposed noise generating construction activities at the proposed Newton Marina are provided in Technical Appendix 7.1, within Volume 3 of the Newton Marina EIAR.

The greatest predicted noise generating construction stages that may occur concurrently for each of the considered periods is shown in Table 6-1.

Table 6-1: Greatest Noise Generating Concurrent Construction Stages; Newton Marina and Deep Water Port

Assessment Period	Greatest Noise Generating Concurrent Construction Stages			
	Newton Marina		Deep Water Port	
	Scenario / Duration	Combined Construction Stages	Scenario / Duration	Combined Construction Stages
Daytime	6; 2 Months	Dock structure, pontoons, surfacing, services to pontoons	3B; 2 Months	Excavate rock and infill reclamation, dredging (backhoe) and infill reclamation, linkspan support dolphin.
Evening	6; 2 Months	Dock structure, pontoons, surfacing, services to pontoons	3B; 2 Months	Dredging (backhoe) and infill reclamation, linkspan support dolphin.
Night-time	N/A	N/A	3B; 2 Months	Dredging (backhoe) and infill reclamation.

The greatest noise generating combination of construction stages during the daytime and evening and are from Scenario 6 at Newton Marina, and Scenario 3B at the DWP (refer to Technical Appendix 7.1, within Volume 3 of the Newton Marina EIAR for full details). There is no predicted cumulative impact at night, as there are no concurrent night-time works scheduled.

The construction of the proposed fish processing factory at Goat Island, scheduled to occur during daytime hours between January and December 2019 (but which may be subject to change) has the potential to contribute to the overall cumulative noise impact at existing residential receptors. Noise generated by the proposed construction activities at the factory has been modelled at the location of the existing sensitive receptors using CadnaA software. The noise data and assumptions used within the model is shown as Ref 17 in Appendix C of Technical Appendix 7.1 of the Newton Marina EIAE. As the exact timings of the construction of

the factory is unknown at this stage, noise generated by construction activities associated with it have been included within the cumulative noise impact assessment, along with worst case noise generating construction stages from Newton Marina and the DWP.

An assessment of the worst-cast cumulative impacts, if the greatest noise generating construction stages at Newton Marina, the DWP and the fish processing factory on Goat Island are to occur concurrently, are shown in Table 6-2 and Table 6-3.

Table 6-2: Worst Case Cumulative Impact; Daytime

Noise Sensitive Receptor	Predicted Cumulative Facade Level dB(A)	Threshold Level dB(A)	Excess dB(A)	Significance
1	58.9	65	-6.1	Neutral
2	64.6	65	-0.4	Neutral
3	65.9	65	0.9	Slight
4	65.0	65	0.0	Neutral
5	62.9	65	-2.1	Neutral
6	57.0	65	-8.0	Neutral

Table 6-3: Worst Case Cumulative Impact; Evening

Noise Sensitive Receptor	Predicted Cumulative Façade Level dB(A)	Threshold Level dB(A)	Excess dB(A)	Significance
1	57.5	60	-2.5	Neutral
2	63.6	65	-1.4	Neutral
3	65.1	65	0.1	Slight
4	64.0	65	-1.0	Neutral
5	61.5	65	-3.5	Neutral
6	56.3	55	1.3	Slight

The results show that during the daytime period, the significance of the worst case cumulative impact if the greatest noise generating construction activities at Newton Marina, DWP and the proposed fish processing factory on Goat Island occur concurrently is Slight at NSR 03 (Newton Street). At the remaining noise sensitive receptor locations the impact is Neutral. During the evening, the significance is Slight at NSRs 03 (Newton Street) and 06 (Builnacraig Street).

There are no scheduled night-time concurrent construction activities at Newton Marina, DWP and the proposed fish processing factory on Goat Island.

6.1 Construction Noise Mitigation

The worst case daytime significance of effect from construction activities at Newton Marina (including cumulative impacts) are predicted to be of Slight significance. During the evening, the worst case impacts (including cumulative impacts) are predicted to be of Moderate significance at one receptor (NSR 06). Impacts of Moderate significance are undesirable, but of limited concern (refer to Table 2-2).

At night, the worst case impacts (including cumulative impacts) are predicted to be of Major significance at one receptor (NSR 06). Neutral night-time impacts are predicted at the remaining noise sensitive receptors. The predicted Major impact is as a result of employing the less preferred backhoe dredging method at night. The use of backhoe dredging at night is not considered likely, if it were to be employed the maximum duration that it would occur is two months.

Backhoe dredging equipment contains many moving parts requiring access, and as such significant control of noise at the source is considered to be impractical. Similarly, acoustic screening between the source and receptor has been considered. However, as the backhoe dredger moves throughout the dredging area at sea this could only practically be situated on land where it would be less effective than were it to be located at source. Due to the extent of acoustic screening required, high wind loading considerations on the barrier, and the visual impact this would have, the use of acoustic screening is not considered to be practical.

7 OPERATIONAL NOISE MODEL RESULTS AND ASSESSMENT

7.1.1 BS4142:2014 Acoustic Feature Correction

CadnaA software has been used to model the specific sound level from operational activities at the location of the most exposed sensitive receptors. To calculate the rated sound level, the assessment considers the character of the sound being assessed at the receptor location. If present, corrections for impulsivity, intermittency and/or tonality are added to the specific sound level to calculate the rated sound level.

A sound source may exhibit acoustic characters at source, however, the prominence of these features may be masked at the location of the noise sensitive receptors by the residual (background) sound at these locations. The amount by which the residual sound masks these features varies as the residual sound changes in level and possible character. Similarly, the sources acoustic character may also vary with time.

In the case of cargo ships loading/unloading, the movement of metal containers has the potential to create sound which is impulsive in nature. The modelled specific sound from these activities is predicted to be below, or close to the measured background noise at the most exposed sensitive receptors, which is an indication that the sound is predicted to be mostly inaudible. Despite this, due to the high transient peak levels that the movement of metal containers may create it is considered likely that some sound from these activities may be just perceptible at the most exposed sensitive receptors. For this reason, a correction of 3dB(A), for impulsivity that is just perceptible, has been applied to the specific noise levels all receptor locations.

Similarly, in the case of decommissioning, metal being moved by items of plant such as cranes and excavators, has the potential to create sound which is impulsive in nature. The modelled specific sound from these activities is predicted to be below, or close to the measured background noise in most cases, which is an indication that the sound is predicted to be mostly inaudible. Despite this, due to the high transient peak levels that the movement of metal containers may create it is considered likely that some sound from these activities may be just perceptible at the most exposed sensitive receptors. For this reason a correction of 3dB(A), for impulsivity that is just perceptible, has been applied to the specific noise levels from decommissioning activities at all receptor locations.

If present at source, it is not considered likely that any tonal component from items of plant associated with cargo ship loading/unloading or decommissioning shall be audible at the most exposed receptor locations. This is due to the large separation distances between sources and noise sensitive receptors, along with the generally low modelled partial specific noise levels of individual items of plant relative to the measured background sound.

7.1.2 Cargo Ship Loading / Unloading

The noise model results and TAN 2011 assessments for the day and night-time periods for cargo ship loading/unloading activities (Scenario 10) are shown in Table 7-1 and Table 7-2.

Table 7-1: Noise Model Results and TAN 1/2011 Assessment; Daytime, Receptor Height 1.5m.

Noise Sensitive Receptor ID	1	2	3	4	5	6
Modelled Specific Level $L_{S,(1\ hour)}$ dB	38.1	32.5	31.3	34.9	30.3	39.9
Acoustic Feature Correction dB(A)	3.0	3.0	3.0	3.0	3.0	3.0
Rated Noise	41.1	35.5	34.3	37.9	33.3	42.9

Noise Sensitive Receptor ID	1	2	3	4	5	6
$L_{Ar, (1\ hour)}$ dB						
Background Noise $L_{A90, (1\ hour)}$ dB	50.5	48.7	48.7	48.7	48.7	42.0
Rated - Background Noise dB(A)	-9.4	-13.2	-14.4	-10.8	-15.4	0.9
Sensitivity of Receptor	Low					
Existing Level $L_{Aeq, (1\ hour)}$ dB	56.7	60.2	60.2	60.2	60.2	50.1
Specific Level + Existing Level $L_{Aeq, (1\ hour)}$ dB	56.8	60.2	60.2	60.2	60.2	50.5
Change in level	0.1	0.0	0.0	0.0	0.0	0.4
Magnitude of Impact (After – Before)	Negligible	No change				Negligible
Significance of Effects	Neutral / Slight	Neutral				Neutral / Slight

Table 7-2: Noise Model Results and TAN 1/2011 Assessment; Night-time, Receptor Height 4m.

Noise Sensitive Receptor ID	1	2	3	4	5	6
Modelled Specific Level $L_{S, (1\ hour)}$ dB	35.7	30.1	28.9	32.5	27.9	37.5
Acoustic Feature Correction dB(A)	3.0	3.0	3.0	3.0	3.0	3.0
Rated Noise $L_{Ar, (1\ hour)}$ dB	38.7	33.1	31.9	35.5	30.9	40.5
Background Noise $L_{A90, (1\ hour)}$ dB	36.0	40.0	40.0	40.0	40.0	31.8
Rated - Background Noise dB(A)	2.7	-6.9	-8.1	-4.5	-9.1	8.7
Sensitivity of Receptor	Low					Medium
Existing Level $L_{Aeq, (1\ hour)}$ dB	49.2	49.5	49.5	49.5	49.5	38.0
Specific Level + Existing Level $L_{Aeq, (1\ hour)}$ dB	49.4	49.5	49.5	49.6	49.5	40.8
Change in level	0.2	0.0	0.0	0.1	0.0	2.8
Magnitude of Impact (After – Before)	Negligible	No change	No change	Negligible	No change	Minor
Significance of Effects	Neutral / Slight	Neutral	Neutral	Neutral / Slight	Neutral	Slight

The results show that the daytime noise from cargo ship loading / unloading activities at the DWP is predicted to result in an increase in noise levels at sensitive receptors of between 0.1dB(A) at NSR 01 (South Beach) and 0.4dB(A) at NSR 06 (Builnacraig Street). The significance of the increases in noise level are Neutral/Slight at NSRs 01 (South Beach) and 06 (Builnacraig Street). The noise levels are predicted to be unchanged at NSRs 02, 03, 04 (Newton Street) and NSR 05 (Seaview Terrace).

At night the noise from cargo ship loading / unloading activities at the DWP is predicted to result in an increase in noise levels at sensitive receptors of between 0.1dB(A) at NSR 01 (Newton Street) and 2.8dB(A) at NSR 06 (Builnacraig Street). The significance of the increases in noise level are Neutral/Slight at NSRs 01 & 04 (South Beach & Newton Street) and Slight at NSR 06 (Builnacraig Street). The noise levels are predicted to be unchanged at NSRs 02 &0 3 (Newton Street) and NSR 05 (Seaview Terrace).

7.1.3 Decommissioning

The noise model results and TAN 2011 assessments for the daytime period for decommissioning activities (Scenario 11) are shown in Table 7-3.

Table 7-3: Noise Model Results and TAN 1/2011 Assessment; Daytime, Receptor Height 1.5m.

Noise Sensitive Receptor ID	1	2	3	4	5	6
Modelled Specific Level $L_{S, (1\ hour)}$ dB	46.0	48.9	39.3	49.0	48.2	48.0
Acoustic Feature Correction dB(A)	3.0	3.0	3.0	3.0	3.0	3.0
Rated Noise $L_{Ar, (1\ hour)}$ dB	49.0	51.9	42.3	52.0	51.2	51.0
Background Noise $L_{A90, (1\ hour)}$ dB	50.5	48.7	48.7	48.7	48.7	42.0
Rated - Background Noise dB(A)	-1.5	3.2	-6.4	3.3	2.5	9.0
Sensitivity of Receptor	Low	Low	Low	Low	Low	Medium
Existing Level $L_{Aeq, (1\ hour)}$ dB	56.7	60.2	60.2	60.2	60.2	50.1
Specific Level + Existing Level $L_{Aeq, (1\ hour)}$ dB	57.1	60.5	60.2	60.5	60.5	52.2
Change in level	0.4	0.3	0.0	0.3	0.3	2.1
Magnitude of Impact (After – Before)	Negligible	Negligible	No change	Negligible	Negligible	Minor
Significance of Effects	Neutral / Slight	Neutral / Slight	Neutral	Neutral / Slight	Neutral / Slight	Slight

The results show that the daytime noise from decommissioning activities at the DWP is predicted to result in an increase in noise levels at sensitive receptors of between 0.3dB(A) at NSRs 02, 04 & 05 (Newton Street & Seaview Terrace) and 2.1dB(A) at NSR 06 (Builnacraig Street). The significance of the increases in noise level are Neutral/Slight at NSRs 01 (South Beach) 02 & 04 (Newton Terrace) & 05 (Seaview Terrace) and Slight 06 (Builnacraig Street). The noise levels are predicted to be unchanged at NSRs 03 (Newton Street).

7.1.4 Cargo Unloading and Decommissioning

The noise model results and TAN 2011 assessments for the daytime period for cargo ship loading/unloading activities and decommissioning activities occurring concurrently are shown in Table 7-4.

Table 7-4: Noise Model Results and TAN 1/2011 Assessment; Night-time, Receptor Height 4m.

Noise Sensitive Receptor ID	1	2	3	4	5	6
Modelled Specific Level $L_{S, (1\ hour)}$ dB	46.6	49.0	40.0	49.2	48.3	48.7
Acoustic Feature Correction dB(A)	3.0	3.0	3.0	3.0	3.0	3.0
Rated Noise $L_{Ar, (1\ hour)}$ dB	49.6	52.0	43.0	52.2	51.3	51.7
Background Noise $L_{A90, (1\ hour)}$ dB	50.5	48.7	48.7	48.7	48.7	42.0
Rated - Background Noise dB(A)	-0.9	3.3	-5.7	3.5	2.6	9.7
Sensitivity of Receptor	Low	Low	Low	Low	Low	Medium
Existing Level $L_{Aeq, (1\ hour)}$ dB	56.7	60.2	60.2	60.2	60.2	50.1
Specific Level + Existing Level $L_{Aeq, (1\ hour)}$ dB	57.1	60.5	60.2	60.5	60.5	52.5
Change in level	0.4	0.3	0.0	0.3	0.3	2.4
Magnitude of Impact (After – Before)	Negligible	Negligible	No change	Negligible	Negligible	Minor
Significance of Effects	Neutral / Slight	Neutral / Slight	Neutral	Neutral / Slight	Neutral / Slight	Slight

The results show that the daytime noise from cargo ship loading / unloading and decommissioning activities at the DWP is predicted to result in an increase in noise levels at sensitive receptors of between 0.3dB(A) at NSRs 02, 04 & 05 (Newton Street & Seaview Terrace) and 2.4dB(A) at NSR 06 (Builnacraig Street). The significance of the increases in noise level are Neutral/Slight at NSRs 01 (South Beach), 02 & 04 (Newton Street), 05 (Seaview Terrace) and Slight at 06 (Builnacraig Street). The noise levels are predicted to be unchanged at NSR 03 (Newton Street).

7.2 Operational Road Traffic Noise Assessment

The proposed development is predicted to increase traffic flows on the local road network surrounding the site. In order to assess how the noise levels will increase in these areas, future year noise models for 2021 (year of development completion; Phase 1) with and without development generated traffic have been compared. The traffic data used includes operational road traffic from the proposed Newton Marina development and therefore considers cumulative impact from both sites.

The locations and relevant heights for each of the existing noise sensitive receptors are detailed in **Error! eference source not found.**2, Section 4. Their locations are shown in Drawing No. 670525-034, Appendix A.

7.2.1 Comparison of Daytime Predicted Noise Levels

Daytime noise levels in the rear gardens of the noise sensitive receptors with vs without development generated traffic are compared in Table 7-5.

Table 7-5: Comparison of Daytime Noise Levels With vs Without Development; 1.5m Receptor Height.

Noise Sensitive Receptor ID	2021 Without Development $L_{Aeq,T}$ dB(A)	2021 With Development $L_{Aeq,T}$ dB(A)	Differences dB(A)	TAN 2011 Magnitude of Impact	TAN 2011 Level of Significance
01	44.4	44.9	0.5	Negligible	Slight
02	41.5	42.3	0.8	Negligible	Slight
03	40.2	40.7	0.5	Negligible	Slight
04	43.9	44.2	0.3	Negligible	Slight
05	43.0	43.3	0.3	Negligible	Slight
06	44.8	45.2	0.4	Negligible	Slight

The results show that the predicted change in daytime noise levels within rear gardens when comparing between the with vs without development scenarios for the year of development completion (2021) varies between 0.3dB(A) at NSRs 04 & 05 (Macaulay Road & Perceval Road South) and 0.8dB(A) at NSR 02 (Marybank), the TAN 2011 significance of which is Slight. This is due to the current traffic flows increasing with development generated traffic. An increase in noise levels of less than 1dB(A) shall not be perceptible to the listener, and is therefore considered as insignificant.

7.2.2 Comparison of Night-time Predicted Noise Levels

Night time noise levels at the facades of the noise sensitive receptors with vs without development generated traffic are compared in Table 7-6.

Table 7-6: Comparison of Night-time Noise Levels With vs Without Development; 4m Receptor Height

Noise Sensitive Receptor ID	2021 Without Development $L_{Aeq,T}$ dB(A)	2021 With Development $L_{Aeq,T}$ dB(A)	Differences dB(A)	TAN 2011 Magnitude of Impact	TAN 2011 Level of Significance
01	47.7	48.0	0.3	Negligible	Slight
02	46.2	46.9	0.7	Negligible	Slight
03	43.4	44.1	0.7	Negligible	Slight
04	45.4	45.5	0.1	Negligible	Slight
05	41.0	41.1	0.1	Negligible	Slight
06	46.9	47.3	0.4	Negligible	Slight

The results show that the predicted change in night-time façade noise levels when comparing between the with vs without development scenarios for the year of development completion (2021) varies between 0.1dB(A) at NSRs 04 & 05 (Macaulay Road & Perceval Road South) and 0.7dB(A) at NSRs 02 & 03 (Marybank & Perceval Road South), the TAN 2011 significance of which is Slight. This is due to the current traffic flows increasing with development generated traffic. An increase in noise levels of less than 1dB(A) shall not be perceptible to the listener, and is therefore considered as insignificant.

8 CONCLUSIONS

A construction and operational noise assessment has been carried out for the proposed Deep Water Port development at Stornoway.

8.1 Construction Noise

Worst case combined construction stages based on the proposed construction schedule have been modelled using CadnaA software. Details of construction activities and associated plant on which assessment assumptions are based have been provided by Wallace Stone and Stornoway Port Authority.

8.1.1 Daytime and Evening Construction Noise

The greatest noise generating activities during the daytime and evening are predicted to be from the combined construction stages of excavate rock and infill reclamation, backhoe dredging and infill reclamation, and construction of the linkspan support dolphin (Scenario 3B; Months 7, 8 & 9). The worst case impacts from these construction activities at the DWP and are predicted to be of Neutral significance during the daytime, and Moderate significance at NSR 06 (Builnacraig Street) during the evening.

8.1.2 Night-time Construction Noise

Potential construction activities that may be carried out at night are dredging (cutter suction and/or backhoe) and infill reclamation (months 7 & 8), and placing of concrete caissons (month 13).

The greatest noise generating activities during the night-time are predicted to be from backhoe dredging (Scenario 3B; Months 7, 8 & 9). The worst case night-time impacts from this construction activity at the DWP are predicted to be of Major significance at NSRs 06 (Builnacraig Street), and Neutral significance at all other receptors. The maximum duration that backhoe dredging may be carried out at night is three months.

8.1.3 Cumulative Impact

A cumulative noise impact assessment has been carried to consider scheduled concurrent construction activities at the proposed DWP, Newton Marina, and fish processing factory on Goat Island. Timings of proposed construction schedules have been provided by Wallace Stone and Stornoway Port Authority.

During the daytime period, the significance of the worst case cumulative impact from scheduled concurrent construction activities at DWP, Newton Marina and the proposed fish processing factory on Goat Island is Slight at NSR 03 (Newton Street). At the remaining noise sensitive receptor locations the impact is Neutral. During the evening, the significance is Slight at NSRs 03 (Newton Street) and 06 (Builnacraig Street).

There are no scheduled night-time concurrent construction activities at DWP, Newton Marina, and the proposed fish processing factory.

8.2 Operational Noise

The operational noise assessment considers potentially significant noise generating activities within the DWP; cargo ship loading/unloading within Phase 1 and decommissioning of large marine structures within future

proposed phases 2, 3 & 4. The change in road traffic noise as a result of development generated traffic has also been modelled and assessed.

8.2.1 Cargo Ship Loading / Unloading and Decommissioning

The noise from cargo ship loading / unloading activities within Phase 1 of the DWP and decommissioning of large marine structures within Phases 2, 3 & 4 has been modelled and assessed, both individually and as a worst case scenario, occurring concurrently.

The worst case increase in noise levels from daytime cargo loading / unloading activities is by 0.4dB(A) at NSR 06 (Builnacraig Street), the significance of which is Neutral/Slight. At night, the worst case increase in noise levels is 2.8dB(A) at NSR 06 (Builnacraig Street), the significance of which is Slight.

The worst case increase in noise levels from daytime decommissioning activities is 2.1dB(A) at NSR 06 (Builnacraig Street), the significance of which is Slight.

The worst case increase in noise levels from daytime cargo loading / unloading and decommissioning activities occurring concurrently is 2.4dB(A) at NSR 06 (Builnacraig Street), the significance of which is Slight.

8.2.2 Operational Road Traffic Noise; Including Cumulative Impact

A TAN 2011 assessment of the day and night-time noise impact from future (2021) development generated road traffic at existing noise sensitive receptors within the areas surrounding the Site, through comparison between with vs without development scenarios has been carried out. The traffic data used includes operational traffic flows from the proposed Newton Marina development and therefore considers cumulative impact from both sites.

The predicted change in daytime noise levels when comparing between the with vs without development scenarios for the year of development completion (2021) varies between 0.3dB(A) at NSRs 04 & 05 (Macaulay Road & Perceval Road South) and 0.8dB(A) at NSR 02 (Marybank), the TAN 2011 significance of which is Slight. This is due to the current traffic flows increasing with development generated traffic. An increase in noise levels of less than 1dB(A) shall not be perceptible to the listener, and is therefore considered as insignificant.

The results show that the change in night-time façade noise levels when comparing between the with vs without development scenarios for the year of development completion (2021) varies between 0.1dB(A) at NSRs 04 & 05 (Macaulay Road & Perceval Road South) and 0.7dB(A) at NSRs 02 & 03 (Marybank & Perceval Road South), the TAN 2011 significance of which is Slight. This is due to the current traffic flows increasing with development generated traffic. An increase in noise levels of less than 1dB(A) shall not be perceptible to the listener, and is therefore considered as insignificant.

REFERENCES

- BSi British Standards BS5228-1:2009+A1 – 2014; *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Part 1 Noise*.
- Environmental Protection Department of Hong Kong; *Technical Memorandum on Noise from Construction Work other than Percussive Piling,* 1989.
- Royal Haskoning DHV, *Swansea Channel Noise Impact Assessment, Memo,* 25th June 2014. The Scottish Government (2011b). *Technical Advice Note (TAN) 1/2011 - Assessment of Noise*. The Scottish Government.
- Waterman, *Aberdeen Harbour Expansion Project, Volume 2, Environmental Statement*, dated November 2015.
- Waterman, *Aberdeen Harbour Expansion Project, Volume 3, Appendix 20-C, Construction Noise Assessment*, dated November 2015.

APPENDICES

A DRAWINGS

Legend

Deep Water Port Site Boundary
111.76 hectares

Do not scale this map

Client
Stornoway Port Authority

Project
Stornoway Deep Water Port

Title
Site Location Plan

Status
FINAL

Drawing No.
670525-006

Revision

Scale
1:8,000

A3

Date
5 April 2018

Drawn	Checked	Approved
GV	GV	CP

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045

Legend

- Noise Monitoring Locations
- Deep Water Port Site Boundary

Do not scale this map

Client: Stornoway Port Authority

Project: Stornoway Deep Water Port

Title: Noise Monitoring Locations

Status: FINAL

Drawing No.: 670525-027

Revision: -

Scale: 1:10,000

A3

Date: 01/06/2018

Drawn	Checked	Approved
FT	CC	CP

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045

Reproduced from Ordnance Survey digital map data © Crown copyright 2018. All rights reserved. Licence number 0100031673.

Legend

- Deep Water Port Site Boundary
- Noise Sensitive Receptors

Do not scale this map

Client: Stornoway Port Authority

Project: Stornoway Deep Water Port

Title: Noise Sensitive Receptor Plan
Construction and Operational Industrial Noise

Status: FINAL

Drawing No.	Revision
670525-028	-

Scale		Date
1:10,000	A3	11/06/2018

Drawn	Checked	Approved
FT	CC	CP

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045

Reproduced from Ordnance Survey digital map data © Crown copyright 2018. All rights reserved. Licence number 0100031673.

Legend

- Deep Water Port Site Boundary
- Noise Sensitive Receptors

Do not scale this map

Client: Stornoway Port Authority

Project: Stornoway Deep Water Port

Title: Noise Sensitive Receptor Plan
Operational Road Traffic Noise

Status: FINAL

Drawing No.	Revision
670525-034	-

Scale		Date
1:15,000	A3	03/07/2018

Drawn	Checked	Approved
CC	FT	CP

ENVIRO Centre
Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Tel: 0141 341 5040
Fax: 0141 341 5045

B ABC CATEGORY THRESHOLDS

The appropriate ABC category thresholds for each of the noise sensitive receptors has been calculated following guidance provided in Annex E of the standard (refer to Section 2.2.1 for assessment criteria).

Calculations for each of the noise sensitive receptors, based on measured day and night-time ambient noise levels in the absence of construction noise is shown in Table 0-1 to Table 0-3. Evening ambient noise levels have been assumed to be the average of daytime and night-time measured noise levels.

Table 0-1: ABC Category Thresholds, NSR 01

NSR 01; Measurement Position No. 1	Measured Daytime dB(A)	Measured Night-time dB(A)	Evening dB(A)
Ambient Levels	57.7	48.1	N/A
	55.4	50.0	
Average Levels	56.7	49.2	54.4
Average Levels Rounded	55.0	50.0	55.0
BS5228 ABC Category	**A**	**C**	**B**
Threshold Value	65	55	60

Table 0-2: ABC Category Thresholds, NSRs 02 to 05

NSRs 02 to 05; Measurement Position No. 2	Measured Daytime dB(A)	Measured Night-time dB(A)	Evening dB(A)
Ambient Levels	60.3	52	N/A
	60.0	43.2	
Average Levels	60.2	49.5	57.5
Average Levels Rounded	60.0	50.0	60.0
BS5228 ABC Category	**A**	**C**	**C**
Threshold Value	65	55	65

Table 0-3: ABC Category Thresholds, NSR 06

NSRs 06; Measurement Position No. 3	Measured Daytime dB(A)	Measured Night-time dB(A)	Evening dB(A)
Ambient Levels	50.3	39.2	N/A
	49.9	36.2	
Average Levels	50.1	38.0	47.4
Average Levels Rounded	50.0	40.0	50.0
BS5228 ABC Category	**A**	**A**	**A**
Threshold Value	65	45	55

C CONSTRUCTION NOISE MODEL DATA

Ref	Start Month	Finish Month	Construction Stage	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Times	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
1	1	3	Approach Road	Articulated dump truck; site movements	4	85	BS5228 C6 Ref. 17	1	07:00 to 20:00 (780 mins)	80	624	0
				Articulated dump truck; tipping	4	80	BS5228 C1 Ref. 11	1		10	78	0
				30t excavator; loading dumper trucks	1	85	BS5228 C1 Ref 10	1		75	585	0
				30t excavator, grading	1	76	BS5228 D3 Ref 61	0.5		75	585	0
				Vibrating roller	1	80	BS5228 C.5 Ref 21	0.5		90	702	0
				Articulated dump truck; delivery	10 per day	85	BS5228 C6 Ref. 17	1		5	40	0
				Articulated dump truck delivery; tipping	10 per day	80	BS5228 C1 Ref. 11	1		1	10	0
2	1	2	Remove and stockpile overburden from rock excavation area	Articulated dump truck; site movements	6	85	BS5228 C6 Ref. 17	1	07:00 to 20:00 (780 mins)	90	702	0
				Articulated dump truck; tipping	6	80	BS5228 C1 Ref. 11	1		10	78	0
				20t excavator	2	71	BS 5228 C.2 Ref 21	0.5		100	780	0
3	2	6	Install sheet pile wall	100t crawler crane	1	67	BS 5228 C.3 ref 28	1	07:00hrs to 19:00hrs (720 mins)	50	360	0
				Tug boat	1	82	CNP 221	1		10	82	0
				Large capacity vibrating hammer	1	88	BS5228 D4 Ref43	1		65	468	0

Ref	Start Month	Finish Month	Construction Stage	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Times	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
				Large capacity impact hammer	1	90	BS5228 D4 Ref 64b	1		35	252	0
				HGV delivery	4 per day	80	BS5228 C6 Ref 21	0.5		2	16	0
4	6	10	Excavate rock and infill reclamation	Crawler rock drill	3	100	CNP 181	0.5	07:00hrs to 19:00hrs (720 mins)	75	540	0
				30t vibratory roller	2	80	BS5228 C.5 Ref 21	0.5		100	720	0
				40t loading shovel	2	71	BS5229 C4. Ref 13	0.5		90	648	0
				Articulated dump truck; tipping	8	80	BS5228 C1 Ref. 11	1		10	72	0
				30t articulated dump truck	8	85	BS5228 C6 Ref 17	1		75	540	0
				30t excavator; loading dumper truck	4	85	BS5228 C1 Ref 10	1		75	540	0
5a	7	8	Dredge and infill reclamation	Cutter suction dredger	1	82	Royal Haskoning DHV; Swansea Channel NIA, Memo, dated 25th June 2014.	1	24 hours (960mins day / 480 mins night)	100	960	480
5b	7	8	Dredge and infill reclamation	Backhoe dredger	1	88	Aberdeen Harbour Expansion Project; Vol 3, Appendix 20-C, Waterman. Nov 2015.	1	24 hours (960mins day / 480 mins night)	100	960	480
				Hopper barge	1	76	CNP 061	1		100	960	480
6	7	10	Linkspan Support Dolphin	100t crawler crane	1	67	BS 5228 C.3 ref 28	1	07:00hrs to 20:00hrs (780 mins)	90	702	0
				Tug boat	1	82	CNP 221	1		10	78	0
				Large capacity vibrating hammer	1	88	BS5228 D4 Ref43	1		50	390	0

Ref	Start Month	Finish Month	Construction Stage	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Times	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
				Large capacity impact hammer	1	90	BS5228 D4 Ref 64b	1		50	390	0
				HGV delivery	2 per day	80	BS5228 C6 Ref 21	0.5		1	8	0
7	10	12	Foundations for caissons	Hopper barge	2	76	CNP 061	1	07:00hrs to 20:00hrs (780 mins)	50	390	0
				Backhoe dredger	1	78	BS5228 C7 ref. 1	1		70	546	0
				30t excavators	2	75	BS5228 C2. Ref 16	0.5		75	585	0
				Articulated dump truck; delivery	5 per day	85	BS5228 C6 Ref. 17	1		3	20	0
				Articulated dump truck delivery; tipping	5 per day	80	BS5228 C1 Ref. 11	1		1	5	0
8	11	14	Rock armouring to side slopes / link road.	30t articulated dump truck	6	85	BS5228 C6 Ref. 17	0.5	07:00hrs to 20:00hrs (780 mins)	70	546	0
				Articulated dump truck; tipping	6	80	BS5228 C1 Ref. 11	1		10	78	0
				40t excavator	1	81	BS5228 C6 Ref. 6	0.5		100	780	0
				100t long reach excavator	1	86	BS5228 C6 Ref 5	0.5		100	780	0
				Articulated dump truck; delivery	13 per day	85	BS5228 C6 Ref. 17	1		13	52	0
				Articulated dump truck delivery; tipping	13 per day	80	BS5228 C1 Ref. 11	1		2	13	0
				Vibrating roller	1	80	BS5228 C.5 Ref 21	0.5		90	702	0
9	13	13	Placing concrete caissons	Tugs	2	82	CNP 221	1	24 hours (960mins day / 480 mins night)	20	192	96
				Hydraullic winch	4	74	CNP 263	1		20	192	96
				Diesel generator for water pumps	1	62	Manufacturer's data sheet; Aggreko 500kVA Diesel Generator	0.5		40	384	192

Ref	Start Month	Finish Month	Construction Stage	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Times	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
				Submersible water pump (electric)	12	69	BS5228, C11, Ref 3	1		40	384	192
				HGV delivery	2 per day	80	BS5228 C6 Ref 21	0.5		1	8	0
10	14	14	Rock fill to caissons	30t excavator; loading dumper truck	2	85	BS5228 C1 Ref 10	1	07:00hrs to 20:00hrs (780 mins)	75	585	0
				Articulated dump truck	4	85	BS5228 C6 Ref. 17	1		90	702	0
				Articulated dump truck; tipping	4	80	BS5228 C1 Ref. 11	1		10	78	0
11	15	16	Concrete deck to caissons	100t crane	1	67	BS 5228 C.3 ref 28	1	07:00hrs to 20:00hrs (780 mins)	20	156	0
				Vibrating poker	4	78	BS5228 C4. Ref 33	0.5		60	468	0
				Concrete truck deliveries	12 per day	80	BS5228 C.4 Ref 20	0.5		6	48	0
				Concrete truck pouring	2	67	BS5228 C.4 Ref 24	0.5		100	390	0
12	15	16	Concrete slab to quay	50t crane	1	70	BS5228 C3 Ref 29	1	07:00hrs to 20:00hrs (780 mins)	50	390	0
				Vibrating poker	4	78	BS5228 C4. Ref 33	0.5		50	390	0
				Concrete truck deliveries	9 per day	80	BS5228 C.4 Ref 20	0.5		5	36	0
				Concrete truck pouring	2	67	BS5228 C.4 Ref 24	0.5		100	780	0
13	15	17	Fendering to quay walls	50t crane	1	70	BS5228 C3 Ref 29	1	07:00hrs to 20:00hrs (780 mins)	50	390	0
				HGV delivery	2 per day	80	BS5228 C6 Ref 21	0.5		1	8	0
14	16	17	Installation of Linkspan	100t crane	1	67	BS 5228 C.3 ref 28	1	07:00hrs to 18:00hrs (660 mins)	50	390	0
				300t crane	1	78	BS5228 C4 Ref. 38	1.5		10	66	0
				Concrete truck deliveries	2 per day	80	BS5228 C.4 Ref 20	0.5		1	8	0
				Concrete truck pouring	1	67	BS5228 C.4 Ref 24	0.5		50	330	0

Ref	Start Month	Finish Month	Construction Stage	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Times	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
				Delivery vessel	1	82	CNP 221	1		10	66	0
15	16	18	Services and oil pipes	20t excavator	1	71	BS 5228 C.2 Ref 21	0.5	07:00hrs to 18:00hrs (660 mins)	75	495	0
				50t crane	1	70	BS5228 C3 Ref 29	1		50	330	0
				HGV delivery	2 per day	80	BS5228 C6 Ref 21	0.5		1	8	0
16	17	18	Surfacing	Stone Crushers	2	90	BS5228 C9 Ref 14	1	07:00hrs to 20:00hrs (780 mins)	70	546	0
				Vibratory roller	2	80	BS5228 C.5 Ref 21	0.5		100	780	0
				30t excavator; loading dumper truck	2	85	BS5228 C1 Ref 10	1		90	702	0
				Articulated dump truck	4	85	BS5228 C6 Ref. 17	1		80	624	0
				Articulated dump truck; tipping	4	80	BS5228 C1 Ref. 11	1		10	78	0
				Asphalt spreader	2	82	BS5228 D8 Ref 22	0.5		100	780	0

D OPERATIONAL NOISE MODEL DATA

Ref	Description of Operations	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Periods	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
17	Cargo Ship Loading / Unloading	Crane; Cargo loading / unloading; moving containers to / from boat	1	79	Waterman; Aberdeen Harbour Expansion Project, Volume 2 Environmental Statement, November 2015	1.5	Daytime / Night-time	65 day / 50 night	624	240
		Telescopic handler	1	79	BS5228 C 4 Ref. 54	0.5		65 day / 50 night	624	240
18	Decommissioning Activities; Decom Area	Excavator (80 tons) with shears - clipping	2	86	EnviroCentre historical data	1.5	Daytime	65	624	0
		Excavator with sorting equipment – placing metal in skip	1	78	EnviroCentre historical data	1.5		65	624	0
		Large mobile crane (300t)	1	78	BS5228 C4 Ref. 38	1.5		65	624	0
		Cherry Picker; 60m reach (35t wheeled mobile crane)	1	70	BS5228, Table C4, Ref 43	1.5		65	624	0
		Forklifts (30 tonnes)	1	56	Manufacturers' data sheet	0.5		65	624	0
19	Decommissioning Activities; Storage Area	Forklift (30 tonnes)	1	56	Manufacturers' data sheet	0.5	Daytime	65	624	0
		Tractor with trailer	1	79	BS5228, Table C4, Ref 75.	1		65	624	0
		Sweeper truck	1	76	BS5228, Table C4, Ref 90	0.5		50	480	0

Ref	Description of Operations	Individual Plant / Activities	No. of Units	Lp at 10m dB(A)	Data Source	Source Height (m)	Operating Periods	% On-time of Operating Hours	Mins per 16 Hour Daytime	Mins per 8 Hour Night-time
		Excavator with sorting equipment – placing metal in skip	1	78	L_{Aeq} at 4.5m measured data	1.5		65	624	0
20	Decommissioning Activities; Loading operations (to Boat)	Excavator with sorting equipment – placing metal in skip	1	78	L_{Aeq} at 4.5m measured data	1.5	Daytime	65	624	0
		Dump truck (30t)	1	82	Manufacturers' data sheet	1		85	624	0

Technical Appendix 8.1

Aspect
Land + Hydrographic Surveys
CHARTERED SURVEYORS

TEL: 01294 313 399 • WEB: WWW.ASPECTSURVEYS.COM

HYDROGRAPHIC & GEOPHYSICAL SURVEY

STORNOWAY HARBOUR, ISLE OF LEWIS

APRIL 2017

PROJECT REF: A6250

REV: 00

Client:

Wallace Stone LLP

Hebrides Office

21 Tobson

Isle of Lewis

HS2 9NA

WALLACE STONE

ICES Approved Development Partner

Achilles

QAS INTERNATIONAL ISO 9001:2008 REGISTERED FIRM

QAS INTERNATIONAL ISO 14001:2004 REGISTERED FIRM

QAS INTERNATIONAL BS OHSAS 18001:2007 REGISTERED FIRM

CONTENTS

1. INTRODUCTION 3
2. SCOPE OF WORKS 3
3. GEODESY & DATUM 4
4. MULTIBEAM BATHYMETRIC SURVEY 4
5. GEOPHYSICAL SURVEY 7
6. SURVEY VESSEL 11
7. SURVEY PERSONNEL 11
8. SURVEY STANDARDS 12
ANNEX A 13
ANNEX B 14
ANNEX C 15
ANNEX D 16
ANNEX E 17

TABLE OF FIGURES

FIGURE 1 - OVERVIEW OF SURVEY AREAS WITHIN STORNOWAY HARBOUR 3
FIGURE 2 - OVERVIEW OF MULTIBEAM BATHYMETRIC DATA IN NEWTON BASIN 5
FIGURE 3 - OVERVIEW OF MULTIBEAM BATHYMETRIC DATA IN GLUMAIG HARBOUR 6
FIGURE 4 - APPLIED ACCOUSTICS BOOM SYSTEM 7
FIGURE 5 - NEWTON BASIN SBP EXAMPLES WITH THE DIGITISED HORIZON 8
FIGURE 6 - DEPTH OF HORIZON 1 RELATIVE TO CHART DEPTH DIGITISED FROM THE SBP DATA 9
FIGURE 7 - GLUMAIG HARBOUR SBP EXAMPLES WITH DIGITISED HORIZONS 10
FIGURE 8 - ALHS' SURVEY VESSEL COASTAL SENSOR 11

TABLE OF REVISIONS

Revision No.	Date	Issue / Revision	Compiled	Approved
00	11/04/2017		EJS	CDT

This document has been prepared for the Client named on the front cover. Aspect Land & Hydrographic Surveys Ltd (ALHS) accept no liability or responsibility for any use that is made of this document other than by the Client for the purpose of the original commission for which it has been prepared.

1. INTRODUCTION

On the instructions of Wallace Stone LLP, multibeam bathymetric (MBES) and sub-bottom profiler (SBP) surveys were conducted at two areas within Stornoway Harbour by Aspect Land & Hydrographic Surveys Ltd (ALHS).

The program of events was as follows:

Date	Activity
5th April 2017	Mobilise to site. MBES survey completed at Glumaig and started at Newton Basin
6th April 2017	SBP survey of both areas completed
7th April 2017	MBES survey completed at Newton Basin
18th April 2017	Report Issued to client

2. SCOPE OF WORKS

The survey scope was to inform planning stages of development for Newton Basin and aid growth at Glumaig Harbour to support cruise liner capabilities within the harbour.

Newton Basin was located within existing quays of Stornoway Harbour and measured 0.5 km by 0.2 km (Figure 1). The survey area at Glumaig Harbour, 0.5 km south of Newton Basin and west of Arnish Point, measured 0.7 km by 0.7 km.

A combined bathymetric and geophysical survey was required in order to achieve the agreed final deliverable to be issued to Wallace Stone LLP.

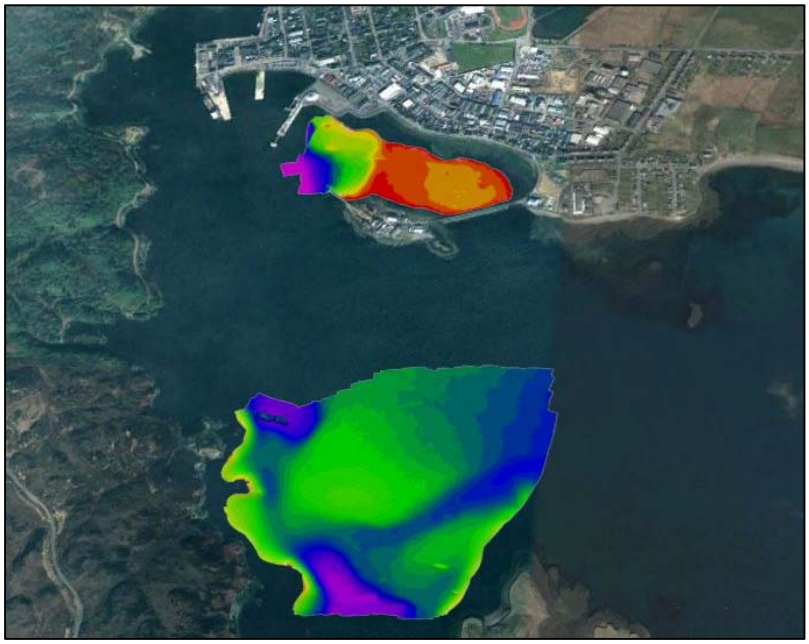


FIGURE 1 - OVERVIEW OF SURVEY AREAS WITHIN STORNOWAY HARBOUR

3. GEODESY & DATUM

The horizontal datum used throughout the survey data gathering was OSGB36 (OSTN15).

OSTN15 defines OSGB36 National Grid in conjunction with the National GPS Network. In this respect OSTN15 can be considered error free (not including any GPS positional errors). The agreement between OSTN15 and the old triangulation network stations (down to 3rd order) is 0.1m rms.

The vertical datum used for all survey data is Chart Datum (CD). Chart Datum in Stornoway is 2.71m below Ordnance Datum.

4. MULTIBEAM BATHYMETRIC SURVEY

A summary of the equipment used for completion of the multibeam bathymetric survey can be seen in the table below:

Survey Vessel	Coastal Sensor (MCA Cat III)
Positioning System	Trimble SPS 855/555H RTK GPS
GPS Correction Source	Trimble VRS NOW Network RTK
Echosounder	R2Sonic 2022 Multibeam System 400kHz
Motion Compensator	SMC IMU 108-30

ALHS' R2Sonic 2022 multibeam sonar system was used for the bathymetric survey. This was controlled using Sonic Control software during the course of data gathering.

Very detailed data with full seafloor coverage was gathered throughout the survey area as a result of the R2Sonic 2022's narrow beam width and high ping rate and the selection of 400kHz as an operating frequency.

The system was operated at the maximum ping rate achievable throughout the survey, such that the ping rate was controlled by the depth of water.

Sound Velocity (SV) dips were carried out prior to commencing survey operations and thereafter whenever the surface sound velocity varied by more than $2ms^{-1}$. There was very little variation in surface SV observed during data gathering either temporally or geographically.

The SV dips were carried out using a Valeport dipping probe with Datalog Express software, and the data was incorporated into the Hysweep Survey software for real-time corrections.

Positioning was achieved using a Trimble SPS 855 RTK GPS system, providing horizontal and vertical positioning. Heading was provided by a Trimble SPS 555 system working in conjunction with the SPS 855.

Motion compensation for the system was provided by an SMC IMU 108-30 motion sensor mounted directly at the sonar head.

An R2Sonic Sonar Interface Module (SIM) was used to control the sonar throughout the course of data gathering. The multibeam data was transmitted to the survey laptops running Hypack Hysweep over an Ethernet connection.

Hypack Hysweep Survey was used for data gathering. Hypack MBMax software was used for post-processing. The stages of multibeam processing are detailed in Annex C.

Data was gathered to give at least 200% insonification over the survey area. This allowed full quality assurance checks to be carried out. Calibration values for the survey vessel were calculated from patch tests conducted on each day of data collection. Details of the conduct of the patch test can be seen in Annex D.

Depths within Newton Basin ranged from -2m - 9m below chart datum (Figure 2). The centre of the area exhibited the shallowest depths with a ridge extending from north to south with average depths 1m above chart datum.

West of the ridge showed deeper depths with a steep slope in the North West, East of the ridge exhibited a deeper basin 0.2m above chart datum.

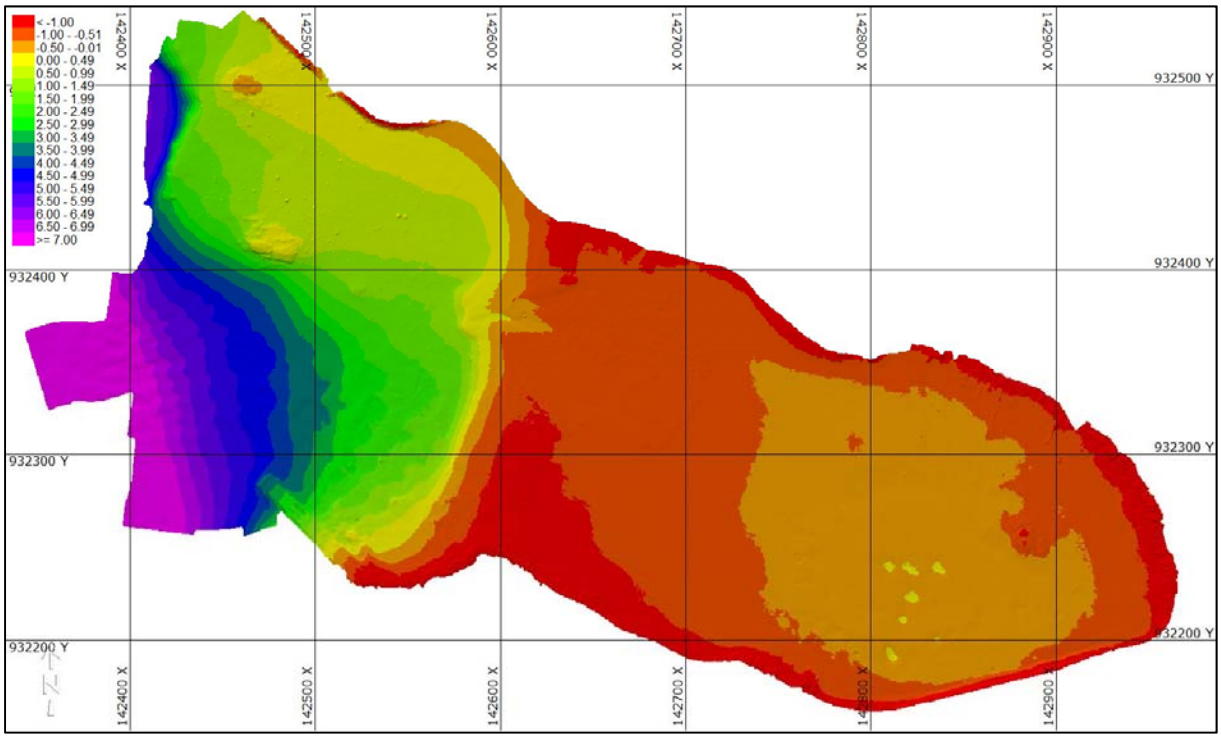


FIGURE 2 - OVERVIEW OF MULTIBEAM BATHYMETRIC DATA IN NEWTON BASIN

Glumaig Harbour showed deeper depths than Newton Basin from between 0 - 15m below chart datum (Figure 3).

There was a deeper channel in the west of the survey area and from the east to the south, with a shallower bank in the middle.

Average depths on this bank were 6.6m below chart datum. Four wrecks were visible in the data, the largest visible in the north west of the area. This wreck extends 8m above the seafloor at its shallowest part.

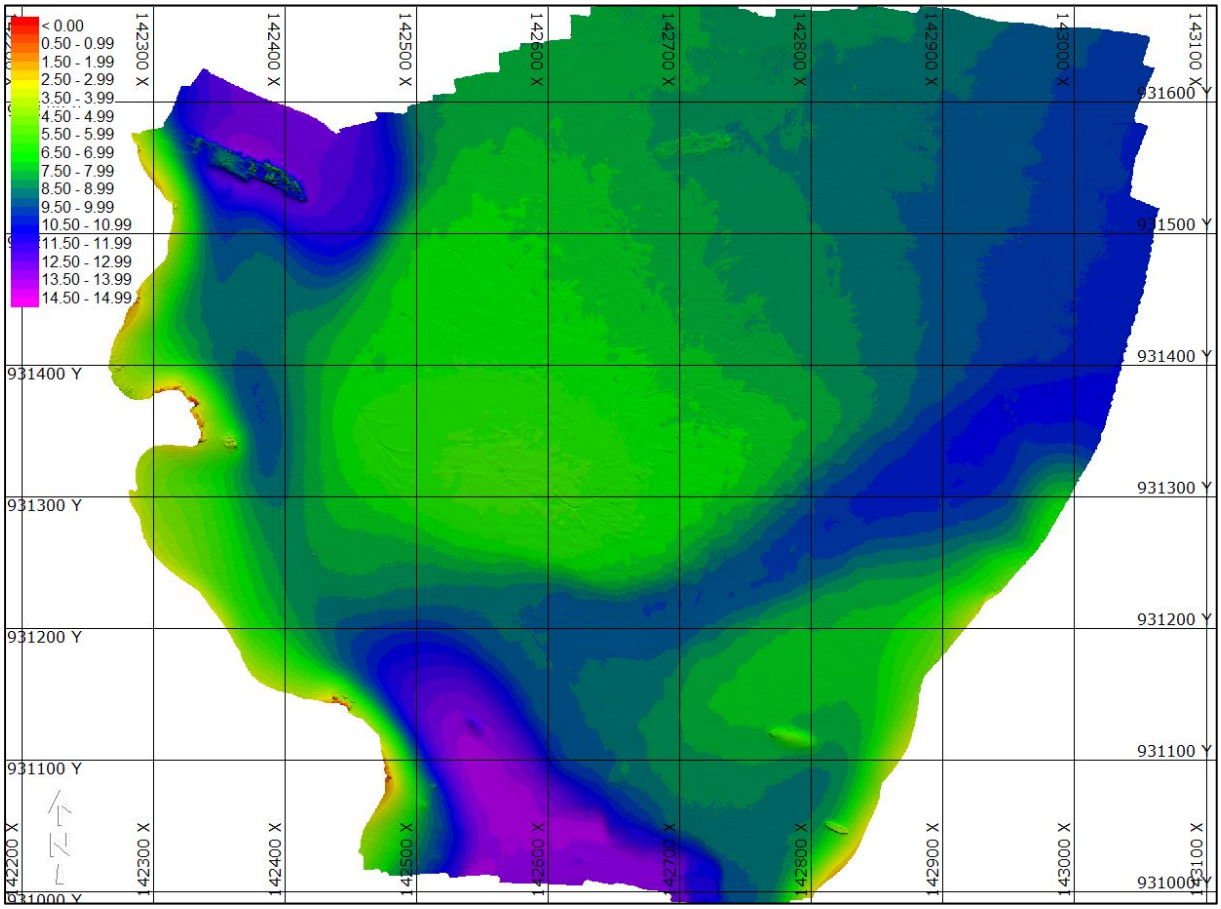


FIGURE 3 - OVERVIEW OF MULTIBEAM BATHYMETRIC DATA IN GLUMAIG APPROACHES

5. GEOPHYSICAL SURVEY

ALHS' lightweight Applied Acoustics boomer system was utilised to collect the sub-bottom data across both sites (Figure 4).

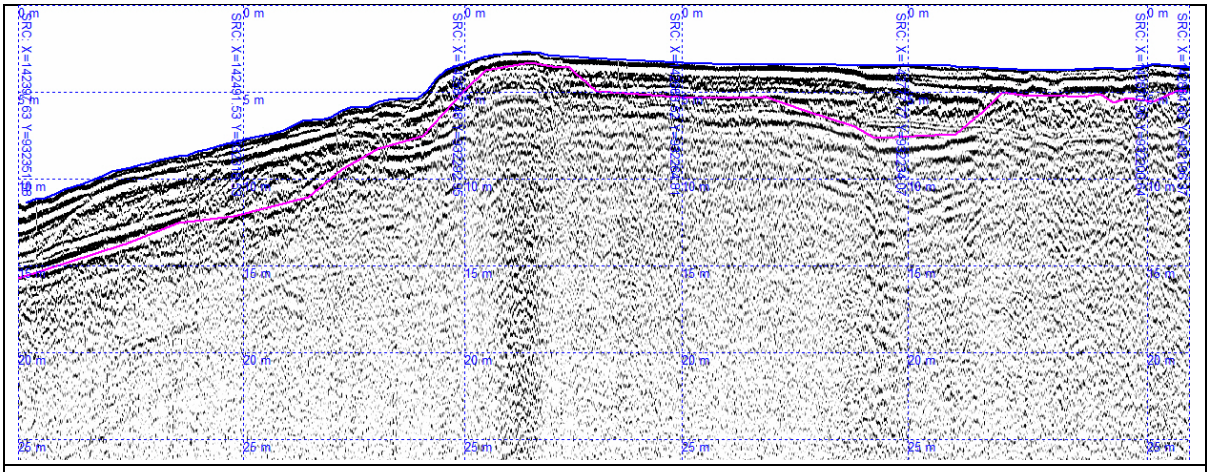
The system comprises a high-voltage power supply CSP-L 100 Joule, an AA201 boomer plate (sound source), a 12-element hydrophone (receiver), a Chesapeake analogue to digital converter and Chesapeake SonarWiz4 on-line acquisition software.

The boomer plate and hydrophone were towed alongside the survey vessel in order to maximise the manoeuvrability of the vessel, in particular in Newton Basin.

FIGURE 4 - APPLIED ACCOUSTICS BOOM SYSTEM

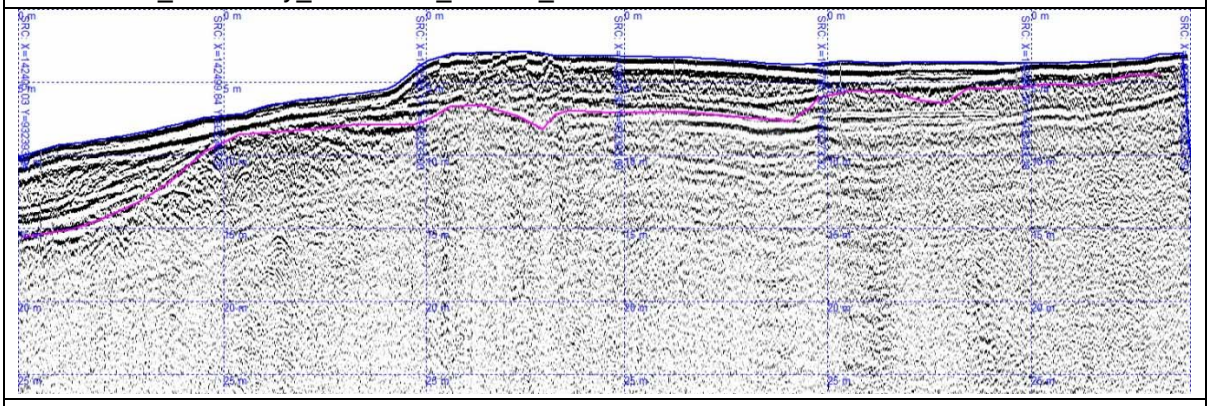
One geophysical horizon was digitised within the SBP data collected from Newton Basin (Figure 5). The magenta line, horizon 1, indicated a well consolidated sediment, heavy gravel or rock. It appears 0 - 5 m below the seabed and depicts the base of stratified sediment.

There was no further penetration through this layer.



E W

Line: A6250_Stornoway_-20170406_163502_CH1



E W

Line: A6250_Stornoway_-20170406_165757-CH1

FIGURE 5 - NEWTON BASIN SBP EXAMPLES WITH THE DIGITISED HORIZON

The shallow ridge in the centre of Newton Basin running north to south that was depicted in the multibeam data was also visible in Horizon 1 below the seabed (Figure 6).

This suggested the ridge was caused by the piling up of heavier sediment below the stratified layer, making it shallower. Horizon 1 relative to chart datum indicated a deeper channel through the middle of Newton Basin from the shallow east to the deeper water off the slope in the west.

As the channel was not visible in the MBES data, it highlighted an increased depth of stratified sediments below the sea floor.

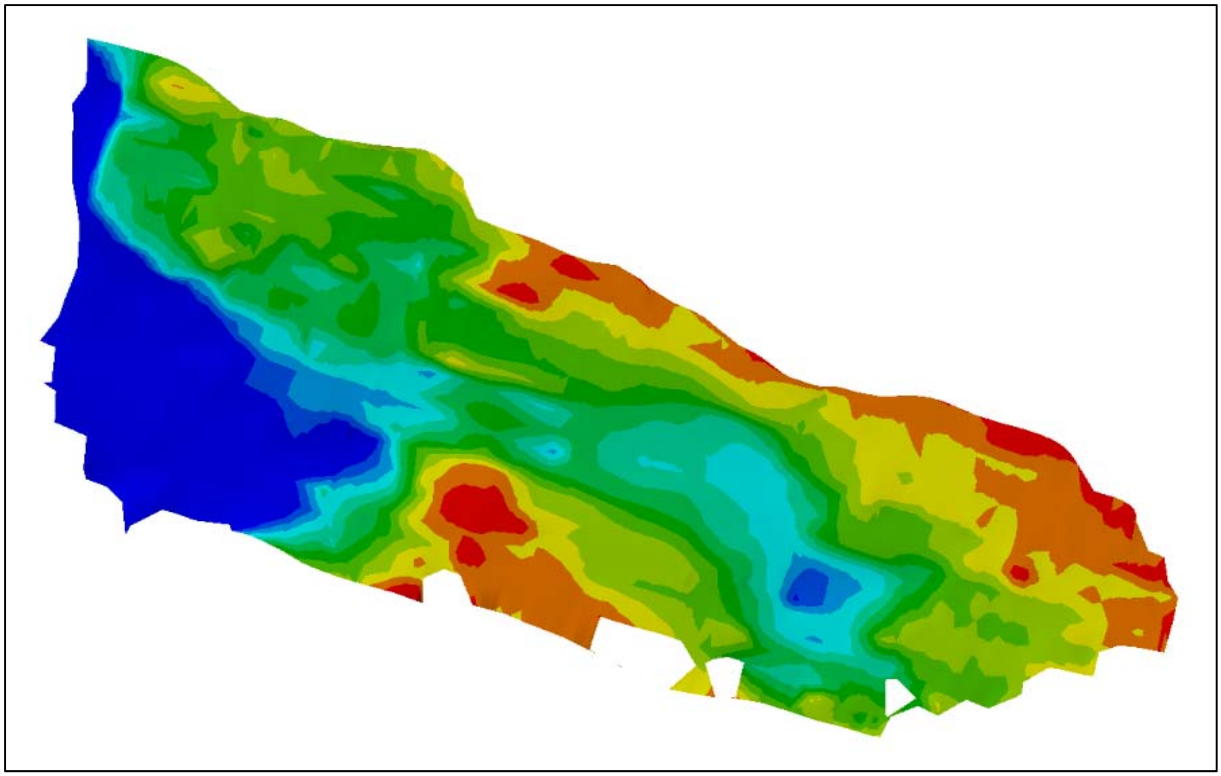
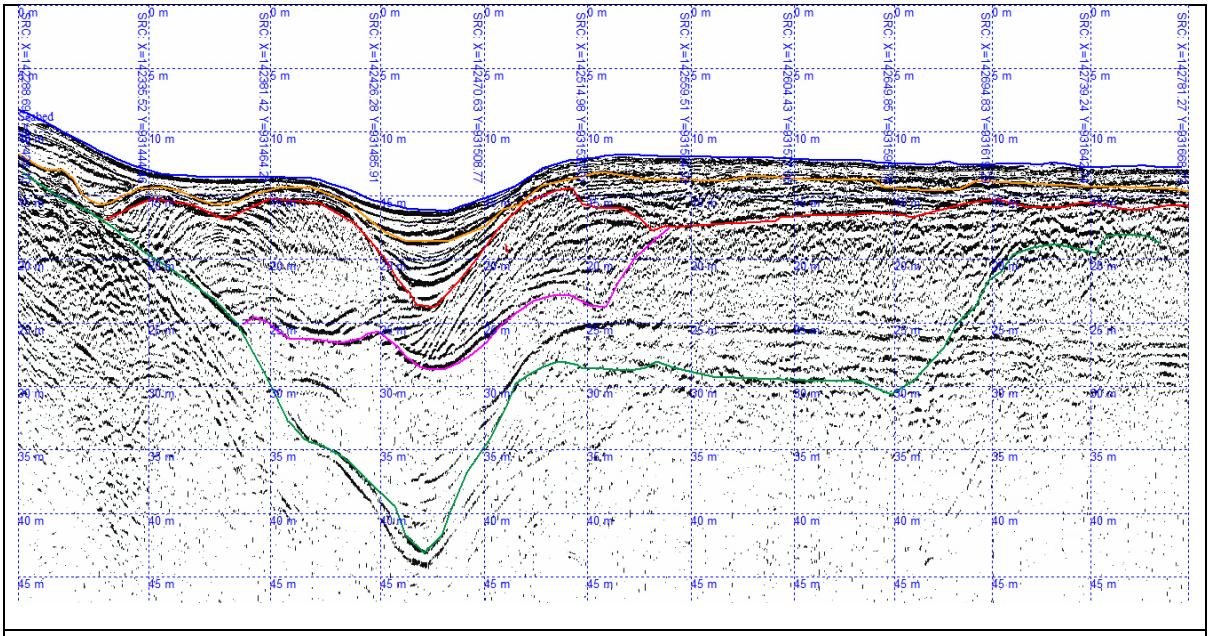


FIGURE 6 - DEPTH OF HORIZON 1 RELATIVE TO CHART DEPTH DIGITISED FROM THE SBP DATA

Four geophysical horizons were identified within the SBP data from Glumaig Harbour (Figure 7).

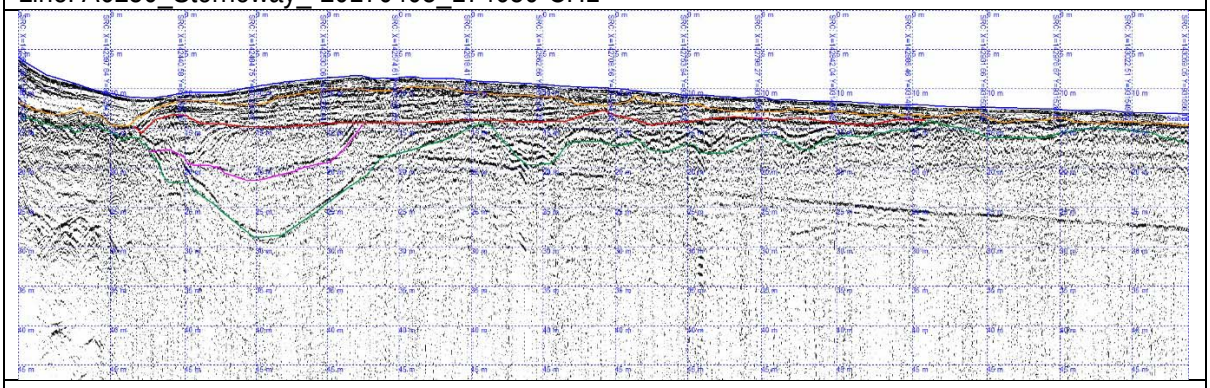
- Horizon 1 (orange line) signifies the base of a layer of unconsolidated and well stratified alluvial sediments.
- Horizon 2 (red line) depicts the base of heavier but still stratified sediments.
- Horizon 3 (magenta digitisation) highlighted what is thought to be the base of a consolidated material that exhibited many hyperbolic contacts. This layer was mainly found in the west and centre of the survey area.
- Horizon 4 (green line) indicated the limit of acoustic penetration, a hard contact which may correspond with rock in places.

Rock can be seen outcropping to the west and east of the area. The hard contact dips down towards the middle of the survey area reaching depths of 25 - 30 m below the seabed.



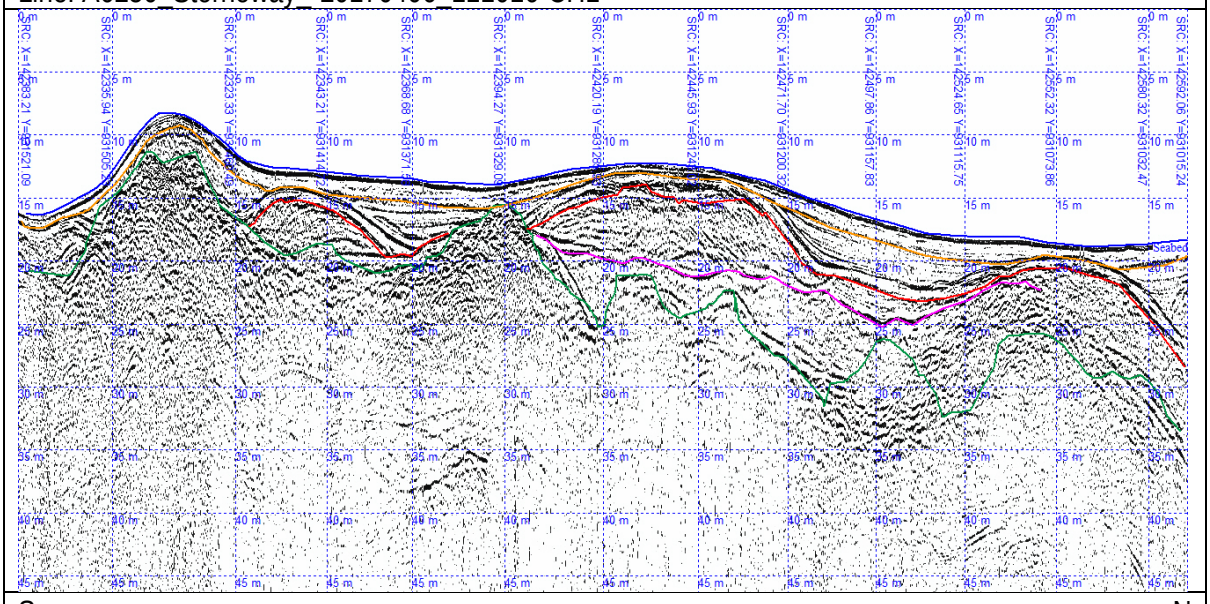
W E

Line: A6250_Stornoway_-20170405_174650-CH1



W E

Line: A6250_Stornoway_-20170406_111016-CH1



S N

Line: A6250_Stornoway_-20170406-142739_CH1

FIGURE 7 - GLUMAIG HARBOUR SBP EXAMPLES WITH DIGITISED HORIZONS

6. SURVEY VESSEL

ALHS' survey vessel Coastal Sensor was used to carry out all aspects of the survey, an MCA Cat III road transportable 6.1m fibreglass hull SPORTIS SK6100K RIB type vessel with enclosed cabin, central console, twin 60HP outboard engine and spacious aft deck that can be used for inshore bathymetry, oceanographic or environmental projects (Figure 8).

FIGURE 8 - ALHS' SURVEY VESSEL COASTAL SENSOR

The vessel, the first of its kind to be operated commercially in the UK, has a twin seated fully enclosed-cabin, equipped to power a laptop computer, and with ample room in the cabin for personnel and equipment, survey works can continue in otherwise impossible weather conditions.

The vessel was piloted by an RYA qualified coxswain and qualified surveyor and equipped with cm precise CODA RTK GPS (centimetric) positioning equipment.

7. SURVEY PERSONNEL

The following personnel were involved in all aspects of the data capture, post processing and data release elements of the project.

Name	Position
C.D. Thomson	QA & Data Release
A. J. McCormick	Survey Coxswain
E.J. Stacey	Hydrographic Surveyor

8. SURVEY STANDARDS

The Hydrographic survey is considered complete to International Hydrographic Organisation Special Order standard, with a Full Sea Floor Search being achieved as per IHO publication S44, Table 1. A representation of the section of interest within that document is shown in Table 6:

Order	Examples of Typical Areas	Horizontal Accuracy (95% Confidence Level)	Depth Accuracy for Reduced Depths (95% Confidence Level)	100% Bottom Search	System Detection Capability	Maximum Line Spacing
Special	Harbours, berthing area and associated critical channels with minimum under keel clearances	2m	a = 0.25m b = 0.0075	Compulsory	Cubic features > 1m	Not applicable as 100% search compulsory

TAKEN FROM IHO PUBLICATION S44, TABLE 1, SHOWING REQUIREMENTS OF A SPECIAL ORDER SURVEY

The error limits for depth accuracy are calculated by introducing the values listed in the above table for a and b into the formula $\pm\sqrt{[a^2+(b*d)^2]}$, where:

a constant depth error, i.e. the sum of all constant errors

b*d depth dependent error, i.e. the sum of all depth dependent errors

b factor of depth dependent error

d depth[1]

The line spacing used for the side-scan sonar and magnetometer surveys are considered well suited to achieve a full understanding of the environment.

The multibeam system shown on numerous instances to be capable of detecting objects far smaller than the 1m cubic features specified for a Special Order survey.

[1] *IHO 2005. Publication M-13 'Manual on Hydrography'. Chapter 1, Pages 9-10.*

Annex A
Drawing Register

A6250

FILE	DESCRIPTION
A6250_Newton Basin_MBES_CD.dwg	MBES survey - AutoCAD format
A6250_Newton Basin_MBES_CD.pdf	MBES survey - PDF format
A6250_Newton Basin_0-5m_CD.xyz	MBES survey - XYZ File
A6250_Newton Basin_CD_Imagery.tif	MBES survey - Geotiff
A6250_Newton Basin_SBP.dwg	SBP survey - AutoCAD format
A6250_Newton Basin_SBP.pdf	SBP survey - PDF format
A6250_Newton Basin_SBP_Trackplot.dxf	SBP survey trackplot - DXF
A6250_Newton Basin_SBP_H1_CD.xyz	SBP survey horizon 1 - XYZ File
A6250_Newton Basin_SBP_Images	SBP survey - Folder containing JPEG images
A6250_Newton Basin_SBP_WEB	SBP survey - Folder containing WEB interface
A6250_Glumaig Harbour_MBES_CD.dwg	MBES survey - AutoCAD format
A6250_Glumaig Harbour _MBES_CD.pdf	MBES survey - PDF format
A6250_Glumaig Harbour _0-5m_CD.xyz	MBES survey - XYZ File
A6250_Glumaig Harbour _CD_Imagery.tif	MBES survey - Geotiff
A6250_Glumaig Harbour _SBP.dwg	SBP survey - AutoCAD format
A6250_Glumaig Harbour _SBP.pdf	SBP survey - PDF format
A6250_Glumaig Harbour _SBP_Trackplot.dxf	SBP survey trackplot - DXF
A6250_Glumaig Harbour _SBP_H1_CD.xyz	SBP survey horizon 1 - XYZ File
A6250_Glumaig Harbour _SBP_H2_CD.xyz	SBP survey horizon 2 - XYZ File
A6250_Glumaig Harbour _SBP_H3_CD.xyz	SBP survey horizon 3 - XYZ File
A6250_Glumaig Harbour _SBP_H4_CD.xyz	SBP survey horizon 4 - XYZ File
A6250_Glumaig Harbour _SBP_Images	SBP survey - Folder containing JPEG images
A6250_Glumaig Harbour _SBP_WEB	SBP survey - Folder containing WEB interface

Annex B

Horizontal & Vertical Positioning System Precision

A6250

Trimble SPS 855 / 555 Geodetic grade GPS Receiver and Heading system, using RTK corrections.

	HORIZONTAL ACCURACY	VERTICAL ACCURACY
REAL TIME KINEMATIC	±10mm + 1ppm RMS	±20mm + 1ppm RMS

All horizontal positions in the survey are referred to OSGB and have used the OSTN 15 model to transform WGS84 positions obtained from GPS observations.

Annex C
Data Processing Procedures

A6250

Multibeam Processing Stages

Sonar Control 2000 software was used to control the MBES system during the data gathering phase.

Data was logged in HYPACK HYSWEEP software.

After data gathering the data was post processed in HYPACK MBMax where the following stages of processing were undertaken:

- Navigation data was processed.
- Motion Sensor data was examined and edited as required.
- Tidal data was examined and edited as required
- Automatic filtering of the data was carried out.
- Individual lines of MBES sounding data were manually edited.
- Processed files were loaded into Fledermaus visualisation and editing software and fully quality assured before being unloaded back to Hypack.
- The data was gridded at appropriate post spacing for the scale of plot requested by the client. This was exported to AutoCAD for presentation.
- The data was contoured at 0.5m intervals in Hypack and exported to AutoCAD.

Sub-Bottom Profiler Processing Stages

The sub-bottom profiler data was collected and processed using Chesapeake SonarWiz Software.

- SEG-Y data was imported into the software
- Frequency filtering, gain and time-variable gain settings were adjusted to ensure that the best possible picture of the sub-bottom data was available to the user
- Each individual horizon was digitised
- An xyz of the thickeness between the seabed and each horizon was prepared and exported to McCarthy Taylor System LSS 3D modelling software
- LSS was used to prepare isopach xyz and to export isopach dxf of the sediment thickness

A drawing file was prepared in AutoCAD to show the sediment thickness detected during the survey

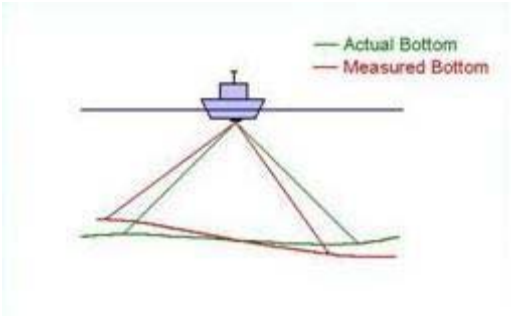
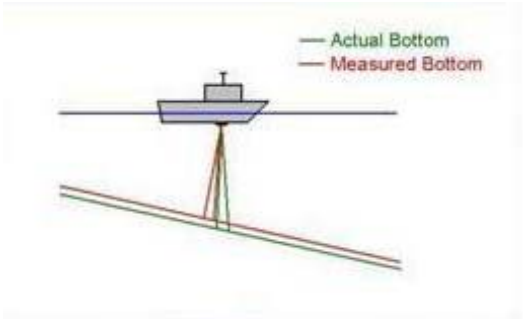
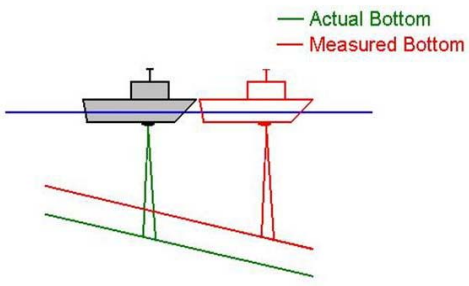
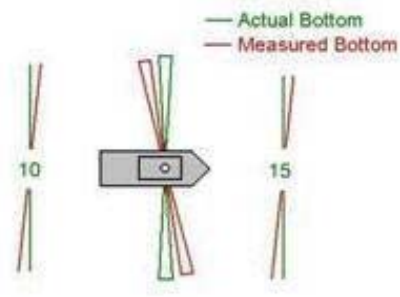
Annex D
Multibeam Echosounder Calibration

A6250

Patch tests are tests which are performed after initial equipment installation, and periodically thereafter as well as if sensors are modified, to quantify any residual biases from the initial system alignment.

During this calibration series, four separate tests must be performed to determine residual alignment biases for:

- Roll offset
- Position Time Delay (Latency)
- Pitch Offset
- Yaw (Heading) Offset

<table>
<tr><td><u>ROLL</u>
 
</td><td><u>PITCH</u>
 
</td></tr>
<tr><td>▪ Sonar and Motion Reference Unit (MRU) alignment relative to vertical.
▪ Can cause large depth and position errors at outer beams.</td><td>▪ Sonar and MRU alignment relative to vertical.
▪ Can cause depth and position errors across the swath.</td></tr>
<tr><td><u>LATENCY</u>
 
</td><td><u>YAW (HEADING)</u>
 
</td></tr>
<tr><td>▪ The delay between position and fix transmission.
▪ Will cause positional errors.
▪ Error is independent of multibeam system.</td><td>▪ Sonar and MRU alignment relative to vertical
▪ Can cause depth and position errors across the swath.</td></tr>
</table>

Annex E
Standard Disclaimer

A6250

1. All client-supplied data is taken on trust as being accurate and correct, and the sub-contractor cannot be held responsible for the quality and accuracy of that data set.

2. Geophysical interpretation of bathymetry and sonar is based on an informed opinion of the supplied data, and is subject to inherent errors out with the control of the interpretational hydrographer or geophysicist, which include but are not limited to GPS positioning errors, navigation busts, data quality, assumed speed velocity sediment profiles in the absence of Geotechnical data, sub bottom profile pulse width, and induced scaling errors therein associated with seismic signature. Seabed geomorphology and sub-seabed geology should be further investigated by visual or intrusive methods.

3. The limits of this survey are defined by the data set; out with the survey limits are not covered at any level by the sub-contractor.

4. The data is accurate at the time of data acquisition, the sub-contractor cannot be held responsible for environmental changes, and the client by accepting this report accepts that the environment of the seabed is subject to continuous change, that items of debris, hard contacts etc. may move, appear, be relocated or removed, thickness of surficial sediment change out with the knowledge of the sub-contractor and they will not be held responsible for such actions at any level.

Technical Appendix 8.2

Deep Water Port Stornoway
Stage 1 Development
Hydraulic Modelling
Report

DOCUMENT CONTROL SHEET

Client	Stornoway Port Authority					
Project Title	Deep Water Port Stage 1 Development – Hydraulic Modelling					
Document Title	Report					
Document No.	IBE1434 – DWP1					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	56	1	1	1

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
0	Draft	AKB	CN	AKB	Belfast	09/05/18
1	Final	AKB	NS	AKB	Belfast	29/05/18

Consulting Engineers

TABLE OF CONTENTS

1 INTRODUCTION 1
2 DEEP WATER PORT – STAGE 1 3
2.1 PROPOSED SCHEME 3
3 SURVEYS AND INVESTIGATIONS 5
3.1 APRIL 2017 MULTI BEAM SURVEYS 5
3.2 BATHYMETRIC SURVEY DATA FOR STORNOWAY HARBOUR MODEL 6
4 METHODOLOGY FOR MODELLING COASTAL PROCESSES 8
4.1 OVERVIEW 8
4.2 COASTAL PROCESS MODELS 8
4.2.1 North Minch Spectral Wave Model 8
4.2.2 North Minch Flow Model 10
4.2.3 Stornoway Harbour Flow and Spectral Wave Model 11
4.3 FLOW REGIME MODELLING 13
4.4 WAVE CLIMATE MODELLING 14
4.5 HARBOUR DISTURBANCE MODELLING 15
4.6 EXTREME WAVE AND WATER LEVEL MODELLING 15
4.7 MODELLING SOFTWARE 16
5 TIDAL REGIME IN STORNOWAY HARBOUR 17
5.1 TIDAL REGIME UNDER EXISTING CONDITIONS 17
5.2 TIDAL REGIME WITH THE PROPOSED DWP STAGE1 DEVELOPMENT 20
5.3 IMPACT OF THE PROPOSED SCHEME ON THE TIDAL REGIME 22
6 WAVE CLIMATE IN STORNOWAY HARBOUR 27
6.1 GENERAL 27
6.2 WIND DATA 27
6.3 WAVE CLIMATE APPROACHING STORNOWAY HARBOUR 28
6.4 WAVE CLIMATE APPROACHING DEEP WATER PORT STAGE 1 29
6.5 IMPACT OF THE PROPOSED SCHEME ON THE WAVE CLIMATE 40
6.6 STORM WAVE CLIMATE FOR ENGINEERING DESIGN 41
7 IMPACT OF CAPITAL DREDGING ON WATER QUALITY 43
7.1 BACKGROUND 43
7.1.1 Description of Capital Dredging Requirements 43
7.1.2 Characterisation of seabed 44
7.2 MODELLING OF DREDGED PLUMES 47
7.2.1 Modelled dredging techniques 47

7.2.2 Dredging equipment....48
7.2.3 Source term analysis....48
7.2.4 Numerical representation....50
7.3 RESULTS OF DREDGING SIMULATIONS....52
7.4 SUMMARY OF THE IMPACT OF DREDGING ON WATER QUALITY....56
8 SUMMARY AND CONCLUSIONS....57
1 MIKE MODELLING MODULES....2
1.1 MIKE 21/3 COUPLED FM....2
1.2 HYDRODYNAMIC MODULE....3
1.3 MUD TRANSPORT (MT) MODULE MODELLING SYSTEM....3
1.4 SAND TRANSPORT (ST) MODULE MODELLING SYSTEM....4
1.5 MIKE21 FM FLEXIBLE MESH SPECTRAL WAVE MODELLING SYSTEM....4
1.6 MIKE21 BOUSSINESQ WAVE MODEL....6

LIST OF FIGURES

Figure 1.1: Location of the Deep Water Port in Stornoway Harbour. 1
Figure 2.1: Plan of proposed Deep Water Port Stage 1. 3
Figure 3.1: Extent of the 2017 multi beam bathymetric survey undertaken for Newton Basin 5
Figure 3.2: Extent of the 2013 multi beam hydrographic surveys of Stornoway Harbour 6
Figure 3.3: Combined survey data points for the Stornoway Harbour and approaches model..... 7
Figure 4.1: Extent and bathymetry of the North Minch wave model (to CD) 9
Figure 4.2: Extent and bathymetry of the North Minch Flow model (to MSL)..... 10
Figure 4.3: Extent and bathymetry of the Stornoway Harbour flow and wave model [toCD] 11
Figure 4.4: Bathymetry and mesh of the Deep Water Port Stage 1 existing model [toCD] 12
Figure 4.5: Bathymetry and mesh of the Deep Water Port Stage 1 proposed model [toCD] 13
Figure 4.6: Extent of the RPS Western UK and Irish Waters Storm Surge model 14
Figure 5.1: Tidal elevation in Stornoway Harbour during model simulation period 17
Figure 5.2: Spring tidal elevation and currents at a point to the west of Goats Island . 17
Figure 5.3: Typical spring tide peak flood current velocities in the existing Stornoway Harbour 18
Figure 5.4: Typical spring tide peak ebb current velocities in the existing Stornoway Harbour. 19
Figure 5.5: Spring tide peak flood current velocities in Stornoway Harbour with the Deep Water Port Stage 1 development in place..... 20
Figure 5.6: Spring tide peak ebb current velocities in Stornoway Harbour with the Deep Water Port Stage 1 development in place..... 21
Figure 5.7: Tidal level difference (with scheme minus existing) at MHWS..... 23
Figure 5.8: Tidal level difference (with scheme minus existing) at MLWS 24
Figure 5.9: Tidal current speed difference (with scheme minus existing) at mid flood springs..... 25
Figure 5.10: Tidal current speed difference (with scheme minus existing) at mid ebb springs..... 26

Figure 6.1: Significant wave height and mean wave direction in the North Minch - 1 in 50 year return period storm from 165ºN 29
Figure 6.2: Significant wave height and mean wave direction in Stornoway Harbour - 1 in 50 year return period storm from 180ºN 30
Figure 6.3: Significant wave height and mean wave direction in Stornoway with Deep Water Port Stage 1 development in place - 1 in 50 year return period storm from 180ºN 31
Figure 6.4: Significant wave height and mean wave direction in Stornoway with Deep Water Port Stage 1 including wave energy reflection from quay - 1 in 50 year return period storm from 180ºN 32
Figure 6.5: Storm wave disturbance patterns – Existing – 1 in 50 year return period storm from 180oN 33
Figure 6.6: Storm wave disturbance patterns – DWP stg1 – 1 in 50 year return period storm from 180ºN 33
Figure 6.7: Significant wave heights – Existing – 1 in 50 year return period storm from 180ºN 34
Figure 6.8: Significant wave heights – DWP stg1 – 1 in 50 year return period storm from 180ºN 34
Figure 6.9: Significant wave height and mean wave direction in Stornoway Harbour – 1 in 50 year return period storm from 0ºN 35
Figure 6.10: Significant wave height and mean wave direction in Stornoway Harbour with Deep Water Port Stage 1 development in place - 1 in 50 year return period storm from 0ºN 36
Figure 6.11: Significant wave height and mean wave direction in Stornoway for the existing harbour - 1 in 50 year return period storm from 045ºN 37
Figure 6.12: Significant wave height and mean wave direction in Stornoway for the proposed Deep Water Port Stage 1 development - 1 in 50 year return period storm from 045ºN 38
Figure 6.13: Storm wave disturbance patterns – DWP stg1 – 1 in 50 year return period storm from 045ºN 39
Figure 7.1: The extent of the [pital dredging works required as part of the proposed Deep Water Port Stage1 development. 43
Figure 7.2: The simulated 60 day CSD dredger programme in relation to the tidal cycle at Stornoway. 50
Figure 7.3: Assumed track of Cutter Suction Dredger during the 60 day dredging period 51

Figure 7.4: Typical SSC plume at a point in time when dredger is working near the quay and the tidal currents are running north 52
Figure 7.5: Maximum value envelop of the Total Suspended Sediment Concentration that occurs during the 60 day dredging simulation 53
Figure 7.6: Mean value envelop of the Total Suspended Sediment Concentration for the whole of the 60 day dredging period simulation 54
Figure 7.7: Deposition depths of sands and silts lost from the dredging operations at the end of the whole of the 60 day dredging period simulation 55

LIST OF TABLES

Table 6.1: Wind speeds for storm simulations over the fetches across the Minch..... 27
Table 6.2: Wind speeds for storm simulations over the fetches across Stornoway Harbour 28
Table 6.3: Northern Revetment – Incoming Storm Wave Climate 41
Table 6.4: Southern Revetment Roundhead – Incoming Storm Wave Climate 41
Table 6.5: Southern Revetment Trunk – Incoming Storm Wave Climate..... 42
Table 6.6: Finger Quay – Incoming Storm Wave Climate 42
Table 6.7: Main Quay – Incoming Storm Wave Climate 42
Table 7.1: Average PSA of Seabed sediments samples..... 44
Table 7.2: PSA of Seabed sediments around the dredged area..... 45
Table 7.3: Location of the sediment sampling campaign undertaken by Causeway Geotech..... 46
Table 7.4: Modelled sediment characteristics. 48
Table 7.5: Composition of the 5% losses from the cutter head dredging source term. 49
Table 7.6: Composition of the 6% losses from the overspill source term..... 49

1 INTRODUCTION

Stornoway Port Authority through their Consulting Engineers, Wallace Stone LLP, have appointed RPS to undertake computational modelling of the hydraulic regime for the proposed Deep Water Port development scheme to be located on the western side of Stornoway Harbour at Arnish.

The Deep Water Port development is to be developed in a series of four stages, Figure 1.1, with a total area of 28 ha. The total project includes 600,000 m^3 of rock excavation, 360,000 m^3 of dredging and the construction of about 1000m of new quays. Stage 1 of the project is to be constructed over an 18 month period (Jan 2019 to June 2020) and includes 10ha of port area (shown in yellow in Figure 1.1), the finger pier plus 250m of quay wall and the dredging.

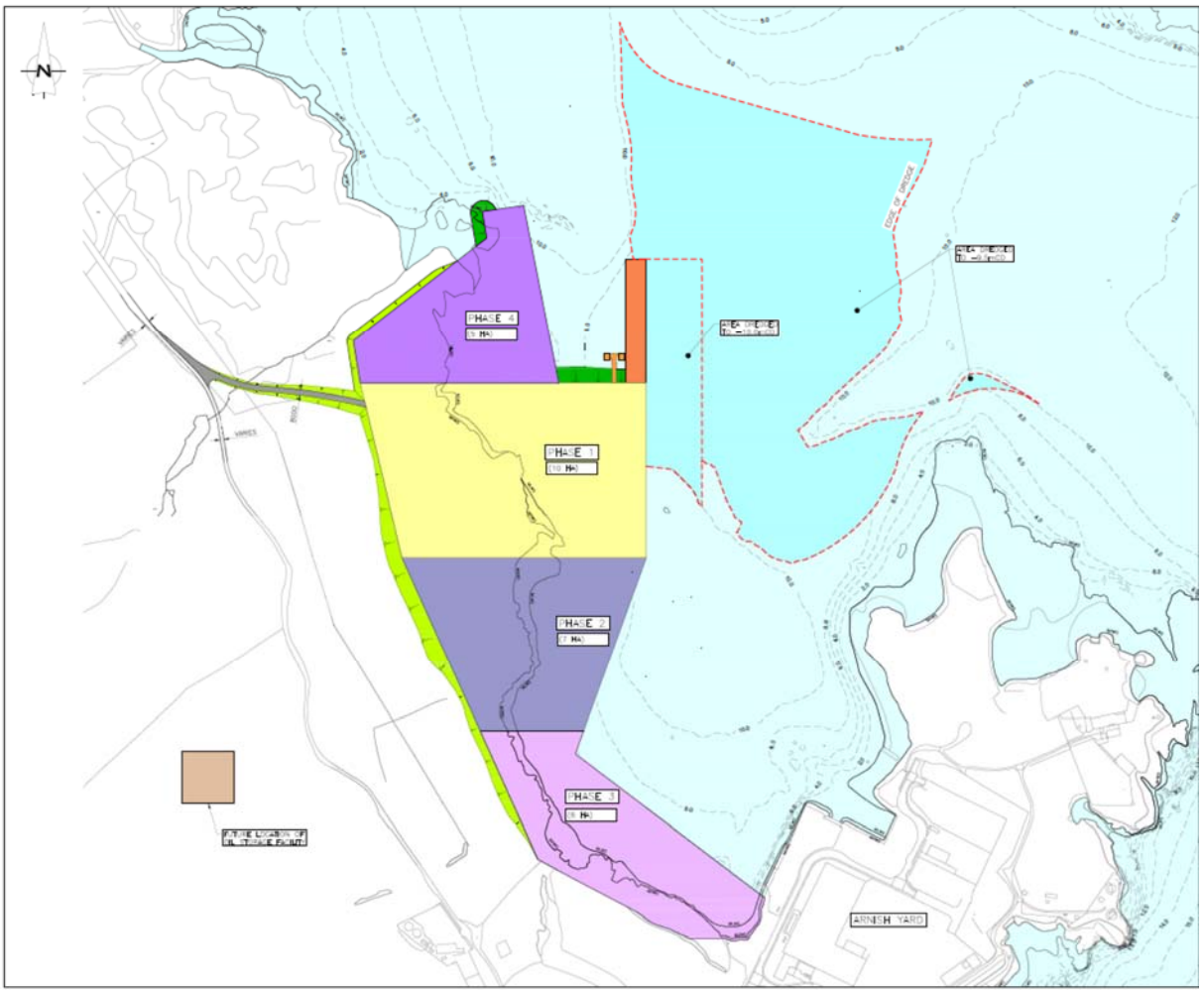


Figure 1.1: Location of the Deep Water Port in Stornoway Harbour.

The objectives of this study are to:

1. Briefly describe the existing site conditions and the development scheme proposed for Stage 1 of the Deep Water Port project.
2. Present the bathymetry field data collected in support of this study.
3. Develop computational numerical models of the Stornoway Harbour area.
4. Identify and summarise baseline conditions in the study area.
5. To understand and quantify the potential effects of the proposed scheme on the existing coastal processes.
6. To provide engineering design data in terms of the design wave climate, extreme tidal levels and the joint probability of waves and water levels.
7. Provide information on the wave patterns and heights around the Port area.

The computational modelling used to provide the engineering data, determine baseline conditions and assess the impact of the proposed scheme was undertaken using RPS' in house suite of MIKE coastal process modelling software developed by the Danish Hydraulic Institute. This software has been described in more detail in Appendix 1.

2 DEEP WATER PORT – STAGE 1

2.1 PROPOSED SCHEME

The DWP Stage 1 is proposed to provide a 430m long deep water quay with depths of 10 metres at LAT and a freight ferry berth with up to 8 metres water depth at LAT. These berths are serviced by 10 ha of port area formed by a combination of rock excavation and reclamation using dredged material. The proposed Stage 1 scheme is shown in Figure 2.1 below.

It was originally proposed that the finger pier would be of open piled construction but the early indications from the site investigation suggest that the finger pier will be constructed from caissons. The material to be dredged is likely to be mainly sands and gravels and this material will be used to form the reclamation behind the sheet piled vertical walled quay.

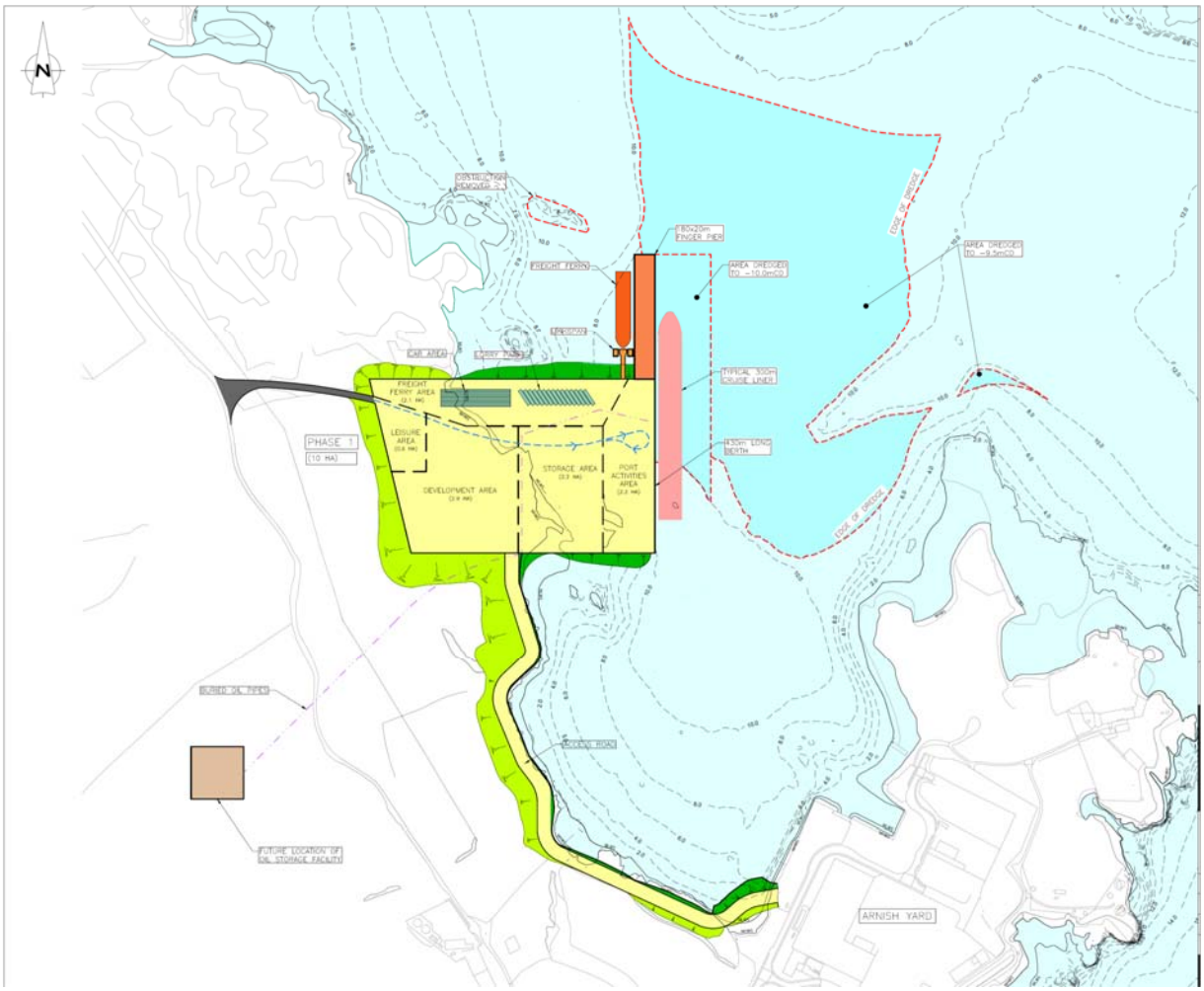


Figure 2.1: Plan of proposed Deep Water Port Stage 1.

The total dredged volume in the -9.5m CD area and the dredged pocket to -10m CD is expected to be about 360,000m^3. It is anticipated the material will be dredged by the cutter suction dredger and pumped ashore behind the sheet piled quay wall and the supporting rock bunds on the north and south boundaries of the reclamation area. Any unsuitable material will be deposited at sea in the licenced disposal site to the south of Arnish peninsula.

3 SURVEYS AND INVESTIGATIONS

In April 2017 Aspect Land & Hydrographic Surveys Ltd were contracted by Wallace Stone LLP on behalf of Stornoway Port Authority to carry out multi beam bathymetric and geophysical surveys for the Newton Basin and the Deep Water Port projects. Aspect Surveys had previously undertaken hydrographic surveys of Stornoway Harbour and its approaches in 2013. The data collected during these surveys and investigations are summarised in the following sections of this chapter.

3.1 APRIL 2017 MULTI BEAM SURVEYS

An overview of the extent of the high resolution multi beam survey that was undertaken by Aspect Surveys for the Newton Basin is presented in Figure 3.1 below. The data collected during this survey was converted into 0.5m grid dataset which was then used with other survey data to develop the range of numerical models used for this study.

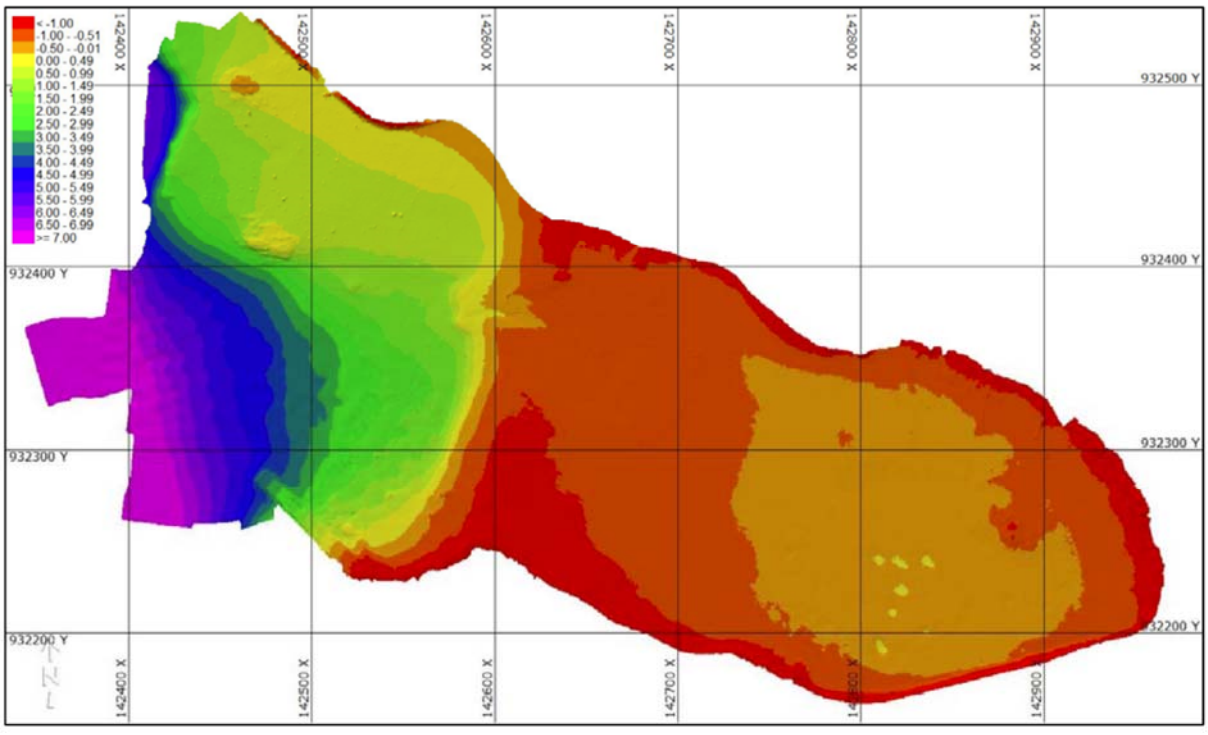


Figure 3.1: Extent of the 2017 multi beam bathymetric survey undertaken for Newton Basin

3.2 BATHYMETRIC SURVEY DATA FOR STORNOWAY HARBOUR MODEL

The 2013 bathymetric surveys carried out by Aspect Land & Hydrographic Surveys Ltd. was used as a source of bathymetric data for areas of Stornoway harbour and its approaches not covered in the April 2017 multi beam surveys.

The extent of the multi beam surveys undertaken in 2013 is shown in Figure 3.2 below.

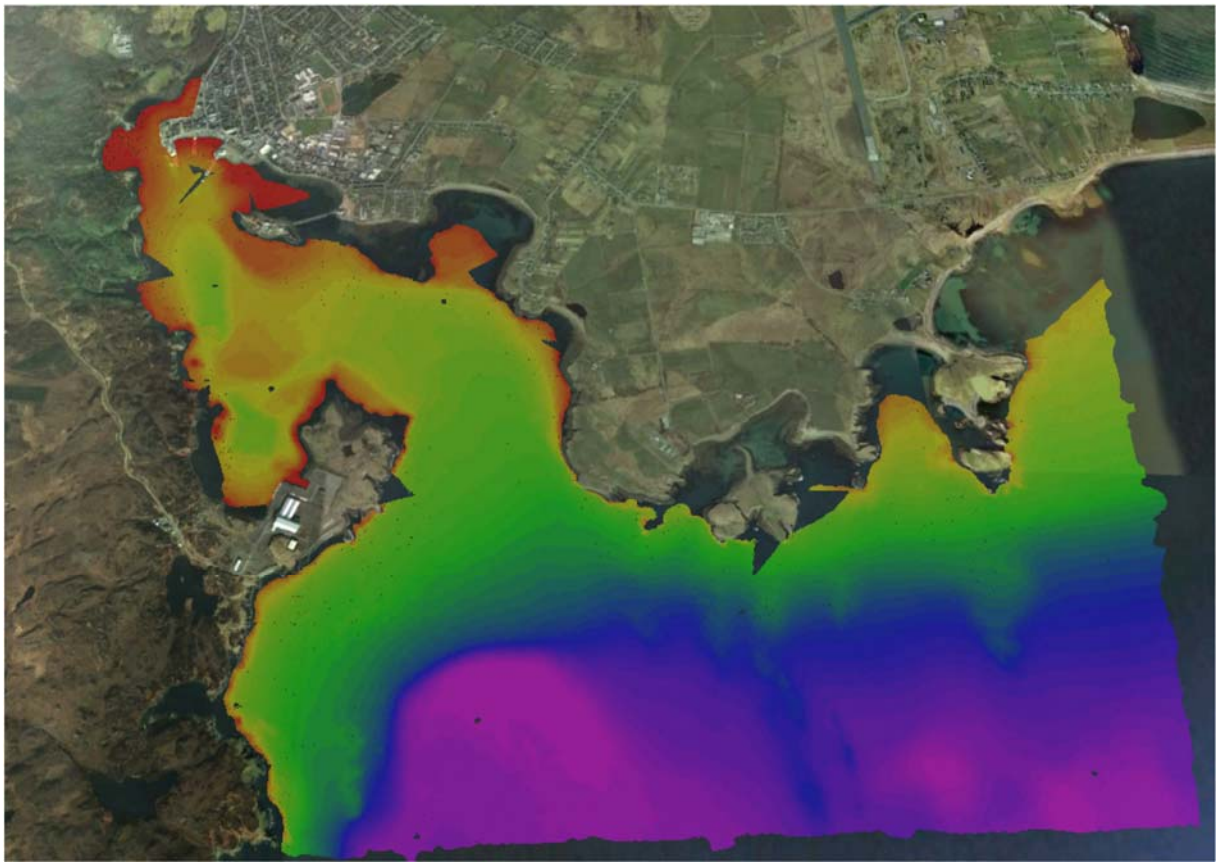


Figure 3.2: Extent of the 2013 multi beam hydrographic surveys of Stornoway Harbour

The 2013 survey data was split into 5 sub areas and the hydrographic data supplied as a 1m resolution grid. After combining the various surveys the overall data set which was used for the numerical model was compiled and is shown in Figure 3.3. Data for some small areas not covered by the 2013 and 2017 surveys (mainly drying intertidal areas) was taken from digital chart data supplied by C-Map.

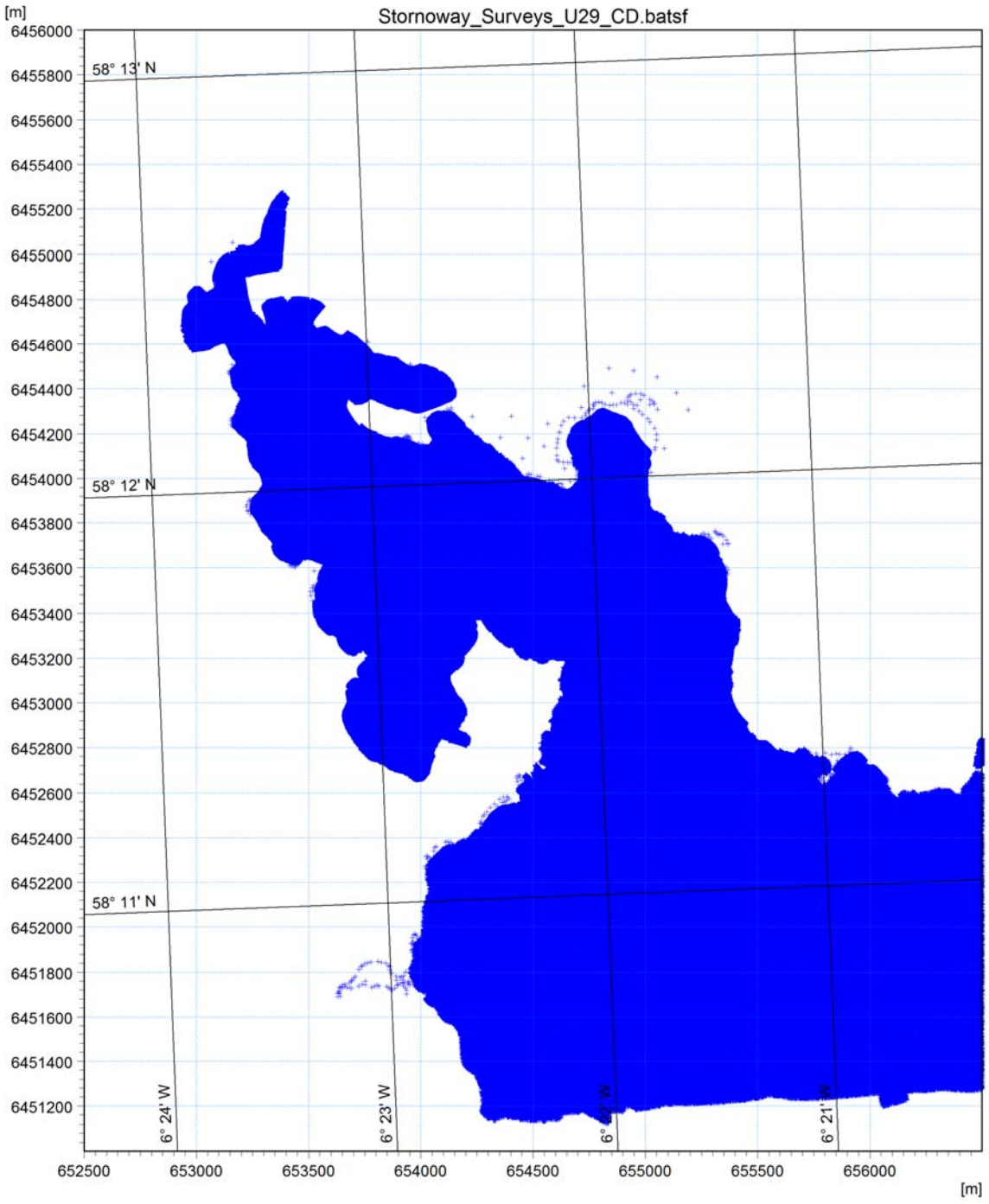


Figure 3.3: Combined survey data points for the Stornoway Harbour and approaches model

4 METHODOLOGY FOR MODELLING COASTAL PROCESSES

4.1 OVERVIEW

The RPS Coastal Processes Team has undertaken various modelling tasks in order to provide data for the engineering design of the scheme and to ascertain the potential impacts of the proposed scheme on the coastal processes in Stornoway Harbour. The modelling tasks were divided into four main areas as follows:

- Flow regime modelling
- Wave climate modelling
- Harbour disturbance modelling
- Extreme wave and water level modelling

The computational modelling was undertaken using RPS' in house suite of MIKE coastal process modelling software which was developed by the Danish Hydraulic Institute. Details of the modelling software used in this study are described in Appendix 1.

4.2 COASTAL PROCESS MODELS

As this study was interested in quantifying a range of coastal processes that occur at the site and adjoining areas of Stornoway Harbour, it was necessary to develop and utilise models of the North Minch and Stornoway Harbour and its approaches. RPS has already developed models for the whole of the west coast of Scotland and the western waters of the UK and Ireland. These existing models were adapted for use in this study. A description of the models and the data used to develop each model variation is described in the following sections.

4.2.1 North Minch Spectral Wave Model

In order to maximise computational efficiency, RPS reduced the extent of an existing model of Scottish waters so that only the northern section of the west coast of Scotland model was included. For the purposes of this study, this reduced model domain is referred to as the North Minch wave model.

The extent and mesh structure of this model is illustrated in Figure 4.1. The model was developed using flexible mesh technology and had cell sizes ranging from $50x10^6m^2$ to $10,000m^2$. The bathymetry for this model was obtained from a range of sources including

bathymetric data supplied by the UK Hydrographic Office (UKHO) under the INSPIRE portal and from detailed hydrographic surveys undertaken for previous projects.

This particular model was used to generate and transform waves from the North Minch into the approaches to Stornoway Harbour whereby boundary conditions could be derived for the Stornoway Harbour model.

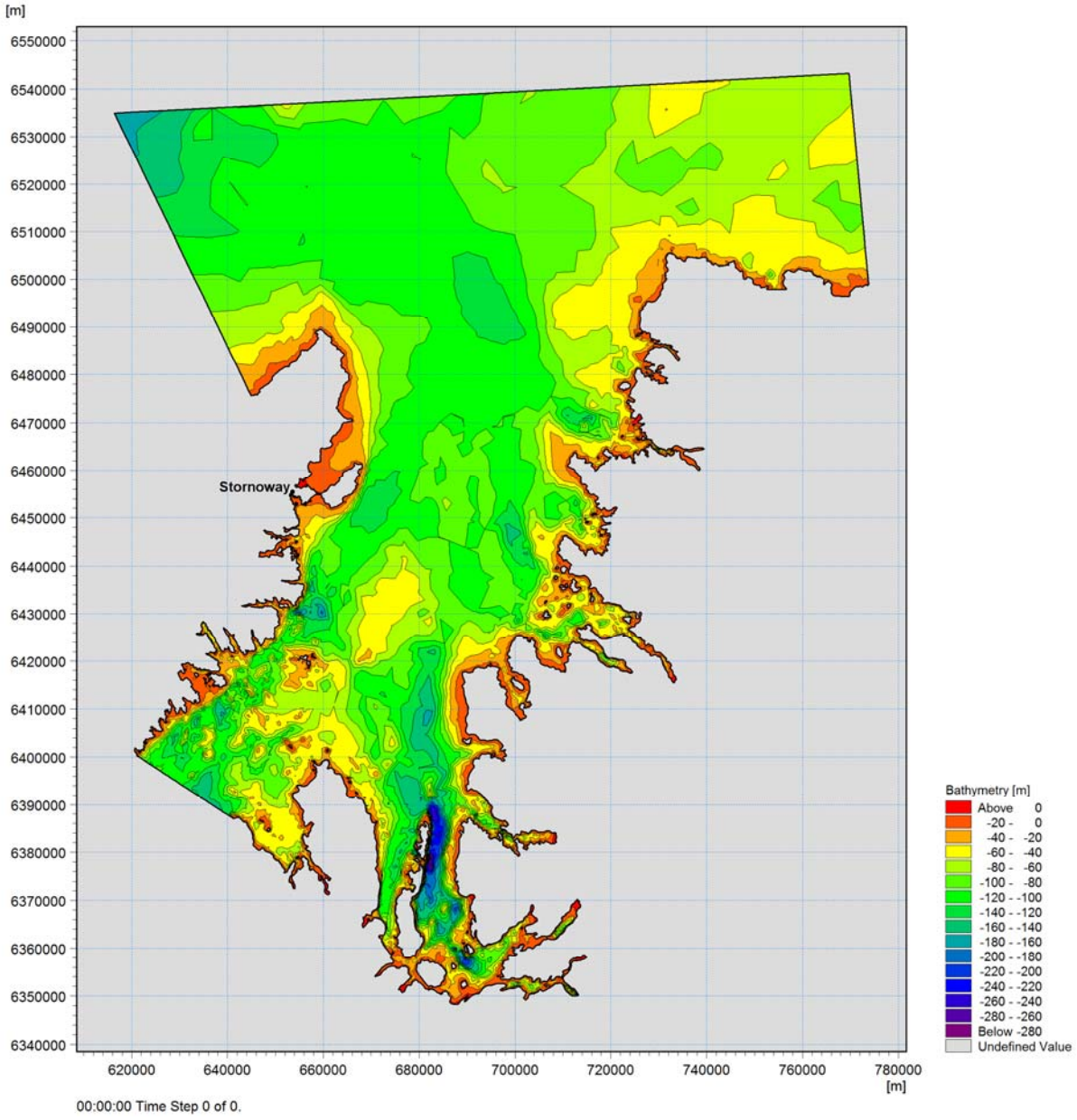


Figure 4.1: Extent and bathymetry of the North Minch wave model (to CD)

4.2.2 North Minch Flow Model

The North Minch flow model covers an area of the North Minch as shown in Figure 4.2. The bathymetry for this model was defined relative to MSL and used a collection of bathymetric survey data including recent surveys of the Stornoway Harbour area which were undertaken in 2013 and 2017, as well as high resolution data collected by the UKHO as part of the government funded INSPIRE initiative. The model resolution varied across the domain with coarser cells at the model boundaries and finer cells in the order of 15m grid size in the vicinity of Stornoway.

The boundaries of the North Minch flow model were specifically chosen so that tidal flows were accurately simulated throughout the domain. This model was primarily used to simulate tidal conditions at approaches to Stornoway Harbour with the aim of deriving tidal boundary conditions for the Stornoway Harbour model.

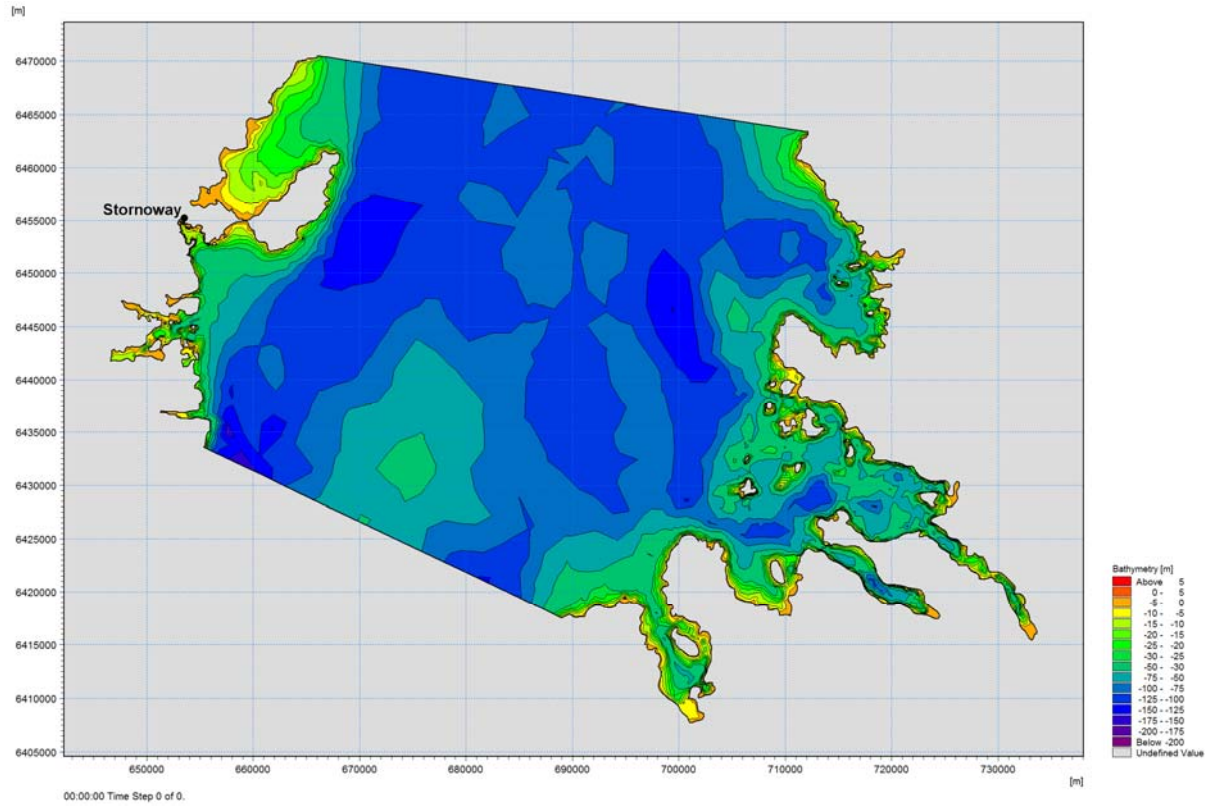


Figure 4.2: Extent and bathymetry of the North Minch Flow model (to MSL)

4.2.3 Stornoway Harbour Flow and Spectral Wave Model

A detailed model of Stornoway Harbour was developed to improve computational efficiency and allow the inclusion of finer resolution data around the proposed schemes. This model was designed with a flexible mesh grid system that would allow for the inclusion of the proposed Newton Basin and Deep Water Port developments without having to alter the model grid system. The model bathymetry was taken from the Aspect Survey's data of 2013 and 2017 as described in Section 3.2 and the extent and model mesh is shown in Figure 4.3. The model also included the tidal section of the River Creed.

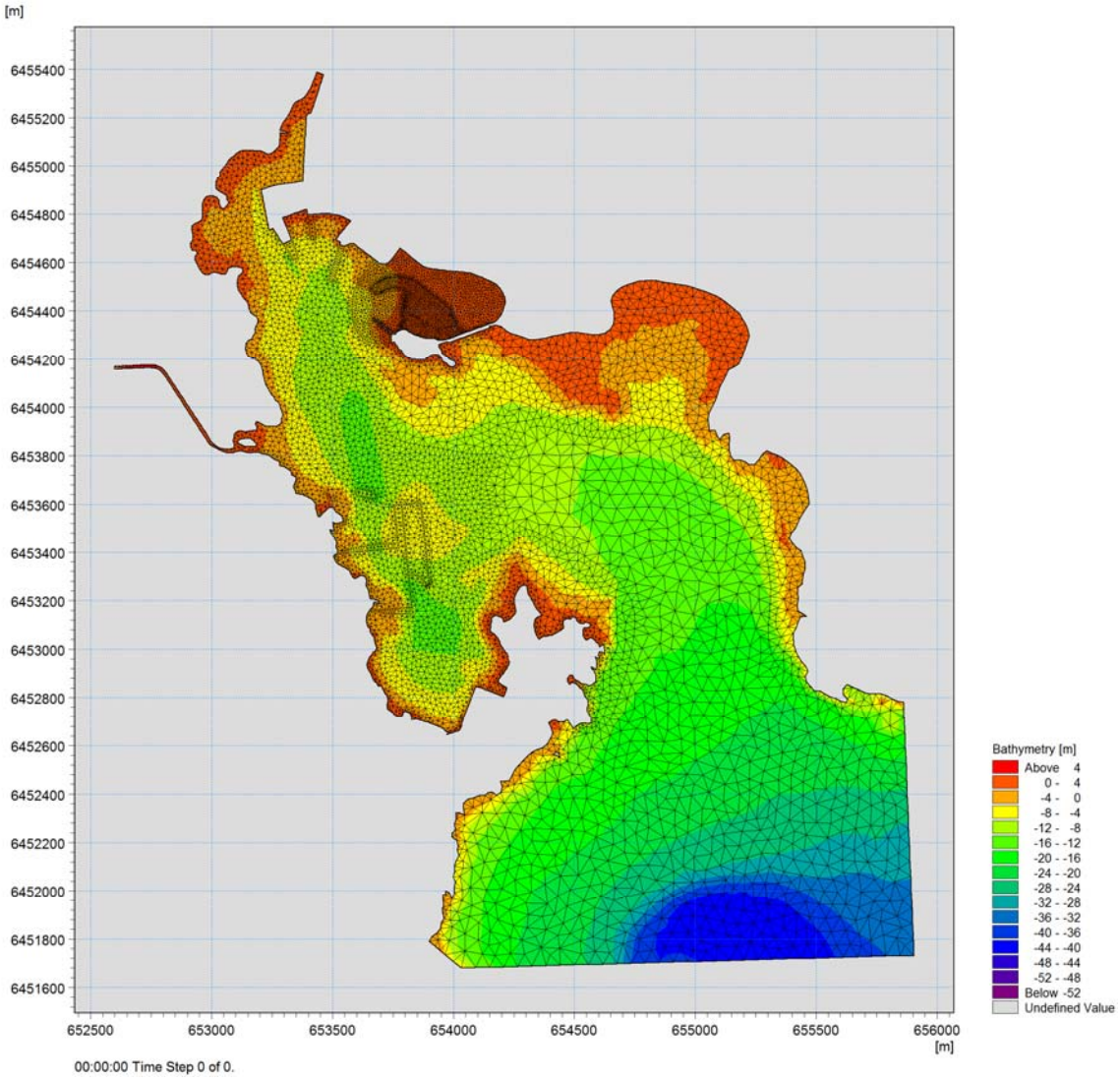


Figure 4.3: Extent and bathymetry of the Stornoway Harbour flow and wave model [toCD]

This model utilised tidal and wave boundary conditions derived from the models detailed in Sections 4.2.2 and 4.2.2 and was ultimately used to run coupled hydrodynamic and spectral

wave simulations for the Deep Water Port proposals. Two different versions of this particular model were developed to represent the existing and proposed Deep Water Port Stage 1.

Figure 4.4 below illustrates the bathymetry and mesh of the existing Arnish area. By comparing this to Figure 4.5, which illustrates the bathymetry and mesh of the proposed Stage 1 development, it can be seen that both configurations have been represented by the numerical models to a high degree of accuracy.

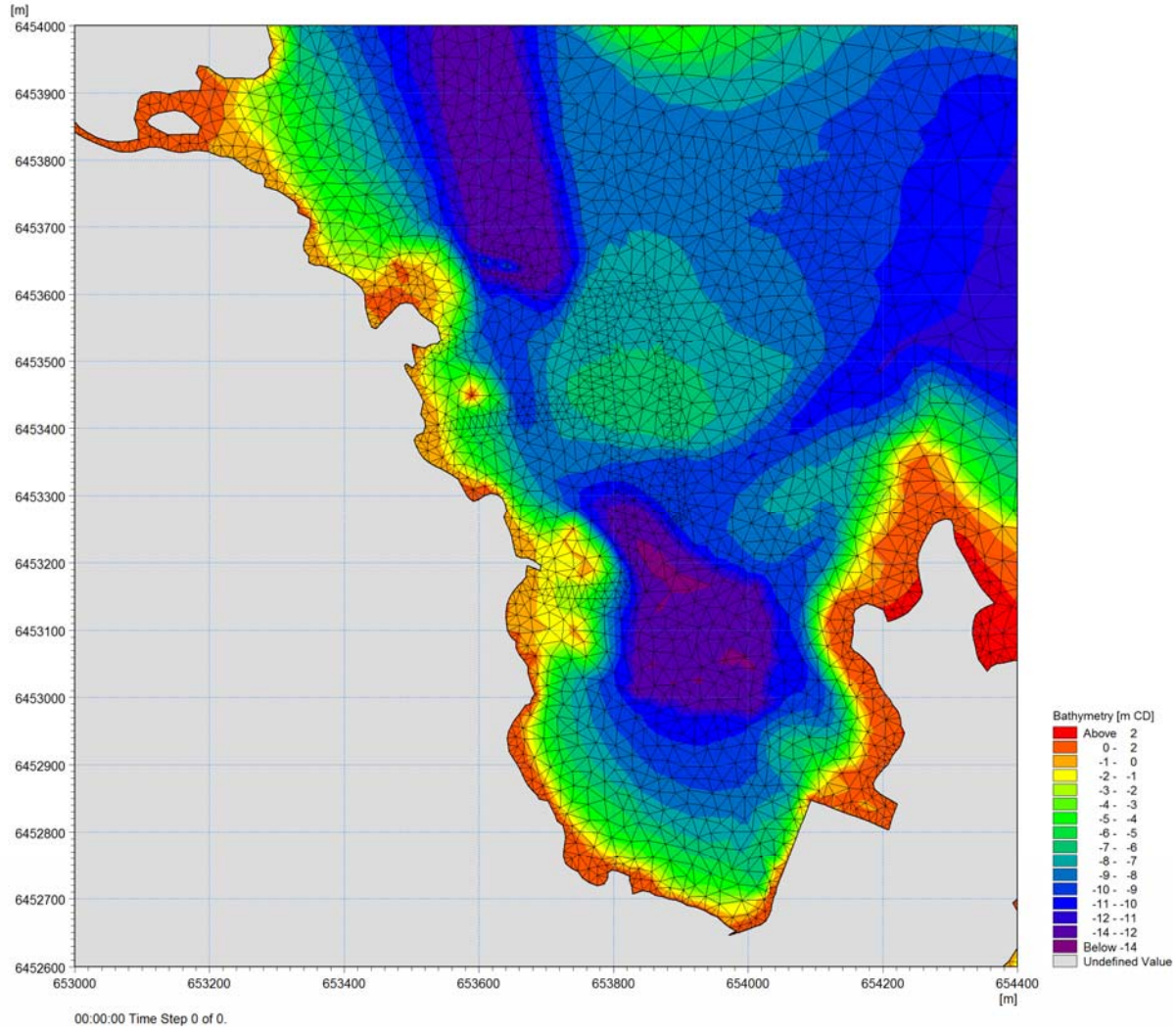


Figure 4.4: Bathymetry and mesh of the Deep Water Port Stage 1 existing model [toCD]

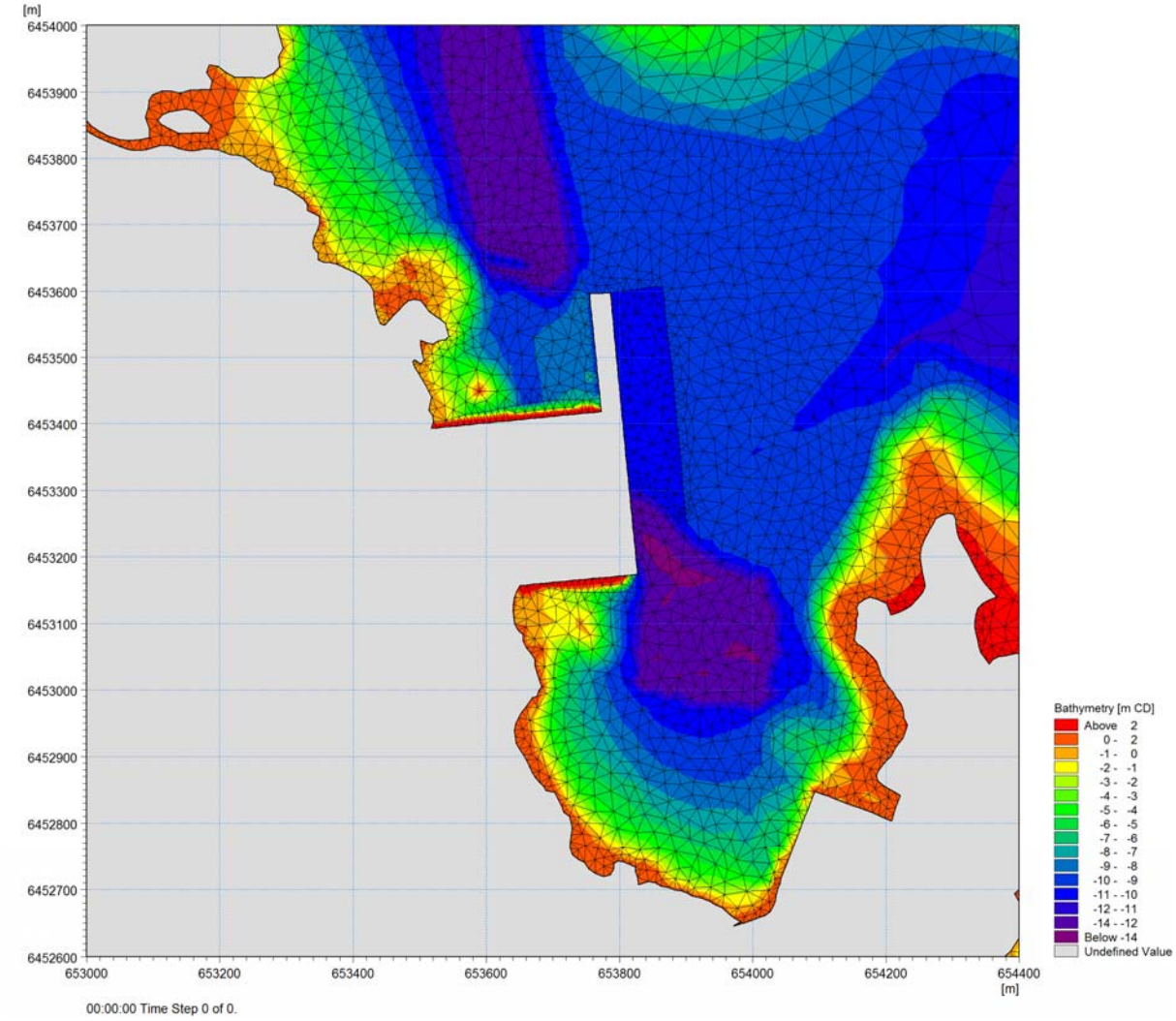


Figure 4.5: Bathymetry and mesh of the Deep Water Port Stage 1 proposed model [toCD]

4.3 FLOW REGIME MODELLING

The North Minch flow model described in Section 4.2.2, was used to simulate tidal flows within the model domain for 3 months of tides so that the base hydrodynamics would be available to provide input tidal conditions for the Stornoway Harbour model.

The tidal boundary data used for the North Minch flow model was generated by RPS' Western UK and Irish Waters Storm Surge model. This model stretches from the north western end of France into the Atlantic to 16° west, including the Porcupine Bank and Rockall. In the other direction it stretches from the northern part of the Bay of Biscay to just south of the Faeroes Bank. Overall, the model covers the Northern Atlantic Ocean and UK continental shelf up to a distance of 600km from the Irish Coast as illustrated in Figure 4.6. This model is driven by astronomic tides generated using the global tidal model developed by DTU Space (DTU10).

The model is currently run 24/7 to provide storm surge warnings for the whole of the Irish Coast.

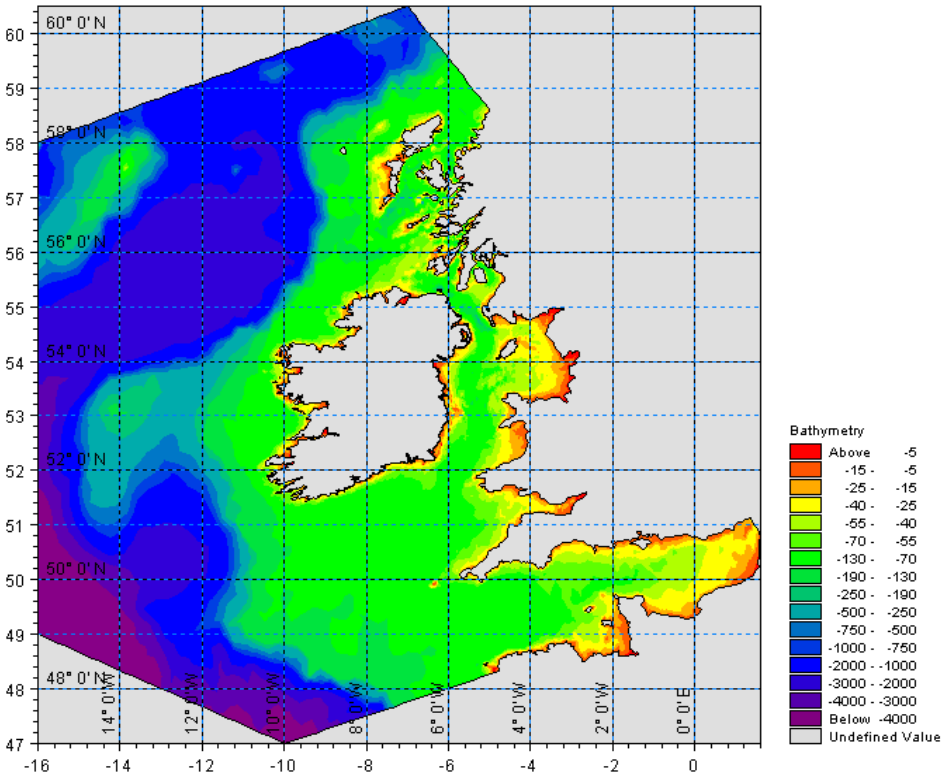


Figure 4.6: Extent of the RPS Western UK and Irish Waters Storm Surge model

The results of the North Minch flow model simulations were used to provide the tidal velocities and tidal elevations along the seaward boundaries of the Stornoway Harbour model. The Stornoway harbour model was run for a full 29 day lunar cycle, including mean river flow conditions in the River Creed, for both the existing harbour configuration and for the harbour with the proposed Deep Water Port Stage 1 in place. This enabled a comparison to be made of the flow conditions both before and after the installation of the proposed development and provided data for the modelling of extreme waves and water levels.

4.4 WAVE CLIMATE MODELLING

The modelling was undertaken using a two stage computational model simulation procedure for storm directions with long fetches to the approaches to Stornoway Harbour (directions 060^{o} to 195^{o}). This involved firstly the generation and transformation of waves from the North Minch to the approaches to Stornoway Harbour and then using the Stornoway Harbour model these waves were run into the study area.

For storm directions with shorter fetches within the harbour area, (directions 315^{o} to 090^{o}) the modelling was undertaken using the Stornoway Harbour model alone.

The model simulations were run for each relevant 15^{o} sector at high tide levels for 1 in 1, 1 in 50, 1 in 100 and 1 in 200 year return period storms. Simulations were also undertaken over the full tidal spring cycle for the most exposed wave direction so that the impact of any wave set up could be included in the assessment of extreme waves and water levels.

As with the flow modelling, all wave modelling was undertaken using the bathymetry for both the existing harbour and with the proposed Deep Water Port Stage 1 scheme in place. This allowed the impact of the proposed scheme on the wave climate at other parts of the harbour to be assessed.

4.5 HARBOUR DISTURBANCE MODELLING

While wave energy reflection can be included in the SW model, spectral wave models cannot include wave to wave interaction and thus do not simulate standing wave patterns. Harbour disturbance simulations were therefore undertaken to assess the effect of wave reflections from the proposed new quays on the wave patterns around Stornoway Harbour. The Deep Water Port is exposed to waves generated across Stornoway Harbour when the wave climate approaching the new quay will consist of short steep breaking waves. The Boussinesq wave does not include wind wave generation within the model area and thus the short steep wind driven waves decline too quickly in the further areas of the model. Thus the combination of the detailed spectral diffraction model and the Boussinesq wave model was used to accurately assess the effect of wave reflections from the quays on the wave climate around the area of Stornoway Harbour adjoining the proposed Deep Water Harbour Stage 1 development.

4.6 EXTREME WAVE AND WATER LEVEL MODELLING

A joint probability analysis was undertaken for extreme water levels and wave heights using the techniques and data contained in the DEFRA/EA “Joint Probability: Dependence Mapping and Best Practice:” report FD2308/TR1. This report indicates that the correlation coefficient for waves from directions from 315^{o} to 045^{o} is 0 and is 0.25 for directions 060^{o} to 195^{o} in the Stornoway area. The extreme water levels were taken from EA/SEPA’s Coastal flood boundary conditions for the UK mainland and islands: design sea levels database. SEPA currently indicate that the projected sea level rise to 2080 at Stornoway would be 0.53 metres. However updated IPCC sea level projections are due in November 2018 and the indications are that the projected sea level rise figures will be increased.

The extreme wave conditions at the site are dependent on the extreme wind speeds across the harbour and the Minch. Thus the joint probability analysis was undertaken between extreme water levels and wind speeds and the equivalent waves at the site were then determined by computational modelling using the appropriate wind speed for wave generation.

4.7 MODELLING SOFTWARE

The coastal processes at Stornoway were simulated using the coupled MIKE 21 Flow Model FM. The MIKE 21 Flow Model FM is a state of the art modelling system based on a flexible mesh approach. The modelling system was developed by the Danish Hydraulics Institute (DHI) for applications within oceanographic, coastal and estuarine environments and the software has been approved by numerous leading institutions and authorities around the world.

The Hydrodynamic Module is the basic computational component of the entire MIKE 21 Flow Model FM modelling system providing the hydrodynamic basis for the advection/dispersion Module, ECO Lab Module, Mud Transport Module and Sand Transport Module all of which may be coupled with the Spectral Wave module. For this study RPS utilised the following modules within the MIKE software package:

- Hydrodynamic module;
- Spectral Wave module;
- Boussinesq Wave module; and
- Extreme Value Analysis module;

A full description of these modules can be found in Appendix 1.

5 TIDAL REGIME IN STORNOWAY HARBOUR

5.1 TIDAL REGIME UNDER EXISTING CONDITIONS

The hydrodynamic model of Stornoway harbour, illustrated in Figure 4.4, was used to simulate over a month of tidal conditions across the entire model domain. The tidal curve for the simulation period is shown in Figure 5.1.

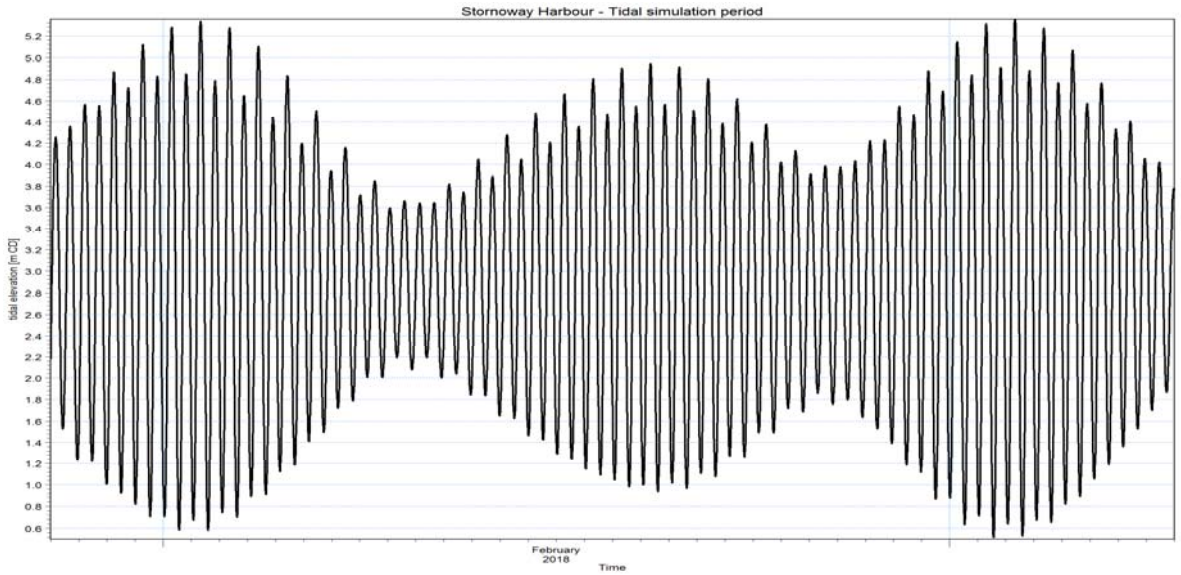


Figure 5.1: Tidal elevation in Stornoway Harbour during model simulation period

Results of the numerical simulations indicated that at Stornoway the change in tidal currents are largely in phase with the tidal elevations as illustrated in Figure 5.2.

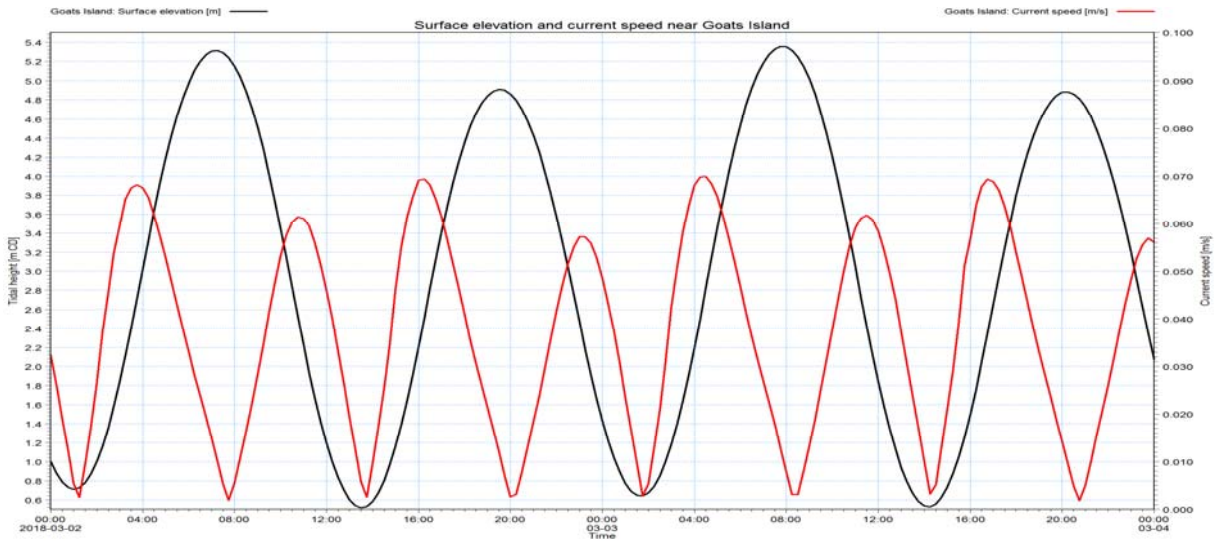


Figure 5.2: Spring tidal elevation and currents at a point to the west of Goats Island

The tidal currents within Stornoway Harbour are weak and generally do not exceed about 0.1m/s. The current field at mid flood and mid ebb of the spring tidal cycle are illustrated in Figure 5.3 and Figure 5.4. From these figures it will be seen that the highest current velocities are observed off the Reef Rock at Arnish Point during the flood and off the Reef and Seid rocks on the ebb. The effect of Goat Island and its causeway is to slightly increase the tidal velocities to the west of Goat Island and increase the tidal flow velocities over the bar between the north end of Goat Island and the shore.

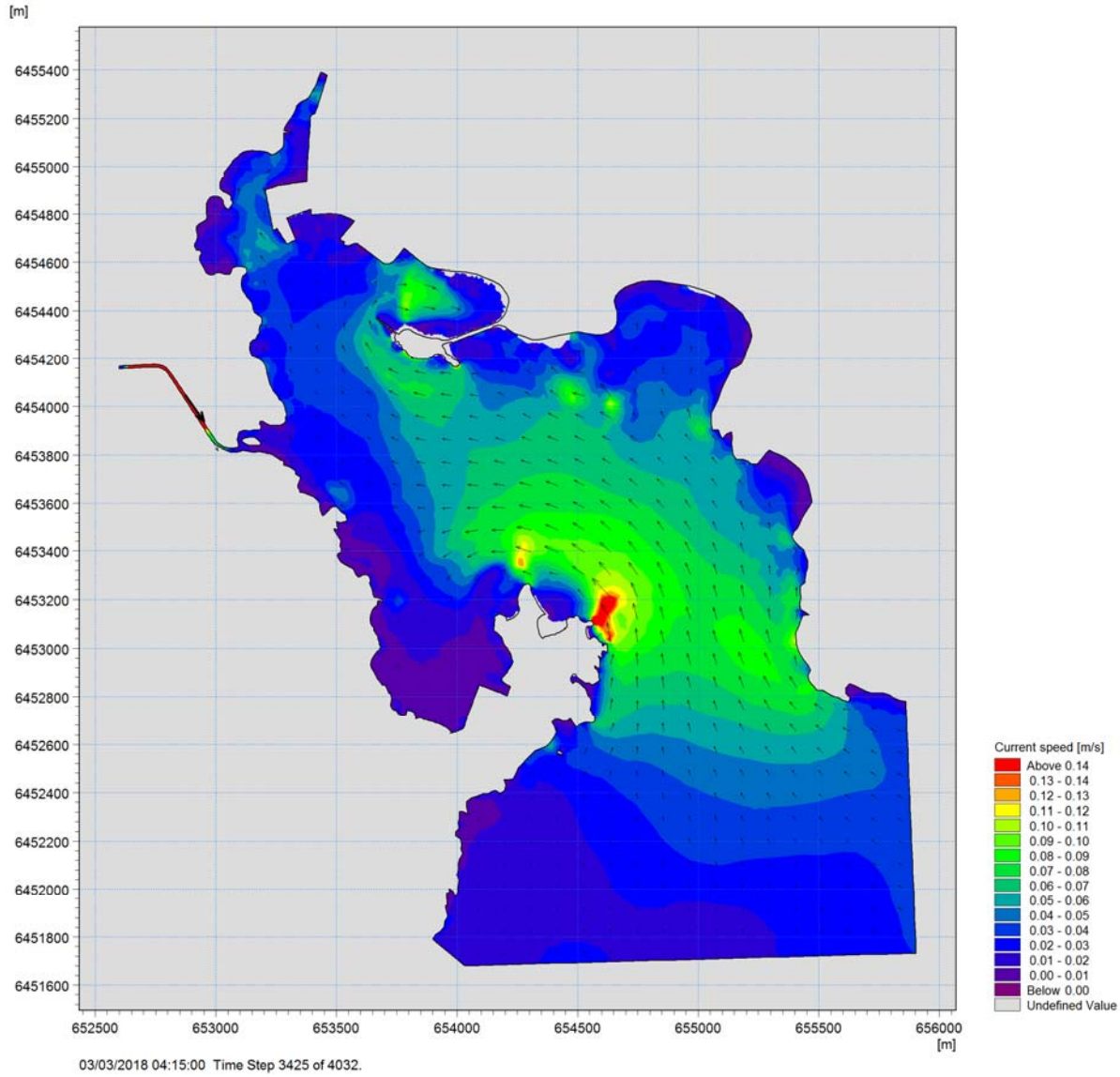


Figure 5.3: Typical spring tide peak flood current velocities in the existing Stornoway Harbour

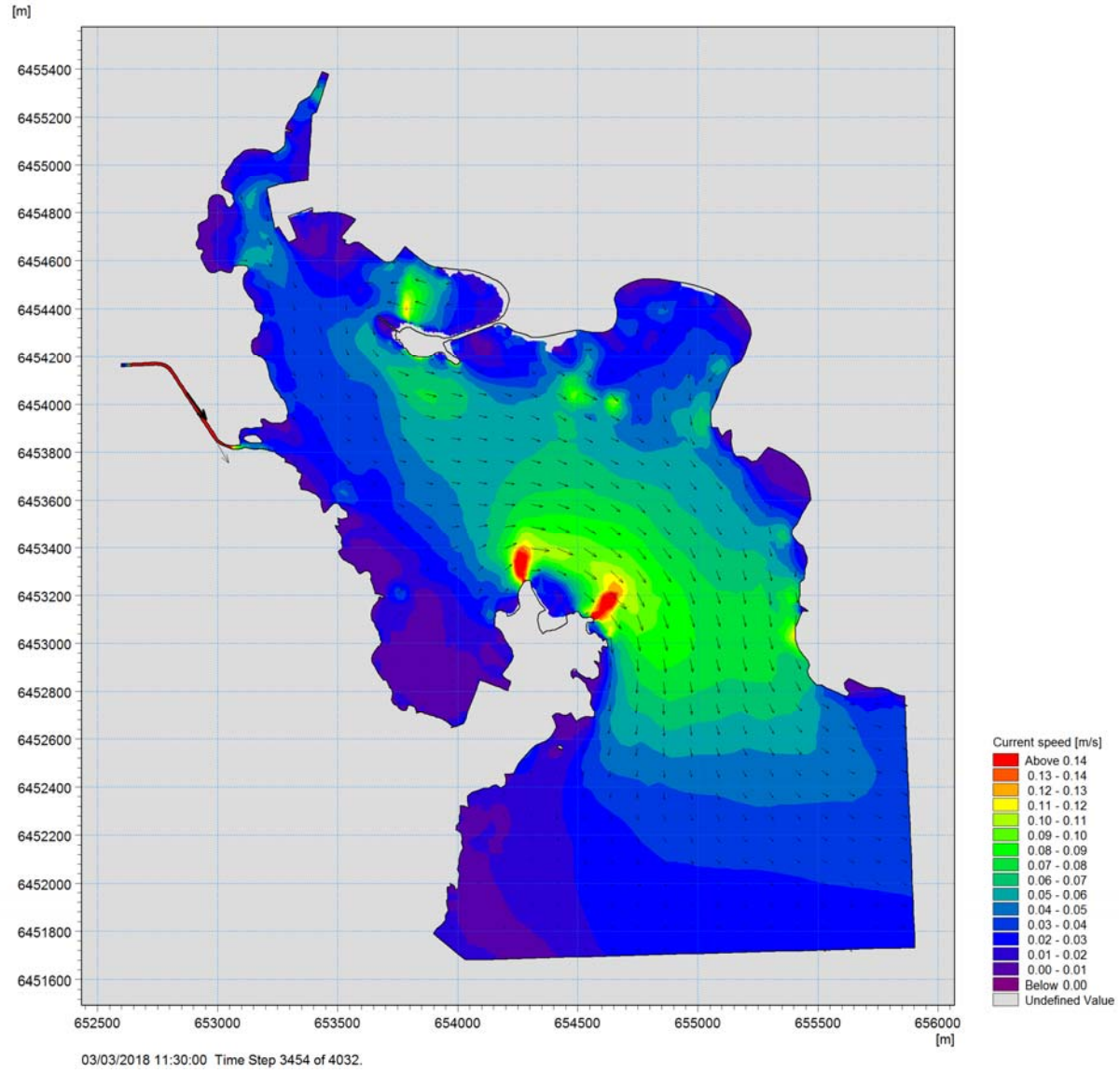


Figure 5.4: Typical spring tide peak ebb current velocities in the existing Stornoway Harbour.

5.2 TIDAL REGIME WITH THE PROPOSED DWP STAGE1 DEVELOPMENT

The hydrodynamic model was then re-run for the same time period as the existing scenario modelled in Section 5.1 of this report using an updated model to reflect the implementation of the proposed scheme; this updated model was previously illustrated in Figure 4.5. The current field at mid flood and mid ebb of the spring tidal cycle are illustrated in Figure 5.5 and Figure 5.6. As can be seen from these figures, there is little apparent change in the flood or ebb current patterns in the majority of the harbour area.

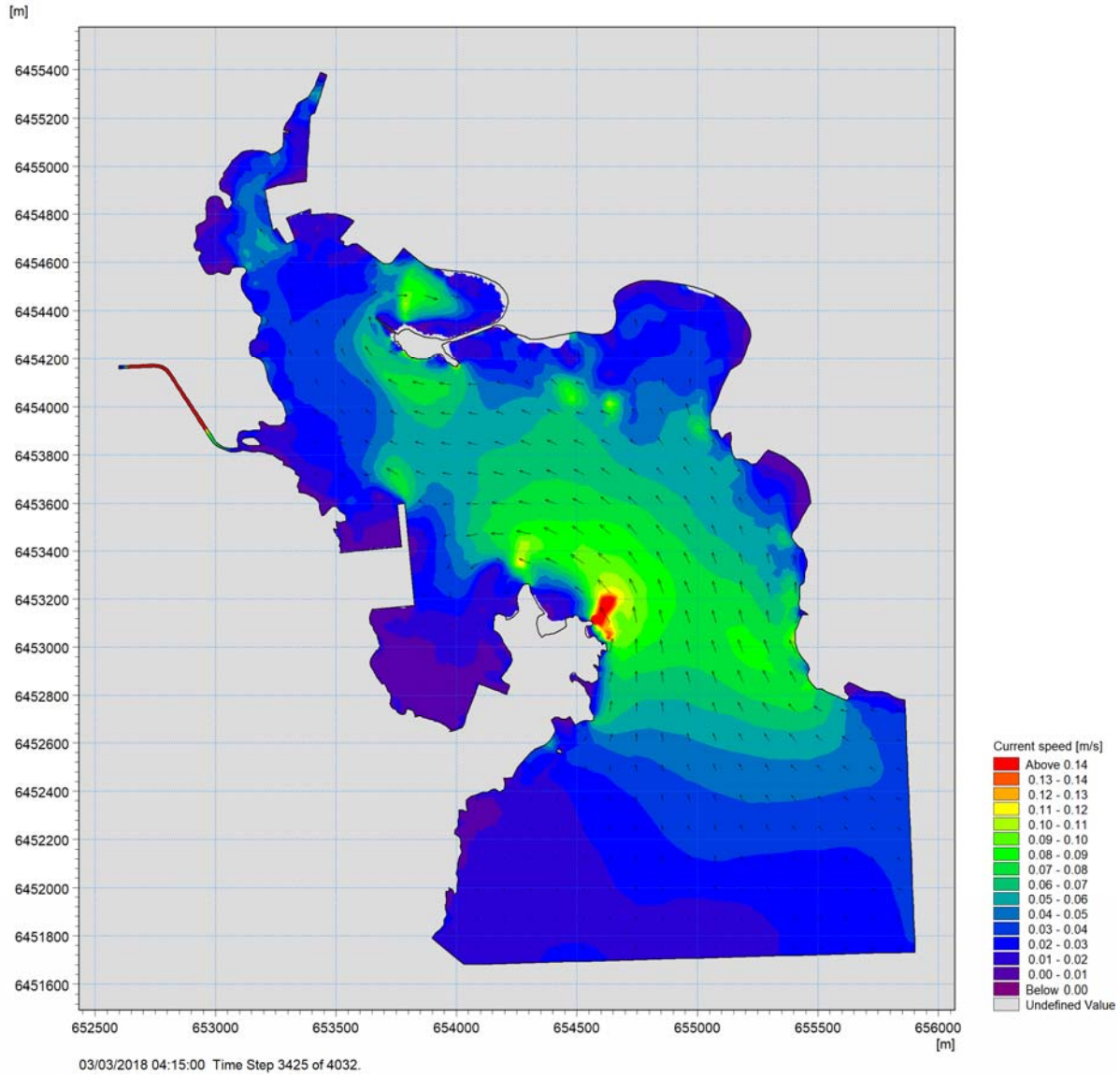


Figure 5.5: Spring tide peak flood current velocities in Stornoway Harbour with the Deep Water Port Stage 1 development in place

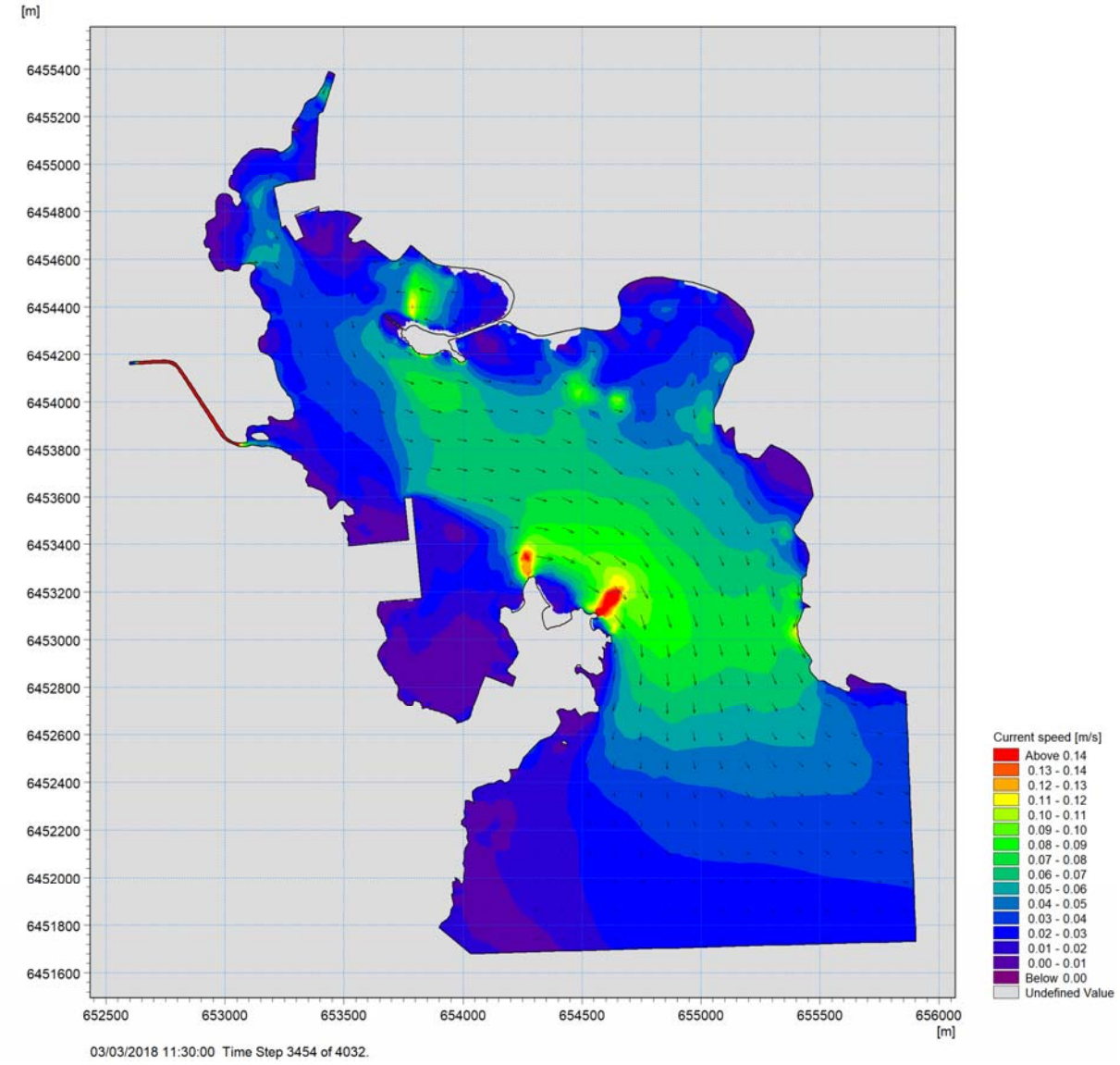


Figure 5.6: Spring tide peak ebb current velocities in Stornoway Harbour with the Deep Water Port Stage 1 development in place

5.3 IMPACT OF THE PROPOSED SCHEME ON THE TIDAL REGIME

The results of the tidal modelling have been used to assess the impact of the proposed Deep Water Port Stage 1 on the tidal regime in Stornoway Harbour. A series of difference plots (harbour with DWP Stg1 minus existing harbour) have been used to illustrate the extent and magnitude of the impacts.

Impact on Tidal Elevations

Figure 5.7 and Figure 5.8 illustrate the differences in the tidal elevations between the harbour with the proposed scheme and the existing scheme at high and low water during a spring tidal cycle.

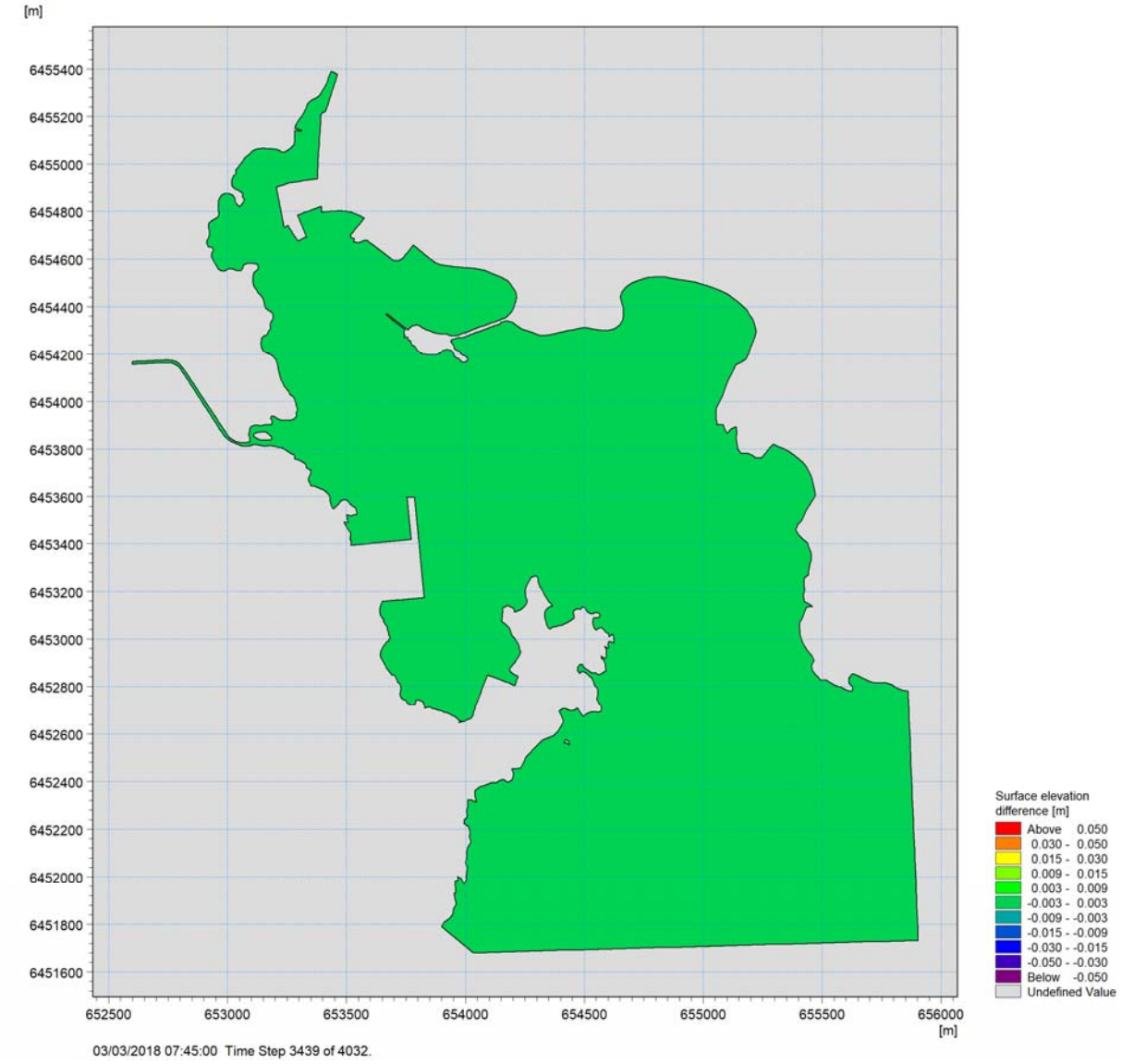


Figure 5.7: Tidal level difference (with scheme minus existing) at MHWS

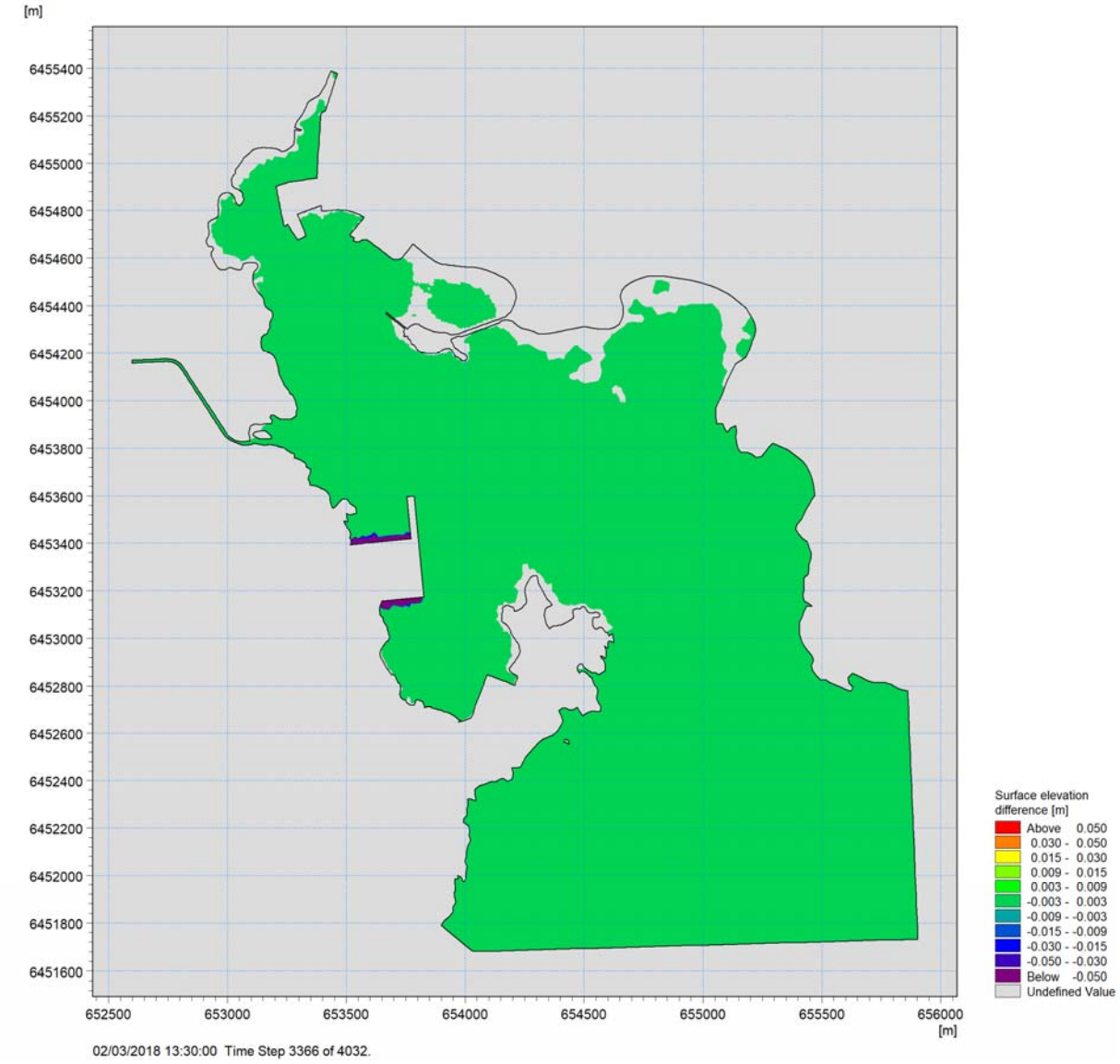


Figure 5.8: Tidal level difference (with scheme minus existing) at MLWS

It will be seen from Figures 5.7 and 5.8 that the proposed Deep Water Port Stage1 project will neither significantly increase the high tide levels or significantly reduce the low tide levels so the proposed scheme will not affect either flooding or navigation water levels in the harbour.

Impact on Tidal Flows

Difference plots have also been produced to show any changes in the tidal flood or ebb flow regime around the harbour which may result from the construction of the proposed Deep Water Port Stage 1 scheme. Figure 5.9 and Figure 5.10 show the changes in the mid flood and mid ebb tidal currents speed during a spring tide.

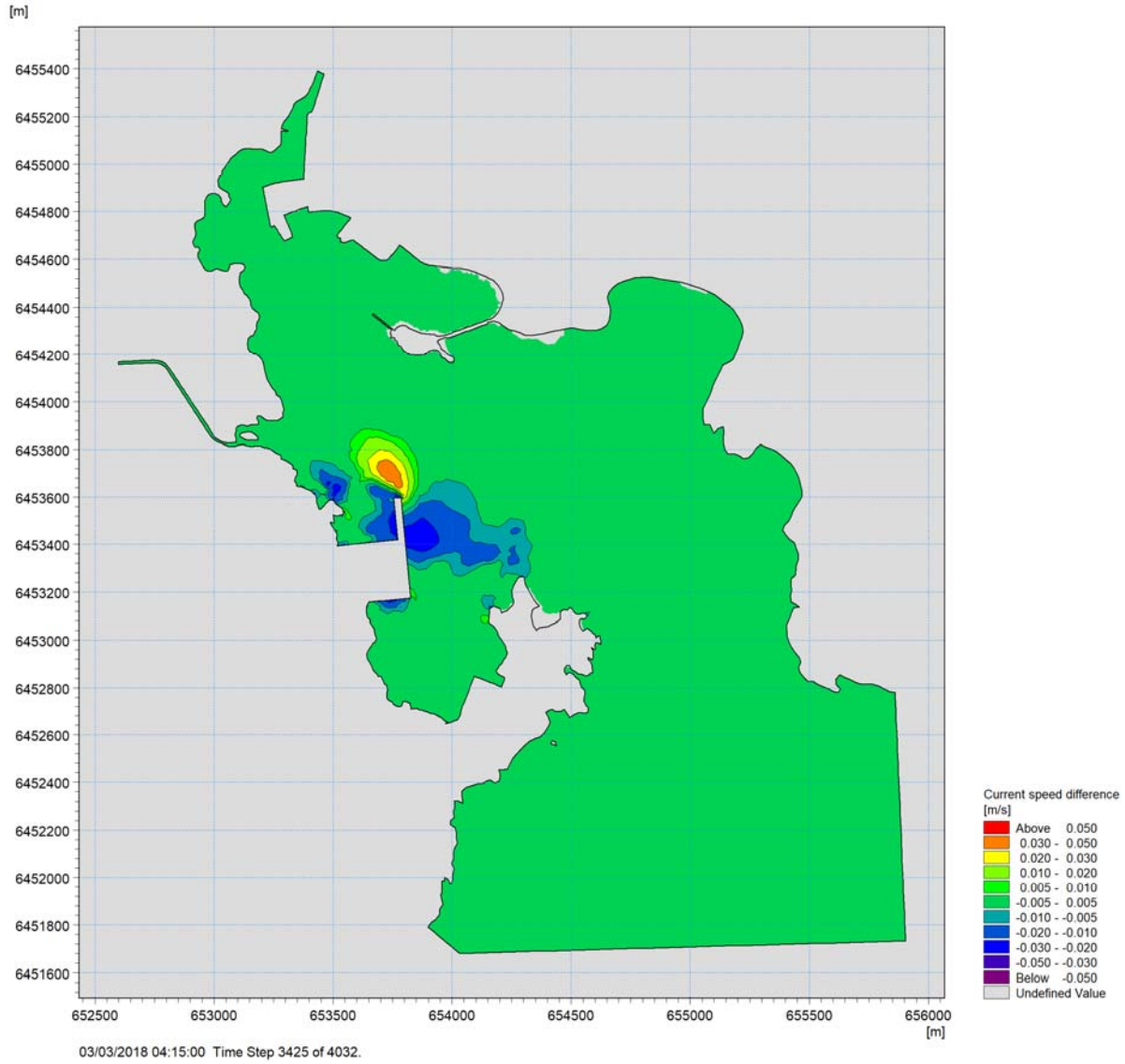


Figure 5.9: Tidal current speed difference (with scheme minus existing) at mid flood springs

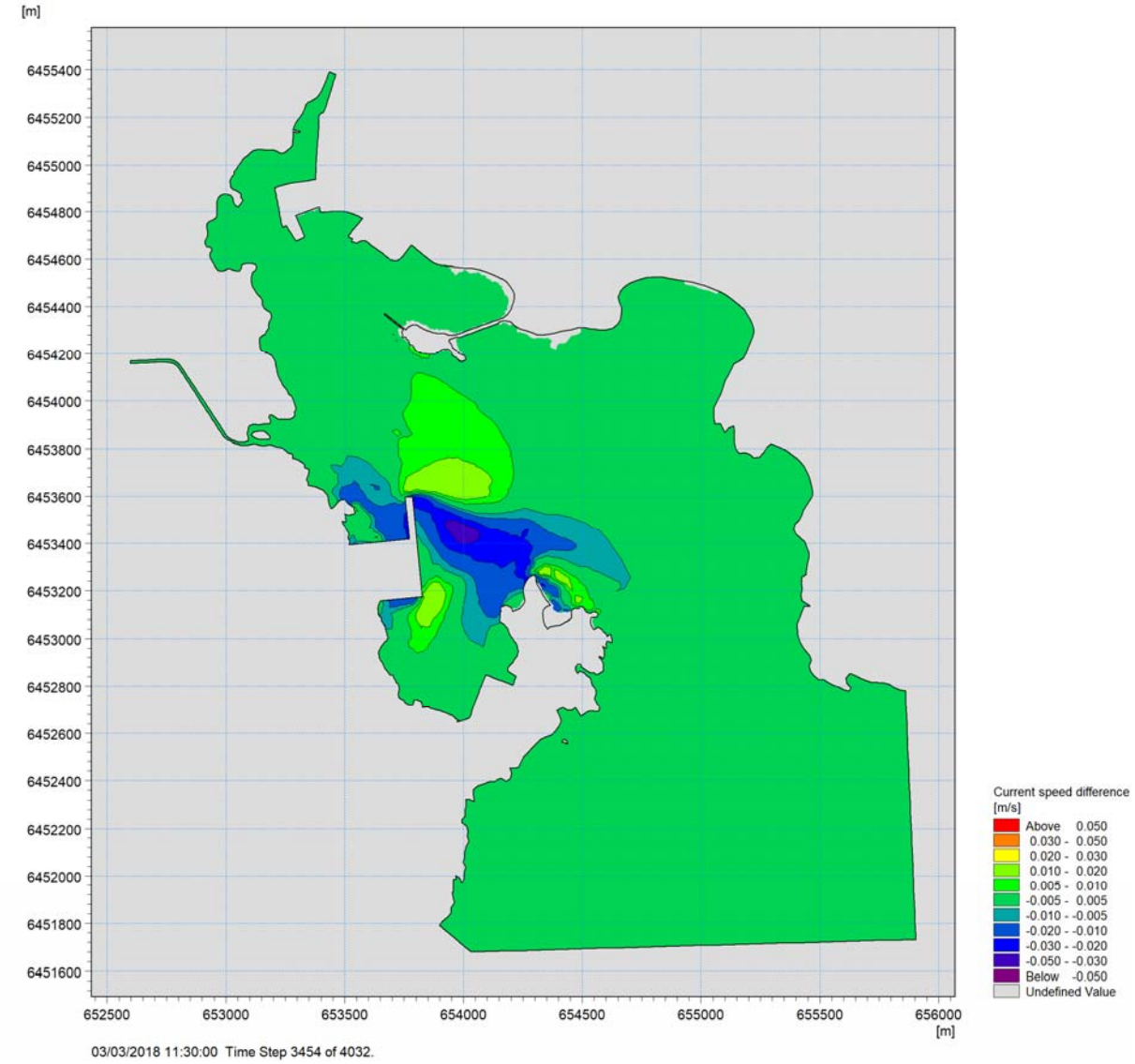


Figure 5.10: Tidal current speed difference (with scheme minus existing) at mid ebb springs

It will be seen from the difference plots that on the flood there is a small localised area of increased tidal velocity to the north of the finger pier and an equivalent reduction in the tidal velocity locally to the west and east of the pier. During the ebb tide the proposed development results in a slight increase in the tidal velocities to the north of the development and a reduction in the tidal velocity to the east of the finger pier. It should be noted that these tidal velocity differences assume that the finger pier will be of solid construction using caissons.

The tidal differences are small and not significant in terms of altering the hydrodynamic regime in Stornoway Harbour. Under typical tidal conditions, the changes in current speeds within the harbour area away from the vicinity of the proposed Deep Water Port Stage 1 development as a result of the proposed development, do not generally exceed ±0.005 m/s.

6 WAVE CLIMATE IN STORNOWAY HARBOUR

6.1 GENERAL

The proposed Deep Water Port Stage 1 development is potentially exposed to waves which penetrate into Stornoway Harbour past Arnish Point as well as to waves generated over the local fetches within Stornoway Harbour itself. The waves which enter Stornoway Harbour past Arnish Point are generated during storms from the 90° to 195° directions over the fetches across the Minch while the locally generated storm waves which may reach the Deep Water Port Stage 1 site occur during storms from the sector 315° to 090°.

6.2 WIND DATA

Wind data prepared by the Met Office for BS EN 1991-1-4:2005+A1:2010 for extreme wind speeds throughout the British Isles has been compared with the results from wind recording stations on the West Coast of Scotland. The results of the analysis showed that the data produced for BS EN 1991-1-4:2005+A1:2010 gave similar results for overland storm wind speeds to the data from analysis of the wind recording stations. Therefore the wind data from the Met Office given in BS EN 1991-1-4:2005+A1:2010 was used for the storm wave generation over the fetches across the Minch in this study with the wind speeds adjusted for overwater values and for the length of time required to fully develop the waves over the fetches across the Minch. The values used in the storm simulations for the fetches across the Minch are given in Table 6.1.

Table 6.1: Wind speeds for storm simulations over the fetches across the Minch

Storm direction [deg N]	1 in 1 yr return period [m/s]	1 in 50 yr return period [m/s]	1 in 100 yr return period [m/s]	1 in 200 yr return period [m/s]
90	18.96	26.95	28.33	29.99
105	19.05	27.08	28.47	30.14
120	19.03	27.04	28.43	30.10
135	20.17	28.66	30.13	31.90
150	20.89	29.68	31.21	33.04
165	21.53	30.61	32.18	34.07
180	22.29	31.67	33.30	35.25
195	23.64	33.60	35.32	37.39

The waves generated over the very short fetches within Stornoway Harbour were modelled using the parametric formulation within the Mike21 SW model as this option uses empirical wind wave growth curves based on overwater wind speeds. This formulation is the most suitable for very short fetches and the overwater wind speeds were derived from gust wind speeds amended for the length of time required to develop the waves over the short fetches. The wind speeds used in the storm simulations for the fetches across Stornoway Harbour are given in Table 6.2.

Table 6.2: Wind speeds for storm simulations over the fetches across Stornoway Harbour

Storm direction [deg N]	1 in 1 yr return period [m/s]	1 in 50 yr return period [m/s]	1 in 100 yr return period [m/s]	1 in 200 yr return period [m/s]
315	26.56	37.58	39.49	41.78
330	24.64	34.84	36.60	38.72
345	23.92	33.81	35.52	37.57
360	23.53	33.27	34.96	36.98
15	22.66	32.03	33.66	35.60
30	21.76	30.76	32.32	34.19
45	21.63	30.56	32.11	33.96
60	21.68	30.64	32.18	34.04
75	21.63	30.56	32.11	33.96
90	21.65	30.59	32.13	33.99

The 1 in 50 year storm 3 second gust wind speed at the Deep Water Port Stage 1 development is predicted to be 54 m/s while the equivalent 30 second gust speed is 48 m/s.

6.3 WAVE CLIMATE APPROACHING STORNOWAY HARBOUR

The wave climate approaching Stornoway Harbour was simulated using the Mike21 Spectral Wave model of the North Minch as shown in Figure 4.1. The simulations were run for storms from each 15^{o} direction from 090^{o} to 195^{o} for return periods of 1 in 1, 1 in 50, 1 in 100 and 1 in 200 years at high tide water levels plus an allowance for storm surge where appropriate. An example of the output from one of these simulations is shown in Figure 6.1 which shows the significant wave heights and mean wave direction for a 1 in 50 year return period storm from 165^{o} N.

The results of these simulations indicated that waves of up to 2.77 metres significant wave height with mean wave periods of 5.5 seconds would approach the entrance to Stornoway harbour during a 1 in 1 year return period storm. The equivalent figures for a 1 in 50 year and 1 in 200 year return period storm showed significant wave heights of up to 4.5 metres with

mean wave periods of 6.6 seconds and significant wave heights of up to 5.0 metres with mean wave periods of 6.9 seconds respectively.

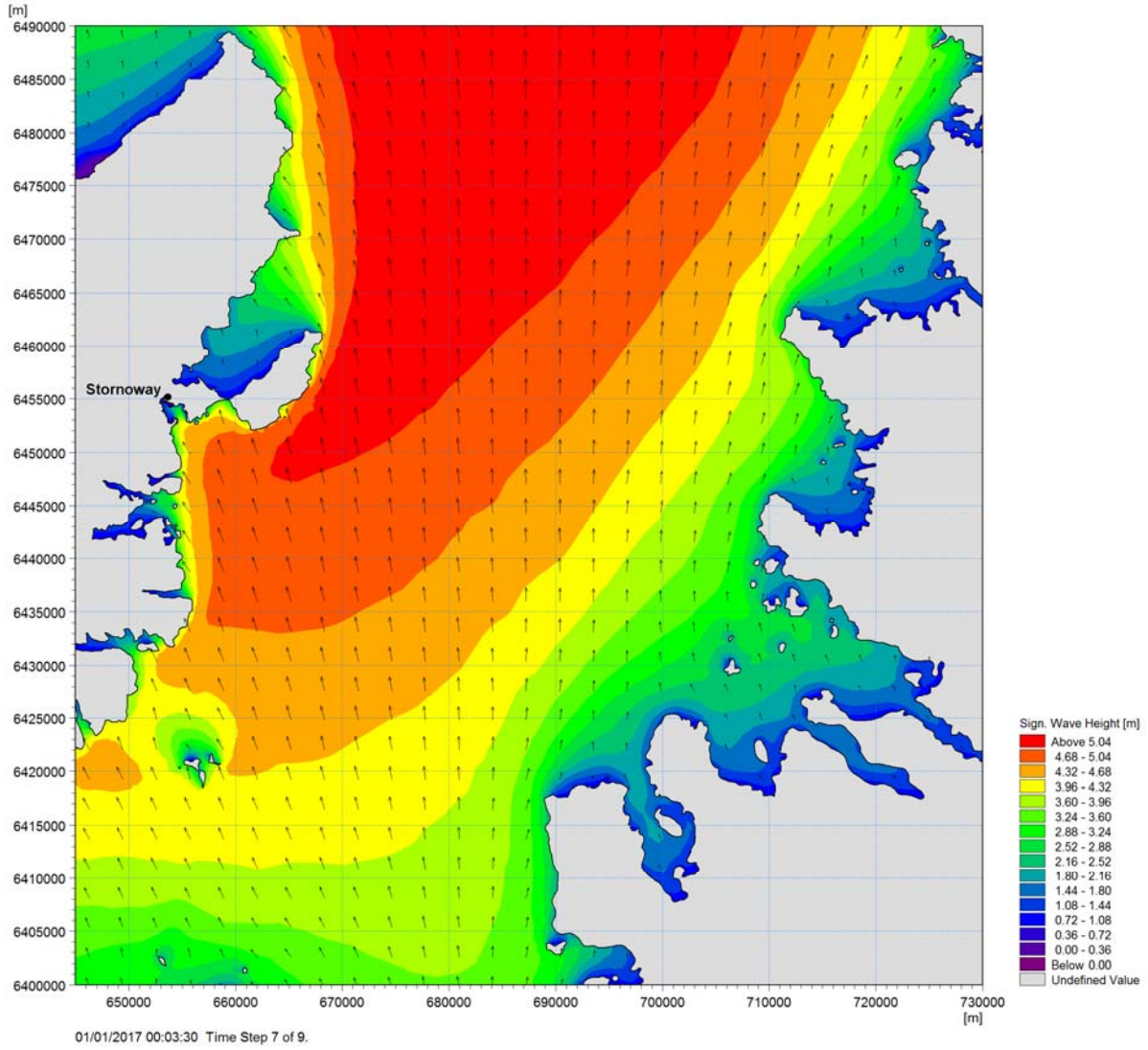


Figure 6.1: Significant wave height and mean wave direction in the North Minch - 1 in 50 year return period storm from 165°N

6.4 WAVE CLIMATE APPROACHING DEEP WATER PORT STAGE 1

The wave modelling showed that waves which may approach the site of the proposed Deep Water Port Stage 1 development consists of those waves which penetrate into the harbour past Arnish Point as well as waves generated within Stornoway Harbour itself.

During storms from 090° to 195° storm waves which enter Stornoway Harbour are refracted and diffracted around Arnish Point and approach DWP Stage 1 from the East. The largest waves which penetrate into Stornoway Harbour and approach the existing piers and berths at

Stornoway Harbour occur during storms from the 165º to 180º directions. Figure 6.2 shows the significant wave heights and mean wave directions of the waves in the existing Stornoway Harbour during a 1 in 50 year return period storm from 180º at high water spring tides. Figure 6.3 shows the same storm conditions for Stornoway Harbour with the Deep Water Port Stage 1 development in place but excluding the impact of wave reflections from the new quay.

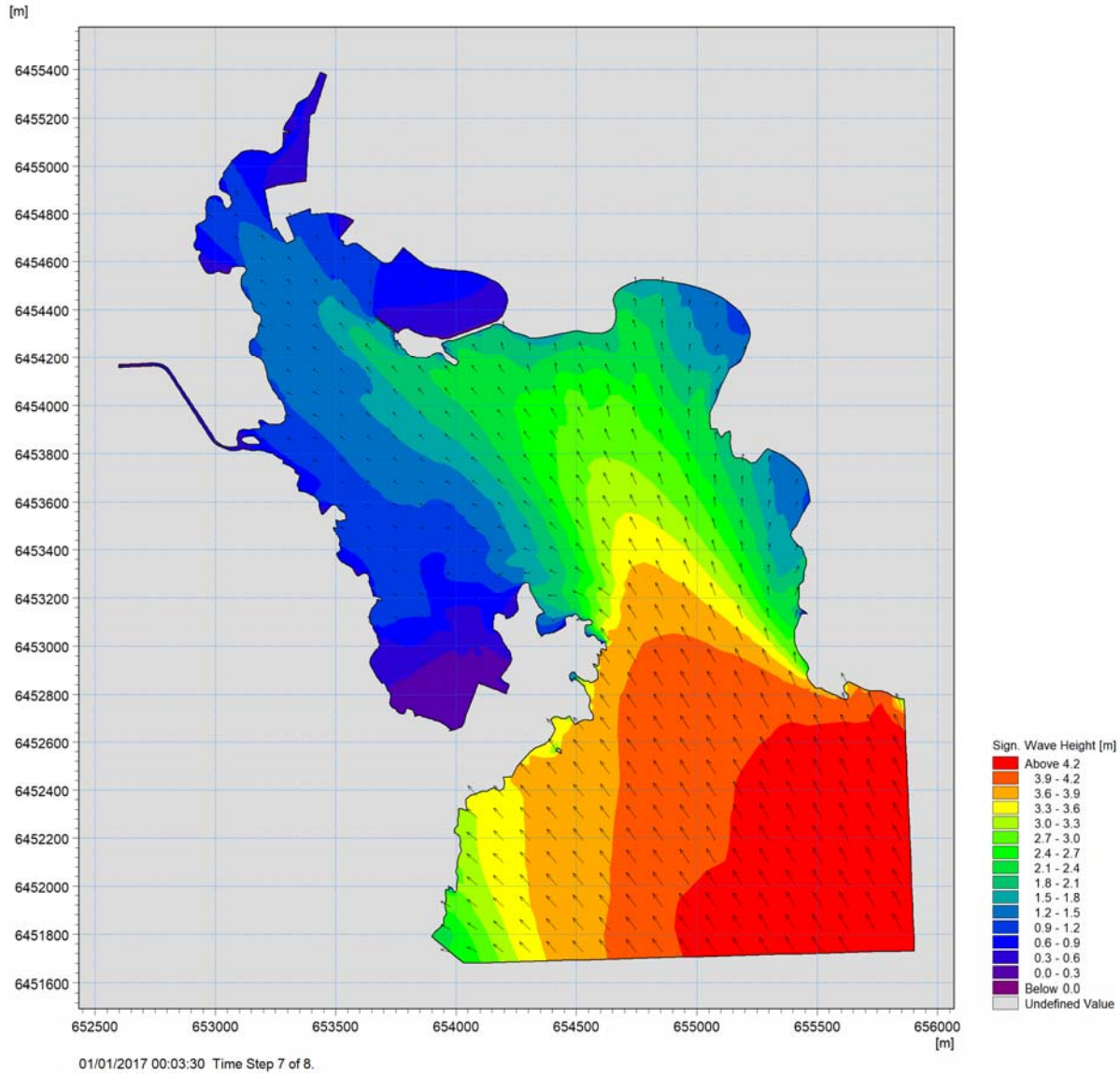


Figure 6.2: Significant wave height and mean wave direction in Stornoway Harbour - 1 in 50 year return period storm from 180ºN

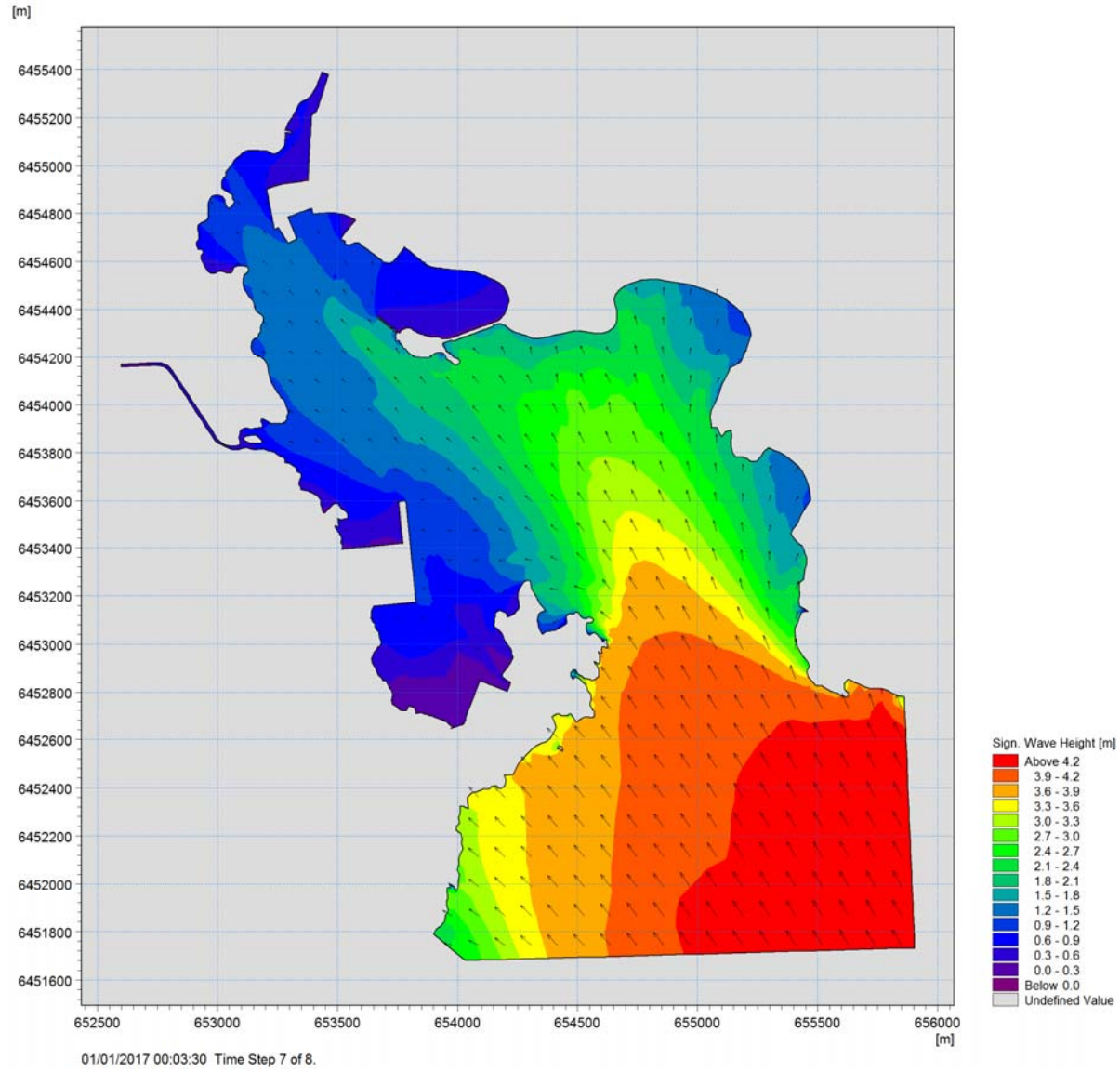


Figure 6.3: Significant wave height and mean wave direction in Stornoway with Deep Water Port Stage 1 development in place - 1 in 50 year return period storm from 180ºN

Figure 6.4 shows the same storm conditions for Stornoway Harbour with the Deep Water Port Stage 1 development in place and includes the effect on the wave energy of the energy reflection from the proposed Stage 1 quays.

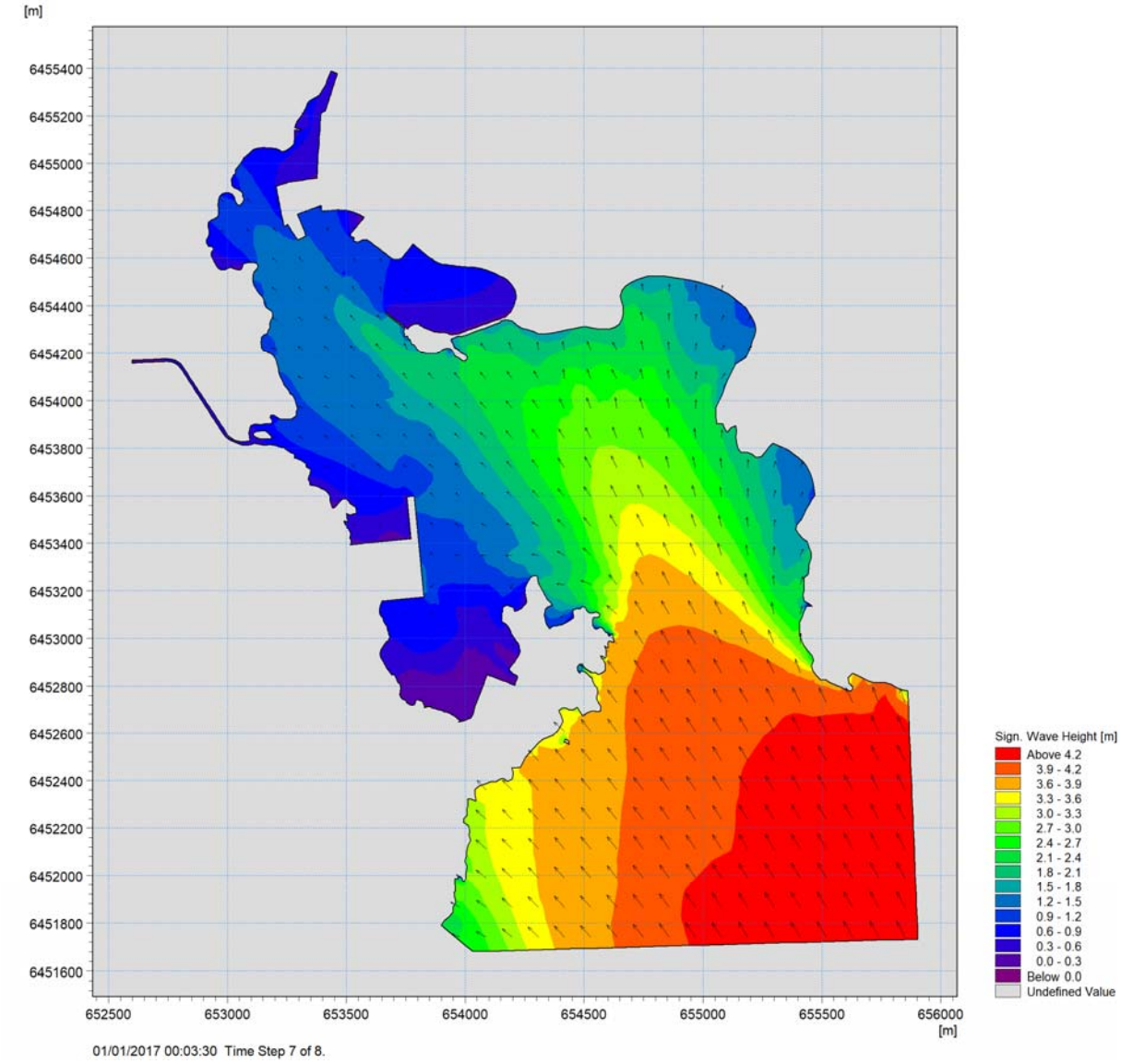


Figure 6.4: Significant wave height and mean wave direction in Stornoway with Deep Water Port Stage 1 including wave energy reflection from quay - 1 in 50 year return period storm from 180ºN

Although the Spectral Wave model can include the effects of wave reflections on the overall wave energy of the wave field it does not include wave to wave interference effects which affect the standing wave patterns that may develop around the approaches to the new berths. Thus the wave climate at the site of the Stage 1 development was also modelled using the Boussinesq harbour wave disturbance model Mike21 BW. The simulations were undertaken for 1 in 50 year return period storms from 180ºN for both the existing conditions and for the harbour with the DWP Stage 1 development in place.

Figures 6.5 and 6.6 shows the wave patterns around the site of the proposed DWP Stage 1 development for a 1 in 50 year storm from 180ºN and the significant wave heights are shown in Figures 6.7 and 6.8.

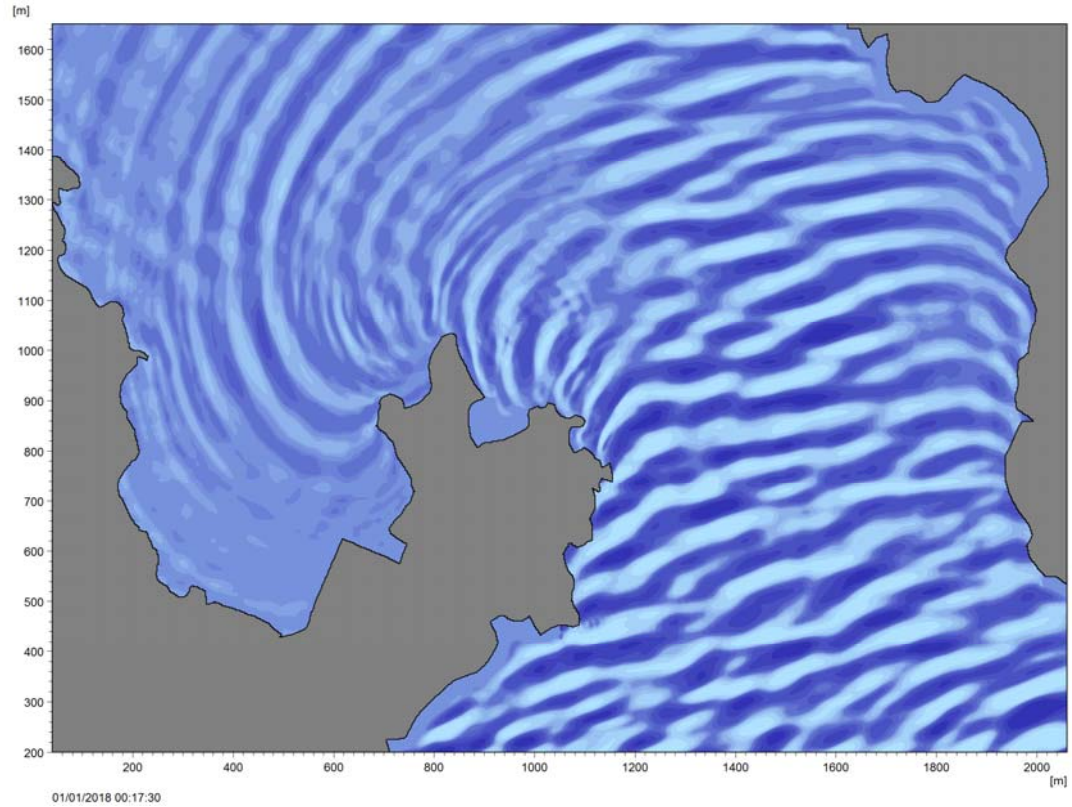


Figure 6.5: Storm wave disturbance patterns – Existing – 1 in 50 year return period storm from 180oN

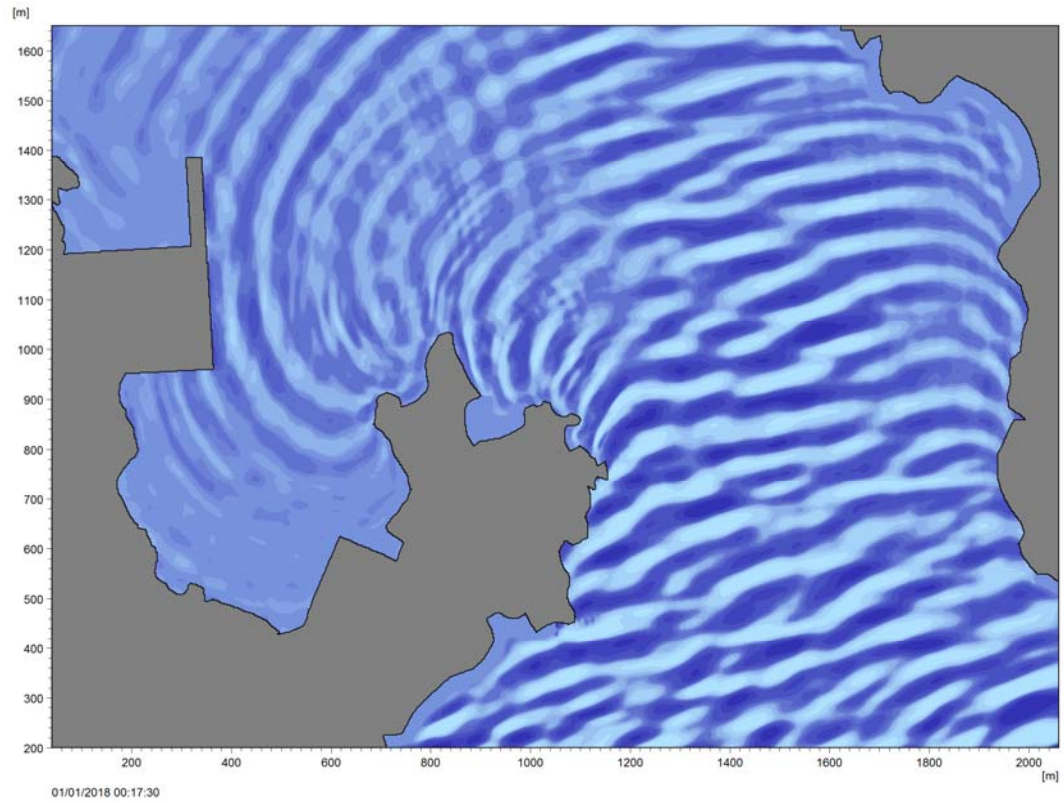


Figure 6.6: Storm wave disturbance patterns – DWP stg1 – 1 in 50 year return period storm from 180ºN

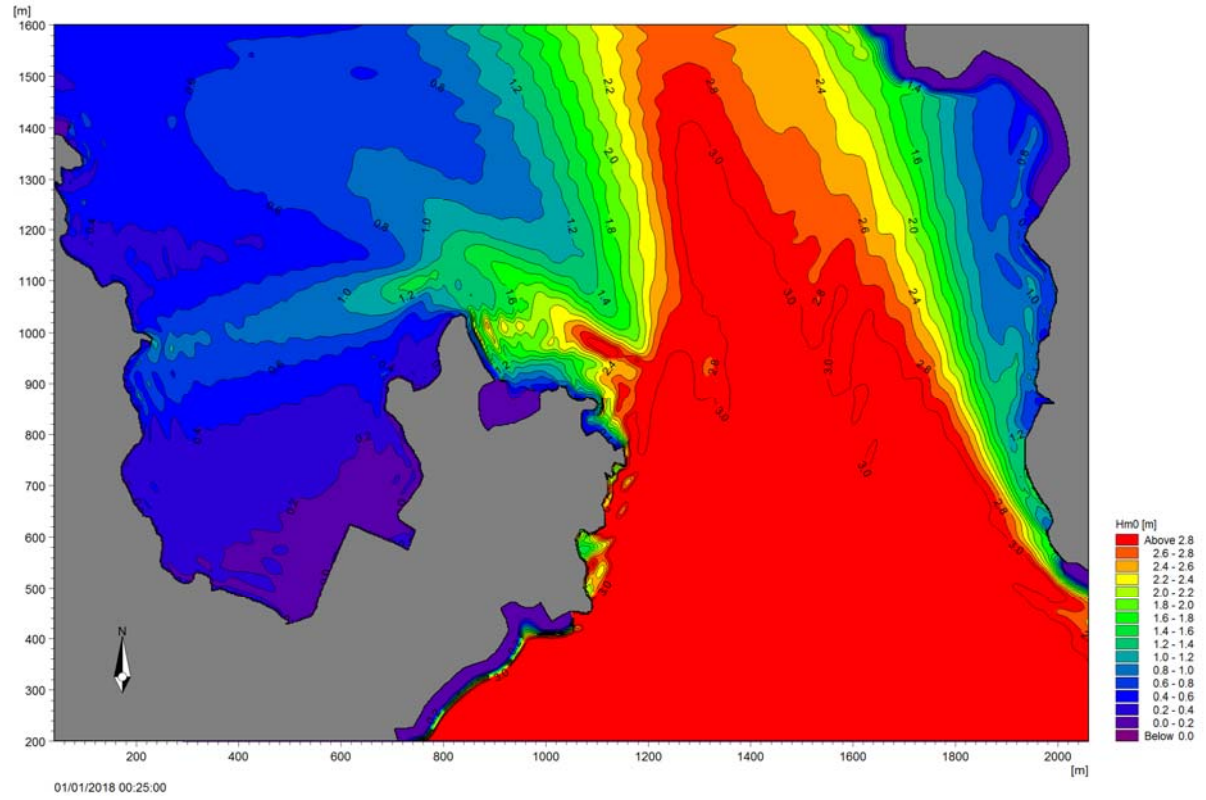


Figure 6.7: Significant wave heights – Existing – 1 in 50 year return period storm from 180°N

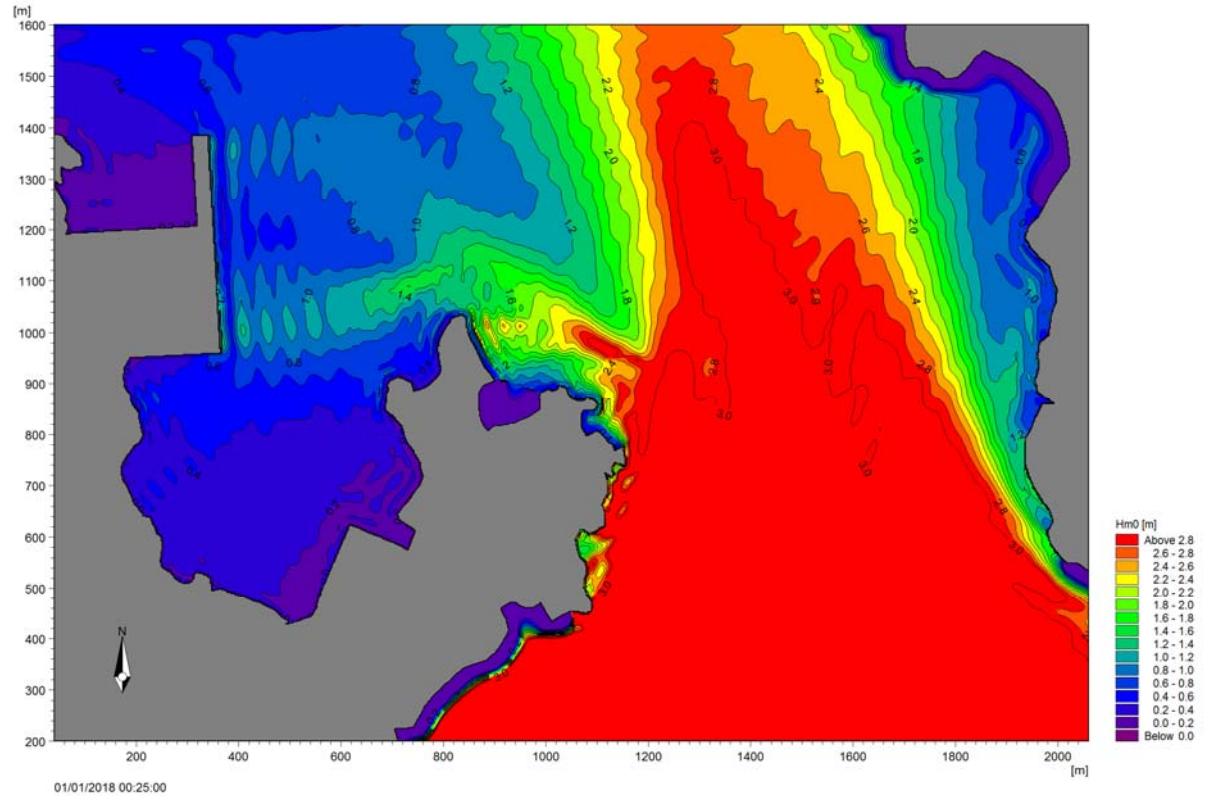


Figure 6.8: Significant wave heights – DWP stg1 – 1 in 50 year return period storm from 180°N

During northerly storms the waves are generated across the short fetch with Stornoway Harbour and the storm waves will be of short period. Figure 6.9 shows the significant wave heights and mean wave directions during a 1 in 50 year return period storm with the existing harbour layout. Figure 6.10 shows the same conditions for the 1 in 50 year return period storm from the north with the proposed Deep Water Port Stage 1 scheme in place.

A comparison of Figures 6.9 and 6.10 shows that the wave climate at the existing Arnish yard berth will be moderated by the proposed new Deep Water Port Stage 1.

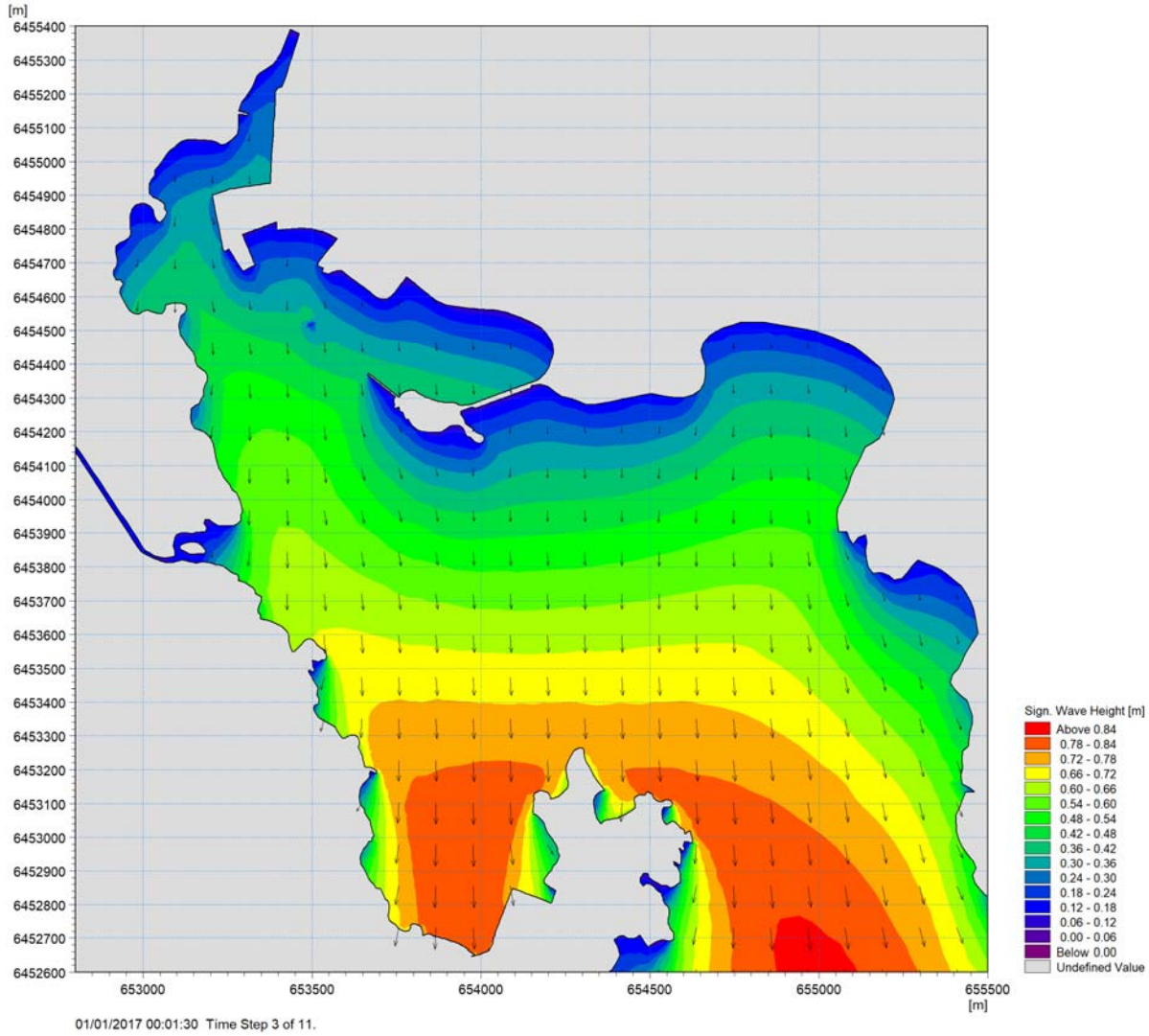


Figure 6.9: Significant wave height and mean wave direction in Stornoway Harbour – 1 in 50 year return period storm from 0ºN

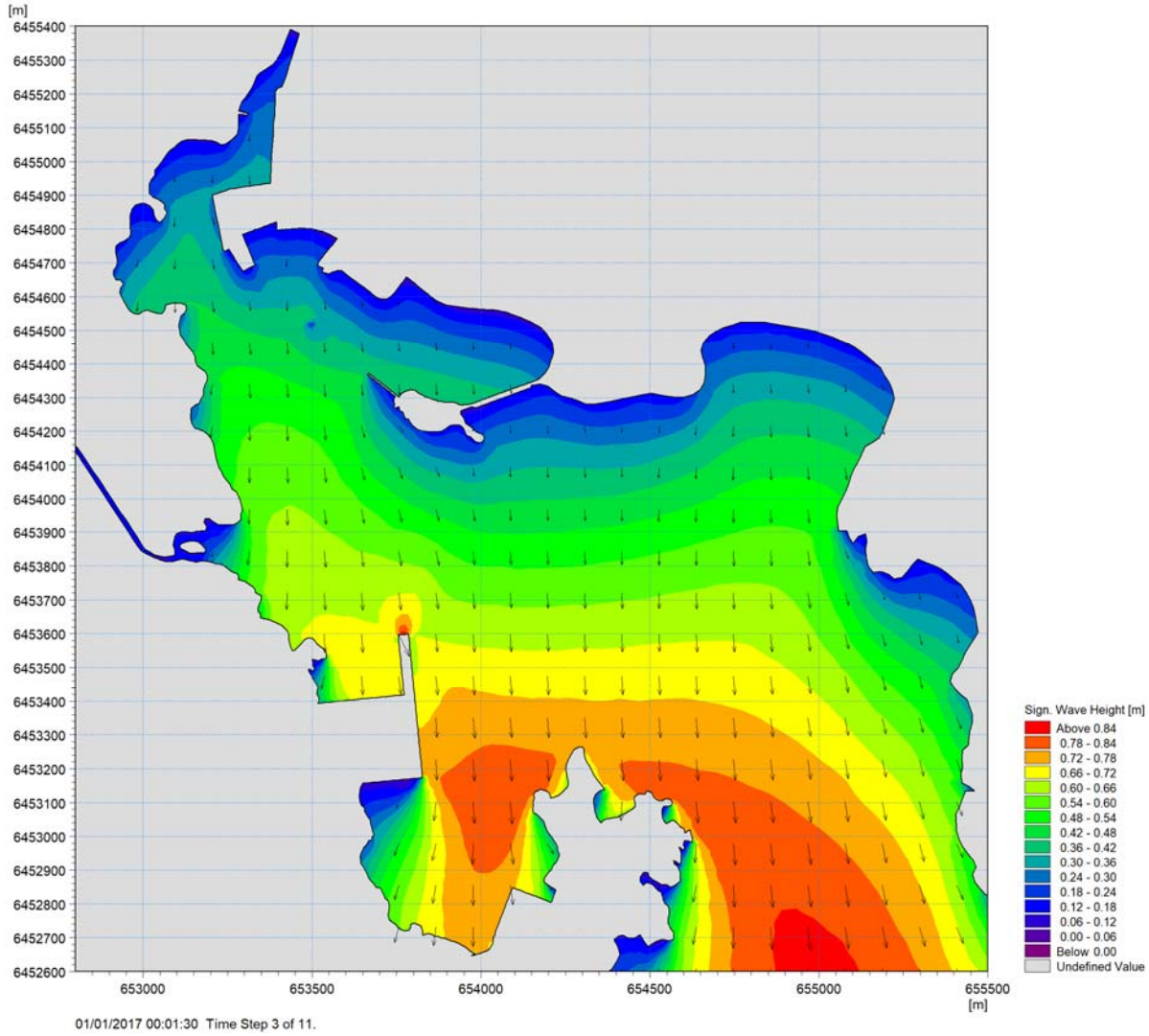


Figure 6.10: Significant wave height and mean wave direction in Stornoway Harbour with Deep Water Port Stage 1 development in place - 1 in 50 year return period storm from 0ºN

During storms from the North East, storm waves approaching the site of the proposed Deep Water Port Stage 1 development will also be generated within Stornoway Harbour and will be of short period. The waves approaching the proposed new quays will be partially reflected and as can be seen from Figures 6.11 and 6.12 will increase the wave energy in the wave climate on the eastern side of the proposed new development.

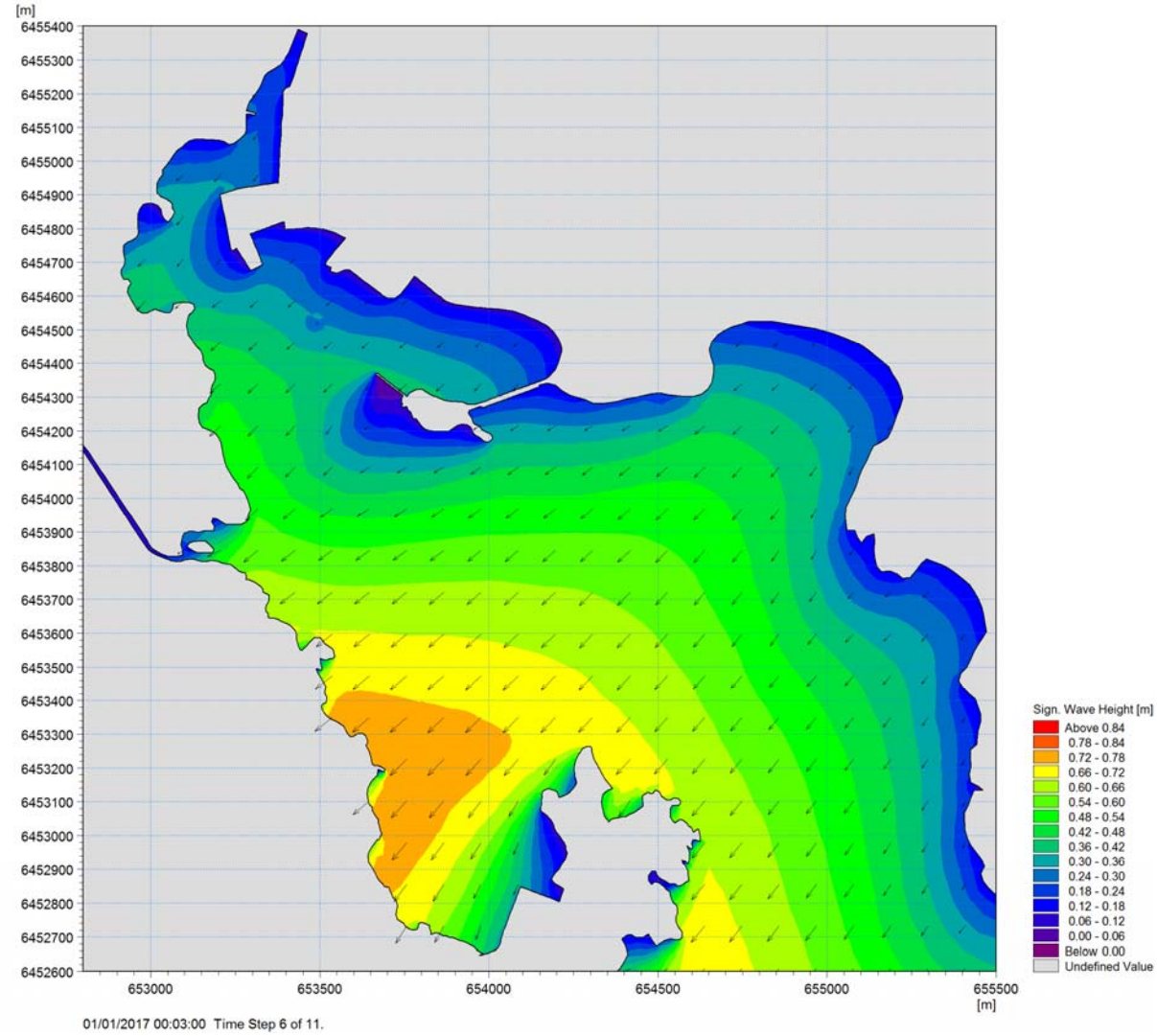


Figure 6.11: Significant wave height and mean wave direction in Stornoway for the existing harbour - 1 in 50 year return period storm from 045ºN

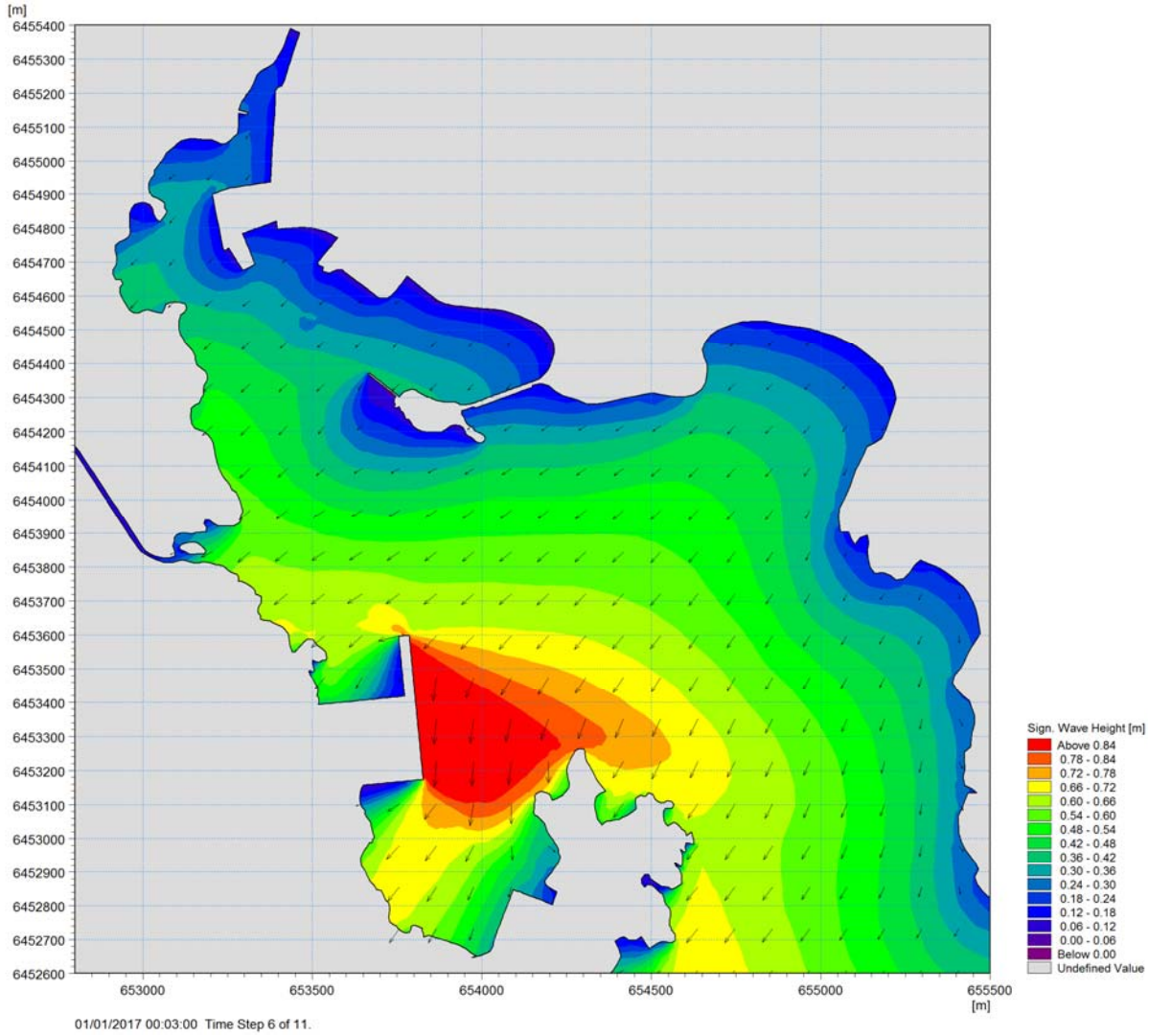


Figure 6.12: Significant wave height and mean wave direction in Stornoway for the proposed Deep Water Port Stage 1 development - 1 in 50 year return period storm from 045ºN

The increased wave heights to the east of the new quay will take the form of wave crest intersections. This wave pattern has been simulated using the Boussinesq wave model and the resulting storm wave patterns are shown in Figure 6.13. The reflected waves from the quay face can be seen in this diagram and show that these reflected waves propagate towards the western side of the Arnish peninsula but do not affect the existing berth in this area. The waves at the proposed new quay during north easterly storms will take the form of small short steep waves which are unlikely to be a significant problem for ships berthed at the new quay.

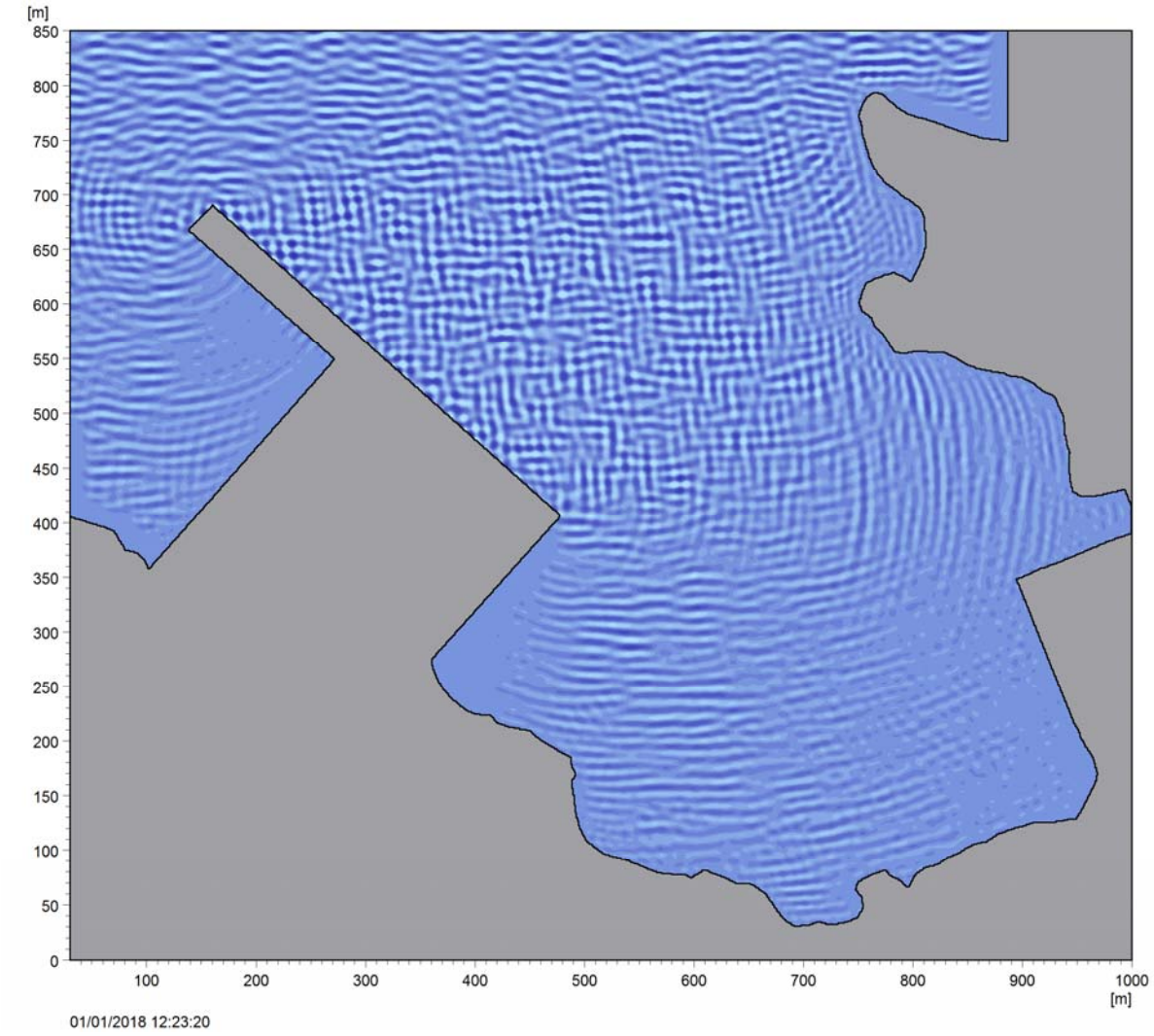


Figure 6.13: Storm wave disturbance patterns – DWP stg1 – 1 in 50 year return period storm from 045ºN

6.5 IMPACT OF THE PROPOSED SCHEME ON THE WAVE CLIMATE

Computational modelling of the wave climate approaching and within Stornoway Harbour has shown that for the longer period waves penetrating into the harbour from the Minch (6 to 8 second wave period), the waves approach the proposed Deep Water Port Stage 1 development from the east. Thus the proposed development does not affect the wave climate at the existing piers and berths for storms in the Minch from East to South South West sector.

A comparison of Figures 6.2, 6.3 and 6.4 shows that the wave climate at the existing piers and berths during storms from the South East to South directions is not significantly changed by the construction of the Deep Water Port Stage 1 scheme with only a slight increase in wave heights to the east of the proposed Stage 1 development.

For storms from the North to North East sector the waves are generated within Stornoway Harbour and have a relatively short wave period (1.8 to 2.2 seconds). The wave modelling has shown that the proposed development does not affect the wave climate at the existing piers and berths as they are upwind of the development. The proposed Deep Water Port Stage 1 development will slightly reduce the wave activity at the existing Arnish berths during storms from the North but the reduction will be relatively small.

The proposed Deep Water Port Stage 1 site is most exposed to waves from the local fetches from the North East and to waves which are diffracted around Arnish Point during storms in the Minch from the South East to South South West directions. During these storm events there will be wave reflections coming off the proposed Deep Water Port quay. These reflected waves will propagate in an easterly to south easterly direction and will not significantly affect any other parts of Stornoway Harbour away from the area immediately to the East of the proposed development.

Overall the modelling and analysis shows that the proposed Deep Water Port Stage 1 development will not significantly affect the wave climate in other areas of Stornoway Harbour.

6.6 STORM WAVE CLIMATE FOR ENGINEERING DESIGN

The incoming storm wave climate has been extracted from the various model simulations to provide design information for the north and south revetments and the finger and main quay structures. The most arduous wave climate at each of the structures for each of 1 in 1, 1 in 50, 1 in 100 and 1 in 200 return period events are provided below.

The north facing revetment is only exposed to waves generated over the local fetches within Stornoway Harbour. The other structures are exposed to both waves generated within Stornoway harbour and waves which penetrate into the harbour from the Minch. The waves which run into the Stornoway Harbour from the Minch are generally of longer wave period than those generated within Stornoway Harbour itself but both sea states can occur at the structures at the same time. Thus, where relevant, both sea states are given in the following tables with "+" denoting combined seastates.

Table 6.3: Northern Revetment – Incoming Storm Wave Climate

Storm Return Period	Sign. Ht Hm0 [m]	Max. Ht Hmax [m]	Peak Period Tp [s]	Mean Period Tm [s]	Wve. Direct. MWD [deg N]
1 in 1	0.454	0.812	1.93	1.60	335
1 in 50	0.696	1.072	2.21	1.83	335
1 in 100	0.742	1.116	2.25	1.87	335
1 in 200	0.795	1.168	2.30	1.91	335

Table 6.4: Southern Revetment Roundhead – Incoming Storm Wave Climate

Storm Return Period	Sign. Ht Hm0 [m]	Max. Ht Hmax [m]	Peak Period Tp [s]	Mean Period Tm [s]	Wve. Direct. MWD [deg N]
1 in 1	0.339	0.483	1.48	1.23	164
+	0.398	0.709	6.97	5.78	60
1 in 50	0.532	0.649	1.72	1.42	160
+	0.604	1.131	8.11	6.73	72
1 in 100	0.567	0.684	1.75	1.46	160
+	0.652	1.215	8.11	6.74	72
1 in 200	0.607	0.708	1.79	1.49	160
+	0.678	1.245	8.46	7.03	72

Table 6.5: Southern Revetment Trunk – Incoming Storm Wave Climate

Storm Return Period	Sign. Ht Hm0 [m]	Max. Ht Hmax [m]	Peak Period Tp [s]	Mean Period Tm [s]	Wve. Direct. MWD [deg N]
1 in 1	0.328	0.481	1.48	1.22	167
+	0.174	0.500	6.93	5.75	114
1 in 50	0.507	0.647	1.73	1.44	162
+	0.500	0.928	8.09	6.71	108
1 in 100	0.532	0.661	1.77	1.47	162
+	0.577	0.940	8.09	6.71	123
1 in 200	0.576	0.696	1.82	1.49	163
+	0.616	1.086	8.44	7.00	125

Table 6.6: Finger Quay – Incoming Storm Wave Climate

Storm Return Period	Sign. Ht Hm0 [m]	Max. Ht Hmax [m]	Peak Period Tp [s]	Mean Period Tm [s]	Wve. Direct. MWD [deg N]
1 in 1	0.506	0.951	2.08	1.73	90
+	0.655	1.344	5.77	2.47	100
1 in 50	0.774	1.264	2.40	1.99	91
+	1.115	2.256	7.16	2.85	98
1 in 100	0.823	1.317	2.45	2.03	91
+	1.203	2.435	7.24	2.92	98
1 in 200	0.882	1.380	2.50	2.08	91
+	1.639	3.308	7.36	3.15	112

Table 6.7: Main Quay – Incoming Storm Wave Climate

Storm Return Period	Sign. Ht Hm0 [m]	Max. Ht Hmax [m]	Peak Period Tp [s]	Mean Period Tm [s]	Wve. Direct. MWD [deg N]
1 in 1	0.481	0.917	2.04	1.69	86
+	0.609	1.252	5.78	2.32	88
1 in 50	0.734	1.216	2.35	1.95	86
+	1.063	2.163	7.17	2.77	88
1 in 100	0.780	1.267	2.40	1.99	86
+	1.150	2.336	7.24	2.83	88
1 in 200	0.837	1.327	2.45	2.04	86
+	1.573	3.174	7.36	3.10	93

7 IMPACT OF CAPITAL DREDGING ON WATER QUALITY

7.1 BACKGROUND

7.1.1 Description of Capital Dredging Requirements

In order to facilitate the development of the proposed Deep Water Port Stage 1 at Stornoway, dredging and reclamation activities have been planned to increase the depth of the seabed along the proposed deep water berth to -10m CD with the remainder of the dredged area deepened to -9.50m CD as illustrated in Wallace Stone LLP drawing 1980-901 shown in Figure 7.1**.**

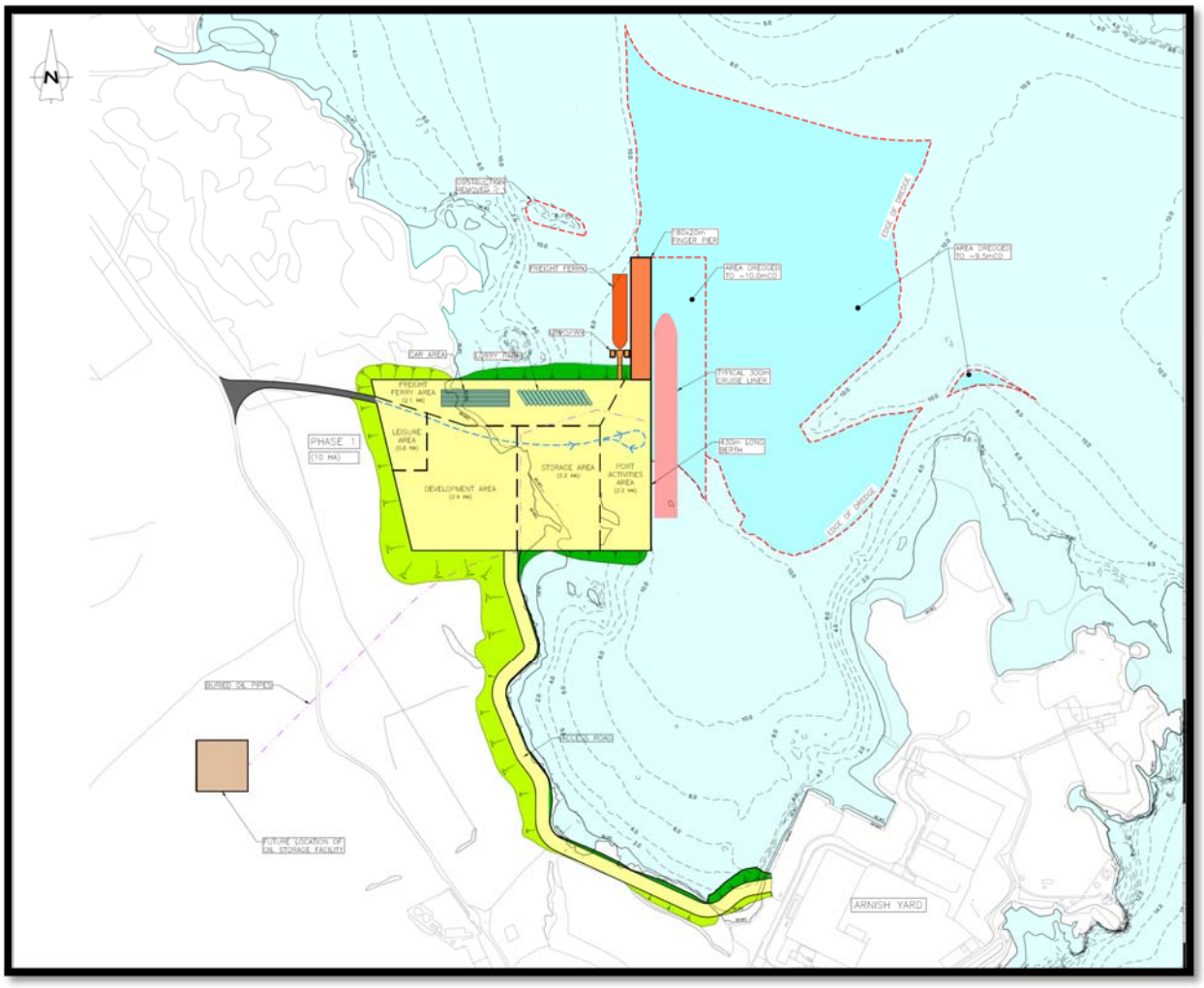


Figure 7.1: The extent of the capital dredging works required as part of the proposed Deep Water Port Stage1 development.

Comparison of the existing and the proposed dredged seabed levels indicates that some 300,000m^3 of material will have to be removed to achieve the required water depths around the proposed harbour. Allowing 0.2m of over dredge, the total quantity of sea bed material to be dredged would be 360,000m^3 and this is the volume of sediment that has been used in the model simulations. Assuming a 60 day dredging period, a flow rate of some 24,000 m^3 per day is required to pump the dredged material to the reclamation area.

7.1.2 Characterisation of seabed

Particle Size Analyses (PSA) of the sediment samples collected during the geotechnical survey indicated that the material in the dredge area is dominated by gravel and sands with a small percentage of silts.

To accurately reflect the nature of the proposed dredge material RPS has examined the sediment characteristics from 15 sediment samples collected for submission to Marine Scotland. A summary description of the PSA is presented in Table 7.2 overleaf with the location of these sediment samples is given in Table 7.3. It will be seen from this table that the material to be dredged is reasonably uniform throughout the area typically consisting of about 69% gravels, 26% sands and about 5% silt as shown in Table 7.1

Table 7.1: Average PSA of Seabed sediments samples

Average PSA values	mm	%
very coarse gravel	>32<64	4.18
coarse gravel	>16<32	34.93
medium gravel	>8<16	16.50
fine gravel	>4<8	9.09
very fine gravel	>2<4	7.49
very coarse sand	>1<2	9.94
coarse sand	>0.5<1	5.60
medium sand	>0.25<0.5	3.67
fine sand	>0.125<0.25	3.26
very fine sand	>0.0625<0.125	1.56
very coarse silt	>0.03125<0.0625	0.95
coarse silt	>0.015625<0.03125	1.04
medium silt	>0.007813<0.015625	1.19
fine silt	>0.003906<0.007813	0.92
very fine silt	>001953<0.003906	0.46
clay	<0.001953	0.55

Table 7.2: PSA of Seabed sediments around the dredged area

Borehole No.		4	5	7	8	9	11	12	13	22	24	25	26	28	29	30
Gravel %		40.0	80.5	86.0	97.0	66.0	94.0	36.0	58.0	83.0	64.0	96.0	74.0	76.0	80.0	34.0
Sand %		47.0	19.3	12.0	3.0	34.0	5.9	46.0	38.0	13.0	25.0	4.0	18.0	24.0	16.0	54.0
Silt %		13.0	0.2	2.0	0.0	0.0	0.1	18.0	4.0	4.0	11.0	0.0	8.0	0.0	4.0	12.0
	mm															
very coarse gravel	>32<64	1.28	0.00	19.40	19.90	13.30	0.00	0.00	0.00	8.75	0.00	0.00	0.00	0.00	0.00	0.00
coarse gravel	>16<32	12.70	28.40	53.20	75.50	42.73	65.00	24.90	12.90	36.10	0.00	77.20	37.40	33.10	24.40	0.48
medium gravel	>8<16	9.72	16.20	11.00	1.15	16.90	21.10	2.98	11.17	27.40	22.10	17.40	18.90	19.30	45.60	6.65
fine gravel	>4<8	6.95	21.40	1.38	0.00	6.83	5.35	4.51	15.35	6.11	27.30	0.10	11.50	11.50	6.31	11.80
very fine gravel	>2<4	9.30	14.50	1.24	0.16	6.03	2.48	3.47	18.65	4.78	14.10	0.95	5.54	12.00	4.11	15.00
very coarse sand	>1<2	15.50	12.50	3.44	1.85	12.38	3.51	8.55	22.50	6.84	12.60	2.51	6.93	13.60	7.87	18.50
coarse sand	>0.5<1	14.10	3.82	4.77	0.89	13.07	1.75	5.70	8.20	2.67	1.85	0.85	3.88	7.43	3.56	11.40
medium sand	>0.25<0.5	8.33	1.09	2.60	0.33	7.39	0.41	8.00	3.87	1.39	3.19	0.48	2.62	1.66	1.85	11.80
fine sand	>0.125<0.25	5.73	1.23	0.82	0.12	0.95	0.17	17.30	2.47	1.51	4.84	0.39	2.71	1.00	1.40	8.32
very fine sand	>0.0625<0.125	3.18	0.62	0.44	0.10	0.30	0.13	6.25	1.26	1.14	2.70	0.13	2.13	0.42	0.99	3.61
very coarse silt	>0.03125<0.0625	2.04	0.19	0.32	0.03	0.07	0.07	3.64	0.94	0.74	1.70	0.02	1.77	0.09	0.59	2.09
coarse silt	>0.015625<0.03125	2.72	0.00	0.39	0.00	0.00	0.00	3.78	0.86	0.71	1.95	0.00	1.88	0.00	0.74	2.50
medium silt	>0.007813<0.015625	3.35	0.00	0.44	0.00	0.00	0.00	4.09	0.83	0.78	2.38	0.00	1.99	0.00	0.97	3.06
fine silt	>0.003906<0.007813	2.48	0.00	0.30	0.00	0.00	0.00	3.19	0.55	0.56	2.16	0.00	1.44	0.00	0.77	2.32
very fine silt	>001953<0.003906	1.17	0.00	0.13	0.00	0.00	0.00	1.65	0.24	0.27	1.29	0.00	0.66	0.00	0.37	1.12
clay	<0.001953	1.28	0.00	0.15	0.00	0.00	0.00	1.92	0.27	0.28	1.90	0.00	0.68	0.00	0.43	1.30

Table 7.3: Location of the sediment sampling campaign undertaken by Causeway Geotech

LOCATION	TYPE	EASTING	NORTHING	APPROX G.L	REV
1	BH	142500.000	931476.397	−8.0mCD	
2	BH	142453.319	931347.280	−7.0mCD	
3	BH	142500.000	931396.397	−7.0mCD	
4	BS	142616.327	931490.164	−7.5mCD	
5	BS	142811.135	931475.297	−9.0mCD	
6	BH	142417.240	931253.219	−9.0mCD	
7	BS	142520.000	931317.674	−7.0mCD	
8	BS	142622.095	931323.282	−7.0mCD	
9	BS	142781.265	931363.263	−8.0mCD	
10	BH	142398.866	931173.530	−6.5mCD	
11	BS	142520.000	931200.786	−10.0mCD	
12	BS	142655.014	931122.973	−9.5mCD	
13	BS	142783.290	931156.406	−7.5mCD	
14	BH	142465.000	931083.897	−2.0mCD	
15	BH	142520.000	931083.897	−11.5mCD	
16	BH	142509.000	930950.615	−11.0mCD	
17	BH	142437.335	930892.090	−8.0mCD	
18	BH	142509.000	930830.790	−9.5mCD	
19	BH	142418.298	930776.403	−6.0mCD	
20	BH	142509.000	930703.581	−7.0mCD	
21	BH	142619.310	930628.782	−6.0mCD	
22	LS	142523.564	931571.476	−8.5mCD	
23	BH	142640.468	931600.176	−8.5mCD	
24	LS	142783.475	931592.807	−9.0mCD	
25	LS	142916.976	931464.141	−10.0mCD	
26	BS	142728.480	931243.685	−9.5mCD	
27	BH	142704.535	931446.818	−8.5mCD	
28	BS	142874.753	931627.105	−9.5mCD	
29	BS	142523.242	931722.861	−9.0mCD	
30	BS	142990.479	931314.388	−9.0mCD	
31	BH	142385.847	930825.899	−5.5mCD	*
32	BH	142450.097	930828.517	−8.0mCD	*

* REVISIONS FROM DWG 1980/101/C

7.2 MODELLING OF DREDGED PLUMES

7.2.1 Modelled dredging techniques

A common method of assessing the potential environmental impact of dredging plumes involves the use of coupled hydrodynamic and sediment transport modelling techniques. An important step in this approach is stipulating appropriate source terms to define the input of dredge material into the model. One of the primary factors in determining the dredging source term is based on the total amount of available fines within the dredge material.

Other studies (Becker *et al*. 2015; Koningsveld 2015) that investigated the large scale spatial and temporal fate of dredge plumes have only accounted for the fraction of fine material (<63µm) as coarser particles are known to settle to the seabed within the near zone (Land *et al*. 2004).

However as this study is interested in assessing the fate of dredge plumes in relation to the adjacent environment within Stornoway Harbour, RPS has also accounted for material as large as very coarse sand (2mm) in the sediment transport simulations detailed in the following Sections. Preliminary investigations found that material coarser than 2mm (Gravels) quickly fell back the seabed and did not re-enter suspension. The dispersion of the silt and sand fractions lost to the water column from the dredging operations were represented in the numerical simulations based on the physical characteristics of the five sediment classes from the PSA results. A summary of these physical characteristics are presented in Table 7.4 overleaf.

Table 7.4: Modelled sediment characteristics.

Average PSA values	%	Classes	%
	4.18		
	34.93		
Gravels	16.50	not included	71
	9.09		
	7.49		
	9.94		
Coarse Sand	5.60	1 mm	15.4
	3.67		
Fine Sands	3.26	0.25 mm	6.93
	1.56		
Sandy Silt	0.95	0.0625 mm	2.51
	1.04		
Medium Silt	1.19	0.015625 mm	2.23
	0.92		
Very Fine Silt	0.46	0.003 mm	1.93
	0.55		

7.2.2 Dredging equipment

It is assumed that a Cutter Suction Dredger (CSD) will be used to remove material from the dredge areas. The CSD will dislodge material using a rotating cutter head and then pump the mixture of dredge material and water to the quay area by means of a discharge pipeline. The overflow from the stilling ponds will be discharged into the nearshore area at the south east corner of the new quay. The CSD is expected to operate at full capacity on a 24/7 basis in the dredge areas. Based on this information it expected to take 60 days to dredge all the area.

7.2.3 Source term analysis

The material introduced into the marine environment as a result of CSD dredging operations can be represented by two source terms: The loss of material from the cutter head near the sea bed and the overspill of material from the stilling pond into sea surface at the south eastern corner of the reclamation.

The losses at the CSD cutter head were taken as 5% of the sand and silt material in dredged areas whilst the overspill from the placement area was taken as 6% of the silt material. Details of these source terms are shown in Table 7.5 and Table 7.6.

Table 7.5: Composition of the 5% losses from the cutter head dredging source term

Source Term	Fraction	Grain size (mm)	Source Distribution (%)	Mass (kg/s)	5% of mass (kg/s)
Cutter Head	1	1	53	17.111	0.8556
	2	0.25	24	7.700	0.3850
	3	0.063	9	2.789	0.1394
	4	0.01563	8	2.478	0.1239
	5	0.003	7	2.144	0.1072

Table 7.6: Composition of the 6% losses from the overspill source term

Source Term	Fraction	Grain size (mm)	Source Distribution (%)	Mass (kg/s)
Overspill	3	0.063	17	0.0279
	4	0.01563	33	0.0496
	5	0.003	50	0.0643

* Values based on a overspill flow rate of 0.2778 cumecs (i.e 24,000 m3 per day)

7.2.4 Numerical representation

Using the source terms summarised in Table 7.4 to represent the input of sand and silt material into the marine environment, the sediment plume simulations were run over the course of a 60 day period which included a full range of spring and neap tidal conditions. This 60 day period relative to the tidal cycle is shown in red in Figure 7.2. The coupled tidal and sediment transport model simulations were continued for a week after the completion of the dredging operations to allow for the transport and deposition of any material in suspension at the end of the dredging period.

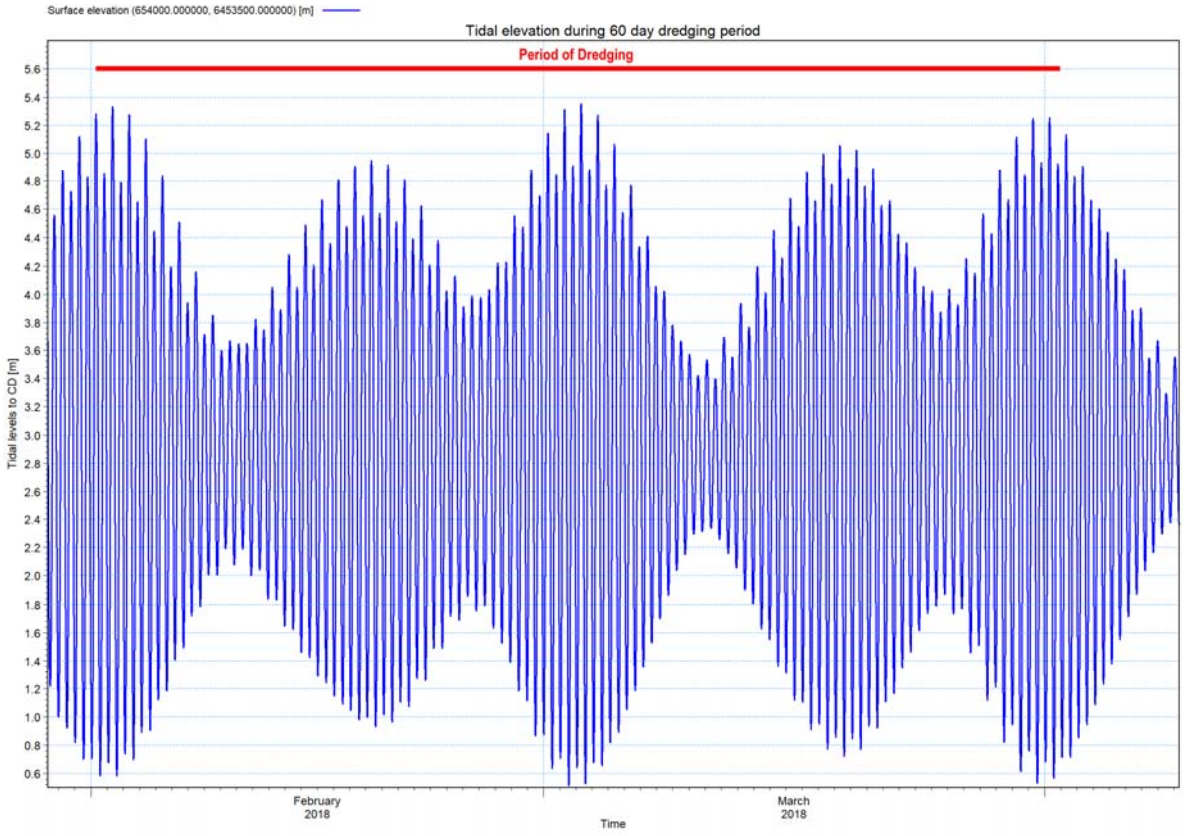


Figure 7.2: The simulated 60 day CSD dredger programme in relation to the tidal cycle at Stornoway.

Given that the capital dredging programme will be undertaken after the installation of the piling for the new deep water quays, the coupled hydrodynamic and sediment transport simulations were run using the existing Stornoway Harbour model domain with the quay walls and rock bunds in place. The tidal model set up and boundary conditions have been described in more detail in Section 5.

The track for the dredger over the 60 day period is illustrated by the red lines in Figure 7.3. In the simulations the dredging commences with the area to the north of the new quays, followed by the area to the east of the quay and then moves to the south eastern section of the dredged area. The speed at which the dredger moves along the track is dependant of the amount of material that has to be removed at any point with the speed adjusted to maintain the designed dredging rate of 6,000 m^3 per day.

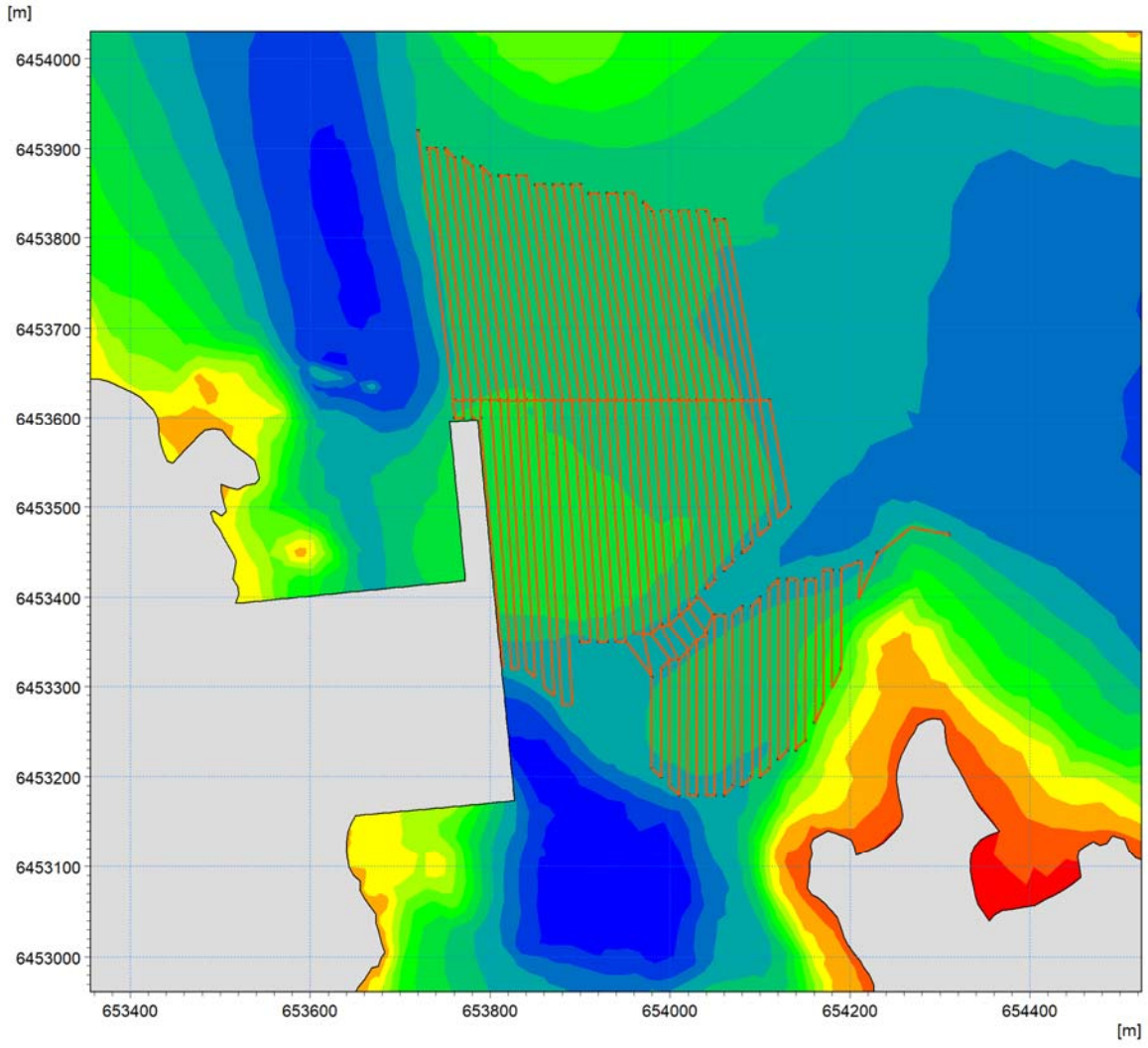


Figure 7.3: Assumed track of Cutter Suction Dredger during the 60 day dredging period

7.3 RESULTS OF DREDGING SIMULATIONS

A sediment plume is created during the course of the dredging operations due to sediment entering the water column from losses around the cutter head and the overspill of the water used to pump the dredged sediment ashore to the quay area. The sediment plume will move about in response to the tidal currents and the location of the dredger. Figure 7.4 shows a typical suspended sediment concentration (SSC) plume at a point in time when the dredger is working near the quay and the tidal currents in the area are running north.

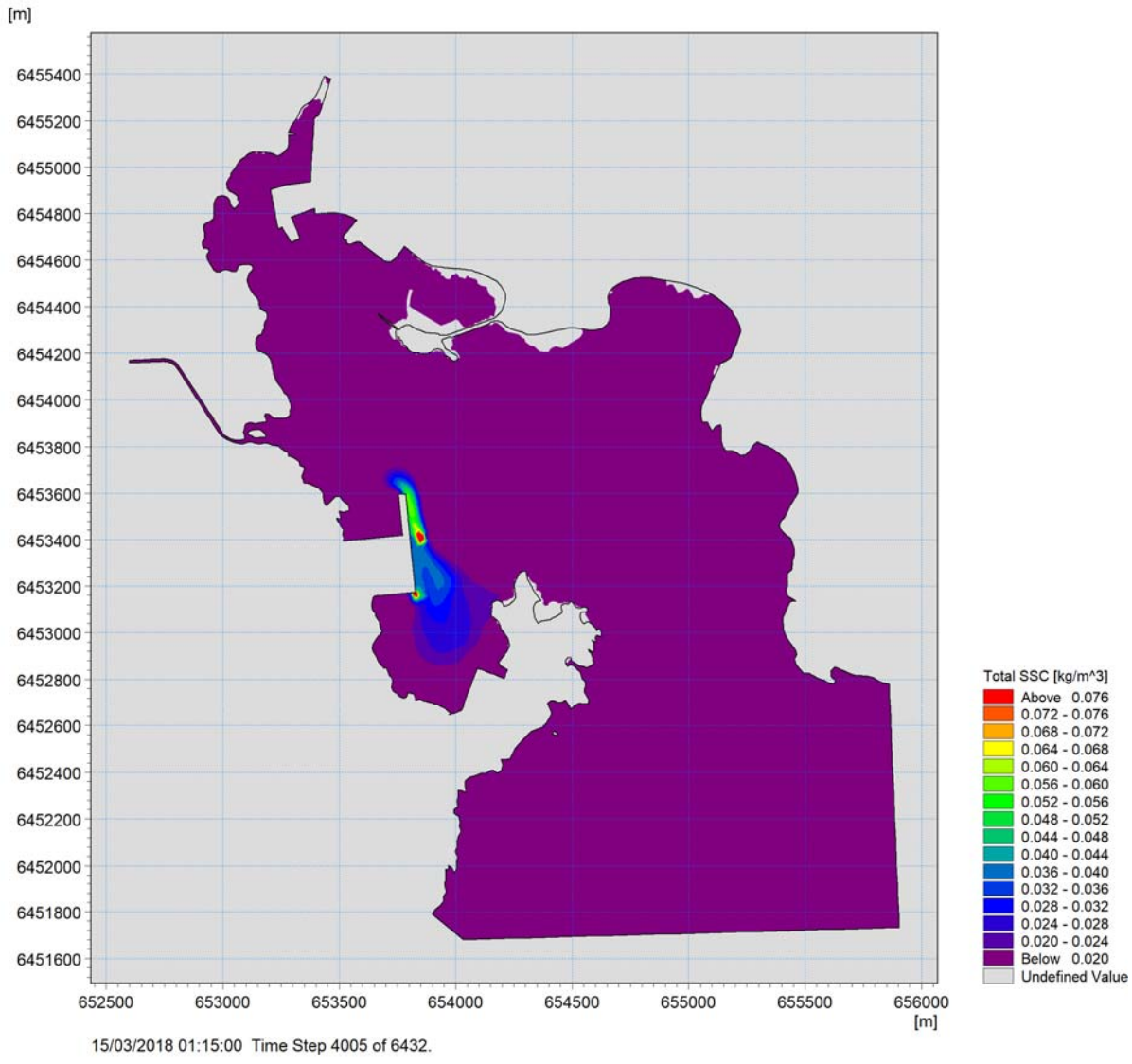


Figure 7.4: Typical SSC plume at a point in time when dredger is working near the quay and the tidal currents are running north

The results of the dredging simulations are given in terms of the total increase in suspended sediment concentrations (SSCs) and deposition of the sediment on the sea bed as a result of the cutter suction dredging operations. The total increase in SSC is presented in terms of the maximum and mean plume envelopes given in Figures 7.5 and 7.6 respectively.

These diagrams represent the envelop that encompasses all the suspended sediment plumes that are generated during the entire dredging operation. Thus the maximum plume envelop presented in Figure 7.5 represents the peak value of the total SSC at each point in the model area as the dredging plume responds to the local tidal currents and the movement of the dredger.

It will be seen from Figure 7.5 that the peak value of the increase in SSC outside the dredged area is predicted to be less than 60 mg/l at all times during the dredging operation. In other parts of Stornoway Harbour remote from the dredged area the maximum increase in the SSC is predicted to be less than 20 mg/l at any time during the dredging operation.

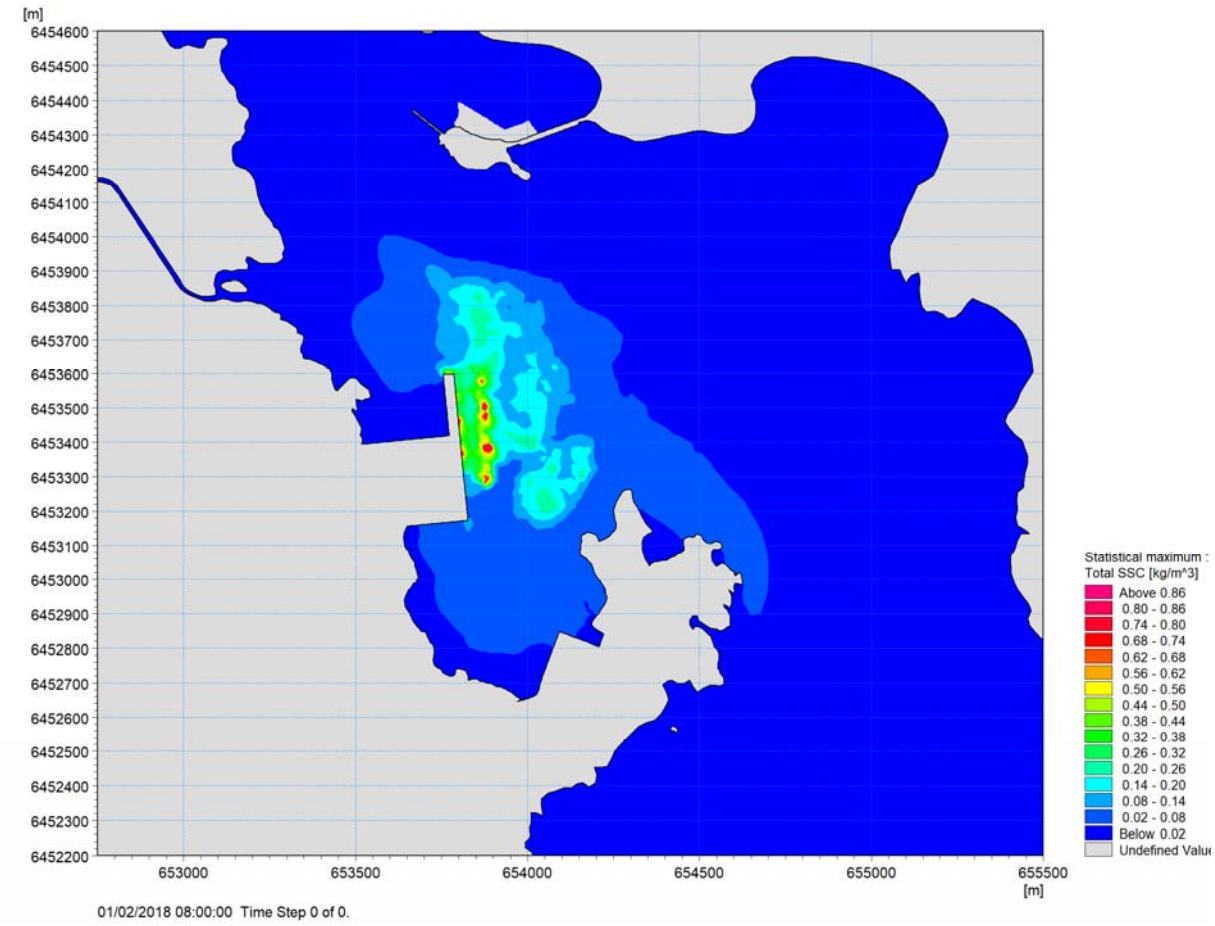


Figure 7.5: Maximum value envelop of the Total Suspended Sediment Concentration that occurs during the 60 day dredging simulation

The peak values may only occur for a very short time during the whole of the dredging operation so the results are also given for the mean value envelop. This envelop, Figure 7.6, represents the mean value to the SSC at each point in the model area over the entire dredging period. The use of the two envelops gives a measure of the short term and medium term impact of the dredging operation on the increase in SSC around Stornoway Harbour.

Figure 7.6 shows that the mean increase in the total SSC in Stornoway Harbour over the dredging period will be less than 10 mg/l away from the immediate area around the proposed Deep Water Port Stage 1 project. The area most affected by an increase in SSC due to the dredging operations will be the region to the south of the south eastern corner of the new quay where the proposed overspill is to be located. Even in this area the increase in the mean value of the SSC is less than about 30 mg/l.

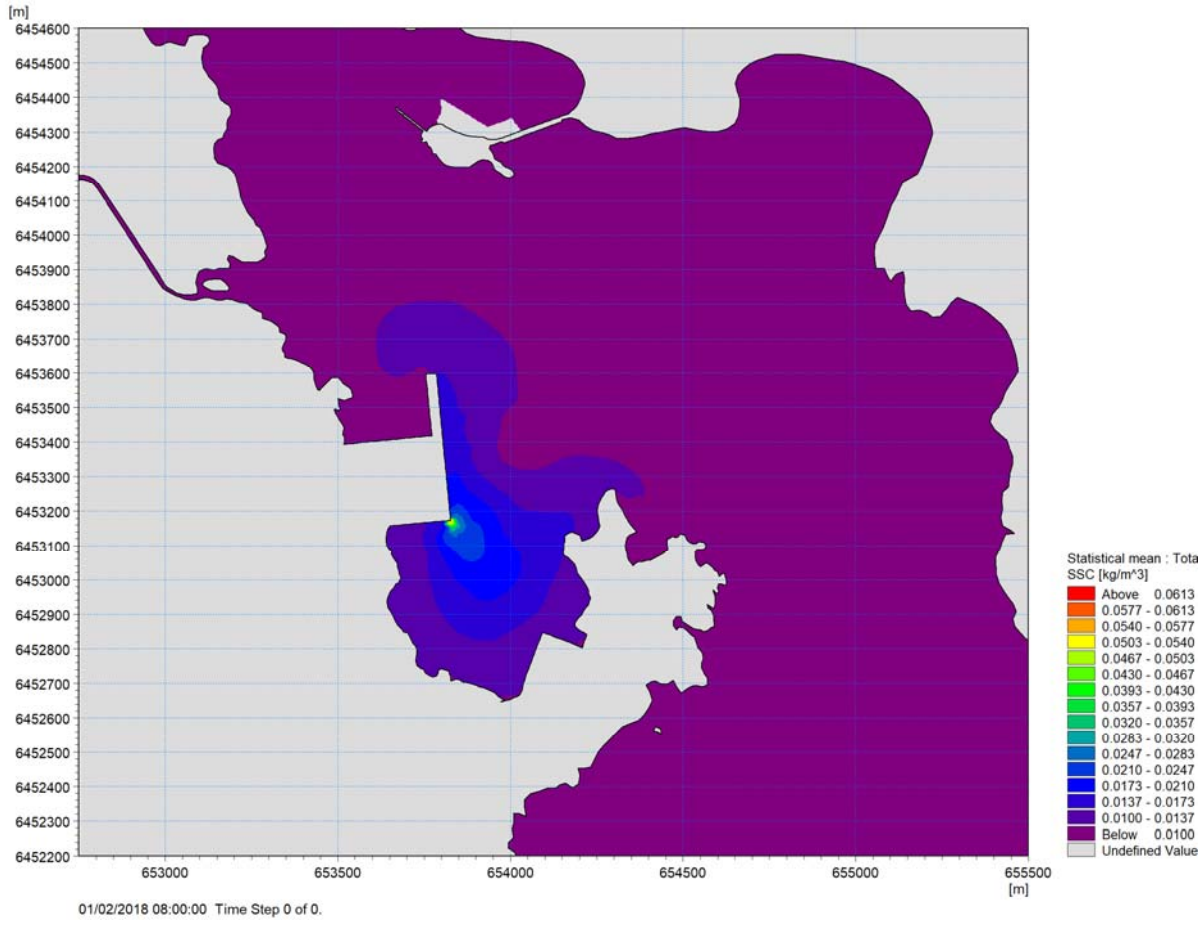


Figure 7.6: Mean value envelop of the Total Suspended Sediment Concentration for the whole of the 60 day dredging period simulation

The deposition of the sand and silt material at the end of the 60 day CSD dredging campaign is illustrated in Figure 7.7. It will be seen that the vast majority of the sand and silts lost to the water column during the dredging operation will be retained within the dredged area. This material will either be picked up during the tiding up operation at the end of the dredging contract or will remain within the over dredged tolerance permitted within the dredging contract.

The results of the simulations show that the deposition depths of material lost to the water column during the dredging operations will be generally less than 1 mm in Stornoway Harbour away from the immediate area of the Deep Water Port stage 1 project.

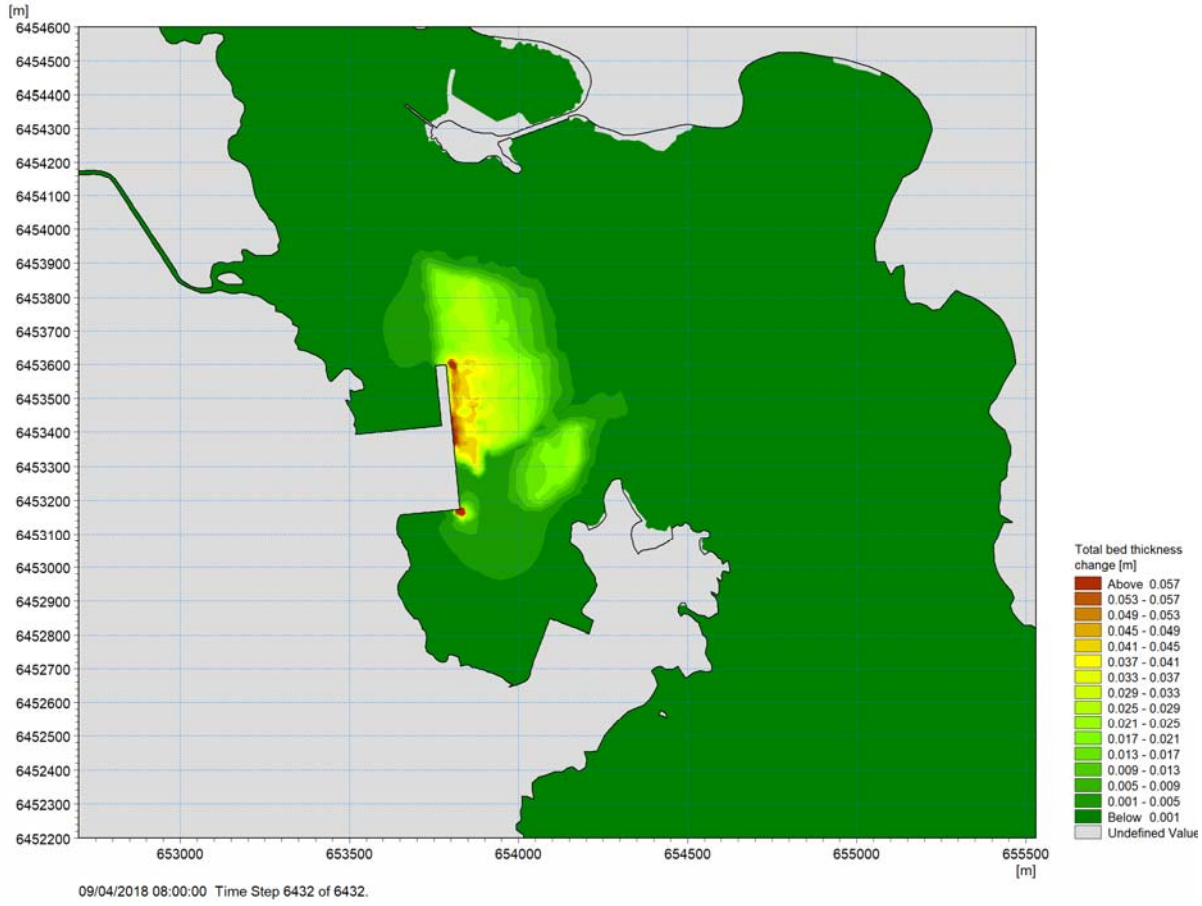


Figure 7.7: Deposition depths of sands and silts lost from the dredging operations at the end of the whole of the 60 day dredging period simulation

7.4 SUMMARY OF THE IMPACT OF DREDGING ON WATER QUALITY

Based on the modelling results presented in Section 7.3 it was found that the peak value of the increase in suspended sediment concentration (SSC) outside the dredged area would be less than 60 mg/l at all times during the dredging operation. In other parts of Stornoway Harbour, remote from the dredged area, the maximum increase in the SSC would be less than 20 mg/l at any time during the dredging operation.

The modelling also showed that the mean increase in the total SSC in Stornoway Harbour over the dredging period will be less than 10 mg/l away from the immediate area around the proposed Deep Water Port Stage 1 project. The area most affected by an increase in SSC due to the dredging operations will be the area of the south eastern corner of the new quay where the proposed overspill is to be located. Even in this area the increase in the mean value of the SSC is predicted to be less than about 30 mg/l.

The results of the simulations demonstrate that in Stornoway Harbour, away from the immediate area of the Deep Water Port stage 1 project, the deposition of material due to the dredging operations will be generally less than 1 mm.

8 SUMMARY AND CONCLUSIONS

The coastal process around the proposed Deep Water Port Stage 1 development and Stornoway Harbour have been investigated using computational modelling techniques based on the DHI MIKE coastal process software.

Tidal regime

The tidal regime in Stornoway Harbour has been simulated for a complete lunar month of tides both for the existing harbour configuration and for the harbour with the proposed Newton Basin marina development in place. The tidal currents within Stornoway harbour are weak and generally do not exceed about 0.1m/s. The maximum flood and ebb velocities off Arnish Point are about 0.15 m/s.

The modelling shows that on the flood there will be small localised area of increased tidal velocity to the north of the finger pier and an equivalent reduction in the tidal velocity locally to the west and east of the pier. During the ebb tide the proposed development results in a slight increase in the tidal velocities to the north of the development and a reduction in the tidal velocity to the east of the finger pier.

However the tidal differences are small and not significant in terms of altering the hydrodynamic regime in Stornoway Harbour. Under typical tidal conditions, the changes in current speeds within the harbour area away from the vicinity of the proposed Deep Water Port Stage 1 development as a result of the proposed development do not generally exceed ±0.005 m/s.

Wave climate

Computational modelling of the wave climate approaching and within Stornoway Harbour has shown that for the longer period waves penetrating into the harbour from the Minch (6 to 8 second wave period), the waves approach the proposed Deep Water Port Stage 1 development from the east. Thus the proposed development does not affect the wave climate at the existing piers and berths for storms in the Minch from East to South South West sector. This is confirmed by the study which shows that the wave climate at the existing piers and berths during storms from the South East to South directions is not significantly changed by the construction of the Deep Water Port Stage 1 scheme with only a slight increase in wave heights to the east of the proposed Stage 1 development.

For storms from the North to North East sector the waves are generated within Stornoway Harbour and have a relatively short wave period (1.8 to 2.2 seconds). The wave modelling has shown that the proposed development does not affect the wave climate at the existing piers and berths as they are upwind of the development. The proposed Deep Water Port Stage 1 development will slightly reduce the wave activity at the existing Arnish berths during storms from the North but the reduction will be relatively small.

The proposed Deep Water Port Stage 1 site is most exposed to waves from the local fetches from the North East and to waves which are diffracted around Arnish Point during storms in the Minch from the South East to South South West directions. During these storm events there will be wave reflections coming off the proposed Deep Water Port quay. These reflected waves will propagate in an easterly to south easterly direction and will not significantly affect any other parts of Stornoway Harbour away from the area immediately to the East of the proposed development.

Impact of Dredging on Water Quality

The modelling and analysis of the dredging over a 60 day period showed that the peak value of the increase in suspended sediment concentration (SSC) outside the dredged area would be less than 60 mg/l at all times during the dredging operation. In other parts of Stornoway Harbour, remote from the dredged area, the maximum increase in the SSC would be less than 20 mg/l at any time during the dredging operation.

The modelling also showed that the mean increase in the total SSC in Stornoway Harbour over the dredging period will be less than 10 mg/l away from the immediate area around the proposed Deep Water Port Stage 1 project. The area most affected by an increase in SSC due to the dredging operations will be the area of the south eastern corner of the new quay where the proposed overspill is to be located. Even in this area the increase in the mean value of the SSC is predicted to be less than about 30 mg/l.

The results of the simulations demonstrate that in Stornoway Harbour, away from the immediate area of the Deep Water Port Stage 1 project, the deposition of material due to the dredging operations will be generally less than 1 mm.

Overall conclusions

The overall conclusion of the coastal process studies for the Deep Water Port Stage 1 development is that the project will have no significant detrimental impact on any of the coastal process within Stornoway Harbour away from the area of the proposed development and will not affect the hydrodynamic conditions at any of the adjoining piers or berths.

APPENDIX 1

MIKE Modelling Modules

1 MIKE MODELLING MODULES

1.1 MIKE 21/3 COUPLED FM

The MIKE 21/3 Coupled Modelling module which is a 2D numerical modelling systems respectively was used to simulate the coastal processes within Stornoway Harbour and its approaches. The MIKE 21/ are truly dynamic modelling systems for application within coastal and estuarine environments and can be used for investigating the morphological evolution of the nearshore bathymetry due to the impact of engineering works (coastal structures, dredging works etc.). The engineering works may include breakwaters (surface-Piercing and submerged), groynes, shoreface nourishment, harbours etc. MIKE 21/3 Coupled Model FM can also be used to study the morphological evolution of tidal inlets.

MIKE 21 Coupled Model FM is composed of the following modules:

- Hydrodynamic Module
- Transport Module
- ECO Lab Module
- Mud Transport Module
- Sand Transport Module
- Particle Tracking Module
- Spectral Wave Module

The Hydrodynamic Module and the Spectral Wave Module are the basic computational components of the modelling system. Using MIKE 21/3 Coupled Model FM it is possible to simulate the mutual interaction between waves and currents using a dynamic coupling between the Hydrodynamic Module and the Spectral Wave Module. The MIKE 21/3 Coupled Model FM also includes a dynamic coupling between the Mud Transport, Particle Tracking and the Sand Transport models and the Hydrodynamic Module and the Spectral Wave Module. Hence, a full feedback of the bed level changes on the waves and flow calculations can be included.

The main features of the MIKE 21 Coupled Model FM are as follows:

- Dynamic coupling of flow and wave calculations
- Full feedback of bed level changes on flow and wave calculations
- Easy switch between 2D and 3D calculations (hydrodynamic module and process modules)

- Optimal degree of flexibility in describing bathymetry and ambient flow and wave conditions using depth-adaptive and boundary-fitted unstructured mesh

1.2 HYDRODYNAMIC MODULE

The Hydrodynamic Module simulates water level variations and flows in response to a variety of forcing functions in lakes, estuaries and coastal regions. The effects and facilities include:

- Flooding and drying
- Momentum dispersion
- Bottom shear stress
- Coriolis force
- Wind shear stress
- Barometric pressure gradients
- Ice coverage
- Tidal potential
- Precipitation/evaporation
- Wave radiation stresses
- Sources and sinks

The Hydrodynamic Module can be used to solve both three-dimensional (3D) and two-dimensional (2D) problems. In 2D the model is based on the shallow water equations - the depth-integrated incompressible Reynolds averaged Navier-Stokes equations.

1.3 MUD TRANSPORT (MT) MODULE MODELLING SYSTEM

The Mud Transport (MT) module of the MIKE 21/3 Flow Model FM describes erosion, transport and deposition of mud or sand/mud mixtures under the action of currents and (if appropriate) waves. The hydrodynamic basis for the MT Module is calculated using the Hydrodynamic Module of the MIKE 21/3 Flow Model FM modelling system and the MT is implemented as a couple model with the two running concurrently. The MT module is applicable for mud fractions and also sand/mud mixtures.

The following processes may be included in the simulation.

- Forcing by waves
- Salt-flocculation
- Detailed description of the settling process
- Layered description of the bed, and
- Morphological update of the bed

In the MT-module, the settling velocity varies, according to the salinity, if included, and the concentration taking into account flocculation in the water column. Bed erosion can be either non-uniform, i.e. the erosion of soft and partly consolidated bed, or uniform, i.e. the erosion of a dense and consolidated bed. The bed is described as layered and is characterised by the density and shear strength.

1.4 SAND TRANSPORT (ST) MODULE MODELLING SYSTEM

The hydrodynamic basis for the Transport Module is calculated using the Hydrodynamic Module of the MIKE 21/3 Flow Model FM modelling system. The transport module calculates the resulting transport of material based on these flow conditions coupled with the other appropriate aforementioned modules. A number of components may be specified with each component defining a separate transport equation. The time integration of the transport (advection-dispersion) equations is then performed using an explicit scheme to calculate the resulting sediment transport.

1.5 MIKE21 FM FLEXIBLE MESH SPECTRAL WAVE MODELLING SYSTEM

Modelling the wave generation and transformation within the Minch and Stornoway Harbour was undertaken using the MIKE 21 Spectral Wave (SW) model which is a third generation spectral wind-wave model based on unstructured meshes. The model simulates the growth, decay and transformation of wind-generated waves and swell in offshore and coastal areas.

MIKE 21 SW accounts for the following physical phenomena:

- Wave growth by wind action
- Non-linear wave-wave interaction
- Dissipation due to white-capping
- Dissipation due to bottom friction
- Dissipation due to depth-induced wave breaking
- Refraction and shoaling due to depth variations
- Diffraction
- Wave-current interaction
- Effect of time-varying depth and flooding and drying

The discretisation of the governing equation in geographical and spectral is performed using a cell-centred finite volume method. In the geographical domain, an unstructured mesh technique is used. The time integration is performed using a fractional step approach where a multi-sequence explicit method is applied for the propagation of wave action.

The MIKE 21 SW includes two different formulations:

- Directional decoupled parametric formulation
- Fully spectral formulation

The directional decoupled parametric formulation is based on a parameterization of the wave action conservation equation. The parameterization is made in the frequency domain by introducing the zeroth and first moment of the wave action spectrum as dependent variables following Holthuijsen (1989).

The fully spectral formulation is based on the wave action conservation equation, as described in e.g. Komen et al. (1994) and Young (1999), where the directional-frequency wave action spectrum is the dependent variable.

The fully spectral formulation was used for the wave modelling in this study with the exception of the wave generation across the very short fetches with in Stornoway Harbour itself which were undertaken using the parametric formulation as this is more accurate for wind wave generation and transformation over very short fetches.

1.6 MIKE21 BOUSSINESQ WAVE MODEL

The Boussinesq Wave model, MIKE 21 BW, is the state-of-the-art numerical model for calculation and analysis of short- and long-period waves in ports, harbours and coastal areas. MIKE 21 BW is capable of reproducing the combined effects of all important wave phenomena of interest in port, harbour and coastal engineering. These include:

- Shoaling
- Refraction
- Diffraction
- Wave breaking
- Bottom friction
- Moving shoreline
- Partial reflection and transmission
- Non-linear wave-wave interaction
- Frequency spreading
- Directional spreading

Phenomena, such as wave grouping, surf beats, generation of bound sub-harmonics and super-harmonics and near-resonant triad interactions, can also be modelled using MIKE 21 BW. The 2DH module (two horizontal space co-ordinates) solves the enhanced Boussinesq equations by an implicit finite difference technique with variables defined on a space-staggered rectangular grid.

The Boussinesq wave model includes the provision of wave reflection and transmission properties for various structures within the harbour. This is achieved by placing porosity layers in the model either along the face in front of fixed structures or, in the case of floating breakwaters, along the line of the breakwater location.

Technical Appendix 9.1

Reference number GB01T17O43

TRANSPORT ASSESSMENT

SYSTRA

STORNOWAY DEEP WATER PORT DEVELOPMENT

TRANSPORT ASSESSMENT

IDENTIFICATION TABLE	
Client/Project owner	EnviroCentre Ltd / Stornoway Port Authority
Project	Stornoway Deep Water Port Development
Study	Transport Assessment
Type of document	Final Report
Date	13/09/2018
Reference number	GB01T17O43
Number of pages	32

APPROVAL

Version	Name		Position	Date	Modifications
1	Author	B Fleming	Consultant	05/07/2018	
	Checked by	S Livingstone	Associate	06/07/2018	
	Approved by	S Livingstone	Associate	06/07/2018	
2	Author	B Fleming	Consultant	01/08/2018	Minor amendments following Client comments
	Checked by	S Livingstone	Associate	01/08/2018	
	Approved by	S Livingstone	Associate	01/08/2018	
3	Author	B Fleming	Consultant	10/08/2018	Final report
	Checked by	S Livingstone	Associate	10/08/2018	
	Approved by	S Livingstone	Associate	10/08/2018	
4	Author	B Fleming	Consultant	12/10/2018	Final Version 2 Report
	Checked by	S Livingstone	Associate	12/10/2018	
	Approved by	S Livingstone	Associate	12/10/2018	

TABLE OF CONTENTS

1.	**INTRODUCTION**	**6**
1.1	GENERAL	6
1.2	DEVELOPMENT PROPOSAL	6
1.3	PURPOSE OF THE REPORT	7
1.4	PRE-APPLICATION CONSULTATION	7
1.5	TRANSPORT ASSESSMENT STRUCTURE	7
2.	**PLANNING POLICY CONTEXT**	**9**
2.1	INTRODUCTION	9
2.2	NATIONAL PLANNING POLICY	9
2.3	LOCAL PLANNING POLICY	11
3.	**EXISTING CONDITIONS**	**13**
3.1	INTRODUCTION	13
3.2	SITE LOCATION	13
3.3	PEDESTRIAN AND CYCLIST FACILITIES	13
3.4	PUBLIC TRANSPORT	14
3.5	VEHICULAR ACCESS & LOCAL ROAD NETWORK	14
3.6	SUMMARY	16
4.	**PROPOSED DEVELOPMENT TRAVEL CHARACTERISTICS**	**17**
4.1	OVERVIEW	17
4.2	PROPOSED DEVELOPMENT TRIP GENERATION	17
4.3	VEHICLE TRIP GENERATION SUMMARY	19
4.4	DISTRIBUTION & ASSIGNMENT	20
5.	**MEASURES TO SUPPORT THE DEVELOPMENT**	**22**
5.1	GENERAL	22
5.2	WALKING & CYCLING INFRASTRUCTURE	23
5.3	PUBLIC TRANSPORT	23
5.4	VEHICLE ACCESS	23
6.	**TRAFFIC IMPACT ASSESSMENT**	**26**
6.1	BASE TRAFFIC DATA	26

6.2	OPENING YEAR OF DEVELOPMENT	26
6.3	COMMITTED DEVELOPMENT – SENSITIVITY TEST	27
6.4	JUNCTION ASSESSMENT METHODOLOGY & REPORTING	27
7.	SUMMARY & CONCLUSIONS	30
7.1	OVERVIEW	30
7.2	SUSTAINABLE TRAVEL	30
7.3	VEHICLE TRIPS	30
7.4	OVERALL CONCLUSION	31

LIST OF FIGURES

Figure 1.	General Location of Proposed Development	6
Figure 2.	Planning Application Boundary	13
Figure 3.	Location of Bus Stops	14
Figure 4.	Bellmouth Entrance at Arnish Road / A859 Junction	15
Figure 5.	Location of Passing Place Opportunities Along Arnish Road	15
Figure 6.	Census Zones Selected Within Community Distance of the Proposed Development	21
Figure 7.	Phase 1 Indicative Development Layout	22
Figure 8.	Location of Passing Place Opportunities Along Arnish Road	24
Figure 9.	Junctions Surveyed	26

LIST OF TABLES

Table 1.	Staff Arrivals and Departures	17
Table 2.	Outer Hebrides Parking Standards	25
Table 3.	A859 / Arnish Road Priority Junction – AM and PM Peak Hour Analysis	28
Table 4.	Manor Roundabout – AM , Mid and PM Peak Hour Analysis	28

1. INTRODUCTION

1.1 General

1.1.1 SYSTRA Ltd (SYSTRA) has been appointed by EnviroCentre Ltd on behalf of Stornoway Port Authority (SPA) to prepare a Transport Assessment (TA) in support of an application for Planning Permission in Principle (PPiP) for the proposed deep water port development at Glumaig Bay in Stornoway, Isle of Lewis. The general location of the proposed development is indicated by Figure 1 below.

Figure 1. General Location of Proposed Development

1.2 Development Proposal

1.2.1 The proposed development would comprise a new multi-purpose deep water port on the west shore of Glumaig Bay, a few kilometres south of Stornoway Harbour. The proposed site is across the bay from Arnish Fabrication Yard and load out quay.

1.2.2 The first phase of the proposed development provides 400m of quay with 10m water depth at lowest tide, a new freight ferry berth and marshalling area, a heavy lift area 50m square, and approximately 10ha of laydown, storage and development land behind the quay. The proposals also incorporate a 25m wide access corridor around the south side of Glumaig Bay, connecting Arnish Yard to the new quay.

1.3 Purpose of the Report

1.3.1 The TA examines the current and future transport matters associated with the proposed development site. The report considers all travel modes including pedestrians, cyclists and public transport users as well as vehicular access requirements and parking.

1.3.2 The TA also provides an analysis of any anticipated off-site transport impacts for staff and operational movements associated with the proposed development. This analysis determines whether the existing transportation network is suitable to accommodate the proposed development without detriment to existing users, as well as considering the requirements of sustainable travel policy.

1.3.3 SYSTRA has also prepared the associated Environmental Impact Assessment (EIA) Report Traffic and Transport Chapter for the proposed development which should be considered alongside the TA.

1.4 Pre-Application Consultation

1.4.1 A Scoping Letter (contained within Appendix A) was prepared which set out the methodology and parameters that would be adopted by the TA. The Scoping Letter was submitted to the Local Authority – Comhairle nan Eilean Siar (CnES) – on 09/04/18 and the scope of the TA was subsequently agreed with CnES on 07/05/18.

1.4.2 The TA has also been informed by a site visit undertaken by SYSTRA on 16th January 2018.

1.5 Transport Assessment Structure

1.5.1 The TA has been completed in accordance with appropriate Local, Regional and National policy and guidance. Specifically, reference is made to the following:

- Transport Scotland – "Transport Assessment Guidance" (TAG) (2012);
- Planning Advice Note (PAN) 75 – "Planning for Transport";
- Scottish Planning Policy (2014);
- Cycle Action Plan for Scotland (2010)
- Outer Hebrides Local Development Plan 2 (LDP2) – "Adopted Plan" (August, 2018) and "Supplementary Guidance: Standards for Car Parking & Roads Layout" (2018); and
- Standards for Highways – "Design Manual for Roads and Bridges" (DMRB).

1.5.2 The TA is structured as follows:

- Planning Policy Context;
- Existing Conditions;
- Proposed Development Travel Characteristics;
- Measures to Support the Proposed Development;
- Traffic Impact Assessment; and
- Summary and Conclusion.

2. PLANNING POLICY CONTEXT

2.1 Introduction

2.1.1 The purpose of this Chapter is to set out national and local planning policy which is applicable to the proposed development site.

2.2 National Planning Policy

2.2.1 National Planning Policy Context for the proposed development is defined by the following policy documents and is discussed in turn below:

- Scottish Planning Policy, adopted June 2014 (SPP); and
- Scottish Planning Advice Note 75 'Planning for Transport', adopted August 2005 (PAN75).

Scottish Planning Policy (SPP)

2.2.2 The purpose of the SPP is to provide policy on land use planning and the planning process. This document sets out a range of transport considerations, with an emphasis on promoting the importance of providing sustainable developments. There are number of key elements of SPP that a development should seek to satisfy. These are summarised as follows:

- *"**Paragraph 15** – Locating the development in the right place can provide opportunities for people to make sustainable choices, improve quality of life and delivering high quality infrastructure and a choice of how to access amenities and services;*
- ***Paragraph 23** – Align development more closely with transport to improve sustainability and connectivity. This is in relation to 'Planning Outcome 4' of SPP to provide a more connected place supporting better transport (and digital) connectivity;*
- ***Paragraph 29** – Planning policies and decisions should be guided by a number of principles including supporting delivery of accessible housing, business, retailing and leisure development and, support delivery of infrastructure for example transport;*
- ***Paragraph 40** – Planning should direct the right development to the right place by optimising the existing resource capacities, principally by co-ordinating housing and business development with infrastructure investment including transport;*
- ***Paragraph 46** – Developments should be easy to move around and beyond by considering the needs of people before the movement of motor vehicles. This could include higher densities and mix of uses that enhances accessibility by reducing reliance on private cars, prioritising sustainable and active travel choices such as walking, cycling and public transport. This would include paths and routes with direct connections and would be well connected to the wider area beyond the site boundary.*
- ***Paragraph 270** – The planning system should support patterns of development that optimises the use of existing infrastructure, reduces the need to travel,*

provides safe and convenient opportunities for walking and cycling and facilitates travel by public transport and, enables the integration of transport modes;

- ***Paragraph 273*** *– Promote development which maximises the extent to which travel demands are met first from walking, cycling, public transport and finally car. Plans should facilitate integration between transport modes;*
- ***Paragraph 279*** *– Significant travel generation developments should be sited at locations which are well served by public transport and supported by measures to promote the availability of high quality public transport services, that provide access to a range of destinations;*
- ***Paragraph 281*** *– When an area is well served by sustainable transport modes, planning authorities may set more restrictive parking standards; and*
- ***Paragraph 287*** *– Planning permission should not be granted for significant travel generating developments where direct links to local facilities on foot and bicycle is not available, public transport networks would involve walking more than 400m and the Transport Assessment does not identify satisfactory measures to meet sustainable transport requirements.''*

2.2.3 It should be noted that whilst Paragraphs 23, 270, 273 and 287 of SPP focus on delivering developments that are integrated into an existing sustainable travel network and developments that primarily promote travel by sustainable modes, the rural location of the proposed development limits the options for walking, cycling and public transport as viable modes of travel to / from the site.

2.2.4 Given that there is an operational fabrication yard at Arnish Point adjacent to the proposed site and that CnES recognise the Arnish Point within the Outer Hebrides LDP as an industrial site with further development potential, it is considered that the site is appropriate for the proposed development. Nevertheless, measures will be taken to manage the number of vehicle trips to and from the proposed development and to manage car parking in accordance with national policy. Such measures will be detailed within this report.

Planning Advice Note (PAN) 75: Planning for Transport

2.2.5 PAN 75 provides a good practice guide for planning authorities and developers in relation to carrying out policy development, proposal assessment, and project delivery. Paragraphs 7 and 24 of PAN 75 respectively highlight the following:

"The intention is for new developments to be user focused and for the transport element to promote genuine choice, so that each mode contributes its full potential and people can move easily between different modes. Consideration should be given to freight logistics as well as person travel."

"Development plan policy should encourage development of significant travel generating proposals at locations which are key nodes on the public transport network that have a potential for higher density development and a potential for mixed use development with an emphasis on high quality design and innovation. These locations should encourage modal shift of people and freight by providing good linkages to rail, walking and cycling networks and with vehicular considerations, including parking, having a less significant role."

2.3 Local Planning Policy

Outer Hebrides: Local Development Plan 2 (Adopted Plan, 2018)

2.3.1 The Outer Hebrides LDP sets out a vision and spatial strategy for the development of land in the Outer Hebrides over the next 10-20 years. The Adopted LDP 2 (which supersedes the 2012 LDP) contains the land use planning policies which the CnES will use for determining planning applications. LDP2 sets out 34 policies.

2.3.2 In relation to traffic and transport, **Policy EI 9:** Transport Infrastructure states:

- *"The priority areas for the upgrading and development of the transport infrastructure within, and serving the Outer Hebrides, are:*
  - **a)** *the spinal and inter island routes;*
  - **b)** *the airports at Barra, Balivanich and Stornoway;*
  - **c)** *ports and harbours, including ferry facilities for mainland and intra island connections.*
- *Development proposals associated with new or improved transport infrastructure and traffic management measures will be required to meet all the following:*
  - **d)** *fit with the character of the area in relation to the Development Strategy and the immediate surrounding area;*
  - **e)** *utilise a sustainable drainage system (SuDS) to deal with surface water;*
  - **f)** *where possible accommodate cyclists and pedestrians and secure improved road safety related to the proposal, in particular around schools, community or leisure facilities."*

Proposed Development Site

2.3.3 The Outer Hebrides Local Development Plan 2 (Proposals Site Maps Booklet) identifies Arnish as a safeguarded, first phase, site in the National Renewables Infrastructure Plan (Proposal Site 16 Arnish, Lewis).

2.3.4 The core of the industrial estate is identified as the prime location for energy related development or other appropriate large scale uses that utilise its facilities and/or

require a deep water harbour. Preferred development would be the following use classes:

- Use class 4: Business;
- Use class 5: General Industrial; and
- Use class 6: Storage or Distribution.

Car Parking

2.3.5 Guidance on car parking standards is provided through Supplementary Guidance of the Outer Hebrides LDP2 (re-adopted supplementary guidance of the 2012 LDP). In relation to the multi-use nature of the proposed development, the guidelines state that:

> *"Where a proposal incorporates more than one element the parking requirement for each element will be assessed independently and then added together. However, where it can be demonstrated to the satisfaction of the Comhairle that peak operating times of the various elements would occur at different times some discounting of the required number of spaces may be acceptable."*

3. EXISTING CONDITIONS

3.1 Introduction

3.1.1 This section considers the existing accessibility of the site and local area. This is based on the hierarchy set out in TAG which details the transport user hierarchy where more sustainable modes of travel are prioritised ahead of the private car. However, as discussed, the rural nature of the site should be taken into account when considering its accessibility credentials, as should the fact that the Outer Hebrides LDP2 recognises the site as appropriate for industrial and business land uses.

3.2 Site Location

3.2.1 Glumaig Bay is located approximately 1.5km – 2km (as the crow flies) south of Stornoway, on the Isle of Lewis. It is accessed from the west via the junction at the A859.

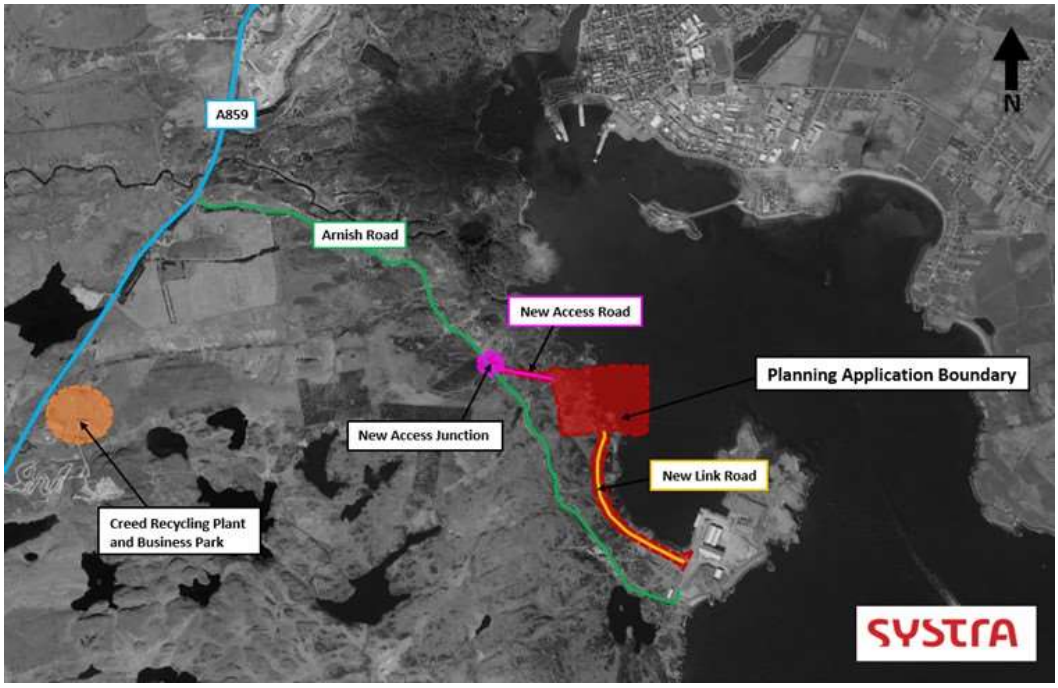


Figure 2. Planning Application Boundary

3.2.2 The general area of Stornoway to the north of the proposed development site is a popular tourist destination as well as a regional employment centre, offering local services and amenities to a large local residential catchment.

3.3 Pedestrian and Cyclist Facilities

3.3.1 The remote nature of the site contributes to the fact that there are no formal facilities for pedestrians or cyclists in the vicinity of the proposed development site.

3.3.2 A continuous footway along the A859 routeing into Stornoway begins at Marybank Quarry, approximately 1km north-east of the junction with the Arnish Point Road. There are tracks used as leisure walking routes through the Lews Castle Grounds to the north

of the proposed development site, however, given the distance from the site to Stornoway Town or any local amenities, walking as a means of travel is not viable in this area.

3.3.3 Whilst there is no formal cycling infrastructure in the vicinity of the site, Stornoway Town Centre is approximately 4.8km (17 minutes) cycling distance from edge of the proposed site boundary via a section of the Arnish Point Road and the tracks within the Castle Grounds.

3.4 Public Transport

3.4.1 It is noted that the nearest bus services to the site are from stops located where the Arnish Point Road meets the A859 serving both northbound and southbound directions, as indicated by Figure 3 below. However, these bus stops are outwith reasonable walking distance from the proposed development of 400m as per PAN 75 guidelines.

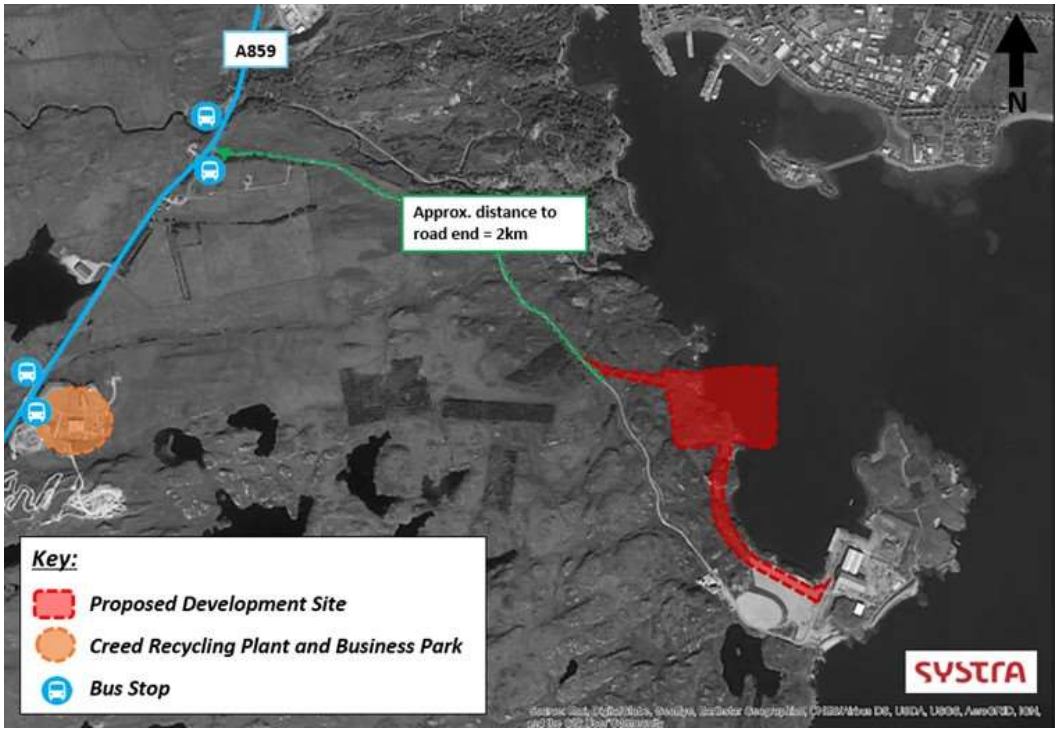


Figure 3. Location of Bus Stops

3.5 Vehicular Access & Local Road Network

Arnish Road

3.5.1 Current vehicular access to Arnish Point is from a junction on the A859 approximately 1.2km north of the access to the Creed Business Park and Recycling Plant. The access is a single track road from a priority junction with the A859. The junction has a wide bellmouth entrance (as indicated by Figure 4) which has been designed to be suitable for HGVs.

Figure 4. Bellmouth Entrance at Arnish Road / A859 Junction

3.5.2 The proposed development will be approximately 3.5km from the main spinal route. The existing single track road has frequent passing opportunities as indicated by **Figure 5**, however, the road may require upgrading works to be suitable to accommodate additional traffic (primarily surfacing of passing places).

Figure 5. Location of Passing Place Opportunities Along Arnish Road

A859

3.5.3 Turning right from the access road, the A859 routes north-east, becoming the A859 Willowglen road and continues east to meet the A857 at Manor Roundabout just north of the town centre. Turning left from the access road, the A859 also routes south-west to the most southerly point of the Isle of Lewis and Harris.

3.5.4 The A859 is a good standard single carriageway road, generally subject to the National Speed Limit (60mph). In the vicinity of Stornoway town, there is street lighting and footways along the northern side of the A859 where the road is referred to as "Willowglen Road" and the speed limit reduces to 40mph. However, generally the A859 does not experience pedestrian activity. Furthermore, the A859 is understood to be well-used by HGVs given that Marybank Quarry is situated approximately 1km north of the junction with Arnish Point Road. During the construction phase of the proposed development the stone and concrete requirement will be sourced from Marybank Quarry.

3.5.5 In the context of the proposed development, construction and operational traffic and staff will travel along the A859 and Willowglen Road to reach Manor Roundabout if routeing onto the A857 travelling northwards, or if travelling into Stornoway Town Centre. Traffic travelling to the west of Lewis or to Harris will travel south along the A859.

A857

3.5.6 The A857 routes north from Stornoway Town Centre to Port Ness at the most northern tip of the Isle of Lewis. Within Stornoway, the A857 has street lighting and good standard footways on both sides of the carriageway. Various pedestrian crossing opportunities are provided in the form of signalised crossings and paved speed tables which act as traffic calming measures.

3.5.7 It anticipated that a large proportion of the operational traffic / staff trips will utilise the A857 to route to and from the town centre / the neighbouring residential areas.

3.6 Summary

3.6.1 From SYSTRA's site visit and desk top study, we would suggest that existing local road network (with the exception of Arnish Road) is suitable in its current form to accommodate additional vehicle movements associated with the proposed development.

3.6.2 It is recognised that the site has limited potential for accessibility by sustainable modes, therefore, measures will be proposed in Chapter 6 of this report aimed at managing the level of vehicle trips generation associated with the proposed development.

4. PROPOSED DEVELOPMENT TRAVEL CHARACTERISTICS

4.1 Overview

4.1.1 This chapter considers the people trip generation for the proposed development and the resultant vehicle trip generation. Given the nature of the development and the lack of existing survey data for this type of mixed use development, the expected trip generation has been calculated from a first principles (and for a worst-case scenario) approach informed by the applicant, SPA.

4.2 Proposed Development Trip Generation

4.2.1 Operational traffic associated with the proposed development will comprise staff travelling to and from the site, predominantly in private cars, HGVs using the freight ferry, and coaches associated with transporting cruise liner passengers from the site to tourist destinations around the island.

Staff

4.2.2 The proposed development is expected to employ around 100 staff members working in shift patterns. It is anticipated that the majority of staff will work day shifts and arrive outwith the typical network peak hour periods (08:00 – 09:00 in the AM and 17:00 – 18:00 in the PM). 100 staff making a two-way trip on the road network within the study area equates to 200 two-way vehicle trips over the course of the day. The likely pattern of staff arrivals and departures for shifts is indicated by Table 1 below.

4.2.3 This represents a robust assessment of vehicle trips given that all 100 staff may not be on-site everyday (e.g. fewer staff may be required at weekends) and that a proportion of staff could car-share with other employees.

Table 1. Staff Arrivals and Departures

TIME	STAFF ARRIVING	STAFF DEPARTING
07:00-08:00	40	0
08:00-09:00	0	20
09:00-10:00	0	0
10:00-11:00	0	0
11:00-12:00	0	0
12:00-13:00	0	0
13:00-14:00	0	0
14:00-15:00	0	0

TIME	STAFF ARRIVING	STAFF DEPARTING
15:00-16:00	40	0
16:00-17:00	0	40
17:00-18:00	0	0
18:00-19:00	0	0
19:00-20:00	0	0
20:00-21:00	0	0
21:00-22:00	0	0
22:00-23:00	0	0
23:00-00:00	20	0
00:00-01:00	0	20

4.2.4 Turning count surveys of the key junctions which would be affected by the proposed development (access / A859 junction and Manor Roundabout) were undertaken and demonstrate that the network peak hour periods for the local road network are 08:00 – 09:00 in the AM and 16:30 – 17:30 in the PM.

4.2.5 Table 1 indicates that for staff beginning a day shift at 08:00, staff will be travelling on the local road network between 07:00 – 08:00. Similarly, staff finishing a night shift at 08:00 will be travelling on the local road network between 08:00 – 09:00. Therefore, staff arriving for their day shift and staff departing after their night shift would not necessarily coincide. However, to provide a robust and worst-case scenario for the local road network, the traffic impact assessment has been calculated on the basis of 40 staff arriving and 20 staff departing during the network AM peak period.

4.2.6 Table 1 indicates that during 16:00 – 17:00, 40 staff would depart the proposed development having finished a day shift. Although the local network PM peak period occurs 16:30 – 17:30 and it is therefore highly likely that staff departing the proposed development at 16:00 would have travelled beyond the junctions considered within this assessment (access junction and Manor Roundabout) by 16:30, the traffic impact assessment has been calculated on the basis of 40 staff departing during the network PM peak period to ensure a robust assessment.

HGVs

4.2.7 There is expected to be 20 – 30 HGVs will use the freight ferry and transport the materials to elsewhere on the island. Adopting a robust approach, this equates to 60 two-way HGV trips per day. It should be noted that the freight ferry currently delivers to the port in the town centre, generating approximately 20 HGVs (40 two-way HGV

movements) transporting the materials to their destination. Therefore, the proposed development would result in only a marginal increase in the existing HGV levels associated with the freight ferry and would result in a reassignment of HGV movements across the local road network. In fact, the freight ferry delivering materials to the proposed development as opposed to the existing port in the town centre would result in a reduction of HGVs that route through Stornoway Town.

4.2.8 Notwithstanding the above, the HGV trips are expected to occur outwith the network AM and PM peak periods as they will coincide with the freight ferry arrival and departure times which are around 05:00 -06:00 in the morning, 12:00 – 13:00 in the afternoon and 22:00 – 23:00 at night. Therefore, any assessment of HGV trips has not been assessed further within this TA.

Coaches

4.2.9 Associated with the cruise liner berth element of the proposed development, it is anticipated that approximately 25 coaches will be provided that take the cruise liner passengers on two half day trips (a morning and afternoon trip) to sites around the island. This equates to a maximum of 100 coach trips over the course of the day. During the AM and PM peak hour periods, this would translate into 25 coach departures in the AM and 25 coach arrivals in the PM.

4.2.10 In addition, another 3 coaches would shuttle visitors between the site and Stornoway Town Centre. It has been assumed that each coach makes 2 two-way trips per hour for 8 hours, equating to 96 two-way coach trips over the course of the day. In the AM and PM peak hour periods, this would translate into 12 two-way coach trips respectively.

4.2.11 It is important to note that cruise ships are anticipated to be in port only 50 days per year, therefore, the aforementioned level of coach movements are only expected on a minority of days throughout the year and the report presents a robust assessment of the "worst-case" operational day of the proposed development.

4.3 Vehicle Trip Generation Summary

Daily

4.3.1 The estimated daily vehicle trip generation associated with the proposed development is as follows:

- 100 staff travelling to and from the development equates to 200 two-way daily vehicle movements (as a robust scenario as all staff are unlikely to be on-site every day and a proportion of staff may car-share);
- 30 HGVs making a two-way trip equating to 60 two-way HGV movements;
- 25no. coaches making two half-day trips per day equates to 100 two-way coach trips in a day; and
- 3no. coaches making 6 two-way shuttle trips to the town centre, assumed to be operating 8 hours per day, totals as 96 two-way shuttle coach trips.

Peak Periods

4.3.2 During the network AM and PM peak hour periods (08:00 – 09:00 and 16:30 – 17:30 respectively) and the mid (afternoon) peak hour period (12:00 – 13:00), the proposed development's estimated traffic generation is as follows:

AM Peak

- 60 two-way vehicle trips associated with staff movements;
- 25 one-way coach departures associated with the morning half-day trip; and
- 12 two-way shuttle coach trips between the proposed development and the town centre.

Mid (Afternoon) Peak

- No staff movements;
- 50 two-way coach trips associated with the morning half-day trip arriving back at the port and the afternoon half-day trip departing; and
- 12 two-way shuttle coach trips between the proposed development and the town centre.

PM Peak

- 40 one-way vehicle trips of staff arriving at the proposed development;
- 25 one-way coach arrivals associated with return of the afternoon half-day trip; and
- 12 two-way shuttle coach trips between the proposed development and the town centre.

4.4 Distribution & Assignment

Staff / Visitor

4.4.1 In relation to staff and visitors, the distribution of vehicle trips has been calculated using a gravity model and based on 2011 Scottish Census data for the Isle of Lewis. Data on the number of working adults in each zone within reasonable commuting distance from the site was gathered and a percentage applied to each zone appropriately representing the proportion of potential staff residing in that area. The zones selected are indicated by Figure 6 below.

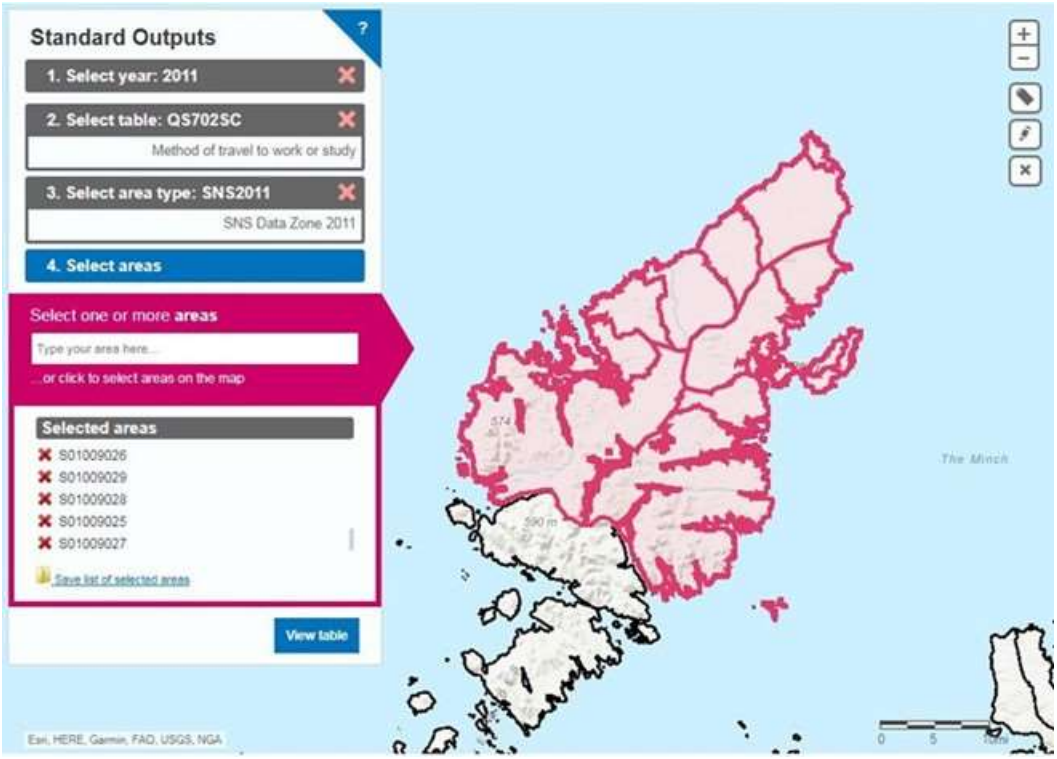


Figure 6. Census Zones Selected Within Community Distance of the Proposed Development

4.4.2 The route(s) staff / visitors would take to travel to and from the site was estimated considering the options available (distance of route and time of journey) and the corresponding vehicle trips have then been applied to the relevant movement at the junctions assessed.

4.4.3 The census data suggests that 15% of staff will approach the site from the south along the A859 and turn right onto the access road. The remaining 85% of staff will approach the site from the north along the A859. The census data suggests that 69% of staff will route through Manor Roundabout and here, 31% will be travelling from the north along the A857, 18% from the east along Perceval Road and 20% from the south along the A857 Macauley Road.

Coach Trips

4.4.4 The distribution of day-trip coach trips has been divided equally between turning right and left to travel north and south respectively out of Arnish Road / A859 junction given the relatively equal distribution of tourist sites in both directions. At Manor Roundabout, all coach trips have been assigned to the A857 to the north of the roundabout.

4.4.5 The shuttle coach trips would make a right turn at the Arnish Road /A859 junction and travel north to Manor Roundabout. At the roundabout, they would make a right turn to route onto the A857 Macauley Road travelling towards the bus station which is the expected the drop-off / pick-up point.

4.4.6 The distribution and assignment of development related trips is provided in Appendix C.

5. MEASURES TO SUPPORT THE DEVELOPMENT

5.1 General

5.1.1 The following section considers the integration of the proposed development into the surrounding transport network by all modes. The phase 1 proposed development will comprise:

- Alongside berthing for cruise liners of all sizes;
- Waiting and turning area for buses serving cruise liner passengers;
- Ferry berth, linkspan and marshalling area (freeing up the current car ferry to provide an additional daily sailing);
- Extensive laydown and storage area with 50m square heavy lift area to service renewables and decommissioning projects;
- Development platform for industrial and / or storage use; and
- Berthing and unloading equipment for oil delivery vessels, with pipelines to new storage tanks (which will provide additional storage capacity for the island).

5.1.2 Figure 6 below indicates an indicative layout of the proposed development. A copy is also provided in Appendix B of this report.

Figure 7. Phase 1 Indicative Development Layout

5.2 Walking & Cycling Infrastructure

5.2.1 Government guidelines indicate a hierarchy of travel modes with walking being the highest and most sustainable form of travel. While this is the case, it is important to recognise that the location of the proposed development is relatively remote and that there are no facilities / amenities within reasonable walking distance of the development site.

5.2.2 It is recognised that cruise liner passengers will not have access to a vehicle when arriving at the proposed development, alternative travel options will be provided as part of the proposed development as identified in Section 5.3 below.

5.2.3 It is noted that the Lews Castle Grounds situated to the north of the proposed development has forestry tracks that are suitable for leisure walking and cycling trips. There is a route from the Castle Grounds to the Arnish Road.

5.2.4 Local hire companies will be able to deliver cycles (including electric cycles) to the proposed development for use by incoming cruise passengers by prior arrangement.

5.3 Public Transport

5.3.1 PAN 75 guidelines recommend that developments are within 400m walking distance of bus services and 800m walking distance of rail services. It is noted that the proposed development is not within reasonable walking distance of a bus service and there are no rail services on the island. However, the proposed development will provide coach transport for cruise liner passengers to facilitate travel around the island by a more sustainable mode than the car.

5.3.2 As discussed in Chapter 4, the proposed development will provide approximately 25no. 50 seater coaches that will take passengers on morning and afternoon half-day trips to tourist sites around the island that are out of reach by walking, cycling or public transport. Furthermore, approximately 3no. 50 seater coaches will operate a shuttle service between the proposed development and the town centre so that the visitors are still able to benefit from facilities / amenities within the town centre that are out of reach by walking, cycling or public transport. Parking and turning areas for coaches will be provided as part of the development.

5.3.3 SYSTRA considers that the provision of coach transport for visitors is the most appropriate solution in this case to the problem of inaccessibility by other sustainable travel modes and is well-suited to serve the needs of the visitors to the proposed development.

5.4 Vehicle Access

5.4.1 As discussed in Chapter 3, current vehicular access to Arnish Point is from a junction approximately 1.2km north of the access to the Creed Business Park and Recycling Plant. The access is a single track road from a priority junction with the A859. The junction has a wide bellmouth entrance which has been designed to be suitable for HGVs, therefore the Arnish Road is considered to be appropriate for HGVs and coaches.

5.4.2 The proposed development will be approximately 3.5km from the main spinal route. The existing single track road has frequent passing opportunities as indicated by Figure 7.

Figure 8. Location of Passing Place Opportunities Along Arnish Road

5.4.3 Dependent upon final development uses, further detailed work may be required at a later stage to ascertain the suitability of the road for specific scenarios. SYSTRA would anticipate that this would be addressed through a condition for a survey of the road to identify and agree with CnES, the level of works required to upgrade the Arnish Road to an appropriate standard.

Car Parking

5.4.4 CnES provides guidance on car parking standards through Supplementary Guidance of the Outer Hebrides LDP (2012), however, given the mixed-use nature of the proposed development, the following statement from the guidelines is applicable in this case:

> *"Where a proposal incorporates more than one element the parking requirement for each element will be assessed independently and then added together. However, where it can be demonstrated to the satisfaction of the Comhairle that peak operating times of the various elements would occur at different times some discounting of the required number of spaces may be acceptable."*

5.4.5 The Outer Hebrides LDP Supplementary Guidance states the following standards covering some of the land uses to be incorporated into the proposed development:

Table 2. Outer Hebrides Parking Standards

TYPE OF DEVELOPMENT	APPROPRIATE PROVISION – SPACES PER 100SQM GFA	COMMENT
Factories	1.1	Special provision may be required for buses.
Warehousing	0.5	Office space to be addressed separately (see below).
Office Accommodation*	4 – 7	Detailed provision depends on specific location and nature of activity.

**In this case, office accommodation refers to office space associated with the warehouse developments*

5.4.6 Parking provision for the proposed development is yet to be confirmed and will be determined during the detailed design phase in consultation with CnES. As discussed, parking and turning areas for coaches will be provided as part of the development. Parking for port and ferry operational staff, and for HGVs using the freight ferry will also be provided.

5.4.7 SYSTRA recommends that parking takes cognisance of the bespoke land uses and the fact that the majority of visitors to the development will travel by cruise liner. As such, parking provision will be informed by staff numbers and anticipated shift patterns.

Car Sharing

5.4.8 It is recognised that travelling by private car will be the primary mode of transport to and from the proposed development for staff. Therefore, car-sharing between staff is a feasible option to promote sustainable travel principles and reduce the overall traffic impact of the proposed development. The proposed development will seek to facilitate car-sharing amongst staff where appropriate.

6. TRAFFIC IMPACT ASSESSMENT

6.1 Base Traffic Data

6.1.1 The purpose of this section of the TA is to analyse that the impact the traffic generated by the proposed development will have on the local transport network. Following discussions with CnES regarding the area of influence for the traffic impact assessment, the following junctions were identified:

1. A859 / Arnish Road Priority Junction; and
2. Manor Roundabout (A857 N / Perceval Road / A857 S / A859) Junction.

Figure 9. Junctions Surveyed

6.1.2 In agreement with CnES, junction turning count (JTC) data was collected for the AM (07:00 – 09:00), afternoon (11:00 – 13:00) and PM (16:30 – 18:30) periods on 24th April 2018. These traffic surveys identified the AM and PM network peak hour periods to be 08:00 – 19:00 and 16:30 – 17:30 respectively and the afternoon peak to be 12:00 -13:00.

6.2 Opening Year of Development

6.2.1 The opening year of the development is anticipated to be 2021. After review of historical traffic count data available from the Department for Transport (DfT) in and around Stornoway (data contained within Appendix D), it was established that the National Roads Traffic Forecast (NRTF) low growth factor was acceptable to apply to the base traffic flows to obtain the projected base flows for the year of opening. The growth factor that has been applied is as follows:

- NRTF Low Growth from 2018 to 2021: Factor – **1.024**

6.2.2 The network diagrams provided in Appendix E demonstrate the traffic flows in the identified area of influence for the AM, afternoon and PM peak periods in the base scenario of 2018 and then factored to the year of opening 2021.

6.3 Committed Development – Sensitivity Test

6.3.1 CnES has requested that the traffic impact assessment for the proposed development takes account of SPA's other planning application for the Newton Marina development proposal, located on Goat Island. The Newton Marina development is expected to come forward at similar timescales to the proposed development.

6.3.2 The Newton Marina development (which will be subject to its own planning application) would comprise the following:

- Land reclamation along the north side of Goat Island and the causeway;
- Breakwater and marina with approximately 75 berths;
- Slipway and yacht lift;
- Boat storage (on land);
- Marina services (club house, toilets, showers, etc.);
- Parking; and
- Replacement of the existing marine engineering workshop with a new workshop on the reclaimed area.

6.3.3 The expected trip generation for the Newton Marina development has been calculated through a TRICS[1] exercise and information provided by SPA and the potential cumulative impact considered at the Arnish Road / A859 priority junction and Manor Roundabout as assessed within this TA.

6.4 Junction Assessment Methodology & Reporting

6.4.1 The ARCADY 6 and PICADY 5 transport planning software tools have been used to undertake the traffic impact analysis for Manor Roundabout and the A859 / Arnish Road Priority Junction respectively.

6.4.2 The ARCADY and PICADY analysis will report the Ratio of Flow Capacity (RFC) and maximum forecast queue for each movement within the junction. The RFC of a junction is one of the principle factors in influencing queues and delays. General engineering design principles as set out in the DMRB are that when assessing a priority junction or roundabout, RFC levels should not exceed 0.85 in order for the junction to operate within 'practical' capacity. Should the RFC level exceed 1.0 then the junction is operating above 'theoretical' capacity.

[1] TRICS (Trip Rate Information Computer System) is a database of trip rates for developments used in the United Kingdom and Ireland for transport planning purposes, specifically to quantify the trip generation of new developments

A859 / Arnish Road Priority Junction

6.4.3 The results of the PICADY assessment for the A859 / Arnish Road Priority Junction are indicated by Table 3 below for the AM, afternoon and PM peak hours in the 2021 projected base scenarios.

Table 3. A859 / Arnish Road Priority Junction – AM and PM Peak Hour Analysis

MOVEMENT	AM		MID		PM	
	2021 BASE	2021 BASE + COM + DEV	2021 BASE	2021 BASE + COM + DEV	2021 BASE	2021 BASE + COM + DEV
	RFC (Q)	RFC (Q)	RFC (Q)	RFC (Q)	RFC (Q)	RFC (Q)
A – C	0.000 (0)	0.044 (0)	0.000 (0)	0.040 (0)	0.015 (0)	0.024 (0)
B – A	0.012 (0)	0.146 (0)	0.026 (0)	0.114 (0)	0.002 (0)	0.124 (0)
C – AB	0.000 (0)	0.012 (0)	0.000 (0)	0.045 (0)	0.002 (0)	0.050 (0)

Note: Arm A – A859 North; Arm B – Arnish Road; Arm C – A859 South

6.4.4 The results indicate that during the projected 2021 base plus committed and 2021 base plus committed plus development scenarios for the AM, afternoon and PM peak hour periods, the Arnish Road / A859 priority junction would operate well within its practical capacity with no queueing anticipated on any arm.

Manor Roundabout (A857 N / Perceval Road / A857 S / A859) Junction

6.4.5 The results of the ARCADY assessment for the Manor Roundabout are indicated by Table 4 below for the AM, afternoon and PM peak hours in the 2021 projected base scenarios.

Table 4. Manor Roundabout – AM , Mid and PM Peak Hour Analysis

ARM	AM		MID		PM	
	2021 BASE	2021 BASE + COM + DEV	2021 BASE	2021 BASE + COM + DEV	2021 BASE	2021 BASE + COM + DEV
	RFC (Q)	RFC (Q)	RFC (Q)	RFC (Q)	RFC (Q)	RFC (Q)
A	0.772 (3)	0.789 (4)	0.499 (1)	0.528 (1)	0.527 (1)	0.560 (1)
B	0.399 (1)	0.428 (1)	0.349 (1)	0.360 (1)	0.547 (1)	0.578 (1)
C	0.260 (0)	0.283 (0)	0.384 (1)	0.401 (1)	0.633 (2)	0.662 (2)
D	0.553 (1)	0.615 (2)	0.602 (2)	0.647 (2)	0.724 (2)	0.792 (3)

Note: Arm A –A857 North; Arm B – Perceval Road; Arm C – A857 South; Arm D – A859

6.4.6 The results from the indicate that during the projected 2021 base and 2021 base plus committed plus development scenarios for both the AM and PM peak hour periods, Manor Roundabout would continue to operate within its practical capacity with a maximum RFC of 0.792 on the A859 arm (D) of the junction during the weekday PM 2021 base plus committed plus development scenario.

6.4.7 Table 3 indicates that during the AM peak hour period between the 2021 base and 2021 base plus committed plus development scenarios there would be one additional vehicle in the queue on the A857 North arm (A) on the A859 arm (D) of the junction respectively. This represents a minor impact.

6.4.8 During the mid-afternoon and PM peak hour periods, Table 3 indicates that between the 2021 base and 2021 base plus committed plus development scenarios there would be one additional vehicle in the queue on the A859 arm (D) during the PM peak. This represents a minor impact.

6.4.9 It is therefore concluded that traffic associated with phase 1 of the proposed development can be suitably accommodated by both the Arnish Road / A859 priority junction and Manor Roundabout without causing a detriment to the existing road users. It should also be reiterated that these results include traffic associated with the Newton Marina Development, therefore, if only the proposed development traffic was taken in account the impact would be even smaller than that demonstrated.

7. SUMMARY & CONCLUSIONS

7.1 Overview

7.1.1 SYSTRA has been appointed by EnviroCentre Ltd on behalf of Stornoway Port Authority to prepare a Transport Assessment in support of an application for Planning Permission in Principle for the proposed development at Glumaig Bay in Stornoway, Isle of Lewis. The phase 1 proposed development would offer a multi-purpose land use anticipated to comprise a quay, a new freight ferry berth and marshalling area, a heavy lift area, and 15ha of laydown, storage and development land behind the quay.

7.2 Sustainable Travel

7.2.1 It is recognised that the existing level of pedestrian and cyclist accessibility is limited considering the remote nature of the development site. Furthermore, it is noted that public bus services are not within reasonable walking distance of the proposed development.

7.2.2 In order to mitigate this, the proposed development will operate coach services to transport cruise liner passengers between the development site and tourist destinations around the island. In addition, coaches will be provided to shuttle cruise liner passengers between the development and Stornoway Town Centre.

7.2.3 With regards to staff, the proposed development will encourage car-sharing amongst staff where appropriate to manage single-occupancy car travel and the development's overall traffic impact on the local road network.

7.3 Vehicle Trips

7.3.1 A robust assessment of the potential vehicle trips that the phase 1 proposed development would generate has been undertaken. The assessment finds that the proposed development is expected to generate (as a worst-case), a total of 97 two-way vehicle trips (37 of which are coaches) and 77 two-way vehicle trips (37 of which are coaches) during the AM and PM peak periods respectively.

7.3.2 The traffic impact assessment has demonstrated that this would have a minor impact on key junctions to be affected by the proposed development which would continue to operate within practical capacity. The traffic impact assessment includes consideration of a cumulative traffic impact associated with the nearby Newton Marina development.

7.4 Overall Conclusion

7.4.1 The development proposals are broadly in accordance with the relevant national and local planning policies. In accordance with SPP, the proposed marina would support growth in the marine leisure sector and in an appropriate location which optimises the resources available. While the proposed development is not situated within 400m of a bus service as recommended within PAN 75, the proposed development will provide coach transport for visitors to mitigate this. In accordance with the Outer Hebrides LDP, the proposed development fits in with the character of the area and is in line with the use classes in which that site has been identified for.

7.4.2 The TA concludes that the phase 1 proposed development can be integrated into the existing transport network, that the development is of a proportionate scale to its situation, and it is anticipated that the vehicle trips generated by the development will not have a significant impact to the local and wider road network.

Appendix A

Scoping Letter

John M MacLeod
Comhairle Nan Eilean Siar Offices,
Sandwick Rd,
Stornoway,
HS1 2BW

Our Ref: GB01T17O43/10708512
Client Ref: 169265

Proposed Stornoway Deep Water Port Development
Glumaig Bay, Stornoway, Isle of Lewis
Transport Assessment Scoping

09/04/2018

Dear John,

SYSTRA Ltd (SYSTRA) has been appointed by EnviroCentre to prepare a Transport Assessment (TA) and Traffic and Transport Environmental Impact Assessment (EIA) Report Chapter. These reports will accompany the full EIA report, which is being prepared in support of a planning application by Stornoway Port Authority (SPA) for the redevelopment of the deep water port adjacent to Arnish Point in Stornoway, Isle of Lewis, referred to as 'Stornoway Deep Water Port'.

This letter is intended to form the Scoping Study that sets out the methodology and parameters that will be adopted in the emerging TA for agreement with Comhairle nan Eilean Siar (CnES). A site visit was undertaken by SYSTRA on 16th January 2018 to inform this Scoping Study and the emerging reports.

EnviroCentre submitted the EIA Screening and Scoping Report for the proposed development to CnES on 12th September 2017, which included details of the methodology to be applied and potentially significant effects during the construction phase and post-completion. A response from CnES was received on 7th November 2017 which agreed to the methodology set out for the Traffic and Transport EIA Report Chapter. In the response, CnES noted that opportunity should be taken to improve road safety, promote green transport, active travel, provide bicycle storage, and address access issues, particularly at stress points. CnES also stated that the new development should meet the car parking standards set out in the Local Development Plan, or provide a justification of the proposed provision and non-conformity with the Standard, and details should be provided as to how pedestrians and cyclists will be accommodated. These aspects will be covered within the TA for the proposed Deep Water Port.

The following paragraphs detail the proposed scope of the TA for the Stornoway Deep Water Port development.

Methodology & Policy Guidance

The Transport Assessment will be completed in accordance with appropriate local, regional and national policy and guidance. Specifically, reference will be made to the following:

- Transport Scotland – "Transport Assessment Guidance" (TAG) (2012);
- Planning Advice Note (PAN) 75 – "Planning for Transport";
- Scottish Planning Policy (2014);
- Outer Hebrides Local Development Plan (LDP) 2 – "Working Towards A New Plan" (2012) and "Supplementary Guidance: Standards for Car Parking & Roads Layout" (2012); and
- HITRANS – "The Transport Strategy for the Highlands and Islands" (2008 – 2021).

The Site

The site is located approximately 1.5km – 2km (as the crow flies) south of Stornoway, on the Isle of Lewis. The site comprises the west Arnish Point Industrial Estate, including a quayside, Fabrication yard and an area of coast on two sides of a peninsula. The site is accessed from the west via the junction at the A859.

Highlands and Islands Enterprise operates the deep water pier at Arnish which is regularly used by offshore construction vessels delivering cargo to the Arnish fabrication yard. The Arnish fabrication facility (operated by BiFab) is currently used to manufacture and assemble oil and gas equipment. It is also likely to continue to be used for both onshore and offshore wind and tidal arrays. The yard comprises a 100m quay, 60,000m^2 of open storage with assembly halls covering 17,400m^2.

Development Proposal

The first phase of the proposals provides 400m of quay with 10m water depth at lowest tide, a new freight ferry berth and marshalling area, a heavy lift area 50m square, and 10ha of laydown, storage and development land behind the quay. The proposals also incorporate a 40m wide access corridor around the south side of Glumaig Bay, connecting Arnish Yard to the new quay.

The proposals are designed to provide the following:

- Alongside berthing for cruise liners of all sizes;
- Waiting and turning area for buses serving cruise liner passengers;
- Ferry berth, linkspan and marshalling area (freeing up the current car ferry to provide an additional daily sailing);
- Extensive laydown and storage area with 50m square heavy lift area to service renewables and decommissioning projects;
- Development platform for industrial and or storage use; and
- Berthing and unloading equipment for oil delivery vessels, with pipelines to new storage tanks (which will provide additional storage capacity for the island).

Vehicular Access

Current vehicular access is from a junction approximately 1.2km north of the access to the Creed Enterprise Park (comprising a business park and recycling plant). The access is a single track road from a priority junction with the A859. The junction has a wide bellmouth entrance (as indicated by Figure 1) which has been designed to be suitable for HGVs, therefore the current Arnish Road is considered to be appropriate for HGVs.

Figure 1. Bellmouth Entrance at Arnish Road / A859 Junction

The Stornoway Deep Water Port development will be approximately 2.0km from the main spinal route. The existing single track road has frequent passing opportunities, however, the road may require some upgrading works to accommodate additional traffic (primarily surfacing of passing places). It should be noted that during its busy periods in the late 80's , the Arnish Fabrication Yard employed upwards of 400 people with associated traffic movements. Deliveries for the site were also significant with steel mainly being imported by road. The road has been upgraded since to accommodate wind turbine deliveries.

Another potential access road option exists via a not yet constructed bypass road from Creed Enterprise Park which would connect to the existing Arnish Road approximately midway between the existing junction with the A859 and Arnish Point. The Creed Enterprise Park also forms a priority junction with the A859. It is noted that further discussions will be required to establish the proposed development's final access arrangement.

The A859 routes north-east to meet the A857 which continues south to the town centre. The A859 also routes south-west to the most southerly point of the Isle of Lewis and Harris.

The TA will provide detailed consideration of the existing conditions of the road network proposed for use by the Stornoway Deep Water Port development. Nevertheless, from SYSTRA's site visit and desk top study we would suggest that existing local road network is suitable in its current form to accommodate additional vehicle movements associated with the proposed development.

Pedestrian, Cycle & Public Transport Access

As discussed, CnES expressed in their response to the EIA Scoping Report that opportunity should be taken to promote green transport and active travel. However, the remote nature of the site should be taken into account when assessing the accessibility of the site by walking, cycling and public transport. With the development of wind farms close to the site, there are two significant Hydrogen energy opportunities currently being investigated by the consortia involved. Such opportunities may allow the use of Hydrogen ferries, and buses to the new development.

It is noted that the nearest bus services to the site are from stops located where the Arnish Point Road meets the A859 serving both northbound and southbound directions. However, these bus stops are outwith walking

distance from the proposed development. Measures to promote the accessibility of the site by sustainable modes will be proposed within the TA, such as the provision of coaches to transfer cruise passengers between the site and the town centre and to take passengers on site-seeing outings, and car sharing between staff to reduce single occupancy car trips.

Parking

CnES provide guidance on car parking standards through Supplementary Guidance of the Outer Hebrides LDP (2012), however, given the mixed-use nature of the proposed development, the following statement from the guidelines is applicable in this case:

"Where a proposal incorporates more than one element the parking requirement for each element will be assessed independently and then added together. However, where it can be demonstrated to the satisfaction of the Comhairle that peak operating times of the various elements would occur at different times some discounting of the required number of spaces may be acceptable."

Parking numbers for the proposed development will be confirmed within the TA in agreement with CnES. SYSTRA would suggest that parking takes cognisance of the bespoke land uses and the fact that the majority of visitors to the development will travel by cruise liner. As such, parking provision will be informed by staff numbers and anticipated shift patterns.

Baseline Traffic Conditions (Surveys)

The Department for Transport holds annual average daily flow (AADF) traffic data from automatic traffic counters (ATCs) on the A859, A857 and A858 and in the vicinity of the site, recorded during 2015 and 2016 (the most recent information available). This data will be used for assessing the percentage increase in total traffic levels and HGV levels along these road links as part of the Traffic and Transport EIA Report for the proposed development.

To inform the traffic impact assessment within the TA, SYSTRA proposes to commission turning count surveys at the following junctions (Figure 2 and Figure 3) during the periods of 07:00-09:00 in the AM, 11:00-13:00 in the mid-morning/afternoon and 16:30-18:30 in the PM:

1. Arnish Road / A859 priority junction; and
2. Manor Roundabout (A857 / A859 / Perceval Road S) roundabout.

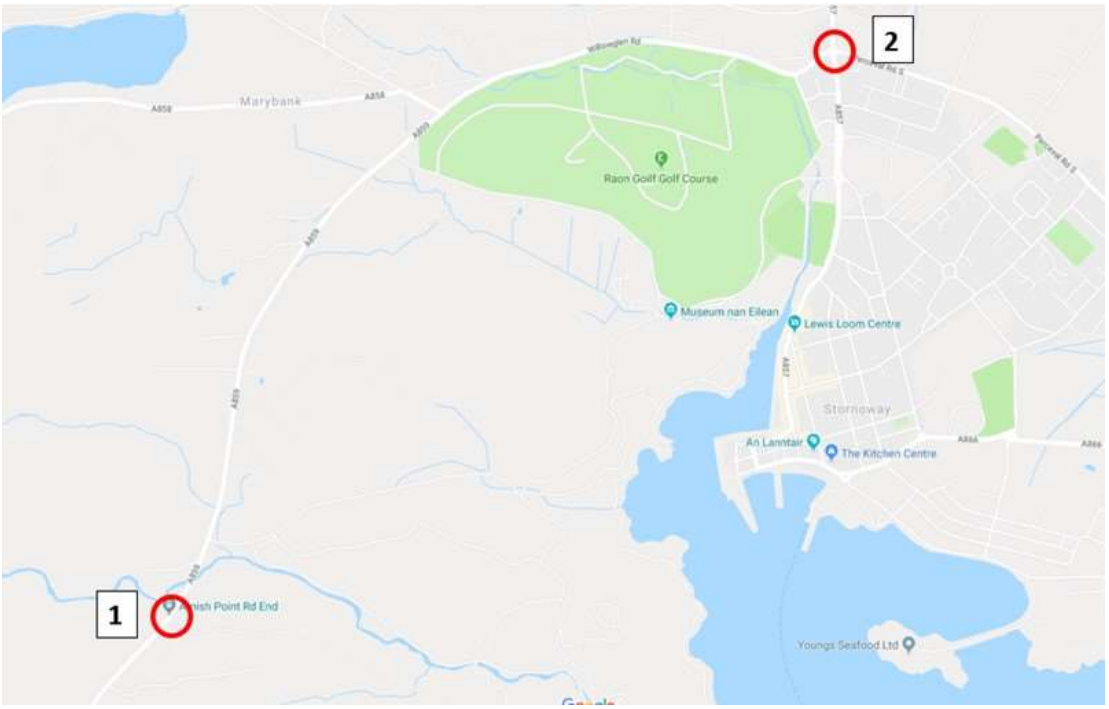


Figure 2. Proposed Junctions to be Surveyed

Junction 1 will be surveyed as the potential access point to the proposed development's access track. However, if access to the proposed development was to be achieved via the Creed Enterprise, data from the Junction 1 survey for the mainline (A859) traffic flows can be utilised and turning count data can be estimated from traffic flows extracted from the TA for the Creed Enterprise development (if available) or estimated using the TRICS database.

All traffic routing into Stornoway Town Centre will utilise Junction 2, hence it will be important to evaluate the proposed development's impact at this junction.

Development Trip Generation

Given the nature of the development, the expected trip generation will be calculated from a first principles (and for a worst-case scenario) approach.

SPA anticipates that during operation, phase 1 of the proposed development would generate in the region of 20 – 30 HGVs per day staggered around the arrival and departure times of the freight ferry which would be around 05:30 and 23:00 respectively. Associated with the cruise ship passengers, it is understood that the proposed development would generate approximately 25no. 50-seater coach trips taking passengers on two half day trips per day (morning trip around 08:00 – 13:00 and afternoon trip around 13:00 – 17:00) equating to 50 two-way coach trips in the morning and afternoon respectively. In addition, there is expected to be 3no. 50-seater coaches operating as shuttle buses between the site and the town centre while a cruise ship is in port.

With regard to vehicle trips associated with staff members for phase 1 of the proposed development, SPA anticipates that there would be approximately 100 employees working in shifts. It is understood that the majority of staff will work day shifts (beginning at around 08:00 and ending around 16:00) and only a small

proportion will work night shifts. This means that the majority of staff numbers will travel outwith the traditional peak periods, with any residual peak hour traffic movements being low and negligible.

The distribution and assignment of the vehicle trips associated with the proposed development will also be derived from a first principles approach. At this time it is expected that there would be a 70/30 split of HGVs routeing north/south on the A859.

The expected number of vehicle trips that the proposed development will generate will be detailed within the TA. This will take into consideration staff numbers, shift patterns and in terms of distribution, population demographics.

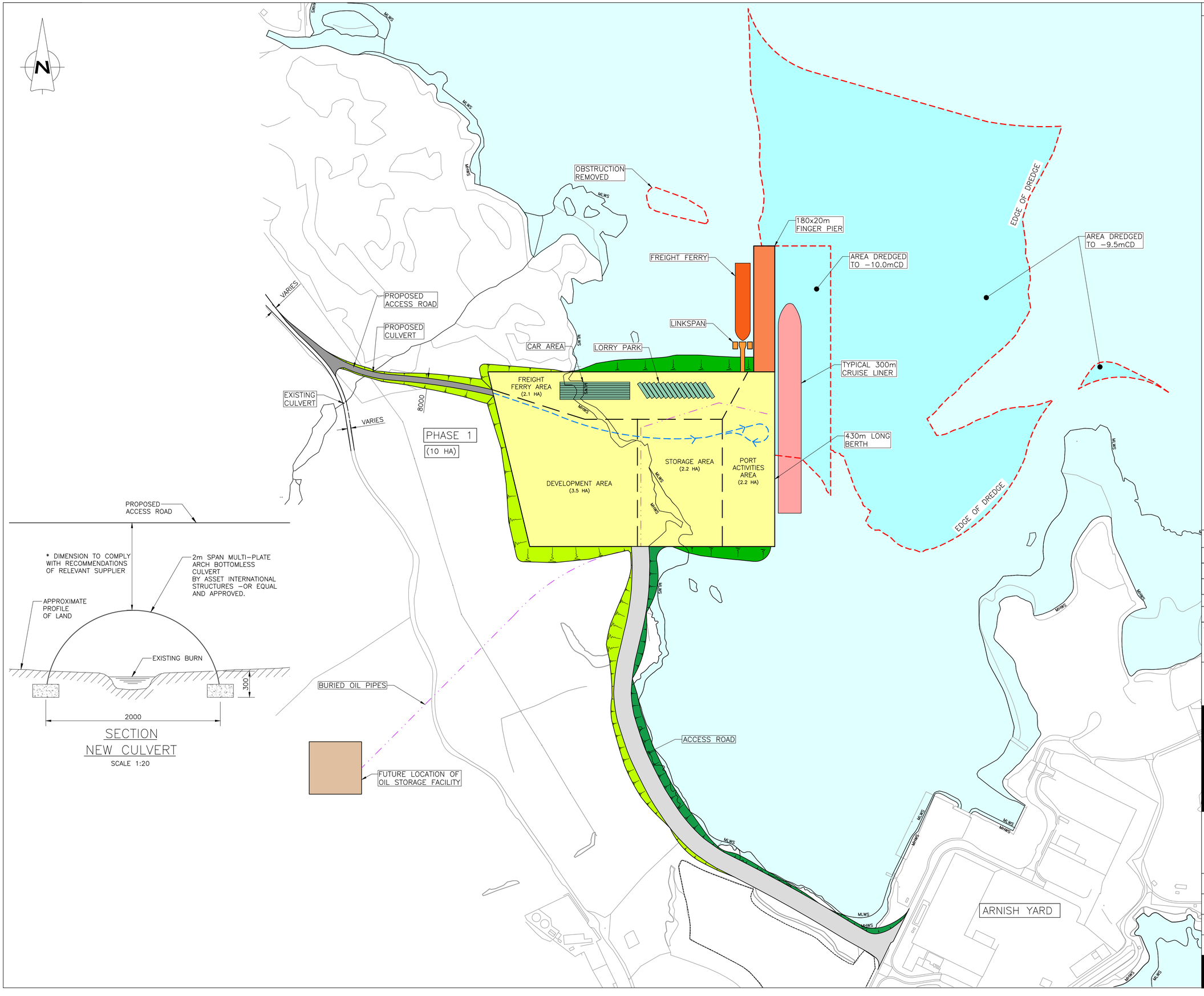
Committed Development
SYSTRA would ask that CnES confirm whether there are any committed developments or proposed transport infrastructure schemes which will impact on the identified study network.

Yours sincerely

Bridget Fleming
Consultant

Appendix B

Indicative Development Layout



SECTION
NEW CULVERT
SCALE 1:20

GENERAL NOTES

1. ALL LEVELS ARE IN METRES AND RELATE TO CHART DATUM, UNLESS NOTED OTHERWISE.
2. CHART DATUM IS 2.71m BELOW ORDNANCE DATUM.
3. TIDE LEVELS:−

HAT=	+5.5mCD	(+2.79mOD)
MHWS=	+4.8mCD	(+2.09mOD)
MLWS=	+0.7mCD	(−2.01mOD)
LAT=	0mCD	(−2.71mOD)

REV	DATE	DETAILS	DRAWN	CHK'D	APP'D
D	05.04.18	LEISURE AREA REMOVED	JA	RD	JP
C	04.04.18	ACCESS ROAD AMENDED. CUT SLOPES ADJUSTED.	AB	JP	JP
B	26.02.18	ACCESS ROAD AMENDED.	AB	JP	JP
A	20.02.18	ACCESS ROAD AMENDED, CULVERT SECTION ADDED.	AB	JP	JP

AMENDMENTS

CLIENT
STORNOWAY PORT AUTHORITY

PROJECT
DEEP WATER PORT

Wallace Stone
CONSULTING CIVIL ENGINEERS
GLASGOW 0141 554 8233 glasgow@wallacestone.co.uk
DINGWALL 01349 866775 dingwall@wallacestone.co.uk
HEBRIDES 01851 612454 hebrides@wallacestone.co.uk

DRAWING TITLE
PHASE 1 LAYOUT

DRAWN	CHECKED	APPROVED
AB	RD	JP
DATE NOV'17	DATE NOV'17	DATE DEC'17

SCALE (A1) 1:2500
STAGE INFORMATION
REVISION A B C D

PROJECT No. 1980
DRAWING No. 901

Appendix C

Staff Distribution and Assignment

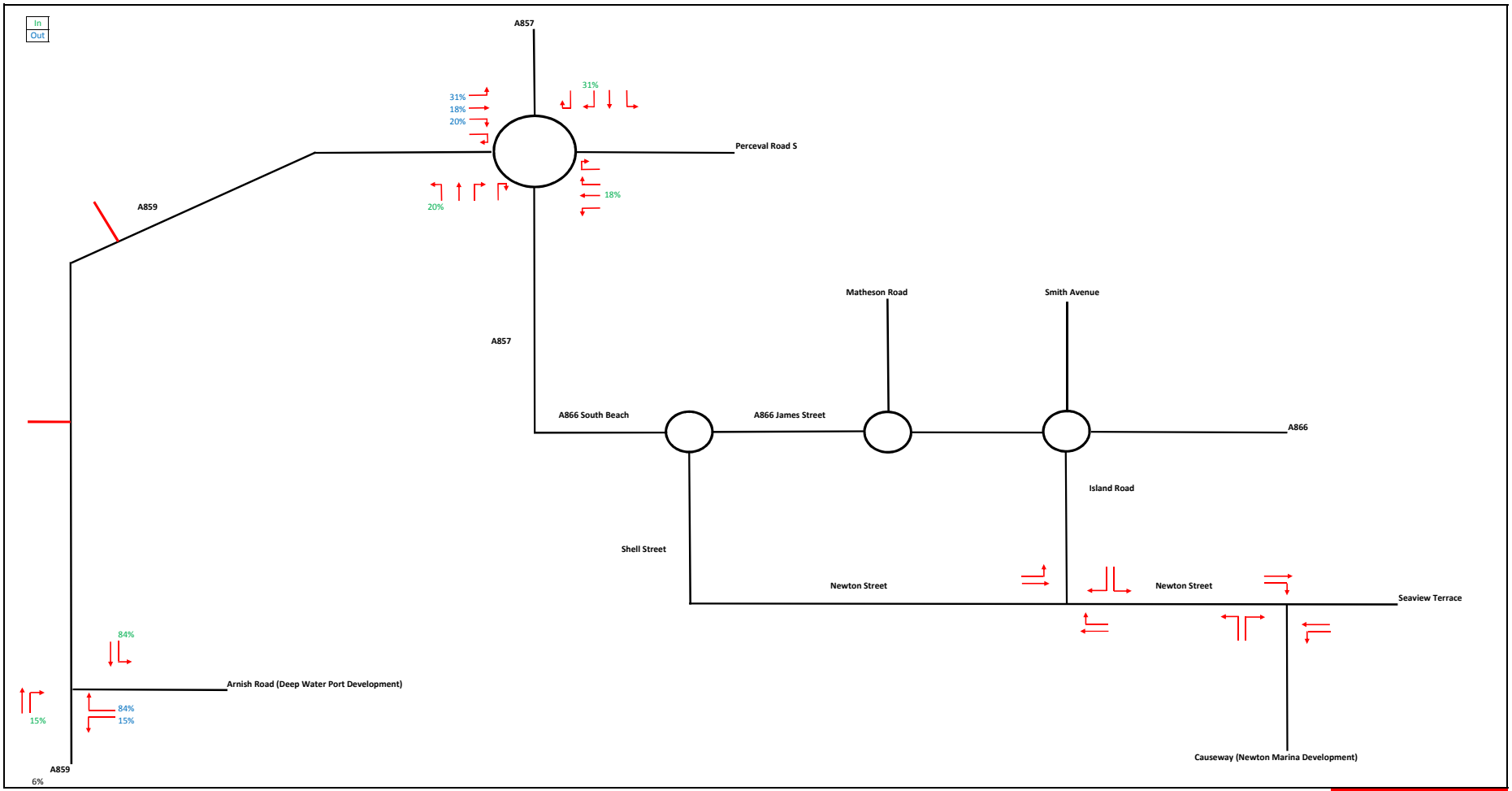


Figure C

DWP Staff Distribution

Appendix D

DfT Historical AADF Traffic Data

A857 Cromwell Street

AADFYear	AllMotorVehicles	Growth
2000	8473	
2001	8801	1.039
2002	9047	1.028
2003	9300	1.028
2004	9377	1.008
2005	9474	1.010
2006	9608	1.014
2007	9360	0.974
2008	9168	0.979
2009	9139	0.997
2010	9080	0.994
2011	9076	1.000
2012	9066	0.999
2013	8070	0.890
2014	8096	1.003
2015	8118	1.003
2016	8270	1.019
2017	8308	1.005

A857 Macauley Road

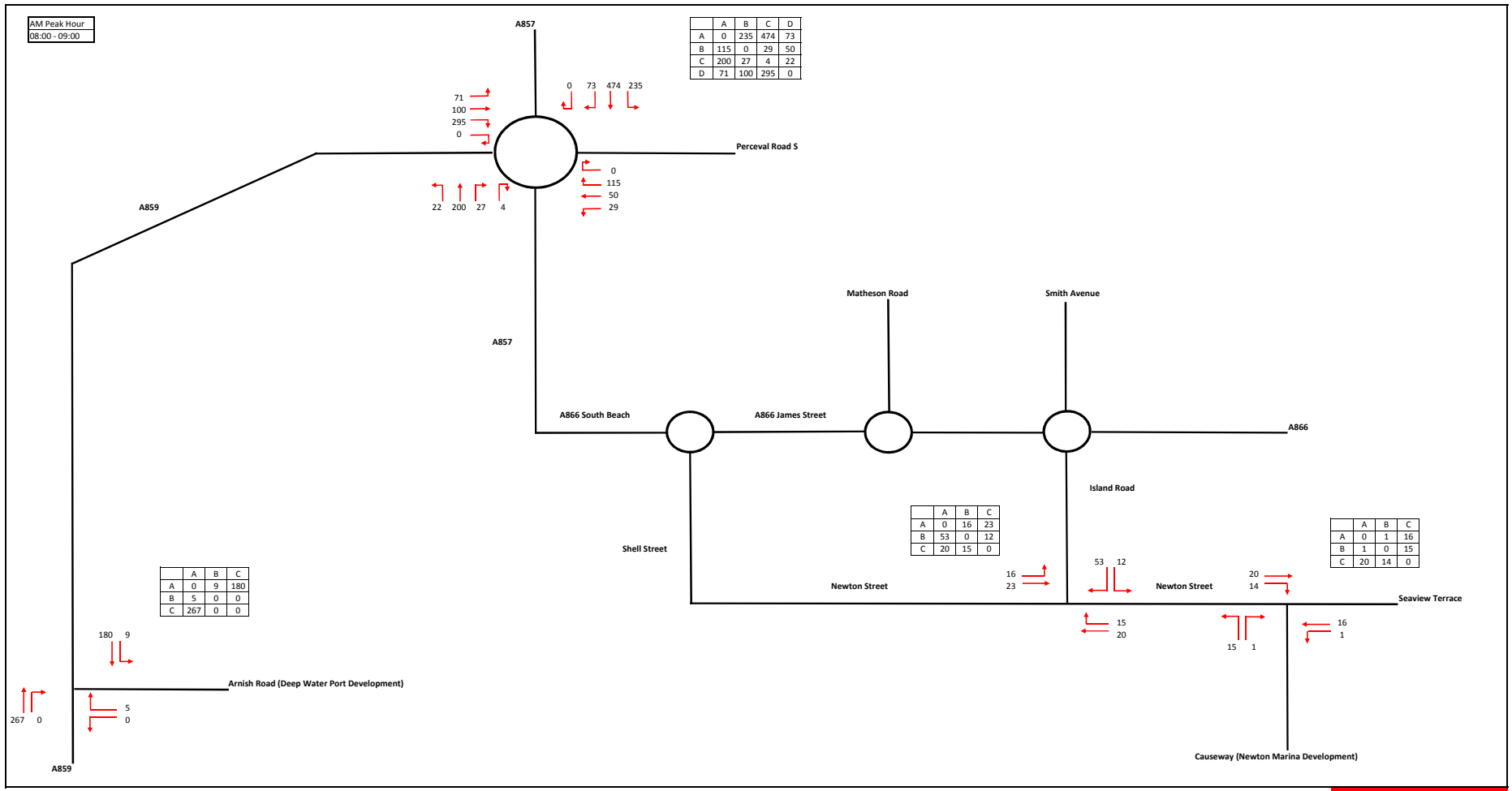
AADFYear	AllMotorVehicles	Growth
2000	13287	
2001	13765	1.036
2002	14203	1.032
2003	14772	1.040
2004	15001	1.016
2005	15197	1.013
2006	15546	1.023
2007	16323	1.050
2008	14476	0.887
2009	14425	0.996
2010	14328	0.993
2011	14317	0.999
2012	17479	1.221
2013	17501	1.001
2014	17549	1.003
2015	17614	1.004
2016	17956	1.019
2017	18056	1.006

A866

AADFYear	AllMotorVehicles	Growth
2000	2381	
2001	2430	1.021
2002	2054	0.845
2003	2142	1.043
2004	2157	1.007
2005	2155	0.999
2006	2191	1.017
2007	2165	0.988
2008	2155	0.995
2009	2200	1.021
2010	2162	0.983
2011	2174	1.006
2012	2135	0.982
2013	2038	0.955
2014	2078	1.020
2015	2123	1.022
2016	2162	1.018
2017	2173	1.005

Appendix E

Network Diagrams



	A	B	C	D
A	0	235	474	73
B	115	0	29	50
C	200	27	4	22
D	71	100	295	0

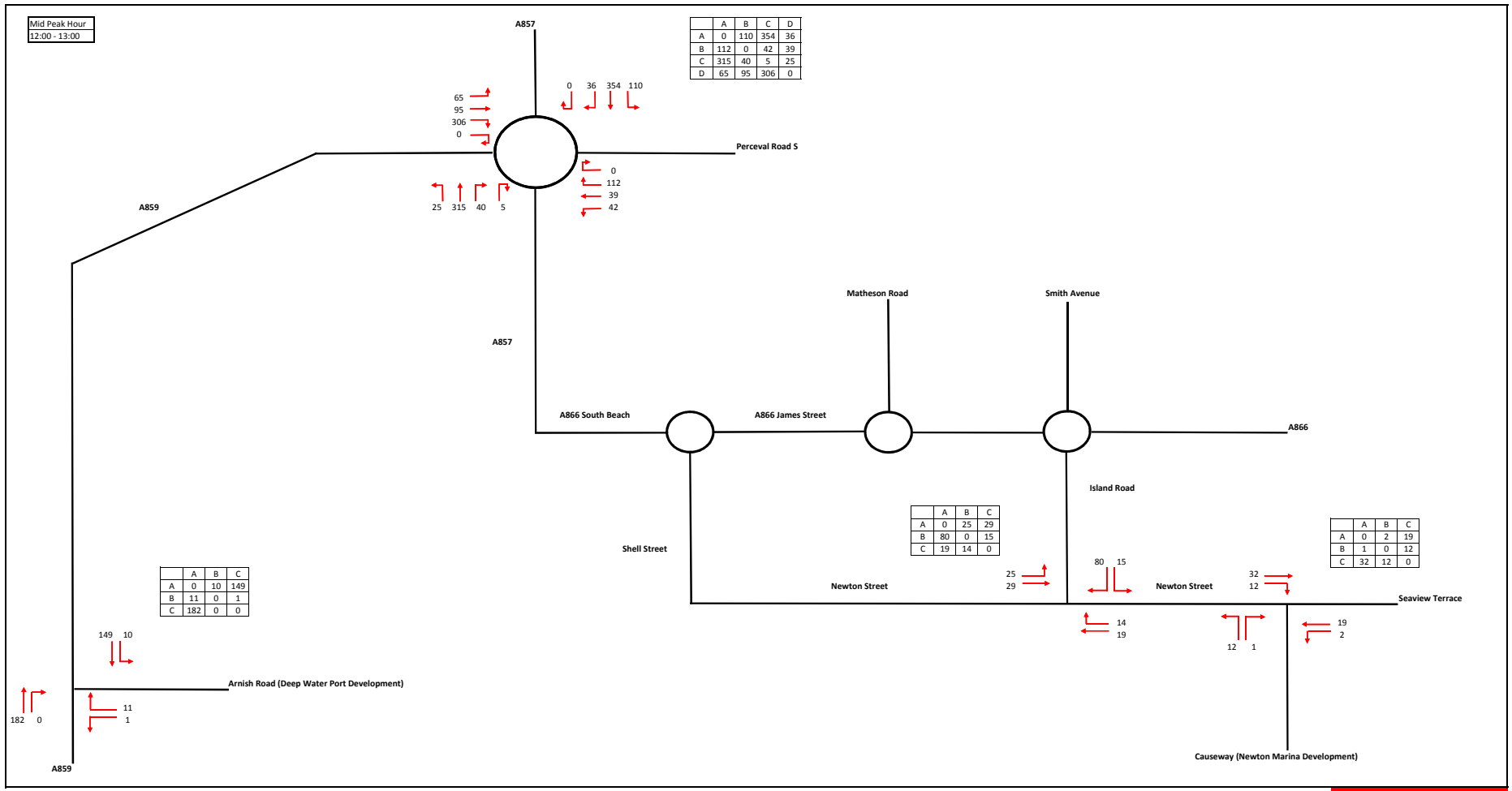
	A	B	C
A	0	9	180
B	5	0	0
C	267	0	0

	A	B	C
A	0	16	23
B	53	0	12
C	20	15	0

	A	B	C
A	0	1	16
B	1	0	15
C	20	14	0

Figure E1

2018 Base AM



	A	B	C	D
A	0	110	354	36
B	112	0	42	39
C	315	40	5	25
D	65	95	306	0

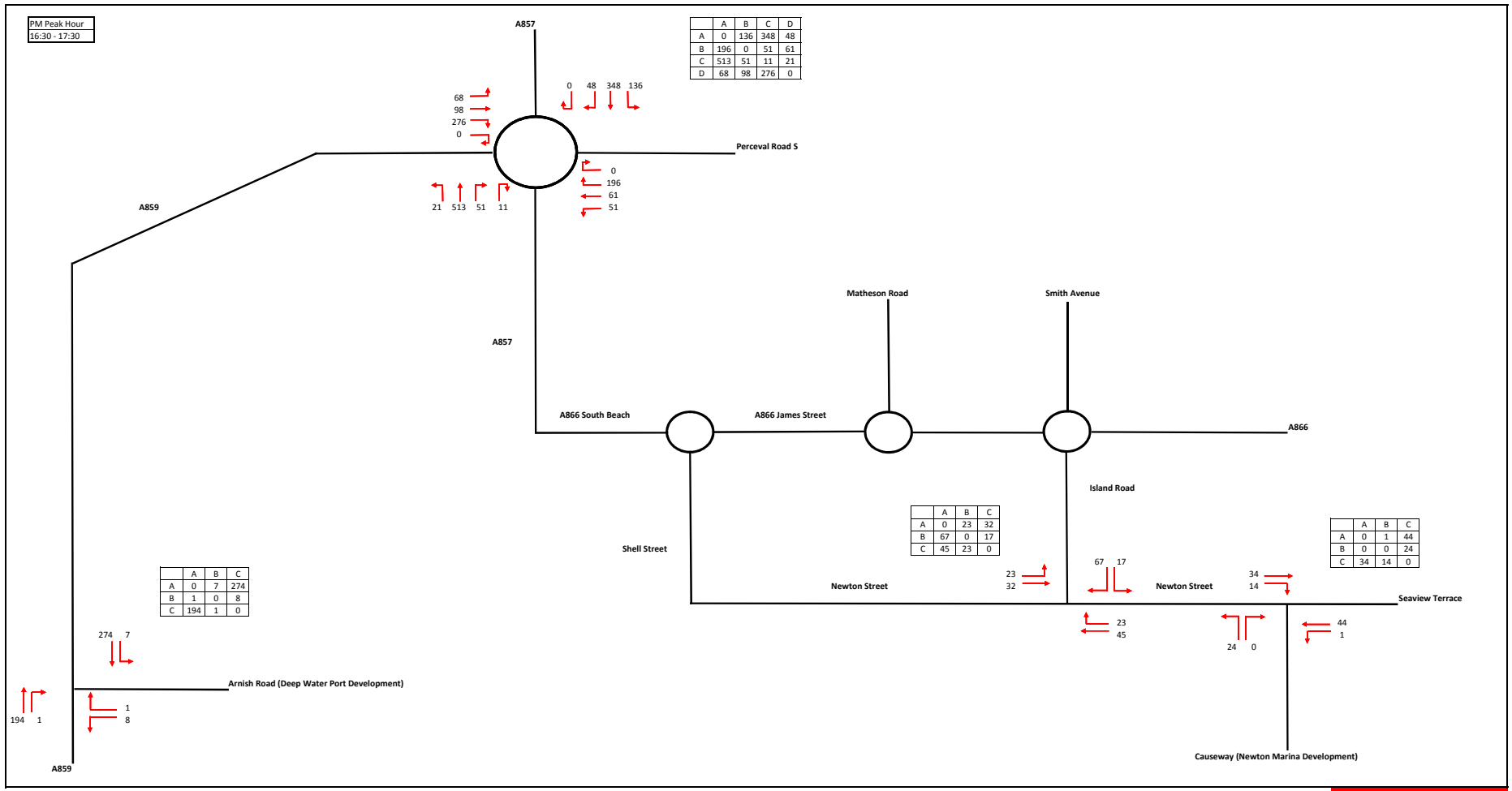
	A	B	C
A	0	10	149
B	11	0	1
C	182	0	0

	A	B	C
A	0	25	29
B	80	0	15
C	19	14	0

	A	B	C
A	0	2	19
B	1	0	12
C	32	12	0

Figure E2

2018 Base Mid



	A	B	C	D
A	0	136	348	48
B	196	0	51	61
C	513	51	11	21
D	68	98	276	0

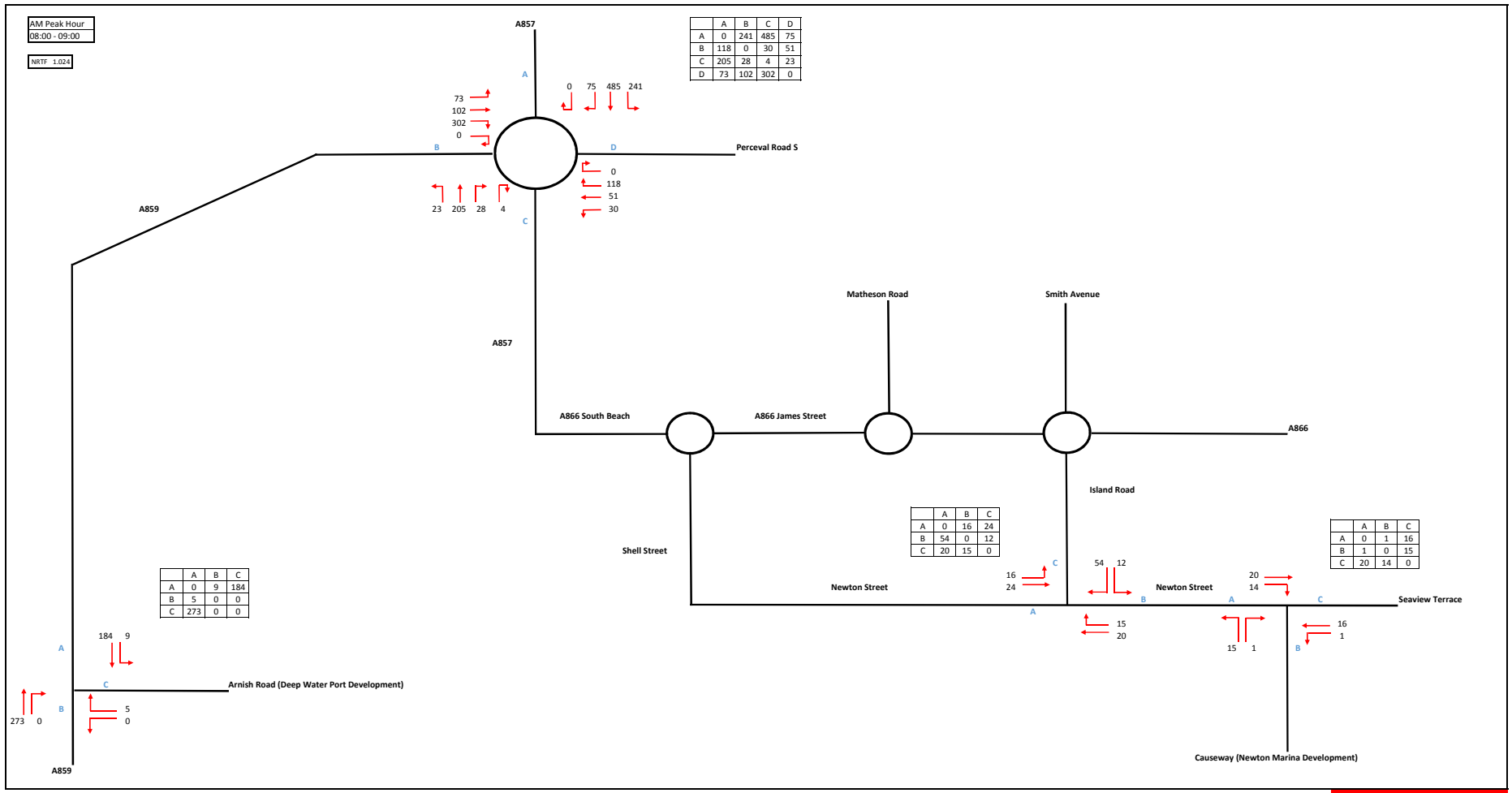
	A	B	C
A	0	7	274
B	1	0	8
C	194	1	0

	A	B	C
A	0	23	32
B	67	0	17
C	45	23	0

	A	B	C
A	0	1	44
B	0	0	24
C	34	14	0

Figure E3

2018 Base PM



	A	B	C	D
A	0	241	485	75
B	118	0	30	51
C	205	28	4	23
D	73	102	302	0

	A	B	C
A	0	9	184
B	5	0	0
C	273	0	0

	A	B	C
A	0	16	24
B	54	0	12
C	20	15	0

	A	B	C
A	0	1	16
B	1	0	15
C	20	14	0

Figure E4

2021 Base AM

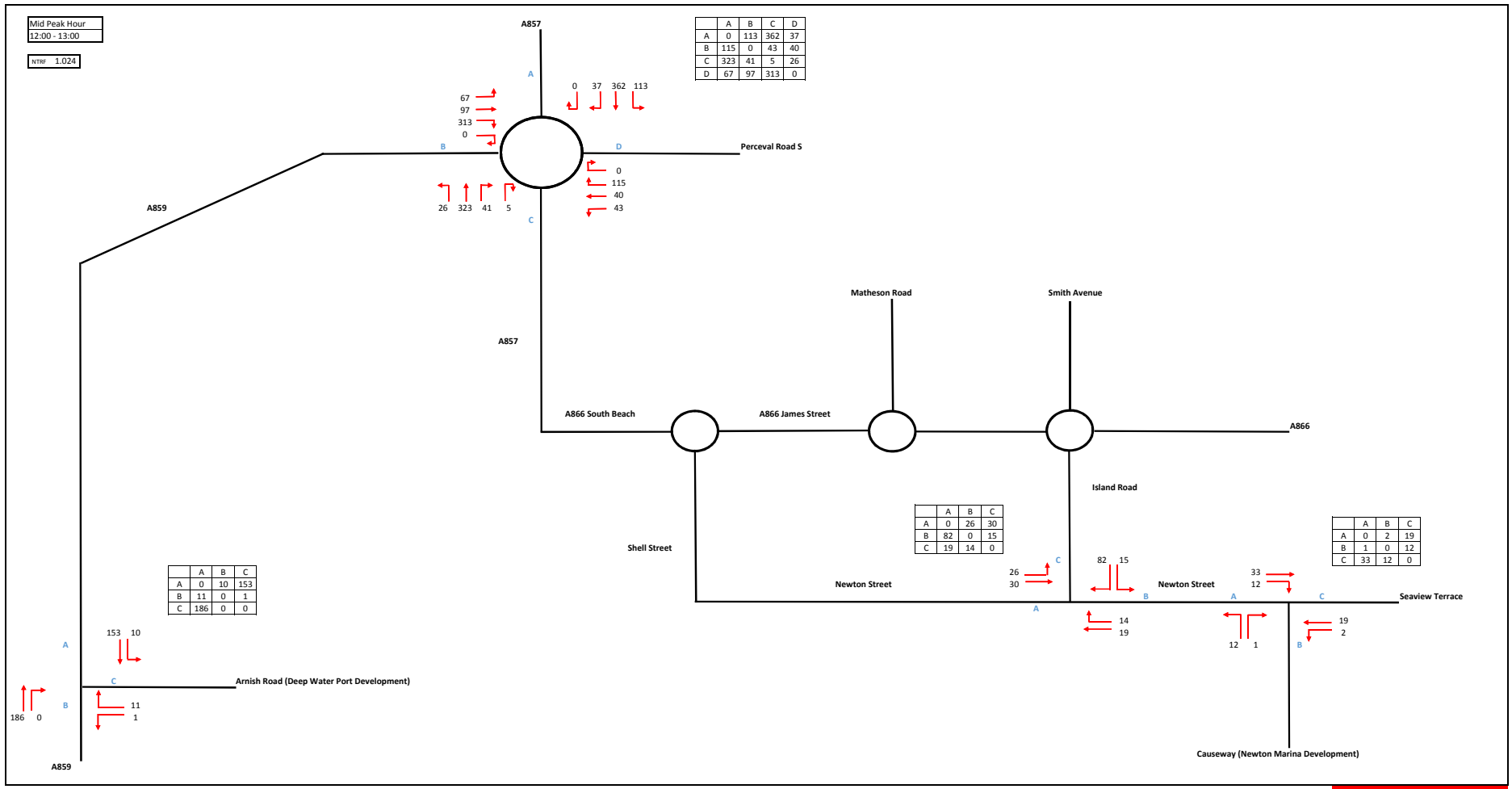
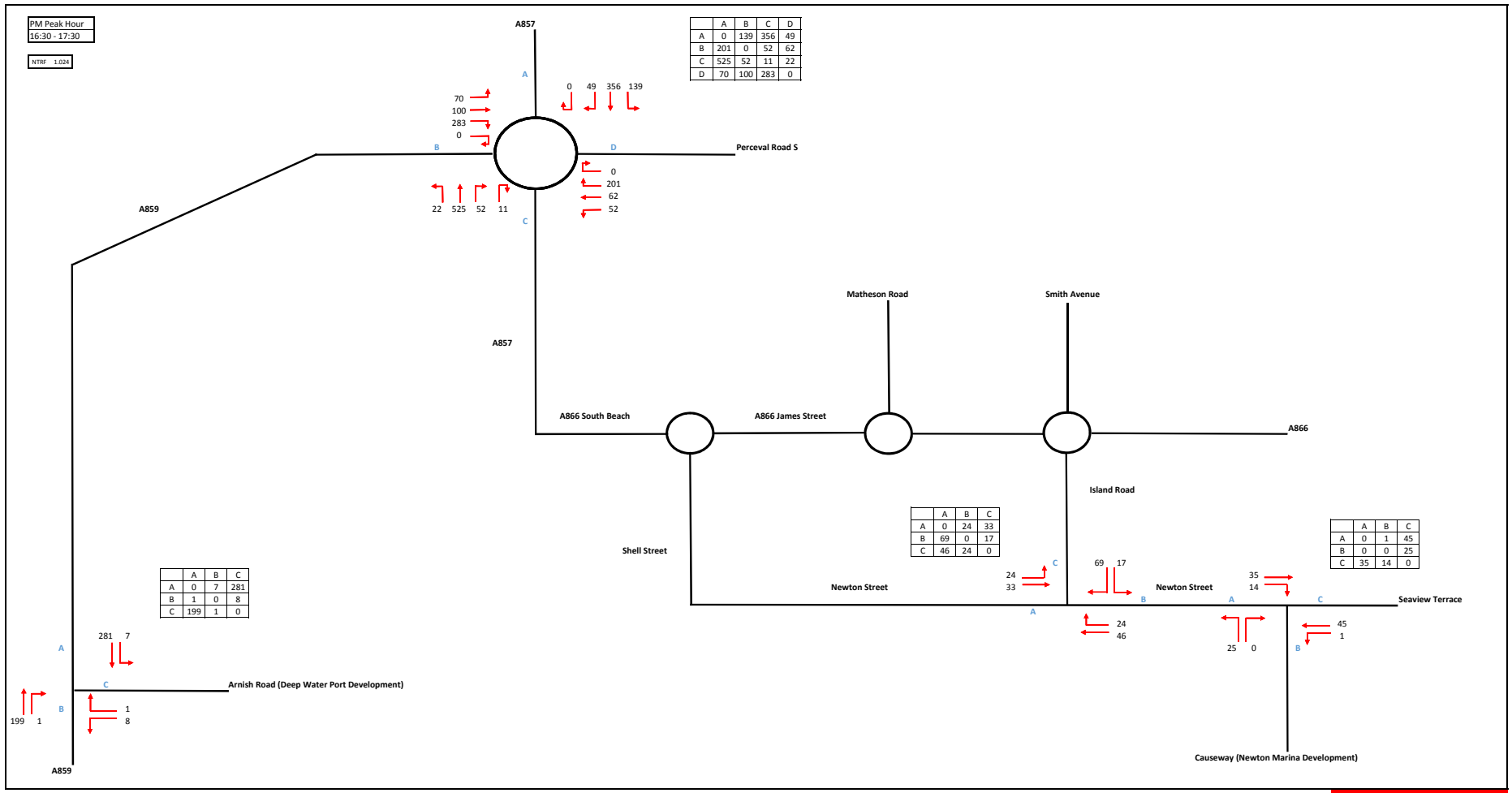


Figure E5

2021 Base Mid



	A	B	C	D
A	0	139	356	49
B	201	0	52	62
C	525	52	11	22
D	70	100	283	0

	A	B	C
A	0	7	281
B	1	0	8
C	199	1	0

	A	B	C
A	0	24	33
B	69	0	17
C	46	24	0

	A	B	C
A	0	1	45
B	0	0	25
C	35	14	0

Figure E6

2021 Base PM

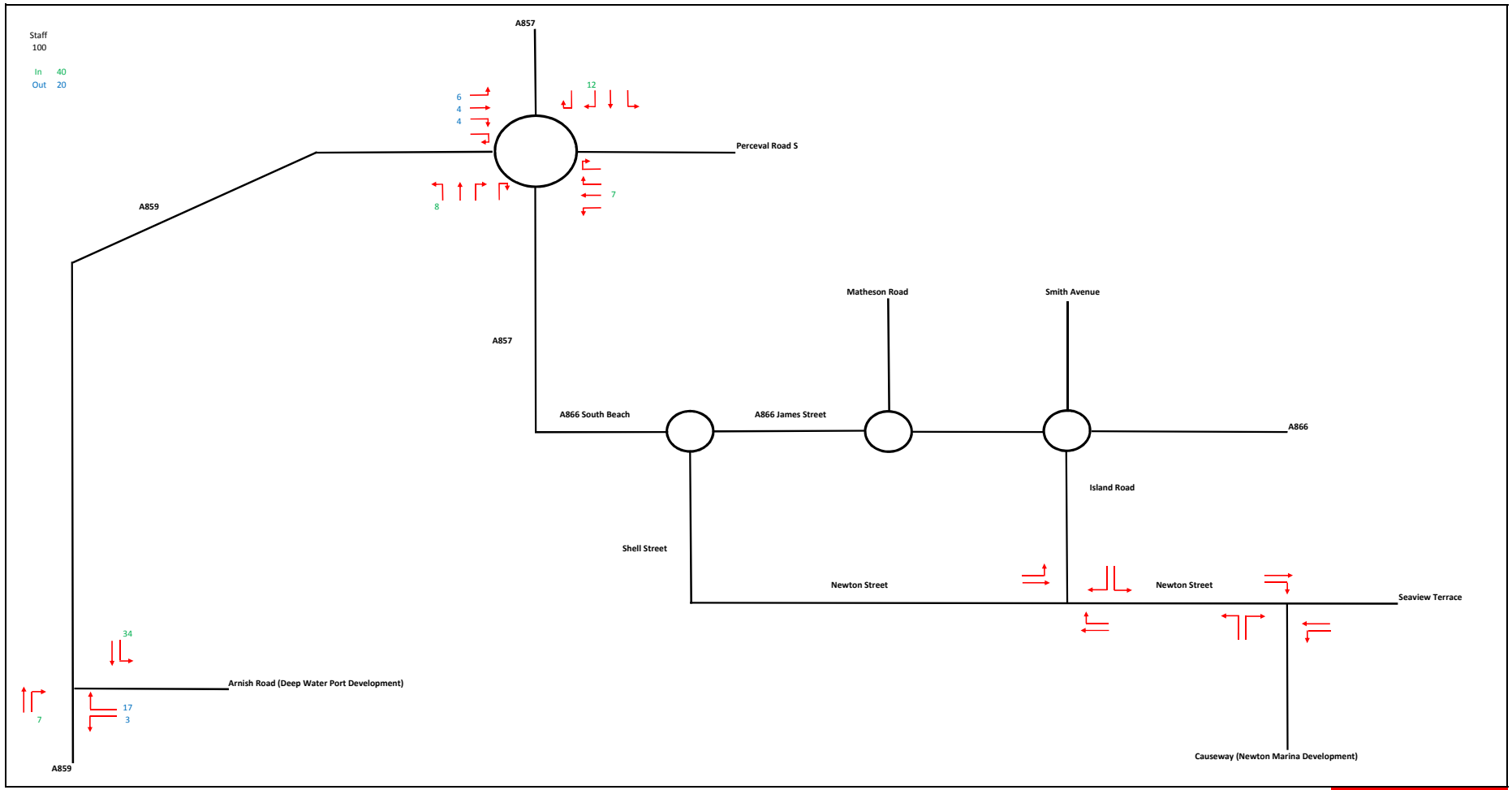


Figure E7

DWP Staff Trips AM

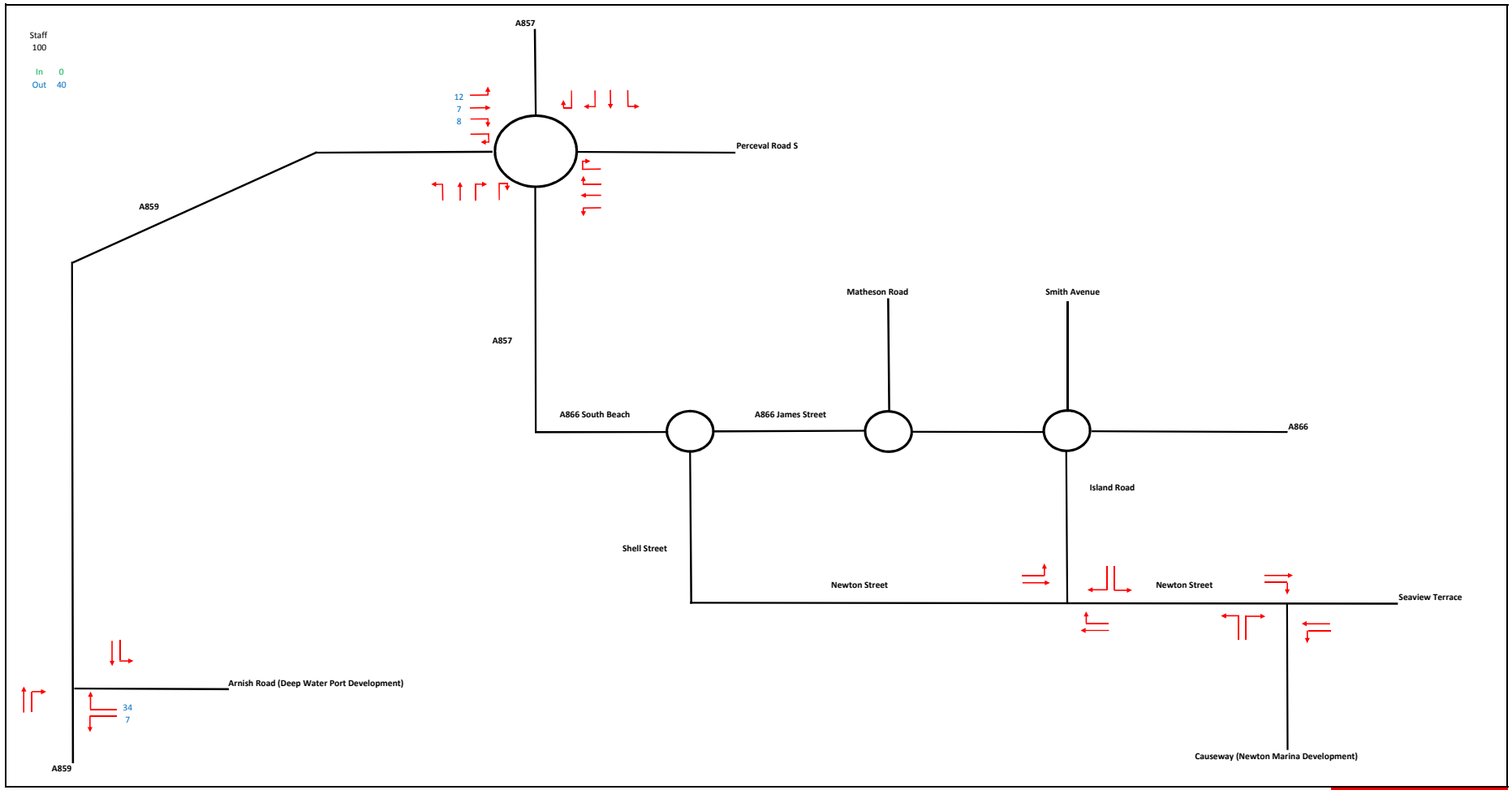


Figure E8

DWP Staff Trips PM

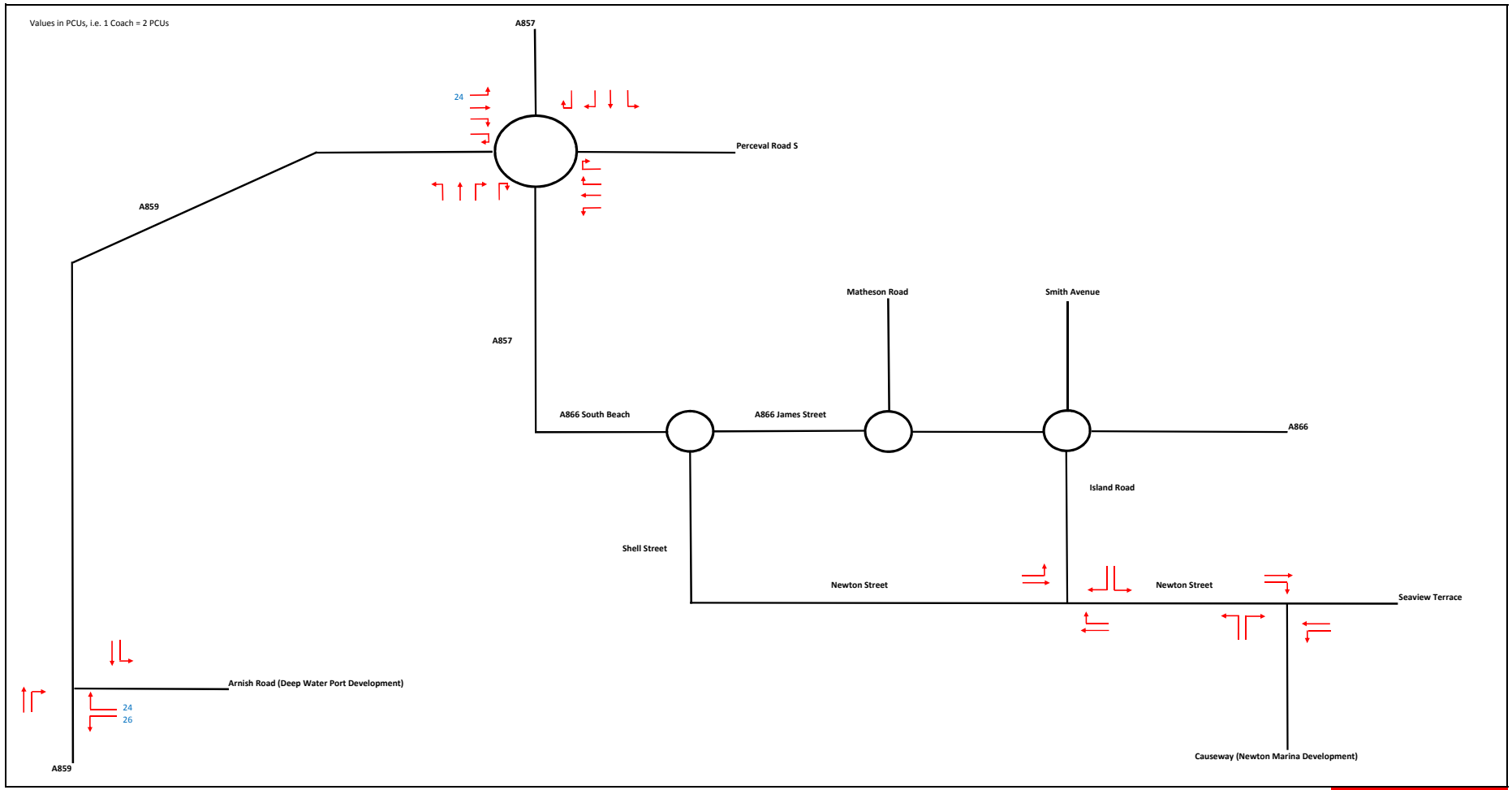


Figure E9

DWP Operational Day-Trips AM

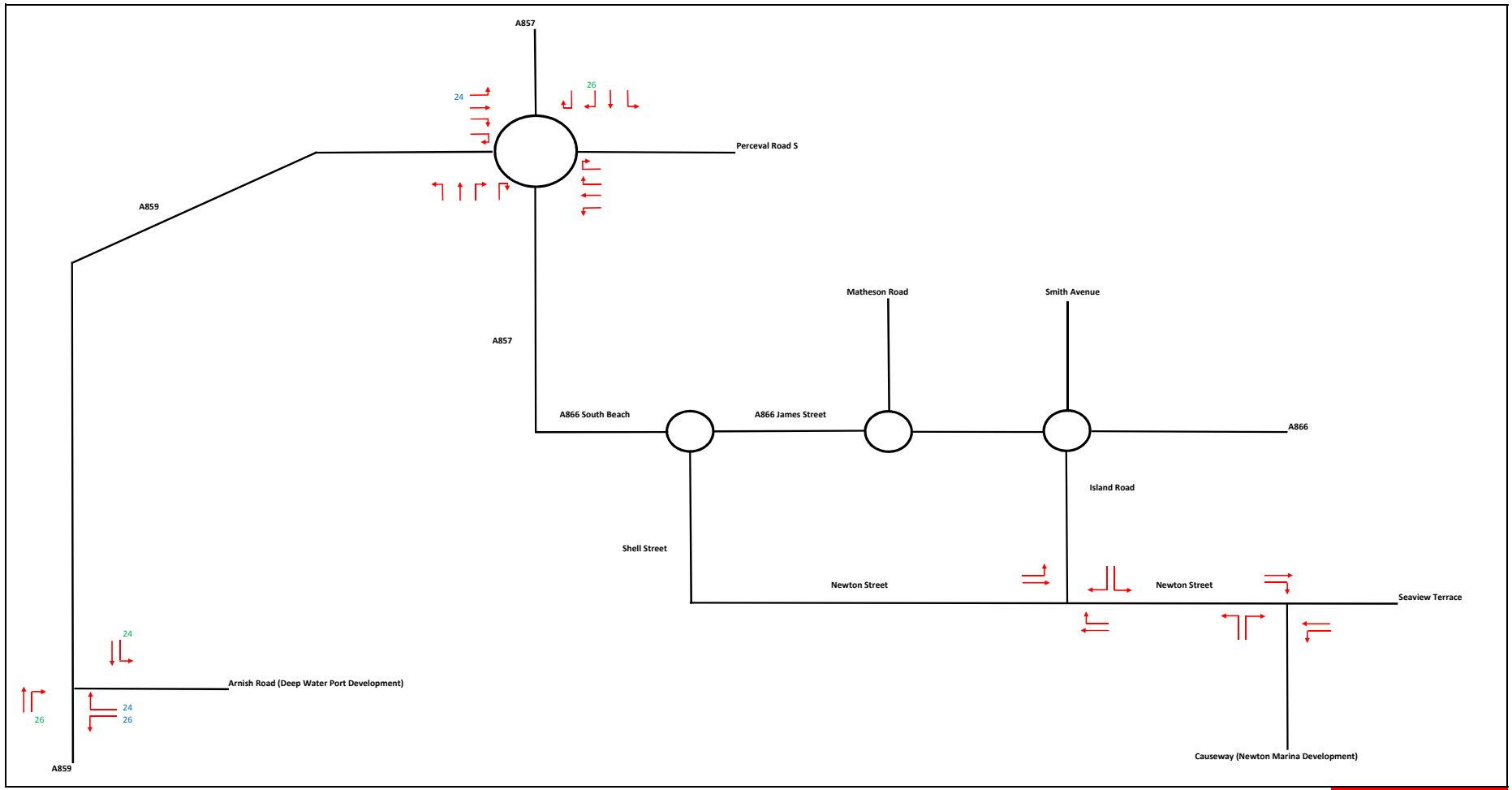


Figure E10

DWP Operational Day-Trips Mid

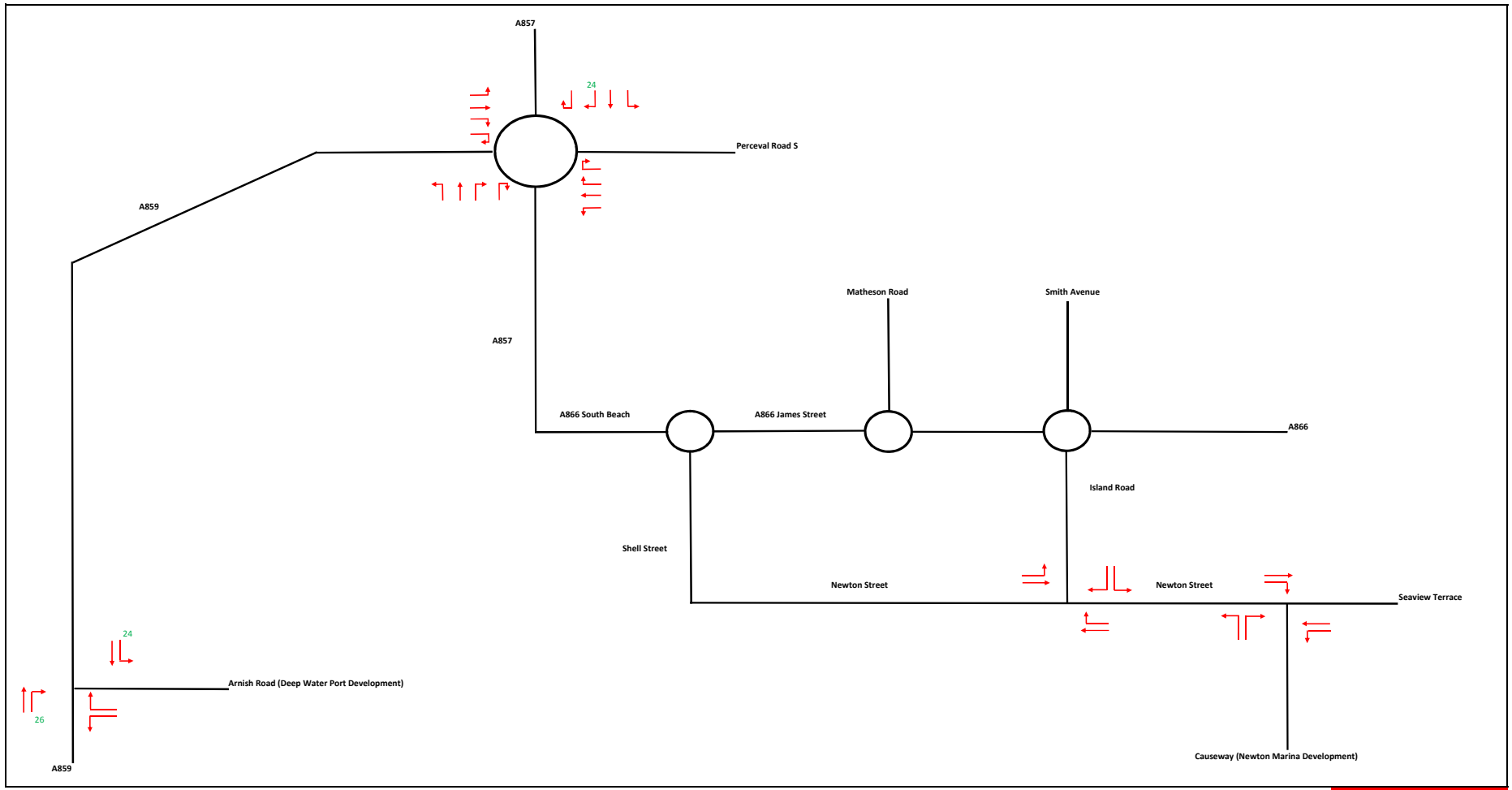


Figure E11

DWP Operational Day-Trips PM

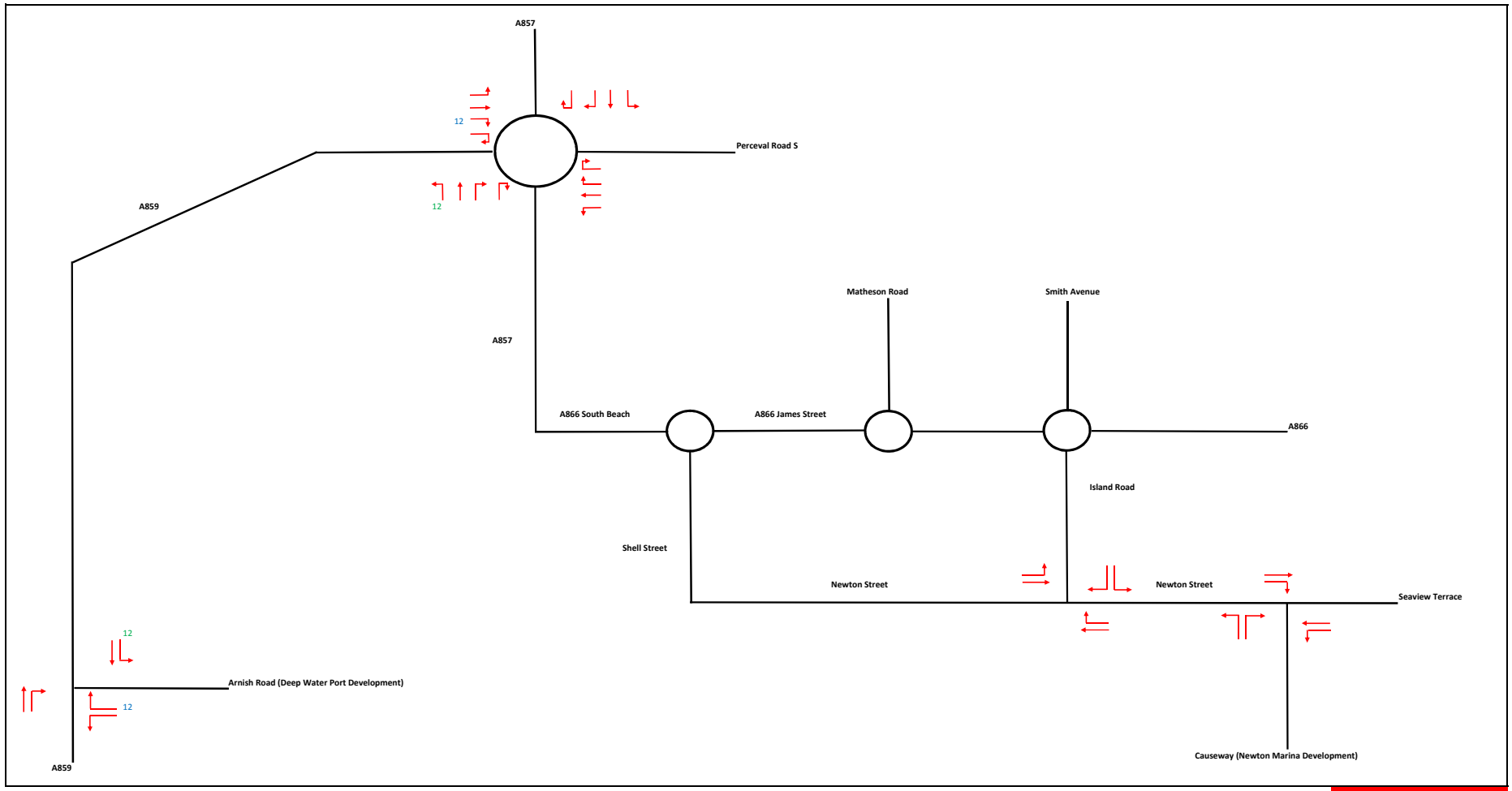


Figure E12

DWP Operational Shuttle AM

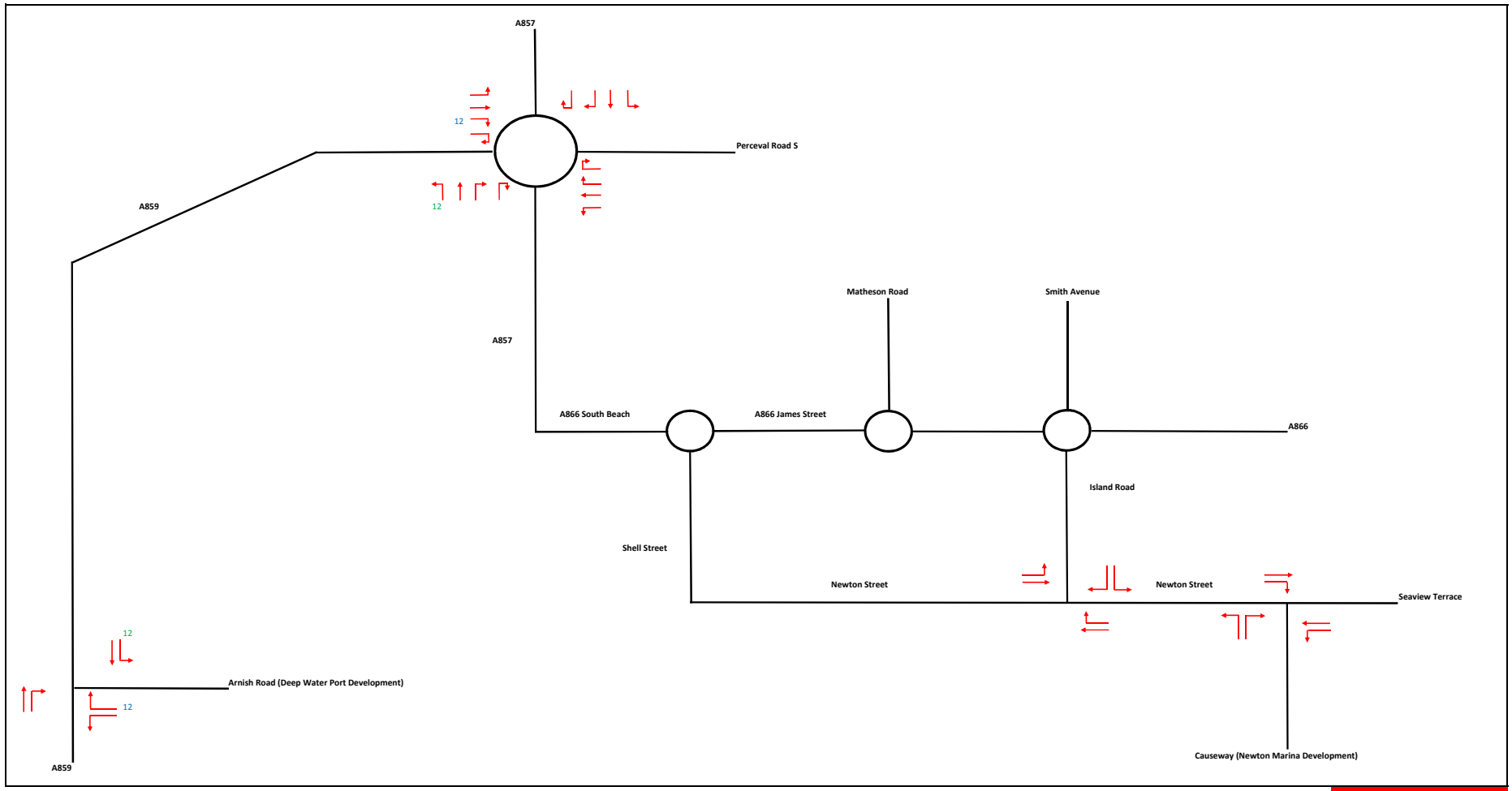


Figure E13

DWP Operational Shuttle Mid

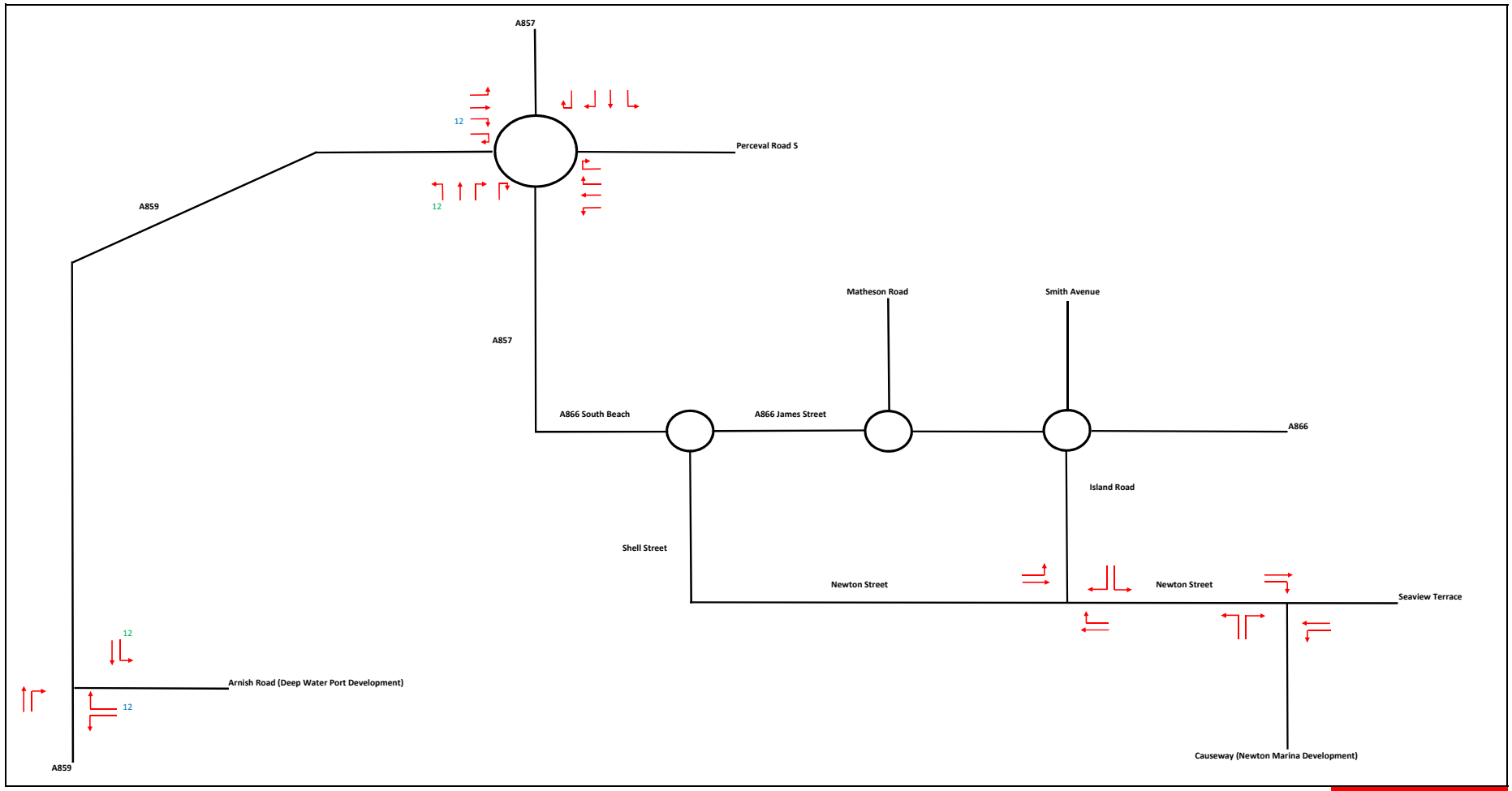


Figure E14

DWP Operational Shuttle PM

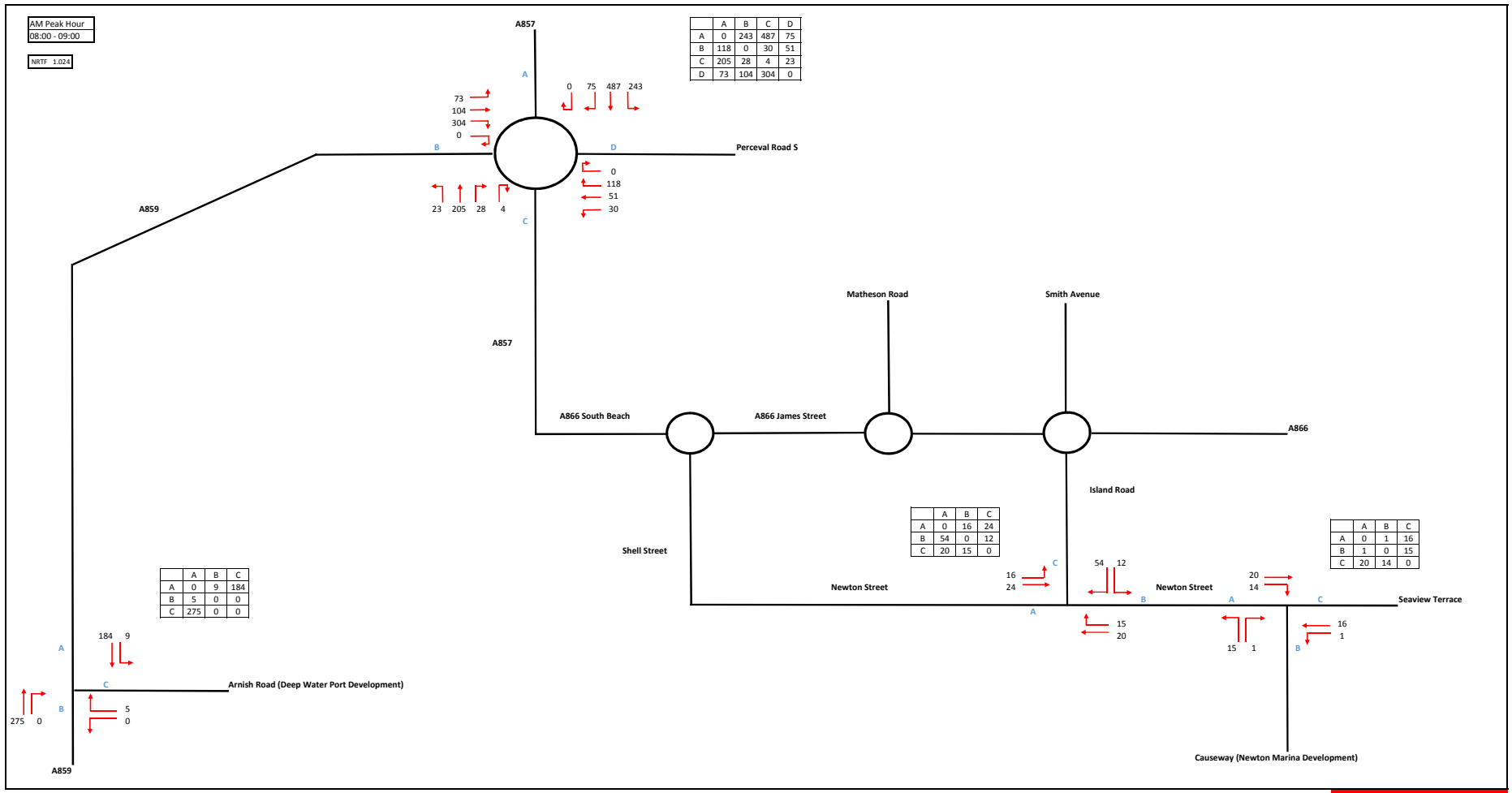
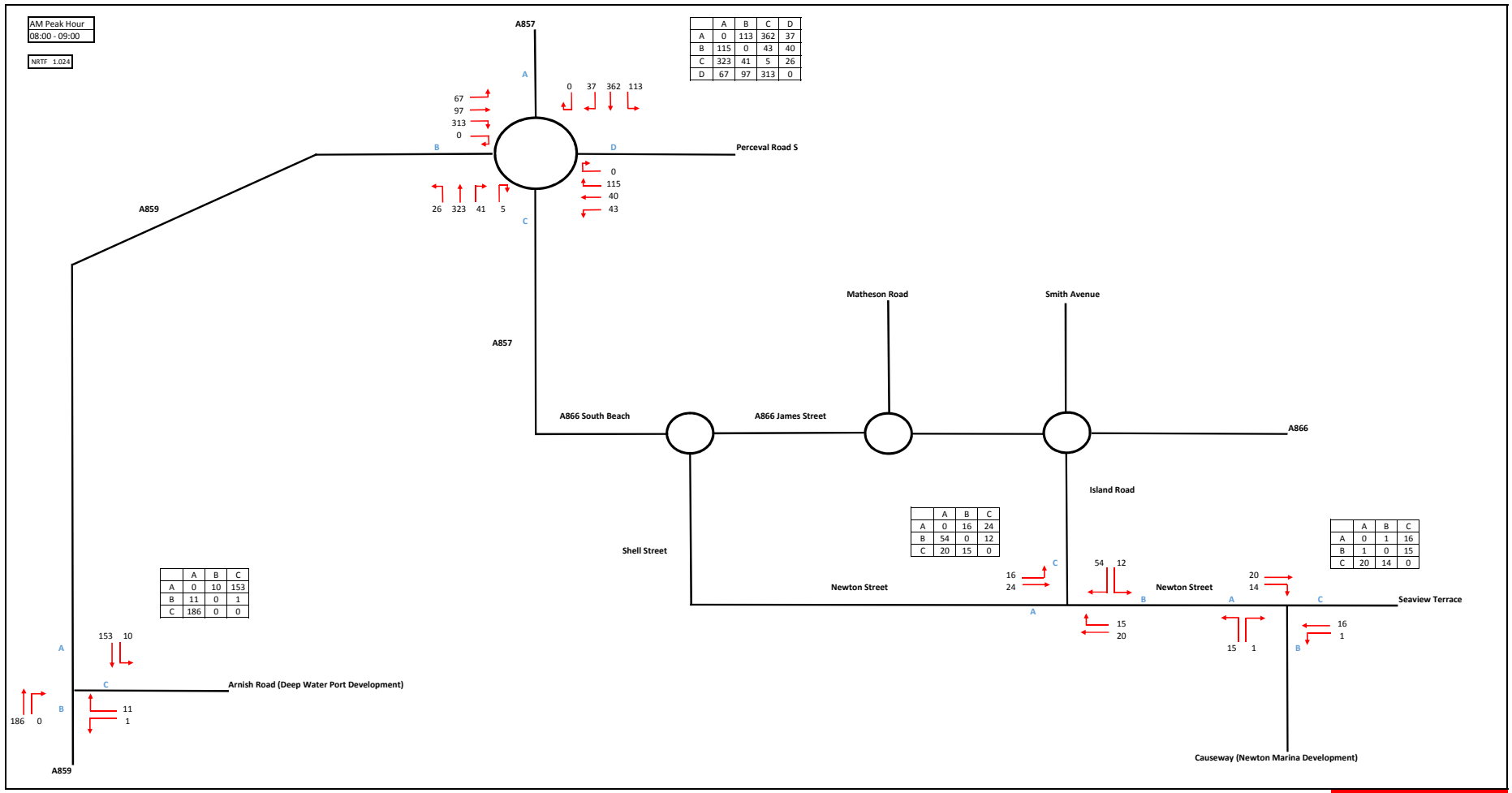


Figure E15

2021 Base AM + Com



	A	B	C	D
A	0	113	362	37
B	115	0	43	40
C	323	41	5	26
D	67	97	313	0

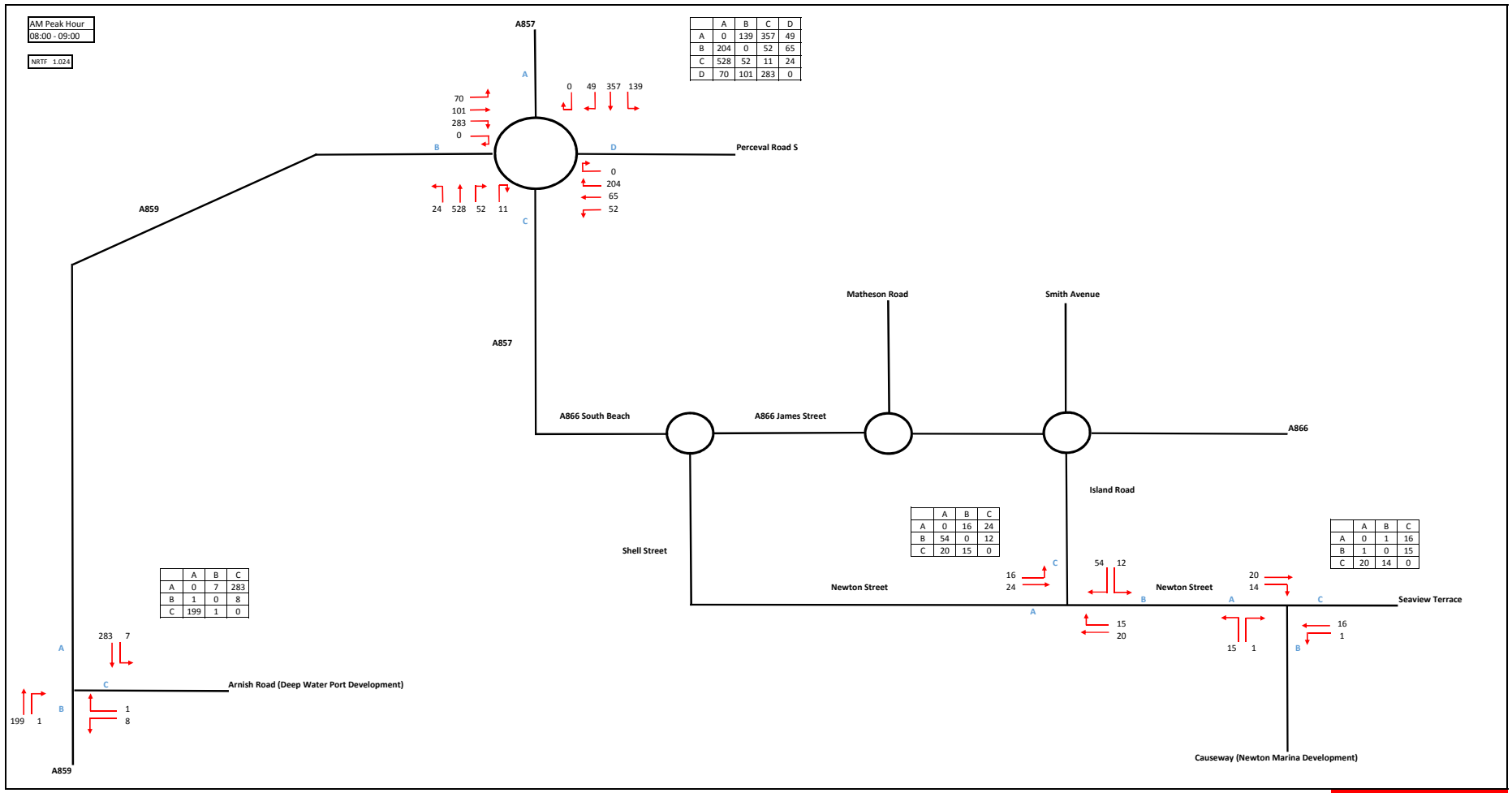
	A	B	C
A	0	10	153
B	11	0	1
C	186	0	0

	A	B	C
A	0	16	24
B	54	0	12
C	20	15	0

	A	B	C
A	0	1	16
B	1	0	15
C	20	14	0

Figure E16

2021 Base Mid + Com



	A	B	C	D
A	0	139	357	49
B	204	0	52	65
C	528	52	11	24
D	70	101	283	0

	A	B	C
A	0	7	283
B	1	0	8
C	199	1	0

	A	B	C
A	0	16	24
B	54	0	12
C	20	15	0

	A	B	C
A	0	1	16
B	1	0	15
C	20	14	0

Figure E17

2021 Base PM + Com

SYSTRA provides advice on transport, to central, regional and local government, agencies, developers, operators and financiers.

A diverse group of results-oriented people, we are part of a strong team of professionals worldwide. Through client business planning, customer research and strategy development we create solutions that work for real people in the real world.

For more information visit www.systra.co.uk

Birmingham – Newhall Street
5th Floor, Lancaster House, Newhall St,
Birmingham, B3 1NQ
T: +44 (0)121 233 7680 F: +44 (0)121 233 7681

Birmingham – Innovation Court
Innovation Court, 121 Edmund Street, Birmingham B3 2HJ
T: +44 (0)121 230 6010

Bristol
10 Victoria Street, Bristol, BS1 6BN
T: +44 (0)117 922 9040

Dublin
2nd Floor, Riverview House, 21-23 City Quay
Dublin 2,Ireland
T: +353 (0) 1 905 3961

Edinburgh – Thistle Street
Prospect House, 5 Thistle Street, Edinburgh EH2 1DF
United Kingdom
T: +44 (0)131 220 6966

Edinburgh – Manor Place
37 Manor Place, Edinburgh, EH3 7EB
Telephone +44 (0)131 225 7900 Fax: +44 (0)131 225 9229

Glasgow – St Vincent St
Seventh Floor, 124 St Vincent Street
Glasgow G2 5HF United Kingdom
T: +44 (0)141 225 4400

Glasgow – West George St
250 West George Street, Glasgow, G2 4QY
T: +44 (0)141 221 4030 F: +44 (0)800 066 4367

Leeds
100 Wellington Street, Leeds, LS1 1BA
T: +44 (0)113 397 9740 F: +44 (0)113 397 9741

Liverpool
Cotton Exchange, Bixteth Street, Liverpool, L3 9LQ
T: +44 (0)151 230 1930

London
3rd Floor, 5 Old Bailey, London EC4M 7BA United Kingdom
T: +44 (0)203 714 4400

Manchester – 16th Floor, City Tower
16th Floor, City Tower, Piccadilly Plaza
Manchester M1 4BT United Kingdom
T: +44 (0)161 831 5600

Newcastle
Floor B, South Corridor, Milburn House, Dean Street, Newcastle,
NE1 1LE
United Kingdom
T: +44 (0)191 260 0135

Perth
13 Rose Terrace, Perth PH1 5HA
T: +44 (0)1738 621 377 F: +44 (0)1738 632 887

Reading
Soane Point, 6-8 Market Place, Reading,
Berkshire, RG1 2EG
T: +44 (0)118 334 5510

Woking
Dukes Court, Duke Street
Woking, Surrey GU21 5BH United Kingdom
T: +44 (0)1483 728051 F: +44 (0)1483 755207

Other locations:

France:
Bordeaux, Lille, Lyon, Marseille, Paris

Northern Europe:
Astana, Copenhagen, Kiev, London, Moscow, Riga, Wroclaw

Southern Europe & Mediterranean: Algiers, Baku, Bucharest,
Madrid, Rabat, Rome, Sofia, Tunis

Middle East:
Cairo, Dubai, Riyadh

Asia Pacific:
Bangkok, Beijing, Brisbane, Delhi, Hanoi, Hong Kong, Manila, Seoul, Shanghai, Singapore, Shenzhen, Taipei

Africa:
Abidjan, Douala, Johannesburg, Kinshasa, Libreville, Nairobi

Latin America:
Lima, Mexico, Rio de Janeiro, Santiago, São Paulo

North America:
Little Falls, Los Angeles, Montreal, New-York, Philadelphia, Washington

SYSTRA